# Abstract 80° Congresso Nazionale della Società Italiana di Cardiologia

## VALVULOPATIE – 1
## Sessione Orale

### A1: WORSENING AORTIC REGURGITATION IS DETRIMENTAL FOR LEFT VENTRICULAR CONTRACTILE FUNCTION IN PATIENTS WITH MODERATE-TO-SEVERE AORTIC VALVE STENOSIS

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**Background.** Several clinical factors contribute to the progression of aortic valve stenosis (AS). Furthermore, despite regular follow-up some patients rapidly develop left ventricular (LV) contractile dysfunction. The causes of this evolution are still unknown, but the combination of AS and aortic regurgitation (AR) is associated with a worse prognosis compared to isolated AS. In this study, we analysed follow-up data of patients with AS in order to identify possible factors predisposing to deterioration of LV myocardial function.
**Methods**. We reviewed data of 58 patients (73±12 years, 23 females), followed at our Heart Valve Clinic for a moderate to severe AS according to current guidelines. The following echocardiographic data were acquired, by echocardiograms performed at baseline and after 32.36±6 month follow-up: aortic mean transvalvular pressure gradient, velocity time integral (VTI) ratio, LV end-diastolic volumes (LVEDV), LV ejection fraction (LVEF), E/e' ratio, tricuspid annular plane systolic excursion (TAPSE) and pulmonary artery systolic pressure (PAPS). AR, tricuspid regurgitation (TR) and mitral regurgitation (MR) were graded according to a four-point scale: 1=trivial, 2=mild, 3=moderate, 4=severe regurgitation.
**Results.** In the entire study population, mean transvalvular aortic pressure gradient increased by 5.9±10.8 mmHg/year (from 33.13±11.40 mmHg at baseline to 49.52±15.08 mmHg at follow-up, p<.001), whereas the VTI ratio decreased by -0.04±0.12/year (from 0.26±0.04 to 0.22±0.05, p=.048). The degree of AR and TR increased over time (p=.031 and p=.026, respectively), while no significant changes were found in MR, PAPS, E/e', LVEDV, TAPSE and LVEF. The variation of LVEF correlated with that of TAPSE (r=0.26, p=.049). Based on the change of LVEF from baseline to follow-up, two different groups could be distinguished: patients with any increase in LVEF (+4.4±5.2%/year, group 1) and patients with any decrease in LVEF (-8.1±12%/year, group 2; p=.006). Both groups showed a similar increase of mean transvalvular pressure gradient (5.6±11.6 mmHg/year in group 1 and 6.3±9.4 mmHg/year in group 2, p=ns) and similar decrease of VTI ratio (-0.04± 0.1/year in group 1 and -0.04±0.11/year in group 2, p=ns). No other data differed between the 2 groups, except AR, which worsened by 0.4±0.8 points/year in group 2, and remained unchanged (-0.1±0.7 points/year) in group 1 (p=.015).
**Conclusions.** In patients with a moderate to severe AS, followed-up according to current guidelines, the trend towards deterioration of LV contractile function over time is associated with any degree of worsening of AR. The impairment of LVEF is paralleled by a decrease of TAPSE, likely related to ventricular interdependence. These findings contribute to explain the increased risk associated with combined aortic valve disease and suggest that a closer follow-up should recommended in these patients.

### A2: PROCALCITONIN, WHITE BLOOD CELL COUNT AND C-REACTIVE PROTEIN AS PREDICTORS OF S. AUREUS INFECTION AND MORTALITY IN INFECTIVE ENDOCARDITIS

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**Background.** Infective endocarditis (IE) is characterized by high rates of in-hospital death, and Staphylococcus aureus infection predicts a worse prognosis. We aimed to assess if admission inflammatory biomarkers (white blood cell - WBC - count, C-reactive protein - CRP, and procalcitonin) are informative on microbiological etiology and short-term outcomes.
**Methods.** Data from 236 patients admitted for IE from January 2013 to June 2018 were retrieved from a multicenter registry.
**Results.** Fifty-two patients (22%) were infected by *S. aureus*. WBC, CRP and procalcitonin had area under the curve (AUC) values for *S. aureus* infection of 0.595, 0.675, and 0.727, respectively. Adding procalcitonin to WBC improved discrimination over WBC alone (p=0.045), and procalcitonin predicted *S. aureus* infection independently from the other inflammatory biomarkers and patient characteristics. Patients with WBC ≥12,800/mm$^3$, CRP ≥130 mg/L, and procalcitonin ≥1.7 ng/mL had an almost 20-fold higher risk of *S. aureus* infection than patients with all biomarkers <cut-offs. AUC values for in-hospital death were 0.702, 0.725 and 0.727 for the WBC, CRP, and procalcitonin, respectively. Among inflammatory biomarkers, WBC and procalcitonin independently predicted in-hospital death. Procalcitonin refined risk stratification when added to WBC, and to the combination of WBC and CRP. Patients with WBC ≥10,535/mm$^3$, CRP ≥85 mg/dL, and procalcitonin ≥0.4 ng/mL had a 27-fold higher risk of in-hospital death than patients with all biomarkers <cut-offs.
**Conclusions.** Among patients with IE, high levels of inflammatory biomarkers on admission, particularly procalcitonin, are associated with a higher likelihood of *S. aureus* infection, and a higher risk of in-hospital mortality.

### A3: CLINICAL, ECHOCARDIOGRAPHIC AND PROGNOSTIC FEATURES OF RIGHT-SIDED INFECTIVE ENDOCARDITIS

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**Background.** The right-sided Infective Endocarditis (right-sided IE) accounts for 5-10% of IE with in -hospital mortality of 7%. Few studies have investigated the prognosis associated to right-sided IE and there are few clinical practice guidelines in comparison with the left-sided IE. Our purpose was to investigate characteristics, microbiology, echocardiographic findings, in-hospital course of patients with right-sided IE and to evaluate if there is a different prognosis in comparison with those who developed left-sided IE.
**Methods.** We retrospectively analysed a population of 455 pts, enrolled between 1992 to 2017, at our dedicated out-patients clinic.
**Results.** 89 pts (20%) had right-IE, were male (64%) and younger than patients with left-IE (56±19 vs 60±15; p:0,064). About the predisposing conditions: 28 pts (31%) had an intracardiac device, 25 pts (28%) had a central venous catheter and 24 pts (27%) were intravenous drug abusers (IVDAs). About the comorbidities, the patients with right-sided IE were HIV+ (6 vs 0,5%; p<0,0001), had severe chronic kidney disease in haemodialytic treatment (19vs6%; p<0,0001) with a Charlson Comorbidity Index higher than the patients with left-IE (3,16±2,16 vs 2,55±2,4; p=0,044). According the echocardiographic features in the right-IE the valve major involved was the tricuspid (62% of cases); the vegetations (92vs83%; p=0,031) were more frequently identified than valvulvar or paravalvular complication, and in the half of cases were adherent to catheter; the vegetations of the patients with right-IE had a dimension >15 mm (36vs15%; p<0.0001), prolapsing the valvular plane (32 vs 22%; p=0,07) and frequently involved different leaflets (12 vs 4%; p=0,007).The embolic events at admission were present in about the 30% of population, especially pulmonary embolization (24%),moreover the arterial emboli in the 12% of left-side IE. There were no differences about the cerebral emboli in the two groups. The cardiac surgery was more frequently in left-

sided IE (37vs8%; p<0,0001). The rate of in-hospital survival (80 of right vs 82%of left; p=ns) and the mortality at 1-year follow-up (41% of the groups; p=ns) were the same in the two groups. About the microorganisms: the Staphylococcus Aureus (31vs12%;p<0,0001) and the Staphylococci Coagulase Negative (31vs19%;p=0,008) were major isolated in patients with right-side EI; instead in the left-IE Streptococchi Viridans (20vs4%; p<0,0001) and Enterococci (14vs7%;p=0,051). Analysing in the two groups the echocardiographic differences of the IE related to Staphylococci microorganisms (Staphylococci Coagulase-Negative and Staphylococcus Aureus): the right-sided EI had more often vegetations of dimension >15mm (33vs9%;p=0,001) and often involving extra-valvular structures(12,9vs2,6%;p=0,017);moreover the left-sided IE related to Staphylococci had more often moderate or severe valvular regurgitation associated to the involved valve (81,8 vs 63,6%;p=0,024). At univariate analysis the right-sided IE due to Staphylococci microorganism was associated with pulmonary embolization (HR: 3,454; p 0,020), instead the localization to the left side was not statistically significant associated to peripheral embolization (cerebral or arterial).
**Conclusion.** The IE associated to right side affected patients younger (IVDA) with pluri-comorbidities than left side, due to Staphylococci and complicated by embolization. The right-EI is not associated to a better outcome than the left-EI in our study population.

### A4: TRICUSPID REGURGITATION IN A NORTHERN ITALIAN COMMUNITY. CLINICAL CONTEXT AND PROGRESSION RATE

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**Introduction.** Tricuspid regurgitation (TR) is often an incidental finding on routine echocardiography. While mild TR is generally regarded as a benign physiological entity, moderate and severe TR are associated with dismal prognosis. However spare data are available on TR clinical setting and progression rate in the community. The aim of this study is to investigate prevalence, describe etiology and population characteristics of patients with TR referred to a tertiary italian center.
**Methods.** The study retrospectively analyzed the echocardiography database of non-selected consecutive patients residents in Verona and referred to University Hospital of the same town, from January 2006 to December 2012. We selected patients with ≥ two transthoracic echocardiography, ≥ 6 months apart, and at least moderate TR. We excluded patients with congenital heart diseases and those with poor echocardiographic images. At our center, qualitative TR assessment was based on multiparametric derived semiquantitative grading (jet area, leaflet anatomy, vena contracta, and hepatic venous flow pattern) according to european guidelines.
**Results.** A total of 118 patients, 48 (41%) men, 74 ± 11 years. Patients were referred for echocardiography with following indications: 15 (13%) for aortic and 19 (16%) for mitral prothesis evaluation, 25 (21%) for aortic or mitral valvulopathy, 31 (26%) for ischemic cardiopathy, 20 (17%) dilated cardiomyopathy, 8 (7%) for primary pulmonary hypertension and none specifically for for TR evaluation. Moderate, moderate-severe and severe TR were detected in 78%, 8% and 14% of patients respectively. Notably 97.5% were functional TR. The more prevalent clinical setting for significant TR were left-sided valve disease and dilated cardiomyopathy.
There was a positive association between the presence of severe TR and impaired left ventricular ejection fraction (LVEF), higher age and female gender. Mean echocardiography follow-up was 2.2 ± 1.6 years. During this time, 13 (16%) moderate TR showed progression to severe TR. Patients who presented TR progression were significantly older (85±6 vs 74±11 years; p< 0.01), with more dilated right ventricle, and all had functional TR.
**Conclusions.** Significant TR is mostly diagnosed in the context of left side heart disease and associated to age, reduced LVEF. Progression is not uncommon and it is related to age and the degree of left side dysfunction.

### A5: ECHOCARDIOGRAPHIC FINDINGS IN PATIENTS WITH BICUSPID AORTIC VALVE WITH AND WITHOUT RAPHE ENROLLED IN REBECCA REGISTRY

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**Background.** Bicuspid aortic valve (BAV) is the most common congenital heart disease, affecting 0.5%–2% of the general population. It is associated with valvular risk (aortic stenosis and/or regurgitation, endocarditis) but also with aortopathy with a wide spectrum of unpredictable clinical presentations, including aneurysmal dilation of the aortic root and/or ascending aorta, isthmic coarctation, aortic dissection, or wall rupture.
**Methods.** The REgistro della Valvola Aortica Bicuspide della Società Italiana di ECocardiografia e CArdiovascular Imaging is a retrospective (from January 1, 2010)/prospective, multicenter, observational registry, with definitive diagnosis of BAV made by transthoracic (TTE) and/or transesophageal echocardiography, computed tomography, cardiovascular magnetic resonance, or at surgery. Anamnestic, demographic, clinical, and instrumental data are collected into dedicated software at first evaluation and during follow-up.
Aortic ectasia is defined for diameters >40 mm for the root, while values >37 mm defined ectasia for ascending aorta.
**Results.** At May 2018, 442 patients with BAV (Male, 70%; M:F ratio 2.3; Mean Age at diagnosis 48 +/-20 years) have been included in the registry. Prevalence of hypertension was 27%, diabetes mellitus 3%, smoking-habit 13%. We reported a majority (43%, 193) of patients of type 1, followed by type 2 (8%, 35) and type 3 (3%, 11). We did not report type 3 without raphe subjects. In 3% (15) of cases, valve phenotype was not assessable at TTE. No gender differences were observed according to BAV phenotypes or calcifications, while male gender was associated to an higher prevalence of aortic valve regurgitation (p=0.0002). There is an higher prevalence of aortopathy in patients with raphe compared with those without raphe (63.7% vs 36.3%; p= 0.012).
**Conclusion.** Preliminary data from Italian Multicenter REBECCA registry underline the high risk of aortopathy in BAV patients with raphe.

### A6: PATTERNS OF HEMODYNAMIC PROGRESSION AND OUTCOME IN AORTIC STENOSIS

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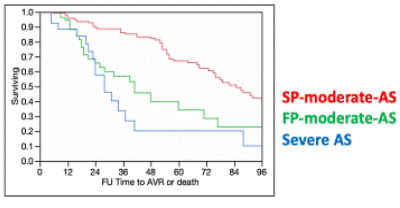
**Background.** Aortic valve stenosis (AS) is a progressive disease characterized by gradual calcification and thickening of leaflets. The echocardiographic progression of the disease has been preliminarily studied in patients already diagnosed severe AS, but little is known in the setting of asymptomatic moderate AS.
**Objectives.** The aim of the present study is to describe AS progression and its prognostic relevance, focusing particularly on moderate AS.
**Methods.** A cohort of 229 patients (77 ± 9 years; 55% male) consecutive patients with AS, normal ejection fraction (EF) and asymptomatic at baseline, who had performed at least 2 echocardiograms have been retrospectively enrolled from 2004-2014. Progression rate was assessed by difference between peak aortic jet velocity (Vmax) and divided by the time between the two echo. Fast progressor (FP) were defined when progression rate was ≥ 0,3 m/s/year. Others were labeled as slow progressor (SP). Primary endpoint was mortality under medical management. Secondary end point was overall mortality.
**Results.** The mean time between the two echocardiograms was 32±23 months. SP were 160 (69,8%); FP were 69 (30,2%). Among baseline characteristics, there weren't significant predictors of fast progression, in particular baseline Vmax was comparable between the two groups (3,2±0,6 vs 3,4±0,5). Mean follow-up duration was 6,2±3,2 years and 127 (55,4%) subjects died. Among patients with moderate AS (203 of 229; 88,6%) FP were 58 (28,6%). FP-moderate-AS patients had higher 5-year mortality rate vs. SP-moderate-AS (39,6% vs 24,8%, p=0.0017 for mortality under medical management and 36,2% vs 16,6%, p=0.0004 for overall mortality). Interestingly the outcome of FP-moderate-AS patients resulted to be similar to patients with severe AS at baseline (Figure 1). FP rate predicted excess-mortality under medical management univariately (HR 2.15 (1.43-3.14), p=0.0004), after adjustment for age, sex, symptoms, baseline EF and baseline AVA (HR 1.86 (1.18-2.86), p=0.008) or after adjusting for Vmax and EF at the last echo (HR 1.21 (1.12-1.31), p<0.0001), being always incremental to the models (p<0.001 for all).



**Conclusion.** Progression rate as defined by Doppler echocardiography is an incremental marker of excess mortality in patients with AS independently of associated clinical characteristics and hemodynamic severity of the stenosis. Progression rate may be particularly important to identify patients with moderate AS at higher risk of events during the current guideline-based medical management.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 1
## Sessione Orale

### A7: THE VALUE OF BIVENTRICULAR UPTAKE OF BONE TRACER IN CARDIAC AMYLOIDOSIS

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**Background.** Early diagnosis and characterization of cardiac amyloidosis (CA) is crucial to improve patients' outcomes, especially considering the recent advances in disease-modifying drugs for transthyretin (TTR)-CA. Cardiac scintigraphy with bone tracers has proven high accuracy for the non-invasive diagnosis of TTR-CA in the adequate clinical context. However, the presence of biventricular uptake (BiV) has never been characterized so far.

**Aims.** We aimed to assess the potential value of biventricular uptake in patients with CA undergoing cardiac scintigraphy.

**Methods.** Cardiac scintigraphy scans of 34 patients diagnosed with CA (13 light chain type and 21 TTR, respectively) according to current recommendations were retrospectively revised. Cardiac uptake was assessed by Perugini Grade in the left ventricle (LV) and by visual analysis in the right ventricle.

**Results.** Nineteen patients (56%) showed BiV. They were significantly older (82 vs 74 years; p=0.046) and with lower estimated glomerular filtration rate (50 vs 68 ml/min/m2; p=0.001) compared to non-BiV group. In addition, BiV was significantly associated with TTR-CA subtype (84 vs 16%; p=0.002), Perugini Grade 3 LV uptake (53% Grade 3 vs 47% Grade 1 or 2; p<0.001), higher values of maximum LV thickness (mean values 20 vs 15 mm; p=0.007) and the presence of atrial fibrillation (84 vs 16%; p< 0.001). No differences in serum biomarkers (BNP, serum troponin and free light chains) were found between BiV- and non-BiV groups.

**Conclusion.** Patients with CA and BiV at scintigraphy suffer more frequently from TTR subtype and represent a subgroup with more advanced stage of disease. Further investigations on larger populations are required in this field to investigate the prognostic role of BiV in CA.

### A8: MYOCARDITIS, MESALAZINE AND SPECKLE TRACKING: THE BEGINNING OF A GOOD FRIENDSHIP

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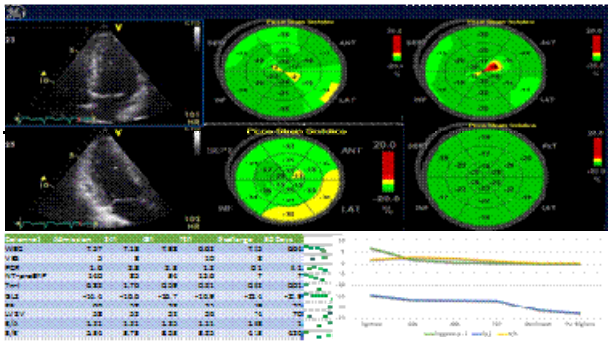
**Introduction.** Ulcerative colitis is an inflammatory bowel disease(IBD), rarely associated with myocarditis. Although mesalazine is the drug of choice, recent studies have shown its possible cardiotoxicity. Therefore, it could be difficult to recognize the myocarditis real pathogenetic noxa in these patients. The use of advanced methods for the cardiac performance evaluation, integrated with clinical and laboratoristic findings, could help in evaluating the therapeutic efficacy. We 're introducing a clinical case about a man affected by mesalazine induced myocarditis, in which the global longitudinal strain(GLS) evaluation helped in the follow up and in the therapeutic choice.

**Case Report.** A 22 years old man affected by ulcerative colitis, in therapy for ten days with mesalazine, referred precordial stabbing pain, intensified by deep inspirations. In blood tests, PCR, troponine and BNP values were increased. ECG and basal echocardiogram were normal. A Cardiac magnetic resonance(CMR) was performed, which showed an acute myocarditis. Taking into consideration his pathological and pharmacological anamnesis, we suspected a cardiac involvement induced by ulcerative colitis or iatrogenic cardiotoxicity. Consequently, we decided to suspend mesalazine for a more conservative approach. The patient underwent blood tests and echocardiographic exams with evaluation of ventricular function using global longitudinal strain (GLS). In the following days, we noticed a rapid improvement of his clinical conditions, supported by troponin and BNP decline, as well as by the increasing GLS, although the inflammation indexes (PCR) values had a fluctuating trend. After 5 days, the patient was discharged. During the clinical follow up, the myocarditis regression was confirmed.

**Discussion.** The RCU is rarely associated with cardiac involvement, which usually occurs many years after the first diagnosis. In this patient, the myocarditis onset after 15 days of mesalazine treatment and the rapid improvement after its suspension supported the pharmacological cardiotoxicity hypothesis. Considering the aetiologic question, the conservative therapy had to be supported by clear clinical, instrumental and laboratoristic evidences. The myocarditis phlogosis reduction was demonstrated by troponin and BNP decline and GLS improvement. The systemic phlogosis indexes showed a non-linear trend, probably caused by the IBD as a confounding factor.



**Conclusions.** This is a rare clinical case of mesalazine induced myocarditis. This is the first time GLS is related to clinical evaluation, influencing therapeutic strategy. The more reliable parameters in this patient's diagnostic and therapeutic iter were troponin, BNP and GLS; the latter has demonstrated to be a valid echocardiographic parameter for the myocarditis phlogosis confirmation.

### A9: CLINICAL AND DIAGNOSTIC CORRELATES OF LATE GADOLINIUM ENHANCEMENT IN BIOPSY-PROVEN MYOCARDITIS

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**Background.** Cardiovascular magnetic resonance (CMR) provides detailed myocardial tissue characterisation. Clinical and diagnostic correlates of late gadolinium enhancement (LGE) in endomyocardial biopsy (EMB)-proven myocarditis are poorly defined.

**Purpose.** We sought to identify clinical, laboratory and imaging correlates of LGE in patients with EMB-proven myocarditis.

**Methods.** Our cohort of patients with EMB-proven myocarditis (n=366) was prospectively analysed to identify patients who underwent CMR (n=154, aged 39±13, 70% males). CMR and EMB were performed in all cases at the time of hospitalisation. Clinical, laboratory, and imaging features at diagnosis were analysed to identify correlates of LGE presence.

**Results.** Demographic characteristics, cardiovascular risk factors and cardiovascular therapy did not differ between patients with and without LGE. There was a trend towards a higher prevalence of LGE in patients presenting with heart failure or acute coronary syndrome (p=0.07) as opposed to those presenting with arrhythmias. Patients with history of myocarditis tended to have a higher prevalence of LGE (25 vs 4 patients, p=0.07). Patients with LGE were more symptomatic in the 6 months preceding diagnosis (palpitations, p=0.03, chest pain p=0.02). Clinical left and right ventricular systolic dysfunction at presentation were more common in patients with LGE (p=0.02, p=0.02 respectively). LGE presence failed to distinguish patients according to EMB findings (active vs. borderline myocarditis) (p=0.66) or according to the histological type of myocarditis. Troponin I levels were higher in patients with LGE (p=0.03). There was no difference in biventricular volumes and function, both on echocardiography and heart catheterization. There was no correlation between anti-heart antibodies and LGE presence, nor were patients with LGE more likely to receive immunosuppressive therapy; however, response to immunosuppression tended to be more common in patients without LGE (13/13 vs 29/38 patients, p=0.09). The rate of heart transplant, death and myocarditis relapse did not differ between patients with and without LGE.

**Conclusions.** Presence of LGE on CMR was associated with longer

symptoms' duration before diagnosis, presentation with heart failure and higher troponin release, but failed to correlate with specific EMB features or myocarditis etiopathogenetic markers.

### A10: SAFETY AND TOLERABILITY OF THERAPIES FOR NEUROHORMONAL ANTAGONISM IN CARDIAC AMYLOIDOSIS

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**Background.** Cardiac amyloidosis (CA) frequently manifests as heart failure (HF). Despite being the mainstay of treatment of systolic HF, therapies for neurohormonal antagonism (especially beta-blockers) are often denied to patients with CA because of concerns about their safety and tolerability.
**Methods.** Data from consecutive patients diagnosed with CA at the Fondazione Toscana Gabriele Monasterio (FTGM) of Pisa from 2009 to 2019 were retrieved from electronic health records. All decisions regarding diuretics and angiotensin converting enzyme inhibitors or angiotensin receptor blockers (ACEi/ARBs), beta-blockers, mineralocorticoid receptor antagonists (MRAs) were left to a group of physicians with specific interest in CA. During ambulatory visits, specific attention was paid to possible adverse effects.
**Results.** Ninety-nine patients were evaluated (72% men, median age 80 years [72-83], 33% amyloid light-chain and 67% transthyretin amyloidosis). Median left ventricular ejection fraction was 50%. Sixteen patients (16%) had a pacemaker, and 14 of them had a paced rhythm; among non-paced patients, 22 had a first-degree atrioventricular block, and 10 a left bundle branch block. The majority of patients (64%) were on ACEi/ARBs, 60% on beta-blockers, and 37% on MRAs. After the diagnostic workup for CA, diuretics were started in 12% of patients, ACEi/ARB in 11%, beta-blockers in 27%, and MRA in 25%. Over a 16-month follow-up (7-29), 8% of patients experienced hypotension, and 6% had a syncope; 30% complained of asthenia, and 6% of bradycardia. Pacemaker implantation was needed in 9%: among these cases, 33% were due to the need for atrioventricular node ablation, 56% to severe bradycardia, and the remaining 22% to conduction disturbances or significant pauses. Furthermore, 53% of patients underwent at least one HF hospitalization, the beta-blocker dose was reduced in 14% of patients, and the drug was discontinued in 15%. The start or up-titration of beta-blocking therapy (57% of patients) was not associated with hypotension (p=0.151), asthenia (p=0.999), syncope (p=0.560), bradycardia (p=0.560), need for pacemaker implantation (p=0.500), HF hospitalization (p=0.135), need for beta-blocker dose reduction (p=0.108), or discontinuation (p=0.999). Similarly, start or up-titration of ACEi/ARB or MRA displayed no significant interaction with these adverse effects.
**Conclusions.** In patients with CA, drugs for neurohormonal antagonism have an acceptable safety and tolerability profile. They might be considered in the absence of clear contraindications, starting from low doses, with slow up-titration and close monitoring.

### A11: MULTIMODAL IMAGING IN THE DIAGNOSTIC AND PROGNOSTIC ASSESSMENT OF PATIENTS WITH ACUTE MYOCARDITIS

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(a) POLICLINICO TOR VERGATA

**Background.** Acute myocarditis is a relatively common disease, characterized by a wide spectrum of aspecific clinical manifestations and potentially followed by unpredictable complications, such as dilated cardiomyopathy or recurrent arrhythmias. Clinical diagnosis is often challenging, therefore multimodal imaging has been gaining lately a progressively major role in the diagnostic process and in the prognostic assessment. More specifically, Cardiac Magnetic Resonance (CMR) has proved to be a valuable tool for detecting inflammation within the myocardium, as recently described in the revised Lake Louise Criteria (LLC).
**Aims.** To evaluate myocardial damage in patients with acute myocarditis, using multimodal imaging (CMR). The aim of our study was to compare the sensitivity of CMR images with the clinical, laboratory and echocardiographic findings in patients diagnosed with acute myocarditis. Moreover, our goal was also to use CMR to investigate the prognostic value of High Sensitivity Troponin I (TnI-hs) levels, to confirm the hypothesis that higher TnI levels relate with larger myocardial damage.
**Methods.** We evaluated 20 consecutive patients with clinical suspicion of acute myocarditis, using echocardiographic examination, laboratory testing (CK-MB; Myoglobin; TnI, PCR) and CMR imaging, obtained in the first 30 days from the acute onset of symptoms.
**Results.** The mean age of our study population was 33± 14 y.o.; 80% were males. At moment of hospital admission, a mean CK-MB values of 367 ± 108 IU/L, myoglobin of 113 ± 89 ng/ml, TnI-hs 10225 ± 9986 ng/L were detected. The left ventricular ejection fraction (LVEF%) was conserved in all patients (52.8 ± 12.5%) as well as the segmental kinesis, except in 4 cases: 3 patients had a LVEF ≤ 30%, while one other case showed akinesia of the apical segments. The global LVEF values found on the CMR were comparable to those of the echocardiogram (54.2 ± 14.6% CMR vs. 52.8 ± 12.8% echo, p = 0.64). The CMR has shown a higher sensitivity in detecting alterations of the segmental kinesis, in fact in 4 patients (20%), it allowed to identify areas of hypokinesia not visible at the echocardiographic evaluation. Unlike the echocardiographic study, the CMR provided a better measurement of myocardial damage, investigating edema and fibrosis respectively using STIR and LGE sequences: patients with ≥3 segments positive at STIR had significantly higher levels of TnI-hs (12484,3±11167 vs 4202,9±3248,6 ng/L, p=0,04) and CK-MB (551,7±194,8 vs 38±31,9 IU/L, p<0,001), as well as patients with ≥3 segments positive at LGE had significantly higher levels of TnI-hs (13687,6±12617,2 vs 4167,4 ± 2653,4 ng/L, p=0,03), CK-MB (513,6±206,6 vs 10,8± 8,2 IU/L, p<0,001), Mioglobina (157,9±106,5 vs 68,4 ± 32,1 ng/ml, p<0,001
**Conclusion.** We stressed the importance of multimodal imaging in the correct diagnostic and prognostic assessment of patients with acute myocarditis. Our results indicate that higher levels of myocardial necrosis markers positively correlate with larger myocardial damage, which is better investigated with CMR rather than with echocardiographic evaluation.

### A12: PARADOXICAL PROLONGATION OF QT INTERVAL DURING EXERCISE IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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**Background.** In LQT1 patients, prolongation of action potential duration (APD) due to reduced $I_{ks}$ is associated with QTc prolongation in response to both epinephrine and exercise. We recently showed that ventricular myocytes from patients with Hypertrophic Cardiomyopathy (HCM) have markedly prolonged APD, associated with down regulation of $K^+$ currents, as well as delayed relaxation due to alterations of intracellular $Ca^{2+}$ handling (Coppini et al., Circulation 2013). Thus, we determined the effects of isoproterenol (ISO) on APD and $Ca^{2+}$ transients in ventricular myocytes of patients with HCM and the changes of QTc interval and diastolic function during exercise.
**Methods.** Ventricular myocytes were isolated from myocardial samples of 11 HCM patients who underwent septal myectomy and 4 non-hypertrophic surgical patients (Controls). A total of 150 HCM patients and 62 control subjects underwent standard exercise ECG test (Bruce treadmill protocol). Eighty-five HCM patients and 40 control subjects underwent exercise echocardiography. All clinical procedures were performed at the Referral Center for Cardiomyopathies of Careggi University Hospital in Florence, Italy.
**Results.** In myocytes (paced at 0.2 Hz) from HCM patients, ISO ($10^{-7}$ mol/L) prolonged APD at 90% repolarization ($APD_{90}$) by +26±8%, whereas ISO shortened $APD_{90}$ in control myocytes (-20±4%, P<0.01, Fig.1). Moreover, intracellular $Ca^{2+}$ transients were also prolonged during exposure to ISO. In patients with HCM (117 of 150), QTc prolonged by an average of 41±24 ms from a baseline value of 439±36 ms. This paradoxical prolongation of QTc during exercise results in shortening of the TQ interval (Fig. 2). In agreement with the reduced diastolic period, E/A ratio was significantly reduced in HCM patients at peak exercise (Fig.3), while it was unaffected in controls.
**Conclusions.** Abnormal balance of inward and outward ion currents in HCM ventricular cardiomyocytes may determine a reduced lusitropic response to beta-adrenergic stimulation, due to insufficient APD shortening. In HCM patients, exercise led to a QTc prolongation, accompanied by shortening in TQ interval, which in turn reduced the diastolic filling time. This may contribute to impair ventricular relaxation and reduce myocardial perfusion during stress or exercise. This abnormal response is likely to underlie the reduced exercise tolerance and stress-induced angina in patients with HCM.

## ARITMIE – 1
## Sessione Orale

### A13: CT-SCAN APPROACH IMPROVING COMPLETE REMOVING OF INFECTED EPICARDIAL IMPLANT IN CONGENITAL HEART DISEASE PATIENTS

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(a) OSPEDALE PEDIATRICO BAMBINO GESU

Infections in cardiac implants are serious complications, with an

associated in-hospital mortality of 5-15%. The aim of this abstract is to describe the algorithm of treatment of pediatric patients with infected epicardial implants.
**Material and method.** We treated consecutively from January 2017 to September 2018 three patients with an average age of 15 years and an average weight of 33 kg.
One patient had a congenital av block and pectus excavatum and the other two patients respectively had complex cardiac anomalies (left isomerism with azygos continuation, persistent superior vena cava and pulmonary stenosis with congenital AV block in one and congenitally corrected transposoition of the great arteries with double inlet left ventricle, pulmonary stenosis and destrocardia in the other one). All patients were treated with multiple sternal approach and have had previous infections of the epicardial implant. Two patients developed lead infection following previous partial lead transection.
**Results.** We used a diagnostic approach with CT scan in all three patients. We treated patients with targeted antibiotic therapy for two weeks before total lead and generator explant and for three weeks after the explant. Within three weeks of an explant, a temporary endocavitary lead was placed in all three patients. There were no recurrences of infection and no major complications occurred.
**Conclusions.**The CT scan made it possible to have a 3-D map of the heart surface that made it easy to localize the leads placed in place during subsequent implants repeated over the years. The combined management protocol of these patients has made it possible to avoid complications and infectious recurrences. Moreover, despite the past approach in that partially retaining a lead might be indicated in cases of device infection in patients with complex congenital heart disease, the experience of propagation of infection with biofilm system,it made us change our mind about the approach, revealing the need to completely remove infected devices and to maintain a treatment window, with a temporary implantation and targeted antibiotic therapy, before re-proposing an endocavitary implant.CT scan is a straightforward method to follow the site to be extracted without the aid of fluoroscopy.

## A14: LONG-TERM SURVIVAL AFTER AN OUT-OF-HOSPITAL CARDIAC ARREST. AN UTSTEIN BASED ANALYSIS

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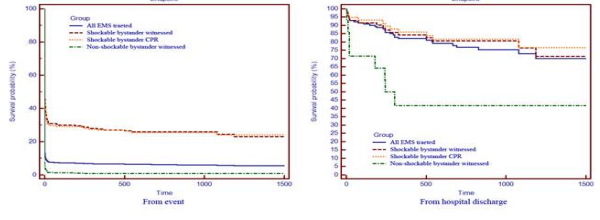
**Purpose.** The majority of out-of-hospital cardiac arrest (OHCA) registries provide a follow-up limited at 1 month, so the subsequent survival remains an unexplored challenge. We sought to evaluate the long-term outcome after OHCA via an Utstein-based cardiac arrest registry.
**Methods.** We enrolled in the Cardiac Arrest Registry of the Province of Pavia (about 550000 inhabitants in northern Italy) all the patients who suffered an OHCA from any aetiology in whom CPR was attempted. The primary endpoint was the survival at 1 month, and the secondary endpoints were the survival at 6 months and then every year until 5 years after OHCA.
**Results.** 1774 resuscitation attempts for confirmed OHCAs were collected in the first 45 months (October 2014-June 2018). 59.7% of the patients were males with a mean age of 73.4 ± 16 years. The mean EMS response time was 11:31 ± 5:09 mins. The vast majority of OHCA occurs at home (78.8%) with a medical etiology (93%). A bystander witnessed the event in 56.1% and the EMS in 15.6%. Bystander CPR rate was 39.5%, whilst an AED was used before EMS in 2.5%. The first rhythm was shockable in 18.2% (90.7% VF, 2.5% VT without pulse, 6.8% AED shockable). Survival was significantly higher for shockable Utstein categories ($p<0.01$) both when considering survival from the event (left panel) and from hospital discharge (right panel). Interestingly, survival continued to decrease also in shockable rhythm categories over time, from 90% in the first year to about 80% at four years.




**Conclusions.** OHCA with shockable rhythm showed a better survival both from the event and from hospital discharge. However, our results demonstrated that survival after OHCA can change over the time in all the Utstein categories, so we believe that a longer follow-up should be encouraged by next Utstein style revision.

## A15: VENTRICULAR ARRHYTHMIAS: AN ENEMY FOR PATIENT WITH INFLAMMATORY CARDIOMYOPATHY

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**Background.** Myocarditis is defined as an inflammatory disease of the myocardium diagnosed by established histological, immunological and immunohistochemical criteria. Endomyocardial biopsy (EMB) is gold standard for diagnosis and its use is limited to specific cases. Myocarditis and inflammatory cardiomyopathy are associated with impaired ventricular function at presentation or during follow up, with ventricular arrhythmias and sudden cardiac deaths (SCD). We present three clinical cases of suspected myocarditis that was correctly diagnosed with EMB guided by electroanatomical mapping (EAM) with CARTO system.
**Case 1.** A 16 years old female with recent history of abdominal pain with nausea and vomiting. She admitted of emergency department for fatigue and palpitations. The exams showed a narrow QRS complex tachycardia with RBBB and left anterior fascicular block morfology and a severe biventricular systolic disfunction, so she underwent electrical cardioversion with restoration of sinus rhytm. The cardiac magnetic resonsance (CMR) demostrated a mid-layer LGE-area in corrispondence of the infero-lateral wall of left ventricle. In suspiction of myocarditis was performed a EMB guided by EAM. During mapping was induced a fascicular VT which was ablated with radiofrequency in corrispondence of posterior fascicle. Moreover bipolar mapping showed low potentials at the level of the inferior-lateral wall while the unipolar mapping showed substantially conserved voltages. The analysis of biopsy documented a inflammatory cardiomyopathy.
**Case 2.** A 47 years old female with systemic sclerosis and a recent viral gastroenteritis. She was referred to our center for palpitations. At the ECG-monitoring was found an high arrhytmic burden with several non sustained VT and echocardiographic examination showed a discinetic right ventricle with a dilated RVOT and a normal left ventricle ejecton fraction. CMR documented a LGE-area in corrispondence of antero-lateral wall of right ventricle and postero-lateral wall of left ventricle. The patient underwent to EMB guided by EAM and the analysis of right ventricle's biopsy documented a chronic active myocarditis. Then we decided to implant a primary prevention subcutaneous ICD.
**Case 3.** A 22 years old male elite athlete. He was referred to our centre due to the finding of frequent supraventricular extrasystoles at rest and during exercise test and for evidence, on CMR, of a subepicardial area of LGE at the level of the postero-lateral wall of the left ventricle. The patient underwent EMB, which documented a chronic myocarditis, and the EAM excluded pathological electroanatomical substrate and non-inducibility of sustained ventricular arrhythmias. In the same procedure was performed also supraventricular extrasystole's ablation at level of upper right pulmonary vein.
**Conclusion.** Our case report series showed that a multiparametric work up including invasive EP study and EAM biopsy guided could be useful to reach a definitive diagnosis in patients with myocarditis and ventricular arrhythmias.

## A16: UNCOMMON EXTRACTION OF SUBCUTANEOUS CARDIOVERTER DEFIBRILLATOR LEAD IN SPORTSMAN PATIENTS

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(a) CITTÀ DELLA SALUTE E DELLA SCIENZA - PRESIDIO MOLINETTE

**Case report.** A 23-year-old, sportsman patient with Brugada ECG pattern and inducible syncopal polymorphic TV at electrophysiological test, was implanted, according the intermuscolar two-incision technique, with a subcutaneous cardioverter defibrillator (Emblem S-ICD, Boston Scientific) in May 2015 for primary prevention. Alternative sensing vector was automatically selected by the device. In May 2018 a short episode of noise on the alternative vector was registered without any shock delivered and optimization was performed by automatically changing from alternative to primary vector, achieving correct recognition of the reproducible noise during abdominal isometric contraction.
In June 2018 during gym isometric exercise the patient received a single inappropriate shock due to myopotential noise related to muscular activity. A CXR scan showed lateral dislocation of the catheter at ring level. Due to low amplitude signal caused by the catheter displacement, SMART Pass algorithm automatically switch off, leading to wave-T oversensing and

inappropriate ventricular fibrillation recognition. Considering the presence of noise on each vector and the patient's wish of continuing gym practice, we decide for implantation revision. A first incision in local anesthesia was made in the mid-axillary line at level of pocket device and the lead was disconnected. We still made a horizontal incision at the xiphoid process level where lead has been fixed with conventional suture. Here we found sleeve's fracture determining a lead dislocation and sleeve rubbing with ring sensing electrode. We hypothesized rubbing of the sensing electrode in this area could be responsible of the noise, then we decided to remove and replace the subcutaneous lead. Anyway, repeated attempts of manual pulling the lead away were unsuccessful. Finally, to remove such strong resistances, we decided to use dilation with progressive dilatators, conventionally used for transvenous lead extraction. Deep sedation was necessary for control of pain, due to ineffectiveness of local anesthesia. When the lead was extracted, fibrosis was discovered around and inside the defibrillation coil. A third 2 cm vertical incision was performed at level of fluoroscopically marked distal tip position at sternal-manubrium junction. Then the implantation was performed according the three-incision method. We strongly sutured the electrode at the distal tip to the underlying fascia and fixed the xiphoid incision with an anchoring sleeve. Arrhythmia induction test was successful, alternative sensing vector was automatically selected, post-implant X-ray was normal and no noise was detected on discharge and after 11 months.

**Conclusion.** The S-ICD was developed as a safe and effective alternative therapy to transvenous system, but uncommon complications could occur. Strong gym isometric exercise could be the cause of sleeve's fracture and lead displacement, with consequent low amplitude signal, oversensing and inappropriate shock. Reprogramming the device didn't resolve the problem and surgical revision was necessary. Remarkable, not expected adherences were found during lead extraction, needing transvenous dilatator tools. A three-incision technique was performed to guarantee gym exercises. Our case highlights the uncommon effort removing subcutaneous defibrillator lead and the usefulness of a three-incision technique in sportsman patient.

### A17: ENDO-EPICARDIAL SUBSTRATE MAPPING AND ABLATION IN PATIENTS WITH BRUGADA SYNDROME: A SINGLE CENTRE EXPERIENCE

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**Introduction.** Brugada syndrome (BrS) is a genetic arrhythmic disease associated with an increased risk of sudden cardiac death. The primary BrS electrophysiological substrate is delayed depolarization over the anterior aspect of the RVOT epicardium and catheter ablation of this abnormal area is able to prevent VT/VF and normalize the ECG pattern. Study aim is to evaluate the results of RVOT endo-/epicardial mapping and ablation in consecutive BrS patients with various clinical presentation.

**Methods.** A total of 37 BrS patients were enrolled, of whom 28 male, with a mean age of 50±9 years. Type I ECG pattern was documented spontaneously in 28 patients and only after ajmaline challenge in the remaining 9. Eighteen patients experienced symptoms: 1 out-of-hospital cardiac arrest, 5 VT/VF storm, 15 had syncope, 15 palpitations. ICDs were implanted in 5 while 6 patients had a loop-recorder. A baseline EP study was performed in all patients before the procedure and sustained VT/VF was inducible in 35 (95%) patients. After RV endocardial mapping and double epicardial access, a substrate electroanatomic RVOT epicardial map was obtained, before and after ajmaline, in order to identify areas of low voltage and tagging all the abnormal ventricular electrograms (AVE) inside. RF ablation was performed aiming to complete elimination of AVEs.

**Results.** Areas with AVEs were present in all patients (9.2±5.2 $cm^2$ at baseline vs. 16.2±7.7 cm2 after ajmaline infusion, p<0.001). Ablation completely eliminated AVEs in all patients, with a mean ablation area of 21.5±10.6 cm2. At the end of procedure, leading to ECG normalization in all patients but VT/VF still inducible in 4 (11%). No acute complications occurred, mild pericarditis was experienced by 15 (41%) patients, rapidly solved with NSAIDs and short-term colchicine. At a median follow-of 10 months, the ECG remained normal, even after ajmaline, in all but 4 patients (11%), while a repeated EPS was routinely performed and VT/VF noninducibility was maintained in all patients. No repeated procedures were performed in the study population.

**Conclusions.** Epicardial substrate elimination by RF ablation is associated with VT/VF noninducibility in all the patients and ECG normalization in the large majority of them. RF ablation set-up must be standardized in order to achieve durable and comparable results. Further studies are needed to understand the impact of this strategy in reducing the risk of SCD.

### A18: NON-INVASIVE MONITORING OF CEREBRAL HEMODYNAMICS DURING ATRIAL FIBRILLATION

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**Background.** Atrial fibrillation (AF) is the most common cardiac arrhythmia and currently affects up to 1-2% of the general population. It has been recently observed that AF is associated with dementia and cognitive decline, independently of stroke. Several mechanisms have been proposed to explain this association: systemic inflammation, cerebral atrophy, small vessel disease, cerebral hypoperfusion and hemodynamic effects. Due to the evident limitations of cerebral invasive monitoring, there is a lack of scientific data regarding cerebral hemodynamics during atrial fibrillation. For this reason, we tested a non-invasive method, the near infrared spectroscopy (NIRS), to study cerebral perfusion.

**Aims.** The aim of this work is to demonstrate whether NIRS can be used to extract beat-to-beat information of cerebral hemodynamics during AF.

**Methods.** From January 2019 to May 2019, we enrolled 29 consecutive AF patients, who underwent an hemodynamic and cerebral monitoring before and after an electrical cardioversion (ECV). Overall, NIRS yielded four output signals: two based on the Beer-Lambert law (O2Hb, HHb) and two estimated through the spatially resolved spectroscopy (SRS) algorithm (tissue oxygenation index (TOI, %) and tissue hemoglobin index (nTHI). In collaboration with the Politecnico of Turin, the first elaboration step of these signals has been run on 6 AF patients. Since the Beer-Lambert signals are more affected by the extracranial circulation, only the SRS signals were used. Due to the presence of noise, a filtering system has been necessary to extract the heart-beat interval (HBI) from these signals. The HBI values extracted from NIRS signals were compared with those extracted from their ECG.

**Results.** The mean (μ) and the standard deviation (σ) of the HBIs extracted from NIRS and ECG signals resulted in good agreement (pre-ECV μ HBI-NIRS 0.72, σ HBI-NIRS 0.12, μ HBI-ECG 0.73, σ HBI-ECG 0.12; post-ECV μ HBI-NIRS 0.92, σ HBI-NIRS 0.14, μ HBI-ECG 0.97, σ HBI-ECG 0.07).

**Conclusions.** Based on this preliminary analysis, it seems possible with NIRS to obtain information on cerebral hemodynamics, extracting information related to the variation of even a single heartbeat. Further analyses will focus on quantifying the variation of cerebral perfusion during arrhythmia compared to sinus rhythm (restored after electrical cardioversion), thus shedding light to hemodynamic mechanisms leading to cognitive decline in AF patients.

[This study was performed thanks to the support of the "Compagnia di San Paolo" within the project "Progetti di Ricerca di Ateneo – 2016: Cerebral hemodynamics during atrial fibrillation (CSTO 160444)" of the University of Turin, Italy.]

## ARITMIE – 1
## Sessione Poster

### A19: HOW TO SAFELY MANAGE DELIVERY OF A PREGNANT WOMAN WITH CONGENITAL AV BLOCK?

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**Introduction.** The incidence of congenital atrioventricular block (CAVB) is between 1 in 15,000 and 1 in 20,000 births. Whenever encountered in a pregnant women, CAVB presents a challenge for gynecologists and calls for a multidisciplinary approach involving cardiologists and anesthesiologists.

**Case report.** A 40-year-old pregnant female underwent routinary cardiologic clinical assessment. 8 years ago an ECG showed 2:1 AV block (presumably congenital). The electrophysiological study showed nodal AV block with adequate rate increase after atropine administration. 8 years later an ECG was taken when her gestation period was 38 weeks. Physical examination, apart from the pregnancy and low heart rate, was normal. She had not experienced any dizziness or syncope. The ECG showed complete heart block with an escape junctional rhythm at 35 bpm. Transthoracic echocardiography showed a structurally normal heart, excluding cardiomyopathy or significative valvular disease. Our approach to manage this complex clinical scenario contemplated a multidisciplinary team involving interventional cardiologists, gynecologists, neonatologists and anestesiologists. We programmed cesarian delivery in order to reduce unknowns of a spontaneous labour and to permit the active presence of all specialists. Lowdose combined spinal and epidural anesthesia was performed. A right jugular venous access was obtained with echography guidance. A 5F steerable electrophysiological catheter

was advanced via superior vena cava until reaching right atrium and leaved there, in order to reduce the possibility of perforation due to positioning in the right ventricle and in case of sudden bradycardia, to rapidly pass throughout the tricuspid valve and stimulate the right ventricle. During cesarian delivery no changes in hemodynamics were observed with a constant heart rate of 35 bpm. The baby delivered had a normal Apgar score. The mother underwent ECG monitoring for the following 4 days in an intensive unit. After delivery the ECG of the patient showed again 2:1 AV block. However, considering the age of the patient, we proposed permanent pacing. So, a dual chamber pacemaker was implanted on 5th postoperative day in DDD mode 50/160bpm. Patient was discharged in good health three days after.

**Discussion.** Thirty per cent of congenital AV blocks remain undiscovered until adulthood, and may present for the first time during pregnancy. Current ESC guidelines affirm isolated congenital complete heart block has a favorable outcome during pregnancy, especially when the escape rhythm has a narrow QRS complex. On the other side, the risks of permanent pacemaker implantation during pregnancy are generally low, especially if the fetus is beyond 8 weeks gestation. Moreover, ESC guidelines suggestes vaginal delivery carries no extra risks in a mother with congenital complete heart block. However vaginal delivery cannot permit to organize an adequate setting. In case of symptomatic bradycardia, transvenous pacing should be established as soon as possible. For these reasons, an adequate venous access should be obtained, before the delivery guarantees minimal x-ray exposure to the fetus. In conclusion CAVB in a pregnant woman is a challenge that requires multidisciplinary approach. Our approach, including jugular venous access in the setting of a cesarean delivery, guarantees a quick emergency transvenous pacing with low risks.

## A20: EFFICACY AND SAFETY OF ORAL ANTICOAGULANT VERSUS ANTIPLATELET THERAPY FOR SECONDARY PREVENTION OF CARDIOVASCULAR DISEASE IN PATIENT WITHOUT ATRIAL FIBRILLATION: A SYSTEMATIC REVIEW AND META-ANALYSIS OF PHASE III RANDOMIZED CONTROLLED TRIAL

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**Background.** Anticoagulation is the mainstay of prevention of arterial thromboembolism in patients with atrial fibrillation, but it could be effective also in secondary prevention of patients who are in sinus rhythm.

**Purpose.** We performed this meta-analysis to determine relative efficacy and safety of oral anticoagulant therapy (OAC) as compared with antiplatelet therapy (APT) in patients with prevalent cerebro-cardiovascular disease without atrial fibrillation.

**Methods.** Our systematic review of the literature published through January 31st, 2019 sought all phase III randomized controlled trials which compare OAC with APT in patients with sinus rhythm and previous cerebro-cardiovascular disease report at least one of the following outcomes: ischemic stroke, death, myocardial infarction, and major bleeding, assessed at the longest available follow-up. We used random-effects models to estimate summary relative risk reduction (RRR) and 95% confidence intervals (95% CI).

**Results.** We identified a total of 9 randomized controlled trials including a total of 34,912 patients (ASA, n=17,726; adjusted-dose warfarin, n=4,460; rivaroxaban, n=12726), with a mean follow-up of 2.2 years. When compared with antiplatelet therapy, OAC was associated with reduced risk of ischemic stroke (RRR 38%, 95%CI: 1,47; P = 0·04; $I^2$=72%) and myocardial infarction (RRR 13%, 95%CI: 0,23; P = 0·05, $I^2$=0%), but increased risk of major bleeding (RRR -52%, 95%CI: -129,-1; P = 0·04; $I^2$=76%). Compared to antiplatelet treatment, OAC did not significantly affect the risk of all-cause death (RRR 1%, 95%CI: -9,10; P = 0·86; $I^2$=12%).

**Conclusions.** In sinus rhythm patients with prevalent cerebro-cardiovascular disease, OAC compared to APT reduces risk of ischemic stroke and myocardial infarction, but significantly increases risk of major bleeding. The choice of antithrombotic treatment does not appear to influence all-cause mortality.

## A21: CLINICAL IMPACT OF ATRIAL FIBRILLATION IN STABLE CORONARY ARTERY DISEASE: A META-ANALYSIS

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**Background.** Atrial fibrillation (AF) is the most common supraventricular arrhythmia and is often associated with stable coronary artery disease (SCAD). Recent computational studies suggest that AF can exert influence on coronary circulation.

**Aims.** Given the likely influence of AF on coronary hemodynamics, we aimed to explore the clinical impact that super-imposed AF can exert in SCAD patients, in terms of mortality, cerebral vascular accidents (CVA) and coronary events (myocardial infarction – MI, and coronary revascularization).

**Methods.** PUBMED/Embase databases were screened for observational studies on SCAD patients providing adjusted estimates on the risk of mortality, CVA, MI or TLR for AF patients with respect to patients without any history of the arrhythmia. Meta-analysis of the adjusted risk estimates was performed using a random-effect model.

**Results.** After bibliographic search, 5 studies were finally selected, with a total of 30,230 subjects included (2,844 in the AF group, 27,386 in the non-AF group). Meta-analysis of the included studies indicates an increased risk of mortality (HR 1.39, 95% CI 1.17-1.66) and CVA (HR 1.88, 95% CI 1.45-2.45) in SCAD patients with AF; on the contrary, there was no significant differences between AF and non-AF groups in terms of MI (HR = 0.90, 95% CI 0.66-1.22) and coronary revascularization (HR = 0.96, 95% CI 0.79-1.16).

**Conclusions.** AF in SCAD patients is an independent negative prognostic factor, associated with mortality and risk of cerebral vascular accidents. However, in terms of coronary events, the risk of MI or coronary revascularization was not different in patients with AF with respect to patients without the arrhythmia.

## A22: A MULTICENTER INTERNATIONAL RANDOMIZED CONTROLLED MANIKIN STUDY ON DIFFERENT PROTOCOLS OF CARDIO-PULMONARY RESUSCITATION FOR LAYPEOPLE: THE MANI-CPR TRIAL

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**Purpose.** Hands-only cardiopulmonary resuscitation (HO-CPR) is one of the most debated topic. However, if high-quality CPR is a key factor to improve survival after an out-of-hospital cardiac arrest (OHCA), it is very difficult to perform a high-quality CPR until the arrival of EMS with HO-CPR. Our aim was to verify whether the inclusion of intentional interruptions of different frequency and duration during the CPR could increase laypeople CPR quality compared with HO-CPR.

**Methods.** We randomised 572 laypeople who passed a basic life support course in 8 training centers to one of four CPR protocols in an 8 minutes simulated cardiac arrest scenario on a manikin: 30 compressions and 2 seconds pause (30c2s), 50 compressions and 5 seconds pause (50c5s), 100 compressions and 10 seconds pause (100c10s) and hands-only (HO-CPR). The primary endpoint was the percentage of chest compressions performed with correct depth evaluated by a computerised feedback system. The secondary endpoints were percentage compressions with correct release, with correct hand position, with adequate rate and the number of interruptions lasting more than 10 seconds (10s-pause).

**Results.** 68.5% of the study population were males, mean age was 32.2±11.6 years, mean height was 174.5±8.3 cm and mean weight 73.7±13.6 kg. There were no difference among the anthropometric characteristics of the 4 protocol groups. Regarding primary outcome, there was a statistical significant difference among the 4 groups (p=0.006). Comparing each protocol to the standard (HO-CPR) through a post-hoc analysis, 30c2s (96%, p=0.007) and 50c5s (96%, p=0.001) were significantly better than HO-CPR (79%), whilst 100c10s did not reach significance (92%). Among secondary endpoint only the 10s-pause was significantly different among the groups (p<0.001), with more 10s-pause in 100c10s (4, IQR 2-6) respect to the others (0, IQR 0-0).

**Conclusions.** The inclusion of intentional interruptions during CPR increase laypeople CPR quality. The protocols consisting in alternating 30 compressions and 2 seconds of pause or 50 compressions and 5 seconds of pause seems to be the more promising to maintain HQ-CPR during an 8 minutes scenario.

### A23: PROVOKED ELECTROCARDIOGRAPHIC BRUGADA TYPE 1 PATTERN IN AN ASYMPTOMATIC WOMAN WITH A NEW HETEROZYGOUS SCN5A MUTATION

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**Background.** Brugada syndrome (BrS) is a rare channelopathy and it's considered to be involved in 4% of all sudden cardiac deaths (SCDs). Not all the genetic abnormalities underlying the disease have been identified, however a mutation of the SCN5A gene is found in 15% to 30% of patients with BrS. To date a great number of SCN5A mutations have been reported but their exact role in developing the disease remains an unresolved issue. We report the case of an asymptomatic female patient, with a family background of BrS and who is carrier of a SCN5A mutation not described in literature (c.3818G>A).

**Case report.** A 69-year-old woman, with normal 12 leads electrocardiogram and a positive genetic test for SCN5A mutation, was referred from another centre to our outpatient clinic.

She had systemic arteryal hypertension, type 2 diabetes and was asymptomatic for syncope and lipotimia. The 12-leads electrocardiogram at rest was normal. Our patient had a cousin with spontaneous Brugada type 1 pattern who was implanted an ICD after a syncope and an asymptomatic first-degree nephew with a spontaneus type 1 pattern and a negative electrophysiological study. All these members of the family shared an heterozygous mutation (c.3818G>A) of the SCN5A. This mutation is not previously reported in scientific literature and it supposedly is pathogenic as it introduces a premature stop codon in the genetic sequence, determining a non-sense mutation. The patient ECG was normal, both with leads V1 through V3 in a classical position and also with these electrodes placed in the second intercostal space. An echocardiographic examination showed mild left ventricular concentric remodelling without any other significant abnormality or sign of structural heart disease. The patient underwent intravenous testing with class 1 sodium channel blocker in order to clarify the significance of this genetic mutation. We injected intravenously 2 mg/kg of flecainide in ten minutes and, two minutes after flecainide infusion ending, we observed a increase in the QRS duration (160 msec) with a coved ST-segment elevation of 4 mm, followed by a wide negative T wave (Brugada type 1 pattern) in V1-V2 positioned on both the second and fourth intercostal spaces. The flecainide test was positive and, to better define the risk of SCD, we proposed the electrophysiological study but the patient denied consent to the procedure.

**Conclusion.** Testing with class 1 antiarrhythmic drug could be a simple and safe way to assess the pathogenetic role of genetic mutations supposed to be involved in Brugada Syndrome.

### A24: ENDOCARDITE ICD-CORRELATA: GESTIONE CLINICA, ESTRAZIONE E REIMPIANTO

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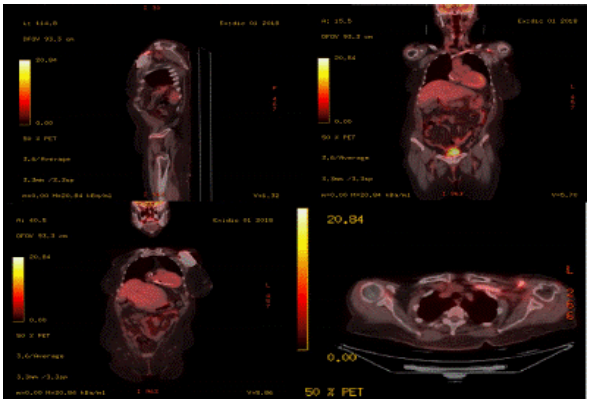
(a) POLICLINICO TOR VERGATA

Le più temibili complicanze nelle procedure di elettrostimolazione sono le infezioni correlate al dispositivo (CIED-I) che si presentano con un ampio spettro di manifestazioni tra 2 e 30 settimane dopo la procedura, a seconda del patogeno coinvolto.

Una paziente di 77 anni, dislipidemica, diabetica e ipertesa, a marzo 2018, a seguito di riscontro ecocardiografico di cardiopatia dilatativa con frazione di eiezione ventricolare sinistra (FEVS) <30%, associata a blocco di branca sinistra, veniva sottoposta a rivascolarizzazione miocardica percutanea con impianto di uno stent medicato su arteria discendente anteriore. Dopo 2 mesi, per il persistere di FEVS <30%, veniva sottoposta, nonostante indicazione a CRT-D, ad impianto di ICD bicamerale per anatomia sfavorevole dei rami del seno coronarico ed inadeguatezza dei parametri elettrici per la stimolazione bifocale. Ad un mese dalla procedura tumefazione ed infammazione della tasca con imaging transesofageo negativo per endocardite; dall'essudato della rima della tasca veniva isolato S.aureus ed impostata terapia antibiotica. A novembre 2018 la paziente veniva ricoverata per sepsi da S.aureus; alla TC-PET si evidenziava incremento metabolico a livello della tasca e della porzione succlaveare omolaterale; dopo ulteriori 3 mesi di terapia, si procedeva ad espianto del CIED. Alla paziente veniva fornito dispositivo Life Vest Zoll™ fino all'impianto di ICD sottocutaneo (S-ICD), eseguito al completamento della terapia antibiotica ed alla negativizzazione delle emocolture.

La scelta di tale percorso è in accordo con le evidenze scientifiche che mostrano come, in presenza di CIED-I in pazienti senza necessità di pacing a rischio di morte cardiaca improvvisa, sia necessario rimuovere il device fino a risoluzione dell'infezione, utilizzando dispositivi di protezione temporanea fino al reimpianto di S-ICD a minor rischio di recidive infettive.




### A25: PREECCITAZIONE VENTRICOLARE OCCULTA IN ANOMALIA DI EBSTEIN

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**Introduzione.** L'anomalia di Ebstein si associa spesso a tachiaritmie sopraventricolari quali flutter atriale, fibrillazione atriale e tachicardie da rientro atrioventricolare, in presenza di vie accessorie talvolta multiple.

**Descrizione del caso.** Presentiamo il caso di un paziente maschio di 17 anni affetto da anomalia di Ebstein sottoposto nel 2003 a plastica valvolare, chiusura del forame ovale pervio e ablazione dell'anulus tricuspidalico per aritmie sopraventricolari e preeccitazione. Dopo l'intervento apparente scomparsa della preeccitazione. 15 anni dopo accesso in PS per comparsa di flutter atriale sottoposto a cardioversione farmacologica efficace con flecainide, mantenuta poi come terapia cronica. Alcuni mesi dopo accesso in PS per recidiva di cardiopalmo con riscontro di flutter atriale con conduzione 2:1 e frequenza ventricolare media 160 bpm, blocco di branca destra in assenza di onde delta. Vista l'inefficacia nel controllo del ritmo della flecainide, quest'ultima veniva sospesa e si iniziava terapia con calcio antagonisti senza beneficio. Si associavano quindi beta-bloccanti. Dopo un iniziale beneficio sul controllo della frequenza si assisteva a nuovo rialzo della FC con modificazioni della morfologia del QRS: da blocco di branca destra a blocco di branca sinistra atipico suggestivo per preeccitazione ventricolare, con tratti di conduzione 1:1 e frequenza ventricolare media 320 bpm. Si procedeva quindi a cardioversione elettrica. Al ripristino del ritmo sinusale riscontro di preeccitazione ventricolare compatibile con via di conduzione anomala postero-laterale destra.

**Conclusioni.** La flecainide può occultare la presenza di un via accessoria che può rendersi nuovamente manifesta alla sospensione del farmaco.

**Figura 1.** Flutter atriale condotto 2:1 con blocco di branca destra.

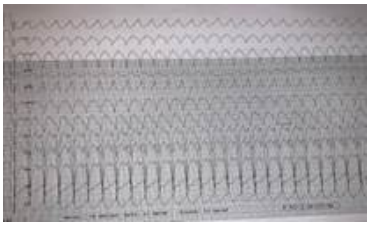

**Figura 2.** Flutter atriale preeccitato condotto 2:1.

**Figura 3.** Ripristino del ritmo sinusale con preeccitazione ventricolare.

### A26: TRANSVENOUS VERSUS NON-TRANSVENOUS IMPLANTABLE CARDIOVERTER-DEFIBRILLATOR: A META-ANALYSIS OF COMPARATIVE OUTCOME STUDIES IN THE PEDIATRIC AND YOUNG ADULT POPULATION

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**Background and Aims.** Implantation of transvenous (TV)-implantable cardioverter defibrillator (ICD) systems in the pediatric population is challenging and associated with a relatively small but nontrivial rate of complications including infection, inappropriate ICD shocks and lead malfunction. Non-transvenous (NTV) systems has been proposed as an alternative therapeutic option, but comparative outcome data are hitherto scarce, especially in the pediatric and young adult population. To overcome this paucity in the current literature, we aimed to summarize and compare safety and efficacy outcomes between TV- and NTV-ICD systems in a meta-analysis of observational studies.

**Methods.** We performed a systematic review and meta-analysis of comparative outcome studies between TV- and NTV-ICD systems from January 2009 to May 2019. We assessed Mantel-Haenszel pooled estimates of relative risk (RR) and 95% confidence intervals (CIs) for all-cause death, lead complications, infections, implant site complications and inappropriate shocks for NTV-ICD versus TV-ICD at the longest follow-up.

**Results.** We identified a total of 6 studies, including an overall population of 495 patients (mean age 16±4 years), with a mean follow-up 40 months. Baseline characteristics were similar between the two groups. The incident risk of lead/device (RR 1.02, 95% CI 0.18-3.90) and implant site complications (RR 0.76, 95% CI 0.23-2.36), infections (RR 1.46, 95% CI 0.42-4.88), inappropriate shock (RR 0.71, 95% CI 0.35-1.32) and all-cause death (RR 0.62, 95% CI 0.28-1.37) was similar between NTV- and TV-ICD systems.

**Conclusions.** No detectable difference was observed between NTV- and TV-ICD systems. This result supports the concept that NTV systems might be considered a safe and effective alternative to TV-ICD in the pediatric and young adult population. Large randomized studies are needed to achieve more comprehensive evidence and bolster clear guidelines on the selection of NTV- versus TV-ICD systems.

### A27: INADVERTENT IMPLANTATION OF A PERMANENT PACEMAKER VENTRICULAR LEAD INTO THE LEFT VENTRICLE: IDENTIFICATION, MANAGEMENT AND IMPLICATIONS.

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Inadvertent malpositioning of a cardiac implantable electronic device lead into the left ventricle is a rare complication of transvenous pacing and defibrillation. Rapid identification of lead position is critical during implantation and just after the procedure, with immediate correction required if malpositioning is detected. Thromboembolic events are common and usually secondary to fibrosis or thrombus formation on or around the lead. Anticoagulation can prevent thromboembolic events. Percutaneous and surgical LV lead extractions have been performed successfully, but the risks of percutaneous lead removal are not well-defined.

We report a case of a 92-year-old female patient with an inadvertent transvenous permanent pacing lead into the left ventricle through an atrial-septum defect implanted for an incidental finding of complete atrioventricular block with a low ventricular rate. The decision was made to leave the pacing lead in place and continue lifelong anticoagulation therapy.

While uncommon, inadvertent LV lead placement is a potentially devastating complication of pacemaker implantation. Appropriate analysis of the paced QRS pattern on ECG and post- implantation chest radiograph may reduce morbidity and mortality by promoting early recognition and treatment, and two-dimensional echocardiography can help to confirm left ventricular placement via an atrial septal defect, patent foramen ovale, or perforation of the interventricular septum.

### A28: UTILIZZO DI CANNABINOIDI E SINDROME DA PRE-ECCITAZIONE VENTRICOLARE: RELAZIONE CASUALE O CAUSALE?

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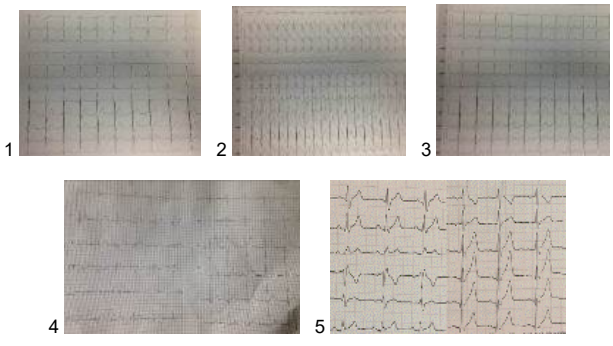
**Introduzione.** Il ruolo dei cannabinoidi nella genesi delle aritmie cardiache non è chiaro. A basse dosi i cannabinoidi sembrano poter incrementare l'attività simpatica mentre è stato ipotizzato che a dosi maggiori potrebbero avere un effetto parasimpatico-mimetico mediato dai recettori CB1. Riportiamo di seguito un caso di pre-eccitazione ventricolare in un paziente utilizzatore abituale di cannabinoidi.

**Caso clinico.** Un paziente maschio di 20 anni si recava in pronto soccorso per malessere e sensazione di oppressione toracica. All'ingresso si evidenziava un minimo rialzo della troponina I (0,063 □ 0,066 ng/ml; cut-off 0,05 ng/ml) e riscontro all'ECG di pre-eccitazione ventricolare in assenza di segni di ischemia miocardica acuta (fig. 1). Dall'anamnesi emergeva consumo abituale di cannabis in assenza di fattori di rischio cardiovascolari e/o patologie di rilievo. Un esame tossicologico risultava positivo per la presenza di cannabinoidi urinari (185 ng/ml). Il paziente veniva sottoposto a test ergometrico che non mostrava segni o sintomi indicativi di ischemia miocardica inducibile. Durante il test si evidenziava graduale riduzione fino alla scomparsa dei segni pre-eccitazione (fig. 2), mentre nel recupero ricompariva la pre-eccitazione (fig. 3). Quattro giorni dopo l'ingresso, seppur con valori in riduzione (96 ng/ml), l'esame urine risultava ancora positivo per la presenza di cannabinoidi e l'ECG invariato. Durante la degenza il paziente veniva sottoposto a studio elettrofisiologico (SEF) che mostrava la presenza di una via accessoria postero-laterale sinistra. Si rilevava un ERP anterogrado di 320 msec che si riduceva a 280 msec durante infusione di isoprenalina e un ERP retrogrado di 350 msec in assenza di inducibilità di tachiaritmie. Il paziente veniva quindi dimesso con flecainide 50 mg bis in die. Per la persistenza di ripetuti episodi di cardiopalmo a distanza di 3 mesi veniva sottoposto a nuovo SEF elettivo. All'ingresso il paziente era in terapia con flecainide a rilascio modificato 150 mg/die, negava l'assunzione di sostanze stupefacenti, l'esame urine risultava negativo per la presenza di cannabinoidi e l'ECG risultava nella norma in assenza di segni di pre-eccitazione (fig. 4). Veniva sottoposto a studio elettrofisiologico con evidenza di inducibilità di tachicardia atrioventricolare ortodromica (TRAV) trattata efficacemente mediante ablazione con radiofrequenza. Ad un follow-up di 6 mesi il paziente non ha avuto più sintomi di rilievo e no presenta più segni di pre-eccitazione (fig. 5).




**Conclusioni.** L'utilizzo di cannabinoidi potrebbe aver contribuito a modulare il fenotipo clinico ed elettrofisiologico della sindrome da pre-eccitazione, a sostegno dell'ipotesi di un potenziale effetto pro-aritmico di queste sostanze, che sono dunque un fattore da considerare nella valutazione di giovani pazienti a rischio di morte cardiaca improvvisa.

### A29: IMPATTO DELLA TERAPIA COMBINATA CON LAMA/LABA LONG ACTING SUI PARAMETRI NON INVASIVI DI ETEROGENEITÀ DELLA CONDUZIONE ATRIALE IN PAZIENTI AFFETTI DA BPCO IN FASE DI STABILITÀ CLINICA E FUNZIONE SISTOLICA GLOBALE CONSERVATA

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**Background e obiettivi.** Le tachiaritmie sopraventricolari (TSV) rappresentano una possibile complicanza della terapia con broncodilatatori inalatori long acting (LAMA e LABA),che rappresentano il gold standard della terapia farmacologica della broncopneumopatia cronica ostruttiva (BPCO), il cui ruolo è quello di migliorare i sintomi e la funzione respiratoria nonché di ridurre le riacutizzazioni. Scopo del nostro studio è stato valutare l'impatto della terapia combinata con due broncodilatatori long acting (Glicopirronio 43 µg/Indacaterolo 85 µg) sugli indici non invasivi elettrocardiografici (durata e dispersione dell'onda P) ed ecocardiografici (ritardo elettromeccanico atriale) di eterogeneità della conduzione atriale, che predispongono all'insorgenza di TSV, in pazienti affetti da BPCO in fase di stabilità clinica.

**Materiali e metodi.** Abbiamo arruolato 26 pazienti (età media 67.2 ± 9.9 anni, 14 M),con conservata funzione sistolica globale,affetti da BPCO

stabile in terapia con singolo broncodilatatore da almeno 3 mesi.Ciascun paziente è stata valutato mediante visita clinica cardio-pneumologica, spirometria globale con tecnica pletismografica e determinazione della capacità vitale forzata (FVC),volume espiratorio max nel primo secondo ($FEV_1$),capacità polmonare totale (TCL) e volume residuo (VR);ECG, ecocardiogramma con doppler tissutale all'arruolamento e dopo almeno 4 settimane di terapia con Glicopirronio 43 µg/Indacaterolo 85 µg. La durata max dell'onda P (P max) e la dispersione dell'onda P (differenza tra Pmax e Pmin) sono state accuratamente misurate utilizzando ECG a 12 derivazioni. Il ritardo elettromeccanico atriale (AEMD) è stato valutato mediante ecocardiografia con Doppler tissutale, misurando il tempo che intercorre tra l'inizio dall'onda P sull'ECG di superficie e dall'onda A del Doppler Tissutale. Quest'ultima è ottenibile a livello dell'anello mitralico laterale, dell'anello mitralico settale e dell'anello tricuspidale lungo la parete libera del ventricolo dx. La differenza tra l'AEMD valutato all'anello mitralico settale e quello all'anello tricuspidale rappresenta l'AEMD intra-atriale dx; quella tra anello mitralico laterale e settale rappresenta l'AEMD intra-atriale sn; la differenza tra l'anello mitralico laterale e l'anello tricuspidale rappresentata l'AEMD inter-atriale. I risultati sono stati presentati come valori medi con deviazione standard e confrontati mediante test t di Student per dati appaiati.

**Risultati.** La terapia combinata con glicopirronio/indacaterolo protratta per 4 settimane ha determinato un trend di miglioramento della funzione polmonare (FVC 2.4 ± 0.8 vs 2.9 ± 0.9, *P= 0.3*; $FEV_1$ 1.6 ± 0.7 vs 1.9 ± 0.7 l, *P: 0.5*; TLC 6.4 ± 1.0 vs 6.1 ± 1.2 l), riducendo in maniera significativa lo stato di iperinflazione polmonare (VR 4.0 ± 0.9 vs 3.1 ± 1.0; *P: 0.03*). Non vi sono state variazioni statisticamente significative in termini di Pmax (95.4 ± 15.9 vs 91.9 ± 18.2 ms, *P= 0.5*) e PD (47.1 ± 10.4 vs 44.4 ± 9.6 ms, *P = 0.3*). Abbiamo evidenziato un trend di riduzione, seppur non statisticamente significativo, dei valori di AEMD inter-atriale (28.04 ± 10.46 *vs* 25.41 ± 11.17 ms; *P= 0.4*), di AEMD intra-atriale sinistro (14.96 ± 9.01 vs 12.54 ± 8.7 ms; *P= 0.6*) e di AEMD intra-atriale destro (13.08 ± 9.80 ms vs 12.87 ± 10.54 ms; *P= 0.3*).

**Conclusioni.** I risultati preliminari del nostro studio suggeriscono che la terapia combinata glicopirronio/indacaterolo riduce lo stato di iperinflazione polmonare dei pazienti BPCO e determina un miglioramento della sincronia elettromeccanica atriale, riducendo potenzialmente il rischio di insorgenza di tachiaritmie sopraventricolari.

### A30: GESTIONE DEL PAZIENTE AD ALTO RISCHIO DOPO SCA CON FORMAZIONE TROMBOTICA IN VENTRICOLO SINISTRO: DUE CASI CLINICI

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**Background.** La formazione di trombi all'interno del ventricolo sinistro (LVT) è una complicanza frequente dell'infarto miocardico acuto (IMA), sebbene oggi, grazie ad una rivascolarizzazione più precoce, completa ed un uso più aggressivo di strategie antitrombotiche, l'incidenza si è ridotta da circa il 20% al 5%. La complicanza più comune e temibile è rappresentata dall'embolizzazione sistemica del trombo. La terapia anticoagulante orale (3-6 mesi) è la prima scelta terapeutica in questi pazienti, per favorire lo scioglimento del trombo e per prevenirne l'embolizzazione sistemica. Nonostante gli antagonisti della vitamina K (VKA) siano sempre stati indicati come prima scelta, le ultime linee guida ESC STEMI 2017 non indicano quale trattamento anticoagulante orale sia preferibile in caso di LVT.

**Case report 1.** Donna di 70 anni con infarto miocardico acuto anteriore e sopraslivellamento del tratto ST (STEMI) trattato con rivascolarizzazione percutanea ed impianto di stent medicato (DES) su arteria interventricolare anteriore (IVA), complicato da shock cardiogeno e persistenza di ridotti valori di emoglobinemia. Durante il ricovero in unità di terapia intensiva coronarica (UTIC), si impostava terapia antitrombotica con acido acetilsalicilico (ASA) 100 mg/die, ticagrelor 90 mg bid ed eparina a basso peso molecolare in monosomministrazione giornaliera 4000 UI. In ventesima giornata, il decorso si complicava con rilevazione ecocardiografica trans-toracica (ETT) di sospetta trombosi apicale in ventricolo sinistro, confermata tramite risonanza magnetica cardiaca (RMC). Si impostava dunque la terapia antitrombotica con ASA 100 mg, clopidogrel 75 mg ed edoxaban 30 mg. Dopo circa un mese dall'inizio della terapia si assisteva a risoluzione del trombo ventricolare sinistro documentata sia con l'ETT che con la RMC, in assenza di eventi avversi.

**Case report 2.** Uomo di 54 anni ricoverato con diagnosti di STEMI anteriore trattato con PCI e impianto di tre DES su IVA, complicato da edema polmonare acuto in prima giornata ed episodio sincopale in decima giornata. Durante il ricovero venivano eseguiti ecocardiogrammi seriati che mostravano una funzione ventricolare sinistra ridotta in assenza di evidenti apposizioni trombotiche ventricolari. Il paziente veniva dimesso dopo dodici giorni con la terapia antitrombotica (ASA 100 mg e ticagrelor 90 mg bid). A quaranta giorni dall'evento, si evidenziava all'ETT apposizione trombotica intraventricolare sinistra confermata da RMC. Si impostava dunque terapia antitrombotica con ASA 100 mg/die, clopidogrel 75 mg e Rivaroxaban 20 mg/die in assenza tuttavia di risoluzione della trombosi ventricolare sinistra dopo un mese di terapia.

**Discussione.** Esistono numerose evidenze riguardo la sicurezza e l'efficacia dei direct oral anticoagulants (DOACs) in aggiunta alla terapia antiaggregante post-IMA, ma non è stato condotto nessun trial randomizzato per valutarne l'efficacia e la sicurezza nella LVT. La scelta dei DOACs nei due casi sovraesposti, in particolare rivaroxaban ed edoxaban, è stata dettata da molteplici fattori, con particolare riferimento alla monosomministrazione giornaliera e all'alto rischio emorragico dei nostri pazienti. La mancata risoluzione della trombosi ventricolare sinistra in uno dei due casi potrebbe essere dovuta alla formazione più tardiva e quindi alla natura più stratificata del trombo stesso. A nostro avviso, l'uso del DOAC può rappresentare un'importante strategia antitrombotica nel setting dei pazienti con trombosi ventricolare sinistra e nuovi studi a riguardo risultano necessari.

## ARITMIE – 2
## Sessione Poster

### A31: RUOLO DELL'INTERVALLO PPI POST ATP FALLITO NELLA DISCRIMINAZIONE DEGLI ICD

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**Background.** Michael et al nel 2014 hanno dimostrato su una coorte di pazienti portatori di ICD (con catetere ventricolare destro posto in apice) come l'intervallo PPI dopo ATP fallito potesse essere utilizzato come valido discriminante tra fibrillazione atriale ad alta risposta ventricolare e tachicardia ventricolare. Il valore di cut-off identificato per il PPI risulta 615 ms mentre per il PPI-TCL 260 ms. Scopo dello studio è stata la valutazione dell'intervallo PPI dopo un intervento di ATP fallito, postulando che un lungo PPI possa essere indicativo di tachicardia ventricolare, mentre un PPI piu' breve di fibrillazione atriale o tachicardia atriale ad elevata risposta ventricolare, prendendo in considerazione pazienti con stimolazione ventricolare settale medio-alta, che rappresenta attualmente il tipo di stimolazione preferita.

**Metodi.** Sono stati presi in considerazioni tutti i pazienti afferenti all'ambulatorio di elettrofisiologia per controllo di defibrillatore, sia esso bicamerale o biventricolare, nel periodo di 2 anni compreso tra Gennaio 2016 e Dicembre 2017. Due osservatori indipendenti hanno analizzato i report aritmici derivanti dai controlli. Sono stati presi in considerazione solo i pazienti con catetere ventricolare destro posto in sede settale medio-alta (valutata tramite RX e criteri ECG).

**Risultati.** Sono stati inclusi nello studio 103 pazienti. Durante l'arco di questi 2 anni 23 (22%) pazienti hanno mostrato aritmie trattate con ATP per un totale di 71 eventi singoli trattati con ATP riconducibili a 26 eventi aritmici. Dei 71 eventi singoli, 48 sono risultati utilizzabili per lo studio degli EGM (14 FA/TA e 34 TV). Il PPI medio è stato di 720±84 ms dopo ATP in corso di fibrillazione atriale o tachicardia atriale e di 506±82 ms dopo ATP in corso di tachicardia ventricolare (p<0.001). Il PPI- TCL medio è stato di 371±77 ms dopo ATP in corso di fibrillazione atriale o tachicardia atriale e di 171±79 ms dopo ATP in corso di tachicardia ventricolare (p<0.001). L'analisi ROC effettuata sul PPI ha evidenziato come un valore >627 ms favorisca la diagnosi FA/TA rispetto alla TV con una sensitività dell'85.7% (95% CI 56.1%-97.5%) ed una specificità del 94% (95%CI 78.9%-98.9%). Per quanto riguarda invece l'analisi del PPI-TCL un valore <274 ms indica come sia piu' probabile la diagnosi di tachicardia ventricolare con una sensitività del 80% (95%CI 51.4%-94.7%) ed una specificità dell'93.9% (95%CI 78.4%-98.9%).

**Conclusioni.** Gli intervalli PPI e PPI-TCL possano essere utilizzati come validi discriminatori tra fibrillazione atriale ad elevata risposta ventricolare e tachicardia ventricolare. In particolare la posizione settale del catetere ventricolare destro non influenza la validità di questi discriminatori, aumentandone anzi la sensibilità e specificità. Tale differenza è legata verosimilmente alla maggior distanza dall'elettrodo settale all'ingresso nelle normali vie di conduzione rispetto all'elettrodo apicale. L'analisi del PPI e del PPI-TCL rappresenta, quindi, una opportunità valida nel panorama degli algoritmi dei defibrillatori impiantabili e la sua integrazione potrebbe ridurre sensibilmente la quantità di shock inappropriati e le relative conseguenze negative.

### A32: UTILITÀ DEL LOOP RECORDER NELLA DIAGNOSI DELLE ARITMIE

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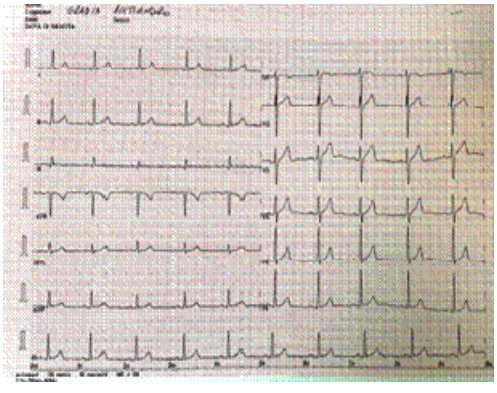
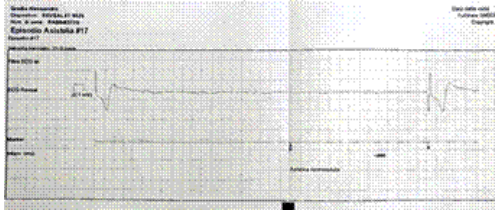
(a) AOU MATER DOMINI UOC MEDICINA INTERNA DIPARTIMENTO SCIENZE MEDICO CHIRURGICHE UMG CATANZARO; (b) AOU MATER DOMINI UOC CARDIOLOGIA DIPARTIMENTO MEDICO CHIRURGICHE UMG CATANZARO

La sincope costituisce un motivo frequente di ammissione in ospedale. Ciononostante dopo complete indagini neurologiche e cardiologiche essa rimane di origine sconosciuta in molti casi. La disponibilità di un loop recorder impiantatile può rendere più semplice la diagnosi di sincopi cardiogene, cosa difficile da realizzare col monitoraggio Holter tradizionale. Viene descritto il caso clinico di un uomo di 40 anni in buone condizioni di salute che giunge alla nostra osservazione per un episodio di malessere generale notturno della durata di pochi minuti accompagnato a sudorazione profusa. Per tale motivo il paziente si era recato in PS dove erano stati eseguiti esami ematochimici inclusi enzimi di miocardionecrosi ed ECG, risultati nella norma. Dimesso a domicilio al paziente veniva consigliato un Holter ECG che refertava: "ritmo sinusale per tutta la durata della registrazione con FC max 114 bpm, FC min 35 bpm. RR max 2.2 sec in concomitanza di episodio di BAV II grado Mobitz 2 notturno. 3 extrasistoli sopraventricolari e isolate. Tratto ST-T privo di alterazioni significative". Il paziente veniva quindi ricoverato,. Si effettuava ECG: ritmo sinusale con Fc 60 bpm. Asse del QRS a +15. Conduzione AV e IV nella norma. QT: 390 msec, QTc: 390 msec. Normale la ripolarizzazione ventricolare. Si effettuava anche un ecocardio che riportava solo una insufficienza mitralica di grado lieve e un Holter ecg risultato nella norma. Veniva quindi impiantato un loop recorder Medtronic reveal XT9529 previa anestesia locale confezionando tasca soprafasciale in regione pettorale sinistra. Il paziente veniva dimesso in seconda giornata. Circa quattro mesi dopo il paziente si presenta a controllo. Il dispositivo viene interrogato e dall'analisi della registrazione si evidenziano diversi episodi di asistolia il più lungo della durata di 6,9 secondi e numerosi periodi bradicardia sinusale. Il paziente viene così ricoverato. Si effettua la rimozione del loop recorder e si impianta un pacemaker bicamerale nella tasca soprafasciale già confezionata con modalità di stimolazione AAI. l'ILR si è dimostrato in questo caso un insostituibile strumento dal notevole risvolto diagnostico nei casi di sincope.





### A33: LATE OR EARLY TWIDDLER'S SYNDROME, SHOULD PACEMAKER GENERATOR REPLACEMENT RESET THE STOPWATCH?

Carlo De Innocentiis (a), Daniele Sacchetta (c), Michele Millesimo (a), Alessandro Corazzini (b), Luigi Leonzio (b), Vincenzo Cicchitti (b)
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**Background.** Twiddler's syndrome is a rare but potentially serious mechanical complication of cardiac implantable electronic devices (CIED) implantation. Different variants and several mechanisms have been described. Recognized risk factors for twiddler's syndrome development include old age, cognitive decline or psychiatric illness, obesity, female gender and oversized device pocket.

**Case description.** We report the case of a 95 years old woman with twiddler's syndrome occurred three months after generator replacement of a dual chamber pacemaker previously implanted for symptomatic complete atrioventricular block. Routine follow-up with device electronic interrogation revealed device dysfunction with failure of both ventricular pacing and sensing. Chest X-ray highlighted the occurrence of leads retraction and coiling around pacemaker generator. On query, the patient admitted that she had repeatedly manipulated the pacemaker generator in the skin pocket. The patient was hospitalized and underwent contralateral de novo implantation because of trapped and damaged leads. Additional safety suture of pacemaker generator to fascia was also performed.
**Discussion.** Despite the majority of cases are diagnosed within the first year, twiddler's syndrome may occur at any time after device implantation. In the described case, CIED was implanted seven years earlier but the patient underwent generator replacement during pacemaker elective replacement interval (ERI) just three months before the evidence of twiddler's syndrome. Although our patient was at high risk to develop the syndrome because of cognitive decline, old age and female gender, it occurred only after pacemaker generator replacement suggesting the hypothesis that such procedure may represent an additional risk factor for leads dislodgement.
**Conclusions.** Twiddler's syndrome, although rare, is increasingly recognized as a cause of idiopathic leads migration. Generator replacement of transvenous CIED may represent the trigger for twiddler's syndrome development.

### A34: ULTRASOUND-GUIDED AXILLARY VEIN CANNULATION FOR CARDIAC IMPLANTABLE ELECTRONIC DEVICES LEADS INSERTION

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**Objective.** To assess safety and feasibility of ultrasound-guided axillary vein cannulation for cardiac implantable electronic devices (CIEDs) leads insertion.
**Background.** In recent years, the axillary vein has been increasingly used for CIEDs placement due to large vessel size, rapid access, and the absence of leads crush. The available venography technique for axillary vein cannulation requires both fluoroscopy and contrast medium administration. Ultrasonography is a well-recognized radiation-free aid to central venous catheterization for jugular, subclavian and axillary veins. However, the safety and feasibility of an ultrasound-guided axillary approach for leads placement is poorly investigated.
**Methods.** In a retrospective observational study, we evaluated the safety of ultrasound-guided axillary compared to blind subclavian vein catheterization for leads placement in a cohort of 81 consecutive patients referred to our center for CIEDs implantation. The primary endpoint is the incidence of puncture-related complications. Secondary endpoints are fluoroscopy time, access time, and 30-day pocket or device complications.
**Results.** 23 patients underwent an ultrasound-guided axillary vein catheterization and 58 a blind subclavian vein catheterization. Puncture-related complications were significantly lower in the ultrasound-guided compared to blind technique group (p= 0.040), due to lower rates of arterial puncture. Access time was significantly shorter in the ultrasound-guided group. There were no differences in fluoroscopy time and in the 30-day incidence of pocket or device complications.
**Conclusions.** Ultrasound-guided axillary vein catheterization is a safe and effective technique for CIEDs leads insertion. This technique reduces the incidence of puncture-related complications and is associated with shorter access time compared to blind subclavian vein catheterization.

### A35: CRYPTOGENIC STROKE AND ASYMPTOMATIC ATRIAL FIBRILLATION IN A REAL-WORLD POPULATION: AN IMPLANTABLE CARDIAC MONITOR STUDY

Massimiliano Faustino (a), Vincenzo Di Stefano (b), Raffaella Franciotti (b), Nanda Furia (a), Enrico Di Girolamo (a), Laura Bonanni (b), Marco Onofrj (b), Maria Vittoria De Angelis (b)
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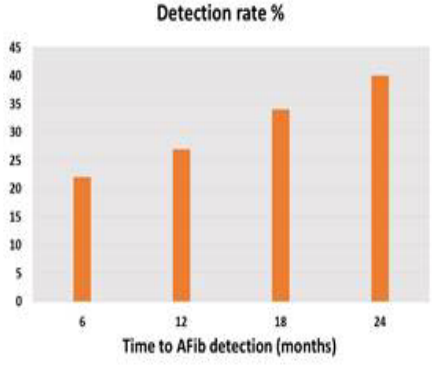
**Background.** The incidence of atrial fibrillation (AF) in cryptogenic stroke (CS) patients has been studied in carefully controlled clinical trials, but real-world data are limited. Aim of this study was to investigated the incidence of AF in clinical practice among CS patients with an implantable cardiac monitor (ICM) placed for AF detection.
**Methods.** Patients with CS admitted to our Stroke Unit were included in the study; they received an ICM and were monitored for up to 2 years for

AF detection (in-hospital clinic and remote monitoring). All detected AF episodes (≥30 sec) were considered.
**Results.** From March 2016 to March 2019, 58 patients (mean age 68 ±12 years, 67% male) received an ICM to detect AF after a CS. No patients were lost to follow-up. AF was detected in 23 patients (40% overall; AF group mean age 72 ± 11 years; 65% male) after a mean time of 6 months from ICM implantation (ranging from 2 days to 2 years) and 8 months after CS (ranging from 1 month to 2 years) (detection rates over time are reported in the figure below). In these AF patients anticoagulant treatment was prescribed and no further stroke.




**Conclusions.** AF episodes were detected via continuous monitoring with ICMs in 40% of implanted CS patients. AF after CS was asymptomatic and thus unlikely to be detected by strategies based on intermittent short-term recordings. Therefore, ICMs should be considered as part of daily practice in the evaluation of CS patients.

### A36: INADVERTENT S-ICD LEAD MALPOSITIONING IN A FAMILIAL TYPE 1 BRUGADA SYNDROME

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Subcutaneous implantable cardioverter defibrillator (S-ICD) represents a valid alternative to traditional ICD in patients who do not require anti-bradycardia pacing. The implantation technique is easy and both the heart and the vessels are left untouched, thus avoiding lead complications.
Case report: A 21 years old man with familial type 1 Brugada Syndrome was referred to our emergency department for unexplained syncope and iterative unsustained ventricular tachycardia. Three first-degree relatives suffered a juvenile sudden cardiac death. According to guidelines, the patient was given the indication to ICD implantation. Given his young age and no need for anti-bradycardia pacing, we suggested an S-ICD system. The S-ICD was implanted according to the two-incision technique, with an intermuscular pocket. The lead was positioned vertically in the subcutaneous tissue, 2 cm sternal midline, left. The induction test was performed, but the S-ICD was not able to restore normal sinus rhythm by a 65-Joules biphasic shock (standard configuration) despite 64-Ohm shock impedance. An external shock of 270 Joules was required. Even the defibrillation test in the reverse polarity mode (65 Joules) failed to restore sinus rhythm (Fig. 1). Again, the shock impedance was 64 Ohms. The system position was reassessed by both postero-anterior and latero-lateral chest fluoroscopy. As a matter of facts, not all the coil lead was on the fascial plane. May be, during vertical tunnellization, the insertion tool was moved up and the tip of the lead was inadvertently positioned within the subcutaneous adipose tissue over the sternum (Fig. 2). The lead was then repositioned and checked in latero-lateral fluoroscopy (Fig. 3). During a new induction test, the S-ICD promptly restored sinus rhythm by a single biphasic 65-Joules shock (Fig. 4). The shock impedance decreased to 46 Ohms.

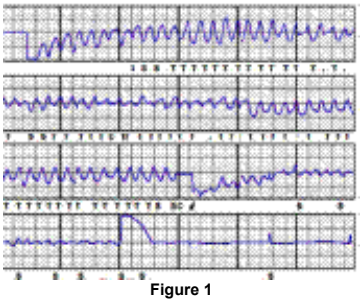
Figure 1


Figure 2

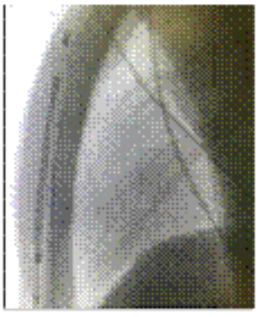
Figure 3

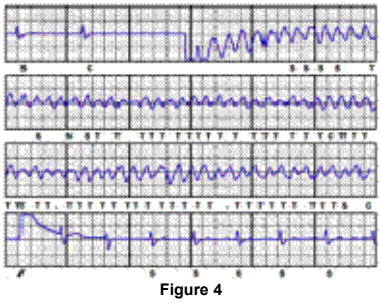
Figure 4

**Discussion.** The S-ICD system is easy and safe to implant, and long-term lead complications can be avoided. Some implanting cardiologists no longer perform induction test and simply consider shock impedance safely predictive for shock efficacy. In an S-ICD system, the can and the lead have to be positioned in contact with the fascial planes, since the adipose tissue between can or coil lead and chest wall significantly reduces shock efficacy, thus raising defibrillation threshold.
Conclusions: Shock impedance alone should not be considered as a safe predictor for shock efficacy of an S-ICD system. The absence of adipose tissue under the coil lead should be checked in a latero-lateral fluoroscopy before induction test or shock failure, and mostly, if induction test is not performed.

### A37: SLEEP APNEA AND ASSOCIATION WITH ATRIAL FIBRILLATION IN AN UNSELECTED PACEMAKER POPULATION

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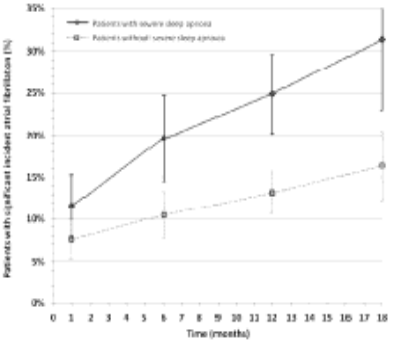
**Background.** Patients with atrial fibrillation (AF) often have sleep apnea (SA), but diagnosis of SA with polysomnography is rather expensive. SA monitoring is a pacemaker algorithm that measures respiratory disturbance index, the extent of abnormal respiratory events divided by sleep duration.
**Purpose.** To evaluate the incidence and severity of SA and its association with AF in an unselected pacemaker population, the following multicenter study was performed.
**Methods.** RESPIRE (Registry of Sleep Apnea monitoring and Atrial Fibrillation in pacemaker patients) was an international, multicenter, observational, open-label study following adult subjects with an SA monitoring-enabled dual-chamber pacemaker for 18 months after implantation. Severe SA was defined as average respiratory disturbance index ≥ 20 from implantation to follow-up visit. The first co-primary end point was the difference in significant AF (cumulative AF episodes lasting ≥ 24 hours over two consecutive days) between subjects with severe and those with nonsevere SA at 12 months in the full analysis set (N = 553). The second co-primary end point was the rate of major serious adverse events at 18 months in the modified intention-to-treat set (N = 1024).
**Results.** Severe SA was detected in 31.1% (172 of 553, left Table). A higher incidence of significant AF was observed in patients with severe SA as compared to patients with nonsevere SA (25.0% vs 13.9%; difference 11.1%; 95% confidence interval 3.7% - 18.4%; $p$ = 0.002). In both groups, significant AF increased over time, but a faster rate was observed in the severe SA group (right Table). No differences between the groups in the overall rate of major adverse events was observed ($p$ = NS).

| | Patients with severe sleep apnea | Patients without severe sleep apnea | Difference [95% CI]; p-value |
|---|---|---|---|
| ***Main analysis - First co-primary endpoint (FAS)*** | *N=172* | *N=381* | |
| Significant AF at 12 months, % (n) | 25.0% (43) | 13.9% (53) | 11.1% [3.7;18.4]; p=0.003 |
| ***Sensitivity analysis - First co-primary endpoint (mITT)*†*** | *N=321* | *N=698* | |
| Significant AF at 12 months, % (n) | 14.5% (50) | 15.2% (92) | 11.7% [6.4;17.1]; p<0.001 |
| ***Main analysis - Second co-primary endpoint (mITT)†*** | *N=312* | *N=712* | |
| Major serious adverse events at 18 months‡, % (n) | 8.7% (27) | 5.9% (42) | 2.8% [-0.8;6.3]; p=0.065‡ |
| Death | 5.1% (16) | 2.4% (17) | 2.7% [0.05; 5.4]; p=0.023‡ |
| Myocardial infarction | 0.6% (2) | 0.4% (3) | 0.2% [-0.8; 1.2]; p=0.33 |
| Stroke | 1.0% (3) | 0.3% (2) | 0.7% [-0.5; 1.8]; p=0.12 |
| Re-intervention | 2.6% (8) | 2.8% (20) | -0.2% [-2.4; 1.9]; p=0.59 |

**Abbreviations:** AF, atrial fibrillation; FAS, full analysis set; mITT, modified intention-to-treat; NA, not applicable.




**Conclusions.** SA screening over 12 months identified severe SA in almost one-third of unselected pacemaker patients. Severe SA was associated with a higher incidence of significant AF.

### A38: STRATIFICAZIONE DEL RISCHIO ARITMICO E PREVENZIONE DELLA MORTE IMPROVVISA IN GIOVANI PAZIENTI AFFETTI DA SINDROME DI KEARNS-SAYRE

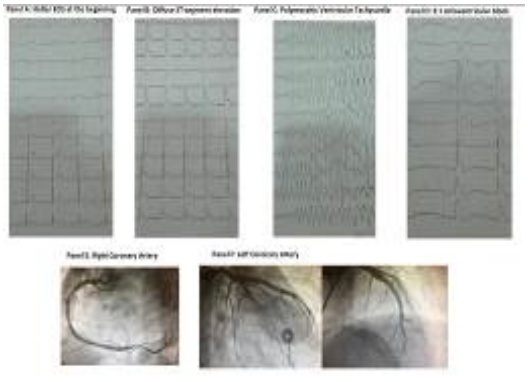
Corrado Di Mambro (a), Massimo Stefano Silvetti (a), Silvia Di Sante (a), Cecilia Marcolin (a), Pietro Paolo Tamborrino (a), Daniela Righi (a), Marie Laure Yammine (a), Sonia Albanese (a), Diego Martinelli (b), Carlo Dionisi Vici (b), Fabrizio Drago (a)
(a) DMCCP - OSPEDALE PEDIATRICO BAMBINO GESU'; (b) PATOLOGIA METABOLICA - OSPEDALE PEDIATRICO BAMBINO GESU'

**Introduzione e scopo dello studio.** La sindrome di Kearns-Sayre (KSS) è una rara citopatia mitocondriale, caratterizzata da oftalmoplegia esterna progressiva, coinvolgimento neurologico, muscolare e cardiaco. La maggior parte dei pazienti manifesta problematiche aritmiche, che sono causa di morte improvvisa (MI) in circa il 20% dei casi. Queste solitamente sono rappresentate da blocco bi-fascicolare (BBF) e da blocco atrioventricolare (BAV). Inoltre, sono state descritte tachicardie ventricolari (TV) anche secondarie a QT lungo. Lo scopo del nostro studio, è stato quello di stratificare il rischio aritmico e valutarne l'evoluzione in una popolazione di soggetti affetti da KSS ad esordio pediatrico.
**Materiali e metodi.** Abbiamo valutato retrospettivamente 12 pazienti (8 maschi) consecutivi affetti da KSS afferenti presso un Centro Pediatrico di Terzo Livello, tra il 2007 ed il 2018. Tutti i soggetti sono stati "screenati" con ECG, Ecocardiogramma ed ECG di Holter a cadenza semestrale/annuale; 4 di questi sono stati sottoposti anche a studio elettrofisiologico (SEF). I dati sono espressi come valore percentuale e/o mediano.
**Risultati.** L'età media dei nostri pazienti era di 15.5 anni (range 13-21 anni). Durante un follow-ip (FU) di 6 anni (range 1-11 anni): 2 soggetti (16.7%) hanno sempre mostrato una normale conduzione AV/intraventricolare; 10 (83%) hanno manifestato blocco fascicolare anteriore sinistro (BFAS); 9 (75%) blocco di branca destro completo (BBDx). Il BBF è insorto in 8 pazienti (67%) e 4 di essi (33.3% della popolazione totale) hanno successivamente sviluppato BAV avanzato/completo. Pertanto, 1 bambino mostrava solo BFAS ed un altro solo BBDx. La maggior parte dei pazienti con BBF (6/8, ossia il 75%) ha manifestato il BFAS precedentemente al BBDx con un range di latenza tra 1 e 7 anni. Un solo soggetto (8.3%) presentava QT lungo ed era in terapia profilattica con Nadololo, mentre 2 pazienti (16.7%) hanno manifestato almeno 1 episodio di TV non sostenuta, quindi trattati efficacemente con terapia farmacologica (in entrambi non inducibilità al SEF). Undici soggetti (92%) avevano una frazione d'eiezione (FE) normale (62%; range 60-75%), mentre uno solo mostrava una FE depressa (38%). Nove pazienti (75%), di cui i 4 con BAV e 5 con BBF, sono stati sottoposti ad impianto di pace-maker (PM) ad un'età di 13 anni (range 9-21 anni): 8 con solo PM (6 in modalità VVI, 2 in DDD) ed 1 con defibrillatore (ICD)-VVI in prevenzione primaria. In questi, non si è verificata nessuna complicanza intraoperatoria e, durante il FU, non abbiamo riscontrato episodi di TV sostenuta, shock appropriati, MI e/o malfunzionamento del PM. Infine, 2 soggetti con PM (22.2% degli impiantati) hanno sviluppato rispettivamente un'infezione del device ed una perforazione ventricolare destra asintomatica indotta dall'elettrocatetere, con in entrambi i casi necessità di estrazione e successivo reimpianto senza ulteriori complicanze.
**Conclusioni.** Nei bambini ed adolescenti affetti da KSS, generalmente la prima problematica aritmica è rappresentata dal BFAS che evolve in BBF e BAV avanzato/completo. Successivamente possono presentarsi, se pur raramente, TV. Appare evidente, quindi, come uno stretto e seriato monitoraggio aritmologico possa prevenire eventi anche catastrofici, e come in questi pazienti l'impianto di PM/ICD possa risultare una terapia appropriata.

### A39: THE WRONG EXAM AT THE RIGHT TIME: A CASE OF VENTRICULAR TACHYCARDIA INDUCED BY CORONARY VASOSPASM

Federico Fortuni (a, b), Filippo Angelini (c), Gabriele Crimi (a), Marco Ferlini (a), Sergio Leonardi (b), Matteo Casula (a, b), Davide Foglia (a, b), Luigi Oltrona Visconti (a), Gaetano Maria De Ferrari (c)
(a) DIVISION OF CARDIOLOGY, IRCCS POLICLINICO S. MATTEO, PAVIA (ITALY).; (b) CORONARY CARE UNIT AND LABORATORY OF CLINICAL AND EXPERIMENTAL CARDIOLOGY, IRCCS POLICLINICOS. MATTEO, PAVIA (ITALY); (c) DIVISION OF CARDIOLOGY, CITTÀ DELLA SALUTE E DELLA SCIENZA DI TORINO HOSPITAL, UNIVERSITY OF TURIN (ITALY)

**Introduction:** Coronary vasospasm is an uncommon but important cause of myocardial ischemia and malignant ventricular arrhythmias.
**Case presentation:** In this case report, we present a striking example of vasospasm manifesting as ST-segment elevation and ventricular tachycardia on electrocardiographic (ECG) Holter monitoring effectively managed with calcium channel blockers. A 48-year-old man was referred to our outpatient clinic after a syncope which was preceded by constrictive chest pain irradiated to the neck. He described similar episodes of chest pain at rest in the last month, all self-limiting and lasting 10-15 minutes. The patient did not have any cardiovascular risk factor nor family history of sudden cardiac death. He did not take any medication and he did not have any allergy or medical problem in the past. Physical exam was completely normal. A 12-lead Holter ECG monitoring was suggested. During the test, the patient had another syncope preceded by the same symptoms that correlated with progressive ST-segment elevation in all the leads, except DI, aVL, aVR and V1, leading to episodes of self-terminating polymorphic ventricular tachycardia (*Figure 1 A-C*) and followed by a phase of 2:1 atrioventricular block (Figure 1D). After this episode the patient was admitted to our hospital. The urgent coronary angiography (Figure 1 E-F) did not show the presence of significant coronary stenosis. The most likely diagnosis was coronary artery vasospasm. The patient was treated with oral calcium channel blockers (diltiazem 210 mg daily divided into three doses) that showed to be effective in managing symptoms and preventing recurrences.



**Discussion.** Contemporary guidelines on implantable cardioverter defibrillator (ICD) therapy do not specifically address recommendations for secondary prevention after life-threatening ventricular arrhythmias due to vasospasm. The arrhythmic risk of coronary vasospasm is variable, ranging from 2% to 17%. Risk stratification is important to effectively identify high-risk patients who may benefit from ICD implantation. A risk prediction score has been developed by the Japanese Coronary Spasm Association (JCSA) that includes: out of hospital cardiac arrest (4 points), smoking history, documented angina, significant coronary stenosis, or multi-vessel spasm (2 points each), ST-segment elevation or spasm while on beta blocker therapy (1 point each). Patients who score ≥6 are at the

highest risk, with a predicted risk of major adverse cardiac events of 13%. However, this score was developed and validated in an East Asian population and there is no proof for its applicability to other ethnicities. In this case, the risk of malignant arrhythmia recurrence was considered to be low (2) according to the JCSA risk score and a reversible cause for the arrhythmia was identified and effectively treated making very low the probability of recurrence. Therefore, an implantable cardioverter defibrillator was not implanted. This clinical case highlights the importance of identifying the cause of an arrhythmic episode in order to introduce an effective therapy. Moreover, it underlines the importance of properly stratifying the arrhythmic risk before considering the implantation of an implantable cardioverter defibrillator.

### A40: AGE-RELATED DIFFERENCES IN ORAL ANTICOAGULANT THERAPY BETWEEN ITALIAN AND WESTERN EUROPE COUNTRIES PATIENTS WITH NON-VALVULAR ATRIAL FIBRILLATION. INSIGHTS FROM THE GLORIA-AF REGISTRY

Stefano Fumagalli (a), Serena Boni (a), Christine Teutsch (b), Niccolò Marchionni (a), Giuseppe Boriani (f), Paolo Verdecchia (g), Giuseppe Di Pasquale (i), Igor Diemberger (h), Vittorio Pengo (k), Dongmei Zhai (c), Marianna Festa (j), Menno Huisman (d), Gregory Lip (e)

(a) GERIATRIC INTENSIVE CARE UNIT, UNIVERSITY OF FLORENCE AND AOU CAREGGI; (b) BOEHERINGER INGELHEIM INTERNATIONAL GMBH; (c) BOEHERINGER INGELHEIM PHARMACEUTICALS INC.; (d) DEPARTMENT OF THROMBOSIS AND HEMOSTASIS, LEIDEN UNIVERSITY; (e) INSTITUTE OF AGEING AND CHRONIC DISEASE, UNIVERSITY OF LIVERPOOL, UNITED KINGDOM; (f) CARDIOLOGY DIVISION, UNIVERSITY OF MODENA AND REGGIO EMILIA; (g) DEPARTMENT OF MEDICINE, HOSPITAL OF ASSISI; (h) INSTITUTE OF CARDIOLOGY, UNIVERSITY OF BOLOGNA; (i) DEPARTMENT OF CARDIOLOGY, MAGGIORE HOSPITAL, BOLOGNA; (j) BOEHERINGER INGELHEIM ITALY, MILAN; (k) CARDIOLOGY UNIT, UNIVERSITY OF PADUA

**Introduction.** Atrial fibrillation (AF) is the most frequent sustained arrhythmia found in clinical practice. Despite the association of AF with thromboembolic (TE) events, and with dementia, the use of oral anticoagulant therapy (OAC) is still unsatisfactory. Non-Vitamin K oral anticoagulants (NOACs) could allow a wider use of OAC. The aim of this study was to compare the clinical characteristics of NVAF patients taking NOACs or Vitamin K antagonists (VKA) in Italy and in the other Western Europe Countries (OWE).

**Methods.** The Global Registry on Long-Term Antithrombotic Treatment in Patients with Atrial Fibrillation (GLORIA-AF) Registry Program is a large, global, prospective study, involving newly diagnosed AF patients with ≥1 stroke risk factors. The registry consists of three overlapping phases. Present analysis refer to the baseline characteristics in GLORIA-AF Phase III, including all eligible patients, independently of the prescribed OAC. Patients were also stratified into two age-groups (<75 and ≥75 years). Comparisons of baseline characteristics and antithrombotic therapy between Italy and OWE were based on standardized differences (SD; unbalanced distributions for values >0.10).

**Results.** Between 2014 and 2016, 9135 (43.0%) patients out of 21,248 in Phase III were enrolled from Western European countries. Italian and OWE subjects were 1378 and 7757, respectively. Patients in the age group of ≥75 years were 47.8% (N= 659) and 44.8% (N= 3473) for Italy and OWE, respectively. No differences in age, gender and TE risk were noticed by area of origin both in the younger (Italy - age: 65±8 years; men: 61.5%; $CHA_2DS_2$-VASc score: 2.4±1.2 / OWE - age: 65±7 years; men: 61.5%; $CHA_2DS_2$-VASc score: 2.5±1.2) and in the older (Italy - age: 81±5 years; men: 45.8%; $CHA_2DS_2$-VASc score: 4.2±1.2 / OWE - age: 81±5 years; men: 48.1%; $CHA_2DS_2$-VASc score: 4.3±1.3) group. In the whole population, OAC was less adopted in Italy compared to OWE (84.0 vs. 90.6%, SD=-0.20). Regarding the <75 years group, OAC was prescribed less frequently in Italian than in OWE patients (80.4 vs. 90.2%; SD=-0.28). This was especially true for NOACs (49.8 vs. 67.6%; SD=-0.37). Also the use of antiplatelet therapy (9.0 vs. 4.6%) and the lack of any anti-thrombotic drug (10.6 vs. 5.2%) were more common in the younger Italian subjects. In the ≥75 years population, no differences existed between Italy and OWE in the prescription of oral anticoagulants (87.9 vs. 91.1%) and, especially, of NOACs (60.5 vs. 63.5%). The proportion of those taking antiplatelets did not differ between older Italian and OWE (6.4 vs. 4.9%) subjects; the same was true for those not receiving any drug (5.8 vs. 4.0%). On the whole, lower dosages of NOACs were more frequently found in Italian patients as compared to OWE patients, particularly in those treated with rivaroxaban 15 mg QD (29.8 vs. 16.6%; SD=0.32) and apixaban 2.5 mg BID (28.6 vs. 20.2%; SD=0.20). Small differences were observed for dabigatran 110 mg (47.2 vs. 40.7%; SD=0.13). These findings can be explained by a more frequent use of the lower NOACs doses in ≥75 years Italian patients. Proton pump inhibitors (PPI) for gastric protection were more often chosen in Italy than in OWE (43.0 vs. 29.0%; SD=0.30) independently of age and OAC.

**Conclusions.** GLORIA-AF Phase III results show the existence of relevant differences in OAC use between Italy and other Western European Countries. Older Italian NOACs users more often receive the lower dosages of the drugs. The prevalence of those not taking anticoagulants is still high, highlighting the importance of a better AF management in routine clinical practice.

### A41: CARDIAC RESYNCHRONIZATION THERAPY IN PATIENTS WITH PERMANENT ATRIAL FIBRILLATION

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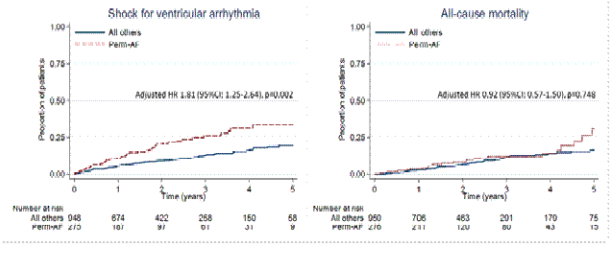
(a) AZIENDA OSPEDALIERA UNIVERSITARIA FEDERICO II; (b) CLINICA MONTEVERGINE; (c) OSPEDALE MONALDI; (d) OSPEDALE VITO FAZZI; (e) OSPEDALE MATER SALUTIS; (f) SPEDALI CIVILI; (g) OSPEDALI RIUNITI; (h) OSPEDALE DI CIRIÈ; (i) OSPEDALE SAN FILIPPO NERI; (j) AO PUGLIESE-CIACCIO; (k) FONDAZIONE DI RICERCA E CURA GIOVANNI PAOLO II; (l) POLICLINICO VITTORIO EMANUELE PO FERRAROTTO; (m) POLICLINICO SANT'ORSOLA-MALPIGHI; (n) OSPEDALE DI CIRCOLO E FOND MACCHI; (o) OSPEDALE DI LODI; (p) BIOTRONIK ITALIA; (q) OSPEDALE SAN RAFFAELE; (r) VILLA MARIA CARE&REASEARCH; (s) VILLA MARIA CARE&RESEARCH

**Introduction.** The benefits of cardiac resynchronization therapy with defibrillator (CRT-D) in heart failure are well established. However, a gap of evidence is still present for patients with permanent atrial fibrillation (perm-AF).

**Methods.** We used the Home Monitoring Expert Alliance database, a nationwide data repository of remote monitoring transmissions, to investigate outcomes of CRT-D patients with perm-AF in terms of appropriate shock for ventricular arrhythmia and all-cause mortality in a long-term time horizon. The episodes with delivered shock were adjudicated by a board of 3 electrophysiologists.

**Results.** Among 1226 CRT-D patients (mean age 71.2±10.0 years; 75.5% males), 276 (22.5%) had perm-AF at device implantation. These patients had more frequently rate responsive function (19.7% vs 64.1%) and higher basic rate (median value 60 bpm vs 70 bpm) as compared to all other patients (p<0.001). The CRT pacing percentage calculated over the first 2 months was slightly lower for perm-AF patients (median value 96.0% vs 98.8%, p<0.001). At 5-year appropriate shock incidence was 34.2% (95% confidence interval [CI], 25.1%-45.3%) for perm-AF and 19.9% (15.6%-25.1%) for all other patients. All-cause mortality was 27.7% (17.7%-41.8%) for perm-AF and 15.6% (12.2%-19.9%) for all other patients. The age- and sex-adjusted hazard ratio between perm-AF and all other patients was 1.81 (95% CI: 1.25-2.64, p=0.002) for appropriate shock and 0.92 (95% CI: 0.57-1.50, p=0.748) for all-cause mortality.

**Conclusions.** Although a higher incidence of appropriate shock, perm-AF at the time of CRT-D implantation was not associated with increased long-term mortality.




### A42: IPERTERMIA, TERAPIA ANTIEPILETTICA E PATTERN BRUGADA: UN CASE REPORT

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La sindrome di Brugada è una patologia autosomica dominante a penetranza incompleta dovuta ad una disfunzione dei canali del sodio, caratterizzata da alterazioni elettrocardiografiche tipiche nelle derivazioni precordiali destre. È associata ad aritmie maggiori e a morte improvvisa. La comparsa delle alterazioni elettrocardiografiche diagnostiche in molti casi non è costante e spesso riscontrabile secondariamente a stimoli provocativi in grado di esacerbare la disfunzione nei canali del sodio come l'ipertermia o stimoli farmacologici che possono portare anche all'induzione di eventi aritmici. Da qui la necessità di identificare i fattori trigger al fine di prevenire l'induzione nei soggetti affetti di aritmie maggiori. L'ipertermia è stata da tempo identificata come uno dei fattori in grado di slatentizzare le mainfestazioni patologiche, così come sono riportati in letteratura dati che correlano casi di epilessia e Sindrome di Brugada. Giungeva alla nostra osservazione un paziente sottoposto in giovane età a ripetuti interventi neurochirurgici per cisti cerebrale endodermica disontogenica in sede frontale destra recidivante in terapia con levetiracetam e carbamazepina che nel 2013 accedeva al pronto soccorso per crisi epilettica durante episodio di ipertermia. Ai controlli elettrocardiografici seriati si documentava pattern Brugada tipo 1 ("Coved") persistente durante febbre che regrediva con la defervescenza. Da allora il paziente veniva sottoposto a controlli cardiologici periodici senza più alcun riscontro di alterazioni sospette per Brugada. A Maggio 2019 veniva quindi ricoverato presso il nostro centro per essere sottoposto a test provocativo con flecainide. Al momento del test il paziente era in trattamento con levetiracetam, aloperidolo e

topiramato. Alla somministrazione del farmaco eseguita secondo protocollo 2 mg/Kg in 15 minuti con monitoraggio elettrocardiografico continuo anche in II spazio intercostale si assisteva a slatentizzazione di pattern Brugada tipo 2 ("Saddle Back"), senza evidenza di pattern tipo 1 ("Coved"). Veniva quindi consigliato al paziente di trattare precocemente l'ipertermia, di evitare terapie antiepilettiche correlate con la Sindrome di Brugada, e di proseguire il follow-up annuale con monitoraggio Holter 12 derivazioni e visita cardiologica. Il risultato negativo del test nonostante l'evidenza di pattern "Coved" durante l'esposizione ad altri fattori trigger, ci permette di soffermarci sull'importanza dei fattori ambientali nella slatentizzazione delle manifestazioni di questa patologia e di quanto sia importante il peso dei falsi negativi nello studio di tale condizione attraverso il test farmacologico provocativo.

## ARITMIE – 3
## Sessione Poster

### A43: NON TUTTI I DECUBITI VENGONO PER NUOCERE

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Donna di 83 anni portatrice di loop recorder per episodi lipotimico/sincopali sottoposta ad impianto di Reveal XT a settembre 2018. Al primo controllo telemetrico a sei mesi nessun episodio significativo. A maggio 2019 ricovero per decubito secco non infetto del loop recorder per pelle molto sottile. All'ECG: "Ritmo sinusale con frequenza di 66 b/m'. Lieve deviazione assiale sinistra. Lievi turbe della conduzione intraventricolare sinistra". All'Ecocardiogramma:"Ventricolo sinistro di normali dimensioni, lievemente ipertrofico, normocontrattile (FE=60%). Cavità destre nei limiti". All'interrogazione telemetrica riscontro di episodi di BAV completo parosssitico con pause di max 5.6 sec. Nel caso clinico in questione (serendipity), Il ricovero per decubito del loop recorder, ha permesso il precoce riconoscimento del BAV parossistico, rispetto ai controlli pogrammati dal follow up del dispositivo. La paziente è stata sottoposta ad impianto di pacemaker bicamerale e a rimozione del loop recorder. L'RX torace dopo impianto di pacemaker evidenzia:"Segni radiologici di broncopatia cronica di tipo misto. Non evidenti lesioni parenchimali a focolaio in atto. Seni costo-frenici liberi. Ectasico e parzialmente calcifico l'arco aortico. Immagine cardiaca nei limiti. PMK ben posizionato". Dimessa con diagnosi di: "Impianto di pacemaker bicamerale in soggetto con BAV parossistico. Cardiopatia ipertensiva. Decubito aperto di tasca di loop recorder. Espianto di loop recorder" e terapia a base di Ramipril 2.5 mg, Furosemide 25 mg, Acido acetilsalicilico 100 mg, Lansoprazolo 30 mg, Cafixima 400 mg 1 cp per 5 giorni. La paziente viene inserita nel programma di follow up di controllo di pacemaker con primo controllo a un mese.

### A44: ANALISI E CARATTERIZZAZIONE DEL SUBSTRATO ELETTRICO DURANTE TACHICARDIA VENTRICOLARE IN PAZIENTI ISCHEMICI SOTTOPOSTI A MAPPAGGIO AD ALTA DEFINIZIONE

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**Introduzione.** Nei pazienti ischemici il potenziale sviluppo di aritmie ventricolari è determinato dalla presenza di aree di tessuto cicatriziale. La caratterizzazione delle zone di rallentata conduzione del segnale elettrico a livello di tali aree di scar non è ben definita.
**Obiettivi.** Caratterizzare le proprietà elettrofisiologiche di conduzione lungo l'intero circuito di rientro di aritmie ventricolari sostenute, monomorfe nei pazienti ischemici.
**Metodi.** Pazienti con storia di cardiopatia ischemica ed episodi ricorrenti di tachicardia ventricolare (TV) monomorfa sono stati sottoposti a mappaggio endocavitario ad alta definizione con il sistema di mappaggio Rhythmia. Gli EGMs sono stati analizzati da due elettrofisiologi (LRL e AF) in cieco. Le mappe sono state esportate su MATLAB per l'esecuzione di un analisi automatizzata e obiettiva per il calcolo automatico delle velocità di conduzione.
**Risultati.** 6 pazienti (5M, 1F; 62.8 ±16.0 anni) sono stati studiati con mappaggio ad alta definizione. In ritmo sinusale l'inner loop presentava voltaggio simile all'outer loop (0.32 mV vs 0.38 mV; p=0.8). La zona con piu basso voltaggio e minor velocità di conduzione di tutto il circuito era l'entrance (0.23 mV and 12.8 m/S) mentre le velocità piu elevate venivano registrate a livello dell'outer loop (38 cm/s). Il numero medio di aree di conduzioni rallentata riscontrato è stato di 3.5 per circuito (range min 3, massimo 5). Aree di rallentata conduzione si verificavano sempre all'entrance e all'exit, cosi come a livello dell'outer loop (da 1 a 3 volte). 5 pazienti avevano un double loop, due pazienti invece un single loop.
Il frazionamento degli EGMs avveniva maggioramento a livello delle aree di rallentamento mentre si osservava frazionamento dei potenziali (LAVA o LP) anche nell'outer loop a livello delle zone di rallentamento.
**Conclusioni.** L'analisi automatica documenta la presenza di aree di rallentata conduzione sia a livello dell'istmo che lungo l'outer loop. Il frazionamento degli EGMs avviene in corrispondenza delle aree di rallentamento.

### A45: LA MEXILETINA NEL TRATTAMENTO DELLE ARITMIE VENTRICOLARI RECIDIVANTI E REFRATTARIE A TERAPIA FARMACOLOGICA CONVENZIONALE

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The antiarrhythmic therapy of recurrent ventricular arrhythmias in patients having undergone catheter ablation and in whom amiodarone or beta blockers were ineffective or contraindicated, is an important issue. The present study sought to evaluate the efficacy and tolerability of mexiletine in a relatively small sample of patients with recurrent ventricular arrhythmias, when the standard therapy strategy failed.
All patients treated with mexiletine for recurrent ventricular tachycardia (VT) or ventricular fibrillation (VF) in our institution between January 2010 and May 2019 were enrolled. The primary endpoint was the total number of VT/VF episodes after the start of mexiletine therapy. Secondary endpoints were total number of ICD therapies and discontinuation of therapy. The events occurring during mexiletine treatment were compared with a matched duration period before the start of mexiletine therapy. Patients served as self-controls.
A total of 29 consecutive patients (23 males, 79.3%; mean age 66.0±16.3 years) were included in our retrospective analysis. The mean time of mexiletine treatment was 17.8±22.3 months (median 13 months; interquartile range [IR]: 3–23.5 months). Mexiletine therapy significantly decreased VT/VF episodes (65 vs 8 episodes; median and IR: 2 [1-3] vs 0 [0-0]; p<0.0001) and ICD interventions (112 vs 16 interventions; median and IR: 1 [0-3.5] vs 0 [0-0]; p=0.006) in comparison with a matched period before mexiletine treatment. Only 4 patients (13.8%) presented severe side effects requiring discontinuation of therapy.
Mexiletine was associated with a significant decrease of ventricular arrhythmias and ICD therapies showing a good profile of tolerability.

### A46: PASSIVE-FIXATION DUAL CHAMBER PACEMAKER IMPLANTATION IN A PATIENT WITH UNKNOWN PERSISTENT LEFT SUPERIOR VENA CAVA

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Among great vessels congenital abnormalities, persistence of the left superior vena cava (PLSVC) emptying into the coronary sinus is the most common and it is an important cause of catheter instability and dislodgements. An active-fixation system and sometimes epicardial pacing may be necessary to maintain leads stability.
A 85-year-old man was submitted to permanent dual-chamber pacemaker because of recurrent lipotimia, dizziness, fatigue and documentation of intermittent sinus bradycardia less than 40 bpm and sinus pauses more than 3 seconds at 24-hour Holter recording. The incision was made in the left pectoral region and the left cephalic vein was isolated in order to introduce both bipolar ventricular and, later, atrial electrode. Fluoroscopy during implantation revealed that ventricular catheter (Boston Scientific, Ingevity MRI 7732-59 cm, USA) followed an abnormal course along the left border of the thoracic spine and entered the right atrium after passing through the coronary sinus. We formed a wide loop in the right atrium in order to successfully advance the ventricular lead into the right ventricular apex. A stable ventricular pacing threshold of 0.2 V x 0.5 msec was obtained with the lead tip located in the right ventriclular apex, ventricular pacing impedance was 830 ohms and R-wave amplitude was 7.0 mV. The J-shaped atrial lead (Boston Scientific, Ingevity MRI 7736-52 cm, USA) was positioned with the stylet softly curved into right atrial appendage in which it was fixed passively after maneuvers to make its terminal part adherent to the lateral wall of the right atrium in order to give it greater stability. Atrial pacing threshold was 1.3 V x 0.5 msec, pacing impedance was 606 ohms and P-wave amplitude was 2.7 mV. Finally, generator Accolade MRI DR Pacemaker (Boston Scientific, USA) was been inserted in a left pectoral pocket and connected to the leads. The following day a fluoroscopy was performed ruling out an early dislodgement of the electrodes and a venography documented the PLSVC. The electronic follow-up of the device performed one week after implantation and also 40 days later showed the stability and validity of the sensing and pacing parameters. Furthermore, 40 days after implantation, the patient also underwent a further fluoroscopy in the same antero-

posterior projection which excluded macro-dislodgement of both electrodes.
In our case passive-fixation atrial and ventricular catheter were successfully implanted and have given till now (40 days after pacemaker implantation) good short-term pacing and sensing data.
Therefore, although the use of active fixation catheters in the case of PLSVC is widespread and shared, we believe that the use of passive-fixation catheters can be a valid alternative as long as their implantation does not prove difficult and at the same time stable positions togheter with ideal electrical parameters can be obtained.

### A47: ROLE OF STRATEGIC PROGRAMMING OF DETECTION AND THERAPY PARAMETERS IN IMPLANTABLE CARDIOVERTER-DEFIBRILLATOR IN PATIENTS WITH ELECTRICAL STORM

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**Introduction.** Considering that approximately 1–2 % of the adult population in developed countries suffer from heart failure (HF) and that at least half of these patients have a low ejection fraction, the number of ICD carriers is wide spreading. For these reasons, electrical storm (ES) is an increasingly frequent cause of access to emergency department. Considering current definition, the incidence of ES varies from 4 to 28 % in a follow-up period between 1 and 3 years. ES is definitely a medical emergency requiring a multidisciplinary approach. ICD uses mathematical algorithms defined by the manufacturer to discriminate life-threatening ventricular arrhythmias from (supraventricular arrhythmias (SVA) and delivers appropriate therapy. The operator interfaces with the ICD through a programmer able to communicate with the device. Each manufacturer uses a different programmer, so it is imperative to know the manufacturer and use the right equipment.
**MethodS.** Our retrospective experience included 23 patients (mean age 67 years, 90 % male) admitted for ES during the period 2009–2019. The mean interval from implant to ES was 48 months. Ischemic heart disease was present in 13, non-ischemic cardiomyopathy in 8, and other etiologies in 2, and 90 % of patients had been treated with ICD for secondary prevention. Mean ejection fraction was 35 %. In 15 patients the arrhythmia at admittance was incessant VT, while the remaining 8 experienced several VT/VF episodes, with a mean number of 6 shocks per patient. In more than half of patients (15), there wasn't a clear trigger and the ES rises from a primitive electrical instability. In the remaining the most frequent triggers were worsening heart failure, electrolyte imbalances, myocardial ischemia, proarrhythmic drug side effects and biventricular pacing. Initial diagnostic workup includes physical examination, electrocardiogram, chest X-ray, echocardiogram, blood gas analysis, electrolytes, serum creatinine evaluation, and ICD interrogation. The first issue to assess in a patient with multiple ICD shocks is to escluded inappropriate shocks(oversensing, atrial arrhythmias, lead fracture). The emergency strategic therapeutic protocol including: antiarrhythmic drugs, sympatholytic therapy, sedation and anxiolytic therapy, external cardioversion or defibrillation, ICD disabled by magnet, repogramming ICD: LV lead off, adjust RV-LV offset, lower FV detection rates, reduced detection time, PTCA / PCI, external cardiopulmonary support (ECMO or IMPELLA).
**Results.** With the ICD reprogramming we observed a significant decrease in the number of total ICD shock and significant increase in appropriate ATP in emergency department (all $P > 0.05$). 4 pts (17,4 %) death during the emergency period.
**Conclusions.** The ES in the end highlights the limits of the ICD's treatment in the prevention of sudden arrhytmic death. In fact even though the ICD interrupts the potentially fatal incessant arrhytmias can't remove the cause at the bottom of the complication. Placing a magnet on an ICD will stop the ICD from delivering shocks. It will have no effect on the ICD's pacing capabilities. This is a point of significant practice variation. In general, unless the patient has decided to change their goals of care, we want the ICD to shock. It is saving the patient's life. However, occasionally an ICD will be firing inappropriately. This can happen with rapid sinus tachycardia, because the ICD only detects the rate, not the specific rhythm.

### A48: VALIDATION OF EPICARDIAL VENTRICULAR TACHYCARDIA CRITERIA THROUGH LEFT VENTRICULAR PACING IN PATIENTS WITH NON-ISCHAEMIC DILATED CARDIOMYOPATHY: INSIGHTS FROM A CARDIAC RESYNCHRONIZATION THERAPY COHORT

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56 ECGs during pacing from epicardial and endocardial sites were collected in 28 patients with CRT. Discriminatory power of the following criteria were tested: q wave in lead I, no q waves in inferior leads, pseudo-delta wave ≥ 75 msec, maximum deflection index ≥ 0.59. We used logistic regression and receiver operating characteristic (ROC) curve analyses to evaluate diagnostic performance of each component and their combinations.Results: all the criteria showed a significant diagnostic performance (ROC areas ranging from 0.625 to 0.768, all p<0.0001).
The combination of the 4 criteria into the same algorithm for pace map localization proved a ROC area of 0.886 (95% CI: 0.811 – 0.962) and an Akaike information criterion (AIC) of 50.54.
Nevertheless, the combination of only 2 criteria (pseudo-delta wave ≥ 75 msec + no q waves in inferior leads) proved a similar diagnostic performance (ROC area: 0.838, 95% CI: 0.742 – 0.934; AIC = 53,92; chi-square=1.04; p=0.307 for comparison).Conclusions: 2-step algorithm (pseudo-delta wave ≥ 75 msec and/or no q waves in inferior leads) may be useful in clinical practice to diagnose epicardial VT.
The combination of only 2 criteria* proved a similar diagnostic performance when compared to 4-step algorithm. ROC area: 0.838, 95% CI: 0.742 – 0.934; AIC = 53,92 p=0.307 for comparison.

**Diagnostic performance of components**

| | ROC area | 95% CI |
|---|---|---|
| q wave in lead I | 0.768 | 0.658 – 0.878 |
| no q waves in inferior leads | 0.696 | 0.591 – 0.802 |
| pseudo-delta wave ≥ 75 msec | 0.625 | 0.507 – 0.743 |
| maximum deflection index ≥ 0.59 | 0.696 | 0.578 – 0.814 |

**Predictors of EPI origin (multivariable logistic regression analysis)**

| Variable | Coef. | z | p |
|---|---|---|---|
| No Q inferior* | 3.06712 | 3.11 | 0.002 |
| pseudo-delta wave ≥ 75 msec* | 3.597446 | 2.83 | 0.005 |
| maximum deflection index ≥ 0.59 | 2.181372 | 2.14 | 0.032 |
| q wave in lead I | 1.743333 | 2.09 | 0.037 |

### A49: THE LOWER RATE LIMIT IN PM RECIPIENTS: AN ARRHYTHMIC COMPLICATION DURING AUTOMATIC MODE SWITCHING

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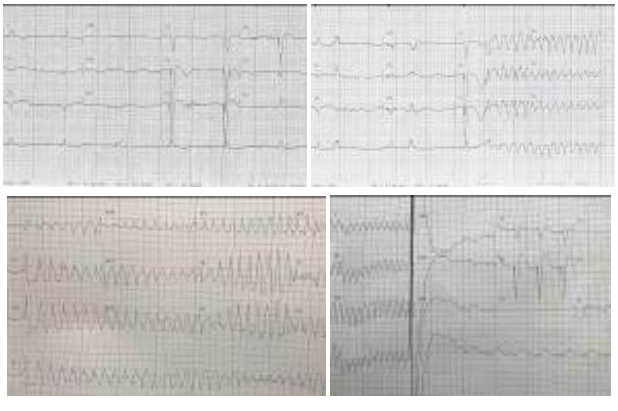
**Introduzione.** Il blocco atrio ventricolare parossistico rappresenta una delle principali indicazioni all'impianto di pacemaker (PM) bicamerale. In assenza di disfunzione del nodo del seno è appropriato programmare il device con un lower rate limit (LRL) inferiore a 50 bpm, allo scopo di preservare l'attività spontanea del nodo del seno, ridurre il rischio di tachiaritmie atriali, preservare la conduzione AV spontanea riducendo il rischio di evoluzione del blocco con dipendenza dal PM. A seconda del costruttore, in alcuni PM il LRL programmato in modalità DDD resta invariato dopo automatic mode switching (AMS), in altri è possibile programmare un LRL dedicato dopo AMS.
**Caso clinico.** un uomo di 76 anni viene ricoverato per stenosi valvolare aortica severa sintomatica trattata con valvuloplastica aortica percutanea complicata da BAV di alto grado parossistico richiedente impianto di pacemaker bicamerale. Il paziente è in ritmo sinusale e non ha storia di fibrillazione atriale. Il pacemaker Azure (Medtronic inc. MN, USA) viene programmato in modalità DDD con LRL a 35 bpm. Nel corso della degenza al monitoraggio ECG si documenta insorgenza di fibrillazione atriale con blocco AV e ritmo stimolato da pacemaker alla frequenza cardiaca di 35 bpm (1), associato a battiti ectopici ventricolari isolati. Dopo pochi minuti il paziente perde coscienza a causa di una tachicardia ventricolare polimorfa (2,3) che viene trattata prontamente con defibrillazione esterna efficace (4), con ripristino del ritmo sinusale.



È stato successivamente incrementato il lower rate limit a 60 bpm con assenza di recidive aritmiche ai controlli successivi. Analizzando l'evento, l'insorgenza di fibrillazione atriale con blocco ha provocato lo switch mode del PM da DDD a DDI, con stimolazione al LRL di 35 bpm, in un dispositivo Medtronic. Per coesistenza di battiti ectopici ventricolari (intervallo di accoppiamento di 600 ms), si è verificata una sequenza short-long-short con prolungamento del QT (fino a 720 ms) che ha generato una early afterdepolarization con innesco di una TV polimorfa.
**Discussione.** La bradicardia è una causa comune di prolungamento del QT, e specialmente in corso di stimolazione ventricolare ed intervalli R-R irregolari, può occasionalmente risultare in una tachicardia ventricolare polimorfa. Questa complicanza è riportata anche nel cambio di modo AAI□DDD in pazienti con disfunzione del nodo del seno: la tolleranza del fenomeno di Wencheback comporta intervalli R-R molto lunghi che possono promuovere torsione di punta. L'AMS alla LRL può essere utile per rendere il paziente sintomatico per insufficienza cronotropa dopo insorgenza di FA, dove non è disponibile il monitoraggio remoto. Altri costruttori permettono di impostare un LRL dedicato durante AMS, programmabile a determinate frequenze cardiache, offrendo protezione verso le aritmie bradicardia-relate.

### A50: EFFICACIA E SICUREZZA A LUNGO TERMINE DELLA STIMOLAZIONE CARDIACA SENZA FILI IN UN CENTRO DI RIFERIMENTO PER ESTRAZIONE DI ELETTROCATETERI: CONFRONTO CON PACEMAKER TRANSVENOSI MONOCAMERALI

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**Obiettivo.** La stimolazione cardiaca senza fili appare una tecnologia promettente in termini di efficacia e sicurezza. L'obiettivo di questo studio è valutare la sicurezza e la performance a lungo termine del pacemaker senza fili Micra in confronto ai pacemaker transvenosi (PM-TV) monocamerali, in un centro ad alto volume di estrazioni di elettrocateteri.
**Metodi.** Tra maggio 2014 e aprile 2019, 100 pazienti (gruppo 1) sono stati sottoposti ad impianto di Micra nel nostro centro (Azienda Ospedaliero-Universitaria Pisana, U.O.C. Cardiologia 2). Abbiamo identificato 100 pazienti portatori di PM-TV VVI (gruppo 2), impiantati nel nostro centro tra febbraio 2013 e dicembre 2018, per un confronto 1:1 senza differenze tra i due gruppi in termini di età (gruppo 1: 77,46 ± 9,58 anni; gruppo 2: 78,78 ± 9,78 anni; P = 0,12), sesso (maschi gruppo 1: 77%; gruppo 2: 67%; P = 0,16), frazione di eiezione ventricolare sinistra (gruppo 1: 56,25 ± 7,6%; gruppo 2: 54,85 ± 6,75%; P = 0,11), percentuale di pazienti sottoposti a precedente espianto di dispositivo transvenoso (gruppo 1: 18%; gruppo 2: 30%; P = 0,069) e durata del follow-up (gruppo 1: 16,78 ± 18,03 mesi, mediana 12, range interquartile 1-24; gruppo 2: 19,28 ± 17,71 mesi, mediana 12, range interquartile 6-36; P = 0,20).
**Risultati.** La procedura di impianto è stata portata a termine con successo in tutti i pazienti di entrambi i gruppi. Nel gruppo 1 la procedura ha richiesto una minor durata (43,86 ± 22,38 vs 58,38 ± 17,85 min.; P < 0,001) ma un utilizzo più prolungato della scopia (12,25 ± 6,84 vs 5,32 ± 4,42 min.; P < 0,001), mentre non si sono osservate differenze in termini di sede (settale o apicale) di impianto (setto gruppo 1 vs gruppo 2: 76% vs 86%; P = 0,10). Nel gruppo 1 non si sono verificate complicanze in acuto né durante follow-up; nel gruppo 2 si sono verificate 7 complicanze in acuto (7%, P = 0,02) e 3 in cronico (3%, P = 0,24) e un totale di 6 revisioni chirurgiche (6%, P = 0,038). È stata osservata una sola complicanza infettiva nel gruppo 2 (1%). I parametri elettrici si sono mantenuti stabili durante il follow-up, con buoni valori di soglia, impedenza e sensing in entrambi i gruppi.
**Conclusioni.** L'impianto del Micra è una procedura sicura ed efficace, con una minor incidenza di complicanze in acuto e di reinterventi rispetto ai PM-TV VVI e stabilità dei parametri elettrici a lungo termine.

### A51: IL RUOLO DELLA DIAGNOSI DI FIBRILLAZIONE ATRIALE ASINTOMATICA NELLA PREVENZIONE DELL'ICTUS CRIPTOGENETICO. DUE CASI CLINICI E ALCUNE OSSERVAZIONI

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**Introduzione.** La fibrillazione atriale (FA) è l'aritmia cardiaca sostenuta più comune. La sua prevalenza nella popolazione generale è variabile e aumenta progressivamente con l'età. La prevalenza di FA asintomatica è sconosciuta, essendo esclusivamente dipendente dai mezzi diagnostici utilizzati per il suo rilevamento: il sistema di monitoraggio non continuo (Holter) ha dimostrato di essere poco efficace nel rilevare questa aritmia. Più dura la registrazione, più aumenta la sensibilità nella ricerca di aritmie (registratori di loop impiantabili, memorie di pace-maker). L'ictus è la terza causa di morte e la principale causa di disabilità negli adulti. La maggior parte (75-80%) di tutti gli ictus ha origine ischemica. Si chiama criptogenico quando viene dimostrata l'origine ischemica, ma la ricerca di cause non dà risultati. Circa un terzo (30-40%) degli ictus ischemici è criptogenetico. Pertanto, non vi è dubbio che una percentuale significativa dei cosiddetti stroke criptogenici potrebbe essere correlata ad una FA asintomatica. L'ictus ischemico, quando associato a FA, ha una prognosi peggiore in termini di mortalità e disabilità rispetto ad un ictus senza FA. Inoltre, la FA asintomatica ha lo stesso rischio tromboembolico della FA sintomatica, e non vi è alcuna differenza tra il rischio tromboembolico associato alla FA parossistica, persistente o permanente. Studi di monitoraggio ECG continuo eseguiti su pazienti con ictus criptogenetico mostrano un'alta prevalenza di FA, anche a breve termine. I dati sulla rilevazione di FA asintomatica nella prevenzione dell'ictus criptogenetico sono carenti in letteratura. Quando rilevata, la FA ha mostrato un rischio più elevato di eventi tromboembolici se è associata ad altri fattori di rischio embolico come età avanzata, ipertensione arteriosa, diabete mellito, ictus o storia di TIA, insufficienza cardiaca, sesso femminile, malattia vascolare (punteggio CHA2-DS2-VASc. L'adozione della terapia anticoagulante ha dimostrato di essere efficace per prevenire l'ictus associato alla FA. Da ciò possiamo dedurre che esiste ancora un'alta percentuale di pazienti con ictus criptogenico causati da fibrillazione atriale asintomatica per i quali non sono disponibili strumenti diagnostici adeguati né una stratificazione adeguata per il rischio embolico. Allo stato attuale, la prevalenza di questa associazione è sconosciuta, e in primo luogo non ci sono linee guida precise per quanto riguarda la prevenzione primaria di ictus criptogenetico associato a fibrillazione atriale asintomatica. Infatti, le ultime linee guida europee suggeriscono che il rilevamento della FA silente può essere preso in considerazione nei pazienti affetti da ictus attraverso un monitoraggio prolungato dell'ECG o un registratore impiantabile (IIa; B), mentre lo screening per rilevare la FA mediante ECG può essere considerato in pazienti di età superiore a 75 anni o ad alto rischio di ictus (IIb)
**Casi clinici.** Descriviamo due casi in cui gli eventi tromboembolici possono essere correlati alla FA asintomatica. *Caso A:* un uomo di cinquantacinque anni, obeso, ha presentato un TIA in assenza di lesioni strutturali cardiache e carotidee. Un Holter ECG eseguito non ha mostrato tachiaritmie. È stato trattato con Aspirina. Sei mesi dopo, nel maggio 2018, si è verificato un nuovo evento di TIA, questa volta mostrando una FA misconosciuta. Ha subito cardioversione elettrica a ritmo sinusale, dopo un adeguato periodo di anticoagulazione. Pertanto, è stato dimesso con terapia anticoagulante orale. *Caso B:* una donna di ottantuno anni, con una storia di precedente episodio di FA (2006), precedente IMA (2010), insufficienza cardiaca (E.F.:40%) e precedente ictus ischemico in assenza di aterosclerosi carotidea. Nel febbraio 2018 nuovo evento di TIA, con il riscontro di FA silente. È stata cardiovertita a ritmo sinusale con farmaci antiaritmici e quindi dimessa con terapia anticoagulante orale.
**Domande.** In questi due casi, si sarebbero potuti prevenire gli ultimi episodi di TIA con un'appropriata e tempestiva terapia anticoagulante? Nel caso A, l'uomo avrebbe potuto essere trattato con anticoagulanti se si fosse trovata la FA, mentre nel caso B, l'anticoagulante era già indicato poichè il paziente aveva una storia di FA e un alto rischio di eventi tromboembolici (punteggio CHA2-DS2-VASc: 5). In secondo luogo, avremmo potuto in questi due casi prevenire anche il primo evento ischemico? Bene, mentre nel caso B la terapia anticoagulante era già indicata dopo il precedente episodio di FA, nel caso A anche se abbiamo trovato FA, la terapia anticoagulante non era indicata (punteggio CHA2-DS2-VASc: 0); tuttavia, quest'ultimo paziente ha avuto un TIA.
**Conclusioni.** Questi due casi suggeriscono che un esame clinico accurato e tempestivo potrebbe aiutare a individuare pazienti che potrebbero trarre beneficio dalla terapia anticoagulante, ma tuttavia ci sono "aree grigie" di trattamento, che potranno essere probabilmente superate con una maggiore conoscenza nella patogenesi del tromboembolismo correlato alla FA.

### A52: PERMANENT HIS BUNDLE PACING IN A PATIENT WITH ATRIOVENTRICULAR NODAL DISEASE AND VENTRICULAR ARRHYTHMIAS

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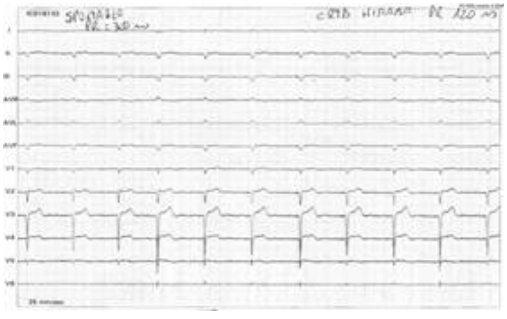
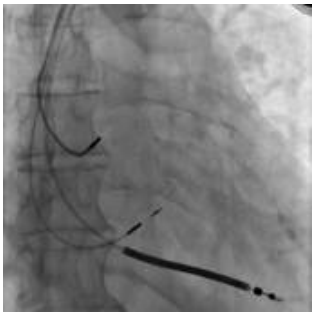
**Background.** Cardiac resynchronization therapy (CRT) with biventricular pacing (BVP) can mitigate the negative effects of RVAP on myocardial performance; however, it has not been universally beneficial and is not feasible in some patients. His bundle pacing (HBP) has recently emerged as a promising approach to achieving physiologic ventricular pacing and improving patient outcomes.
**Case presentation.** A 75-year-old man with a history of hypertension, diabetes mellitus and paroxysmal AFib, treated with repeated electrical cardioversion, was admitted to the cardiology department because of recent onset of dyspnea with marked limitation of physical activity (NYHA III). A 24-h Holter monitoring showed ventricular arrhythmias (frequent premature contraction and non-sustained ventricular tachycardia) and marked first-degree AV block (PR interval 340 ms). Vital parameters were within normal limits and physical examination was unremarkable. Surface electrocardiogram (ECG) showed normal sinus rhythm with marked first degree AV block (PR interval 340 ms), normal IV conduction and QS complexes in DII, DIII, aVF and poor R progression in precordial leads.

Echocardiography showed global hypokinesis with reduced left ventricular function (EF= 35%). Coronary angiography was performed revealing three vessels disease with severe stenotic lesion of LAD, CX and RCA. Four DES were successfully implanted. Because of the ischemic HFrEF with no possibilities of treatment titration because of conduction disease and the need for antiarrhythmic therapy, a CRTD was considered. In view of baseline ECG characteristic His bundle pacing was performed. We used Medtronic 3830 His lead with C315 delivery system. A selective his bundle pacing (SHBP) with narrow QRS was obtained. The patient was discharged after 2 days receiving optimal medical therapy. Three months later thresholds were stable and LVEF was increased.





**Discussion and conclusions.** Permanent HBP was feasible with high success rates in patients requiring CRT. HBP was associated with significant narrowing of QRS and improvement in LV function. HBP can be an excellent alternative to BVP in patients who fail LV pacing and as a primary option in patients with narrow QRS at baseline and high RV pacing burden due to AV nodal disease or AV nodal ablation, like in the case of our patient. Future randomized studies are essential to understand the role of HBP compared to BVP in achieving CRT.

### A53: ECG ABNORMALITIES, ATRIAL FIBRILLATION AND AV BLOCKS IN ATTR VS AL AMYLOIDOSIS: AN ELECTROPHYSIOLOGICAL NATURAL HISTORY

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**Background.** Electrocardiographic (ECG) and rhythm abnormalities are common in patients affected by light-chain (AL) and transthyretin (TTR) cardiac amyloidosis (CA) but systematic comparisons between the two are lacking. The purpose of this study was to assess the arrhythmic profile and the prevalence of ECG abnormalities in the two main types of CA, both at the time of diagnosis and during long-term follow-up.

**Methods.** Standard 12-lead ECG recordings and clinical files from two referral Amyloidosis Centers in Florence and Pavia were reviewed. Relevant findings regarding rhythm (sinus rhythm vs atrial fibrillation [AF]), grade I or greater atrio-ventricular (AV) delays, intraventricular conduction abnormalities, low voltage QRS and pseudonecrosis pattern were reported. Patients with paced rhythm were included in the analysis and clinical data about pacemaker (PM) implantation were reported.

**Results.** A total of 244 patients were included in the study (106 with AL and 138 with ATTR-related CA). At baseline AL patients were younger and showed more often a NYHA class III, while ATTR subjects showed thicker left ventricular (LV) walls, greater left atrial (LA) size along with lower mean LV ejection fraction. At the time of diagnosis ATTR patients showed higher prevalence of AF (36% vs 6%, p=0.0001), AV block grade I or greater (37% vs 13%, p=0.0001), and previous device implantation (18% vs 1%, p=0.0001) compared to AL, while low voltage pattern was more common in AL subjects. After a mean follow-up of 1.9 years, prevalence of AF was 67% among ATTR compared to 18% among AL patients (p=0.0001). During follow-up a greater proportion of AL patients developed AV blocks (31% vs 16%, p=0.015) and rate of PM implantation was similar between the groups. Low voltage pattern was prevalent in AL subjects. AL patients with intraventricular delay showed a worse survival rate compared to those without; nevertheless, survival in each group was not affected by presence of AF, AV blocks or low voltage pattern.

**Conclusions.** In this retrospective study ATTR subjects presented more frequently with AF and AV block requiring pacemaker implantation before disease recognition. AL patients showed a higher prevalence of low voltage and displayed a high rate of AV conduction disorders during follow-up. Such diversity reflects important pathophysiologic differences requiring tailored management strategies.

### A54: CARATERIZZAZIONE AD ALTA DENSITÀ DEL SUBSTRATO ELETTRICO ATRIALE DURANTE MAPPAGGIO IN RITMO SINUSALE IN PAZIENTI CON FIBRILLAZIONE ATRIALE

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**Introduzione.** L'avvento del mappaggio ad alta densità ha facilitato una caratterizzazione più dettagliata del substrato elettrico delle aritmie, soprattutto delle aree a basso voltaggio.

**Scopo dello studio.** Utilizzando un sistema di mappaggio endocardico ad alta densità, abbiamo cercato di caratterizzare il substrato elettrico dell'atrio sinistro in pazienti sottoposti ad ablazione di FA.

**Metodi.** Dodici pazienti consecutivi [7 maschi (58%), età media 58 +/- 12 anni] sono stati sottoposti a mappaggio ad alta densità dell'atrio sinistro durante ritmo sinusale (65%) o in pacing (35%). L'analisi è stata esportata e analizzata offline sul software MATLAB. Sono stati identificati i seguenti fenomeni: zone a conduzione lenta (SC), linee di blocco(LB), linee di collisione (WFC) e aree rotazionali (CURL). Queste analisi sono state poi correlate alle caratteristiche cliniche della fibrillazione atriale nella nostra popolazione. In particolare, per ciascun paziente è stata riportata la data di inizio dell' FA e la stima della sua durata.

**Risultati.** 10 (85%) avevano FA parossistica(PAF), 2 (15%) FA persistente(PsAF). 8 (65%) mappe erano in ritmo sinusale, 4(35 %) in pacing. Il numero medio di battiti collezionato per mappa è stato 516+/- 176 con un numero medio di 6578 +/- 1679 EGM per mappa. Il voltaggio totale medio risultava ridotto nei pazienti con PsAF (0.39 mV) rispetto a quelli PAF. Le percentuali di suddivisione della mappa di voltaggio (tessuto sano, border zone e scar rispettivamente) differivano significativamente tra i due gruppi (46.8%, 40.7.5%, 12.4%, vs in PAF vs 18.3%, 61.4%, 20.3% in PsAF. Il Voltaggio era maggiormente ridotto sul setto in entrambi i gruppi (0.87 ± 0.53 mV in PAF vs 0.11 and 0.24 mV in PsAF). Anche la velocità totale media differiva tra i due gruppi (PAF 72.8 cm/s vs PsAF 64.4 cm/s).

**Conclusioni.** La caratterizzazione mediante mappaggio ad alta densità del substrato elettrico in pazienti con fibrillazione atriale dimostra che in ritmo sinusale vi è un decremento di voltaggio medio, velocità di conduzione media, percentuale di linee di collisione e curl con l'incremento del burden di FA. L'analisi di tali regioni potrebbe facilitare l' identificazione del substrato elettrico responsabile dell' insorgenza delle aritmie atriali.

### A55: FLECAINIDE AT HIGHT DOSES SUPPRESS FREQUENT VENTRICULAR EXTRASYSTOLIA IN A CASE OF MYBPC3 GENETIC MUTATION: DATA FROM TEN YEARS FOLLOW-UP

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We report a long story started five years ago when a 45-year-old woman come to our attention for highly frequent ventricular extrasystoles. No prior syncope or chest pain. She remembered same episodes of short of breath and palpitations at rest in 1999-2004-2006. In 2008 she performed a 12 lead ECG that showed an highly frequent ventricular monomorphic extrasystoles (11900; 1558 couple) with left bundle branch block (LBBB) for the first time. She performed an ergometric stress test that was negative for coronary insufficiency and started b-blocker therapy with propranolol 80 mg/die. In 2009 the ECG and the echocardiography were normal. She was examinated with CT angiography of coronary artery that showed normal coronaries. Propranolol was replaced with metoprolol 25 mg and flecainide 50 mg/bid. In 2010 a cardiac magnetic resonance (CMR) clarified the existance of abnormal left ventricular systolic dysfunction with an ejection fraction (EF) 45% and left ventricular dilatation. In the same year she underwent to an endocardial catheter ablation procedure. Unfortunately she suffered from a number of further recurrent of frequent ventricular contractions (PVCs) and another ablation procedure was performed. Propafenone 325 mg/daily substituted the therapy with b-blocker and flecainide. A CMR was repeated and the exam confirmed an abnormal left ventricular systolic dysfunction (EF 47%) and the left ventricular dilatation with comparable value. Therapy with sotalolo 80 mg replaced propafenone. In 2012 the ECG revealed a LBBB; a 12 lead ECG demonstrated an highly frequent PVCs (17871; 2731 couple and same episodes of non susteined ventricular tachicardia) with LBBB. At the echocardiography the EF was 42%. She discontinued sotalolo, she assumed ivabradine without clinical benefits. The echocardiography performed in 2015 prove a mild ventricular dilatation and EF 45%. She restarted flecainide 100 mg/bid. The 12 lead ECG in 2015 demonstrated a drastic reduction of PVCs (only 66 PVC). In 2016 the PVCs were 173 in 24 h monitoring. In November 2017 on 12 lead ECG reappeared highly frequent PVCs (28650). Flecainide was titrate to 150 mg three times a day; the echocardiography demonstrated EF 50%. The predictive value of ripetitive monomorphic ventricular extrasistoles remain uncertain. In same case the hight frequent ventricular monomorphic extrasystoles forward a reduction of the left ventricular systolic function. A not insignificant percentage of these cases evolve in tachycardiomyopathies definable as a reversible loss of function of the ventricle induced by persistent atrial and ventricular ectopy or arrhythmia that promoting dyssynchrony.In our case the genetic analysis finally revealed a mutation on the myosin-binding protein C (MYBPC3). Myosin-binding protein C is a myosin-associated protein found in the cross-bridge-bearing zone (C region) of A bands in striated muscle expressed exclussively in heart muscle. Phosphorylation of the cardiac isoform by cAMP-dependent protein kinase upon adrenergic stimulation may be linked to modulation of cardiac contraction. Mutations in MYBPC3 are one cause of hypertrophic cardiomyopathy and left ventricular noncompaction. As we know it is the first time that MYBPC3 is related to case of tachycardiomyopathy or dilatative cardiomyopathy. The thing that emerge in this case is that the PVCs drastic reduced with high dose of flecainide without impairment of the left ventricle systolic functinon. We hypothesized that flecainide, an inhibitor of the cardiac late sodium current that suppress catecholamine-induced ventricular arrythmias has a key role in this case, further investigation will be needed to fully understand.

## CARDIONCOLOGIA E CARDIOTOSSICITÀ
## Sessione Poster

### A56: UN CASO DI SEVERA CARDIOTOSSICITÀ DA POLICHEMIOTERAPIA ADIUVANTE (AC-PTX/TRASTUZUMAB) IN UNA DONNA DI 38 ANNI AFFETTA DA CARCINOMA MAMMARIO

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La cardiotossicità è un effetto collaterale comune dei farmaci chemioterapici usati nel trattamento di molti tumori solidi ed ematologici. Tra tutti i farmaci utilizzati nella terapia oncologica, le antracicline, assieme ad altri principi quali ciclofosfamide, taxani e trastuzumab, risultano essere potenzialmente i più dannosi, incrementando la loro tossicità in caso di co-somministrazione. Per tale motivo è fortemente raccomandata la valutazione del rischio cardiovascolare e dei parametri ecocardiografici, in particolare la frazione d'eiezione, prima di intraprendere l'iter chemioterapico. Un monitoraggio ecocardiografico seriato nel corso della terapia oncologica risulta fondamentale al fine di individuare un eventuale deterioramento della funzionalità cardiaca che, se riconosciuto precocemente, può essere reversibile.
Presentiamo il caso di una paziente di 38 anni affetta da carcinoma duttale della mammella (pT1cN0), sottoposta ad intervento di quadrantectomia seguito da chemioterapia adiuvante secondo lo schema ciclofosfamide-adriamicina, seguito da cicli settimanali di paclitaxel associato a trastuzumab. Alla valutazione cardiologica non si riscontrava alcun fattore di rischio cardio-vascolare né precedenti cardiologici di rilievo e tutti i parametri vitali risultavano nella norma per età e sesso. L'ecocardiogramma c/D documentava ventricolo sinistro di normali dimensioni endocavitarie e spessori parietali, normali cinesi regionale e indici di funzione sistolica (FE 70%). A sei mesi dall'inizio dell'iter terapeutico, per insorgenza di intensa astenia, associata a tachicardia persistente e dispnea per sforzi lievi, veniva eseguita rivalutazione cardiologica che metteva in evidenza un quadro di scompenso cardiaco acuto con FE ridotta (FE 25%). La paziente veniva quindi sottoposta a cineRMN cardiaca, che mostrava ventricolo sinistro di dimensioni aumentate con severa riduzione della funzione sistolica globale (FE 24%) per diffusa ipocinesia, ventricolo destro con FE 17%, in assenza di alterazioni del segnale nelle sequenze T2 BB STIR e PSIR. Si confermava l'ipotesi diagnostica di cardiotossicità da chemioterapici. In considerazione della grave tossicità cardiaca riscontrata, non veniva completato l'ultimo ciclo di chemioterapia previsto, né si procedeva a radioterapia e a prosecuzione della terapia con trastuzumab. Per persistenza della severa disfunzione cardiaca ad un mese di follow-up, nonostante la terapia medica dello scompenso cardiaco in atto, si procedeva ad impianto di defibrillatore sottocutaneo in prevenzione primaria.
L'identificazione precoce ed il trattamento della disfunzione ventricolare da chemioterapici è un argomento di cruciale importanza nella pratica clinica. Risulta fondamentale stratificare i pazienti per il rischio cardiovascolare prima dell'inizio della terapia e monitorare la funzionalità cardiaca durante il trattamento, stabilendo timing di sorveglianza personalizzati in relazione al profilo di rischio e al tipo di terapia effettuata. È pertanto necessario un approccio multi-disciplinare di un team composto da cardiologi e oncologi, in modo da evitare il danno irreversibile che limiterebbe la possibilità di effettuare i trattamenti chemioterapici necessari a migliorare la prognosi dei pazienti oncologici.

### A57: IMPATTO CARDIACO DELLA CHEMIOTERAPIA E DELLA RADIOTERAPIA COMBINATE NEL TRATTAMENTO DEI PAZIENTI CON LINFOMA

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**Introduzione.** Le antracicline sono farmaci largamente utilizzati nei protocolli antineoplastici, ma possono causare cardiotossicità attraverso diversi meccanismi, come danno ossidativo e disfunzione mitocondriale. Anche la radioterapia può compromettere la funzione cardiaca, promuovendo la fibrosi cardiaca, provocando danno microvascolare e inducendo riduzione della densità dei capillari del miocardio. Il nostro studio vuole valutare, in maniera prospettica, se la radioterapia provoca un danno cardiaco addizionale in pazienti con linfoma che sono già stati sottoposti a trattamento con antracicline.
**Metodi.** Ventinove pazienti con diagnosi recente di linfoma di Hodgkin e linfoma non-Hodgkin sono stati sottoposti a valutazione della funzionalità cardiaca mediante ecocardiografia basale (prima dell'inizio dei trattamenti antineoplastici, BA), e poi ogni due mesi, fino a 6 mesi dopo la fine di tutti i trattamenti antitumorali. La valutazione ecocardiografica è stata eseguita mediante ecocardiografia standard 2D e mediante Speckle Tracking per la valutazione dello Strain Longitudinale Globale (GLS). Dei ventinove pazienti, ventidue rispettavano i criteri di elezione e erano stati sottoposti a regimi terapeutici a base di antracicline. Di questi, 8 pazienti sono statti trattati solo con chemioterapia (sottogruppo 1, S1), mentre 14 sono stati trattati con radioterapia dopo il completamento della chemioterapia (sottogruppo 2, S2). Per l'analisi statistica sono stati presi in considerazione le valutazioni basali (BA), le valutazioni effettuate entro 1 mese dalla fine della chemioterapia (CA) e le valutazioni effettuate entro 6 mesi dal completamento di tutte le terapie antineoplastiche (FA).
**Risultati.** Alla fine dei cicli di chemioterapia abbiamo evidenziato una riduzione della frazione di eiezione in tutta la popolazione in esame (BA vs CA, p value= 0.033). Inoltre, nel sottogruppo 2, 6 mesi dopo la fine di tutte le terapie antineoplastiche abbiamo evidenziato una riduzione della funzione diastolica cardiaca, valutata mediante aumento del rapporto E/E' quando abbiamo confrontato gli esami acquisiti nei tempi CA e FA (p value < 0.05), non presente nel sottogruppo 1, e del GLS (p value= 0.01), sia per il sottogruppo 1 che per il sottogruppo 2, quando abbiamo confrontato i dati acquisiti nei tempi BA e FA. Inoltre, nel solo sottogruppo 2, abbiamo assistito ad un peggioramento dello strain principalmente a

carico dei segmenti medio-ventricolari ed apicali, confrontando gli esami acquisiti nei tempi BA ed FA, (p value < 0.01 sia per S1 che per S2).
**Conclusioni.** Sulla base del nostro studio, seppur basato su un numero limitato di pazienti, possiamo ipotizzare quindi che in pazienti con diagnosi recente di linfoma le antracicline compromettono la funzionalità cardiaca e che la radioterapia può avere un ulteriore impatto negativo sul cuore di tali pazienti. Inoltre, dai nostri risultati emerge che la radioterapia potrebbe avere un particolare effetto negativo sulle regioni medio-ventricolari ed apicali, che d'altronde sono quelle maggiormente esposte all'irradiazione.

### A58: CARDIAC FUNCTION AT LONG TERM FOLLOW UP AMONG ADULT SURVIVORS OF PEDIATRIC CANCER TREATED WITH ASSOCIATION OF DEXRAZOXANE AND ANTHRACYCLINES

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**Aims.** Cardiovascular disease is a common cause of increased late morbidity and mortality among survivors of childhood cancer treated with anthracyclines. Co-administration of Dexrazoxane has been proven to reduce short-term and mid-term cardiotoxicity. Our aim was to evaluate cardiac morphology and function in survivors of childhood tumors treated with dexrazoxane/anthracycline association at long-term follow-up (>10 years).
**Methods.** Twenty patients previously treated with co-administration of anthracyclines-dexrazoxane for childhood renal tumors or sarcoma and a control group of 20 healthy subjects were enrolled. Echocardiographic measurements included 3D left ventricular (LV) ejection fraction (LVEF) and LV and right ventricular (RV) global longitudinal strain (GLS). In the cancer survivors group, the median age at diagnosis was 5 years (1-17) and they were evaluated at median follow-up time of 21.5 years (10-26).
**Results.** No evidence of cardiac toxicity, as defined by current guidelines, was found in all survivors. No significant differences in standard and strain imaging parameters were observed between survivors and controls (3D LVEF 58 ± 3 % vs 60 ± 5 % p=NS; LV GLS -21 ± 1 % vs - 21 ± 2 % p= NS; RV GLS - 23 ± 2 % vs - 23 ± 5 % p= NS). Considering subjects who received a cumulative dose of anthracyclines above the median (doxorubicin-equivalent dose ≥208 mg/m2) no significant differences were detected with the group receiving a lower dose. No significant correlations between LVEF, LV GLS and RV GLS with the follow-up time were found. No second tumor was detected among dexrazoxane-treated survivors.
**Conclusions.** Our findings may support the role of dexrazoxane as a useful tool for cardio-protection in children treated with anthracycline. Large randomized trials are needed to confirm the cardio-protective role of dexrazoxane at long-term follow-up in pediatric setting.

### A59: RADIOTERAPIA TORACICA ED ISCHEMIA CARDIACA SILENTE IN SOGGETTI SENZA CLASSICI FATTORI DI RISCHIO CARDIOVASCOLARI

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**Obiettivo.** La cardiopatia indotta da radioterapia rappresenta un effetto tardivo dell'irradiazione toracica, contribuendo ad aumentare la mortalità nei pazienti oncologici pregiudicando il pericardio, il miocardio, le valvole e le coronarie. Attualmente, per quanto riguarda il rischio di coronaropatia (CAD), consiglia uno screening cardiologico con ECG sotto sforzo a 5-10 anni dalla radioterapia. Scopo del nostro studio è quello di determinare la prevalenza di ischemia inducibile all'ECG sotto sforzo in una popolazione di pazienti senza fattori di rischio cardiovascolari sottoposti a radioterapia toracica. Come gruppo di controllo abbiamo utilizzato una coorte di pazienti che svolgevano il medesimo test per screening in quanto ad alto rischio cardiovascolare.
**Metodi.** Una popolazione di 115 pazienti radiotrattati senza fattori di rischio cardiovascolari classici è sottoposta ad ECG da sforzo. 135 pazienti con alto profilo di rischio cardiovascolare che avevano eseguito la stessa procedura sono stati utilizzati come gruppo di controllo.
**Risultati.** La coorte di pazienti irradiati era più giovane (48.7±10.1 vs 60.5±10.8 anni, p<0.001) e presenta una minore percentuale di uomini quando paragonata al gruppo di controllo. I soggetti del gruppo di controllo presentavano diabete nel 25.9% dei casi, 62.9% dislipidemia, 67.4% ipertensione e 19.2% erano fumatori attivi. Nonostante queste importanti differenze circa i classici fattori di rischio cardiovascolari non sono state trovate differenze nel numero di soggetti con ischemia inducibile all'ECG da sforzo (10.4 vs 5.9%, p=ns).
**Conclusioni.** La radioterapia toracica rappresenta un forte fattore di rischio cardiovascolare ed uno screening anche nel paziente asintomatico è assolutamente necessario con tempistiche ancora da definire.

### A60: RISK STRATIFICATION AND EARLY CARDIOTOXICITY IDENTIFICATION: ORGANIZATIONAL ADVANTAGES AND CLINICAL IMPACT OF INTRAHOSPITAL CARDIOTOXICITY NETWORK

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**Introduction.** The survival of cancer patients is increasing thanks to the earlier diagnosis and the development of new drug; this exposes patients to the risk of cardiological complication. Collaboration between cardiologist and oncologist becomes the fundamental requirement for the development of an individualized and effective patient management program.
**Objectives.** 1) To identify cardiovascular toxicity in patients with chronic myeloid leukemia (CML) Ph+ treated with tyrosine-kinase inhibitors (TKIs), undergone to regular hematological follow-up (FU). 2) To demonstrate the importance of early detection of toxicity through the use of new software for the analysis of myocardial deformation and Myocardial Work (MW). 3) To demonstrate the advantage, of an intra-hospital cardioncology network, aimed at the integrated and multidisciplinary management of cancer patients.
**Methods.** 18 patients (age: 60 ± 12 years, 66.6% men) with CML Ph+ treated with TKIs and a control group of 35 healthy subjects were enrolled. All patients underwent a cardiac morpho-functional study, myocardial strain (MS) and MW analysis using transthoracic echocardiography and speckle-traking, ECG and blood pressure (BP) measurement with Pulse Pressure (PP) calculation. The baseline assessment of the patients was compared with controls and mean FU of 397 ± 65 days was performed.
**Results.** The main results of the study are partly reported in the Table. Moreover, patients showed a significant increase in BP and PP, left atrial volume and systolic pulmonary artery pressure, and a significant reduction of MS, compared to controls. At the FU, the blood crasis and the metabolic profile remained constant; the incidence of signs and symptoms of heart failure and adverse events, such as peripheral arterial disease (PAD) and venous thromboembolism (VTE), significantly increased between baseline and 2018 FU (p = 0.001), unlike the 2019 FU. PAD and VTE were 5.5% and 11.1%, respectively. The ejection fraction (EF) was not a sensitive parameter of early identification of myocardial dysfunction, unlike the GLS. The PP significantly increased. Finally, MW indices showed a significant trend: by comparing the data of the FU 2018 with those of 2019, a significant reduction in MW indices was documented.
**Conclusions.** Treatment with TKi has repercussions on the cardiovascular system. The EF cannot be considered a sensitive parameter in the patients' FU, unlike the MW which is a sensitive index of early identification of cardiotoxicity. The institution of an intrahospital cardioncology network is of paramount importance.

### A61: PRECISION CARDIO-ONCOLOGY: THE OMICS TECHNOLOGIES UTILITY IN CLINICAL CARDIOLOGICAL PATHWAYS FOR THE BEST PERSONALIZED MODEL OF CARE

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**Background.** Anthracyclines are anticancer drugs that can induce cardiotoxicity even many years after ending treatment. Cardiotoxicity remains a major limitation in continuing anticancer therapy. In cardio-oncology, the early identification of cardiotoxicity and/or the possibility to predict potential cardiotoxicity is essential in order to start preventative therapy and cardiac support.
**Purpose.** The aim of this study is to assess the rationale for the potential use of omics technologies in predicting anthracycline-induced cardiotoxicity and in managing cardiology follow-up in cancer patients.
**Methods.** We have evaluated the studies on early diagnosis of anticancer therapy-induced cardiotoxicity and the studies on "omics" approaches for assessing anthracycline-induced cardiotoxicity.
**Results.** Current diagnostic strategies for early diagnosis of cardiotoxicity, albeit they involve also the use of biochemical markers and advanced imaging techniques, rely almost exclusively on echocardiographic measurements of left ventricular ejection fraction. In fact, global strain echocardiography (GLS), 3D echocardiography, cardiac magnetic resonance (CMR) and nuclear cardiac imaging (MUGA) are more expensive and/or not carried out in all medical centers. Moreover the diagnostic tools for the detection of cardiotoxicity have also some limitation [Echocardiography: inter-observer variability, image quality; GLS: inter-vendor variability; MUGA: Cumulative radiation exposure, limited structural and functional information on other cardiac structures; CMR: Limited availability, patient's adaptation (claustrophobia, breath hold, long acquisition times); Cardiac biomarkers (Troponin I, High-sensitivity Troponin I, BNP, NT-pro BNP): Insufficient evidence to establish the significance of subtle rises, variations with different assays,

role for routine surveillance not clearly established] (Zamorano JL et al, Kardiol Pol. 2016;74(11):1193-1233). Chronic anthracycline-induced cardiotoxicity was associated with a variant of the NAD(P)H oxidase p40phox subunit (NCF4 gene, SNP rs1883112, -212A>G), while acute anthracycline-induced cardiotoxicity was associated with a SNP of the NAD(P)H oxidase p22phox subunit (CYBA gene, SNP rs4673 c.242C>T) (Wojnowski L et al, Circulation. 2005;112:3754–3762). Kuruc JC et al, have published a case report which suggests a potential genetic predisposition for anthracyclines induced cardiomyopathy in patients with mutations in LMNA gene (Kuruc JC et al, BMC Cardiovasc Disord. 2019 Jul 16;19(1):169).

**Conclusion.** The current diagnostic tools for the detection of cardiotoxicity have some limitation, and it has yet to be defined with certainty the most reliable cardiac monitoring approach. The “omics” studies, have already shown a potential genetic predisposition in developing anthracycline-induced cardiotoxicity. Therefore, the realization of clinical cardiological pathways also including “omics” knowledge, could help to guarantee the best and the most cost-effective personalized model of care recommending a personalized therapy and a closer cardiac monitoring with advanced imaging techniques especially in patients with a genetic predisposition to develop anthracycline-induced cardiotoxicity.

### A62: CARDIOTOSSICITÀ ACUTA IN PAZIENTI SOTTOPOSTI A TRATTAMENTO RADIO-CHEMIOTERAPICO PER TUMORE POLMONARE NON A PICCOLE CELLULE STADIO III: STUDIO PROSPETTICO DI COORTE

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**Introduzione.** I pazienti con tumore polmonare non a piccole cellule del polmone stadio III sono sottoposti ad alte dosi cardiache durante trattamento radiante. Nello studio CORTE abbiamo voluto stimare l’incidenza di eventi cardiaci sub-clinici precoci (entro tre mesi dalla fine della terapia) in questi pazienti, identificare le variabili che aumentano il rischio e ricercare eventuali markers predittivi.

**Materiali e metodi.** I pazienti sono stati sottoposti a trattamento radiante con dose totale di 50-60 Gy, in concomitanza alla chemioterapia, per cinque settimane. Ogni paziente ha effettuato una prima visita medica, esami di laboratorio con markers cardiaci, elettrocardiogramma, ripetuti in corso di terapia, ecocardiogramma trans-toracico con strain (GLS) basale, a un mese e a tre mesi dalla fine della terapia e risonanza magnetica cardiaca, basale e a tre mesi dalla fine della terapia. La diminuzione della frazione di eiezione del ventricolo sinistro pari a 10 punti percentuali, ad un valore minore al limite inferiore della norma (50%) è stato il nostro criterio diagnostico di cardiotossicità sub-clinica; una riduzione del GLS pari al 15% del valore assoluto basale è stata considerata anormale.

**Risultati.** Abbiamo analizzato una popolazione di 25 pazienti (età mediana=71 anni). La variazione dei valori medi di TnI dimostra un trend ai limiti della significatività (p=0,070). Solo 20 pazienti hanno completato il follow-up ecocardiografico e il 20% ha sperimentato una cardiotossicità sub-clinica a tre mesi dalla fine della terapia; tra questi il 75% aveva valori anormali di GLS già a un mese dalla fine della terapia. La variazione di FE (%) del ventricolo sinistro a tre mesi dalla fine della terapia è risultata statisticamente significativa (p=0,007) così come la variazione dei valori del volume telediastolico (p=0,048). Abbiamo trovato un’associazione tra la variazione di VTD a quella di TnI (p=0,042). Il 45% aveva valori anormali di GLS a tre mesi dalla fine della terapia e la variazione media di GLS è risultata statisticamente significativa (p=0,0001). La rivalutazione a tre mesi, mediante risonanza magnetica cardiaca, ha dimostrato una variazione dei valori di FE (%) del ventricolo destro e del ventricolo sinistro, statisticamente significativa (rispettivamente p=0,003; p=0,029).

**Conclusioni.** Il nostro studio è il primo studio prospettico osservazionale di coorte che testimonia come le alte dosi di radioterapia possano causare cardiotossicità sub-clinica precoce (entro il terzo mese dalla fine della terapia) in pazienti con tumore polmonare non a piccole cellule stadio III, in assenza di associazioni significative con l’età e i fattori di rischio cardiovascolari. La TnI e il GLS sembrano correlarsi con lo sviluppo di cardiotossicità precoce. Il solo esame ecocardiografico sembrerebbe sottostimare i casi di disfunzione ventricolare sinistra e destra, rispetto la risonanza magnetica cardiaca.

### A63: EARLY DETECTION OF VASCULAR DAMAGE IN PATIENTS WHITH BREAST CANCER TREATED WITH ANTHRACYCLINE CHEMOTERAPY

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**Background.** Cardiovascular toxicity induced by chemotherapy is an emerging problem. Anthracyclines are chemotherapeutic agents very effective to treat various solid and haematological cancer. Unfortunately their use can be associated with the risk to develop cardiac toxicity. Less is known about the role of anthracyclines in inducing vascular damage. The aim of our study was to evaluate the occurrence of preclinical signs of vascular damage in patients with breast cancer (BC) treated with anthracyclines.

**Methods.** A prospective study was carried out on patients with breast cancer (133 women; 55.64 ± 11.74 years) subjected to adjuvant or neoadjuvant therapy with anthracyclines and then with taxol/taxotere and trastuzumab. Patients were evaluated before starting chemotherapy (T0), 3 months after the start of therapy (T1), after 6 months (T2) and after 12 months (T3). Vascular function was investigated by measuring single point arterial stiffness during ultrasound scan of carotid arteries at baseline and during follow-up.

**Results.** Significant increase in the arterial stiffness parameters (pulse wave velocity) were observed at T1 (T0: 6,335 ± 1,64 vs.T1: 6,754 ± 1,59; p=0.03) but it returned to the basal value at T2 and remained stable at T3 (T0-T2: 6,335 ± 1,64 vs. 6,176 ± 1,10; p=0.03 and T0-T3: 6,335 ± 1,64 vs. 6,037 ± 2,00; p= 0,1).

**Conclusion.** Our study demonstrated that anthracyclines may induce subclinical vascular alterations, detectable by measuring arterial stiffness. However vascular damage is acute and reversible after treatment is stopped. Conversely subclinical myocardial damage, detectable measuring Global Longitudinal Strain, persists after the end of treatment and may also progress into overt heart failure as demonstrated in the literature.

### A64: SUCCESSFUL TREATMENT OF FOLLICULAR NON-HODGKIN LYMPHOMA WITH CARDIAC INVOLVEMENT

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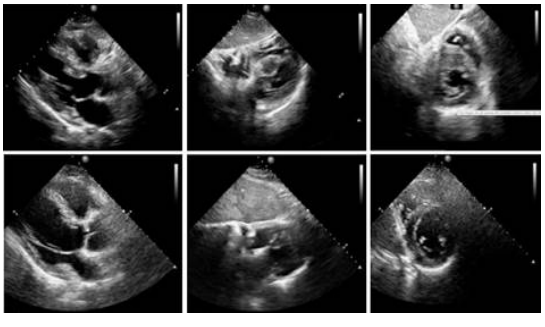
**Background.** Cardiac tumors represent a rare clinical entity, being mostly (75%) benign tumors. The most common primary malignant tumors are sarcomas and lymphomas. Metastatic deposits represent the majority of cardiac malignancies; the common primary sources include cancers of lung, esophagus, and breast as well as lymphoma, leukemia, and melanoma. Cardiac involvement by lymphoma at autopsy has been described in 16% of patients with Hodgkin disease and 18% of patients with non-Hodgkin lymphoma (NHL). The most common presentation of cardiac involvement in NHL is heart failure (34%), followed by chest pain (12%), other possible presentations include arrhythmias and heart block, while 20% of patients presented with symptoms of non-cardiac nature

**Case presentation.** A 59-year-old men, with a recent diagnosis of high grade follicular non-Hodgkin lymphoma (NHL), underwent echocardiography as part of the stadiation protocol of the disease. The echocardiography (figure, top line) showed normal biventricular function, and the presence of focal thickening of the inferior interventricular septum and of the right ventricular free wall. The hypothesis of cardiac localization of lymphoma was confirmed by the cardiac magnetic resonance and the patient was admitted for monitoring during the first cycle of chemotherapy (CHOP, cyclophosphamide/doxorubicin/vincristine/prednisone). The first cycle and successive five cycles were well tolerated without any cardiac or arrhythmic complications. After chemotherapy completion, a PET scan showed the absence of residual disease; the echocardiography (figure, bottom line) and cardiac MRI seven months later confirmed the complete resolution of cardiac involvement.



**Conclusion:** Cardiac involvement in NHL is reported in 16% of patients. Possible clinical presentations include heart failure, chest pain and arrhythmias or heart block, up to 20% of cases may be asymptomatic. We presented a case of asymptomatic cardiac involvement in follicular NHL, successfully treated without any cardiac sequelae.

### A65: ACUTE SEVERE LEFT VENTRICULAR SYSTOLIC DYSFUNCTION IN A PATIENT IN TREATMENT WITH PONATINIB FOR CHRONIC MYELOID LEUKEMIA

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**Background.** An important growth in cancer therapeutics over the last decade has been the development of tyrosine kinase inhibitors (TKIs) for the treatment of different types of tumors, including chronic myeloid leukemia. This new category of drugs can have however serious cardiovascular adverse reactions and in literature we can find cases of cardiotoxicity induced by use of TKIs but the physiopathology and the burden of cardiovascular disease induced by this class of drugs are not still well known and it is unclear how different types of TKIs can affect the cardiovascular system.
**Case presentation.** We report the case of a sixty-six-years old male patient, hypertensive, obese and dyslipidemic, affected by chronic myeloid leukemia in treatment with Ponatinib 15 mg\die, that came to our attention for worsening dyspnea: our assessment showed severe left ventricular systolic dysfunction (left ventricular ejection fraction LVEF 20%, calculated with Simpson biplane method) together with significative left ventricular dilatation (left ventricular telediastolic diameter 72 mm) and new onset atrial fibrillation. An echocardiography performed three months before showed a LVEF of 50% with normal chamber dimensions. We performed a coronary computed tomography that showed no significative coronary stenoses. The patient had started 6 months before he came to our attention therapy with Ponatinib for a new diagnosed chronic myeloid leukemia. We think that the treatment with Ponatinib has determined an important subacute cardiac toxicity with severe depression of systolic function. We suspended treatment with Ponatinib and till now, one month after suspicion of chemotherapy treatment, no improvement of ejection fraction was observed.
**Conclusions.** Treatment with TKIs can have serious cardiovascular adverse reactions: we describe the first case of probable subacute Ponatinib cardiotoxicity in literature. Patients treated with Ponatinib and other TKIs must be subjected to strict clinical and echocardiographic monitoring for the potential onset of serious cardiovascular adverse reactions, also using technology that can identify early stage subclinical damage as speckle tracking echocardiography with evaluation of global longitudinal strain. The pathophysiological mechanism of TKIs cardiac damage and potential agents to prevent it deserves further clinical investigations.

### A66: CARDIOTOXICITY INDUCED BY THE ASSOCIATION OF TRASTUZUMAB AND THE IMMUNE-CECKPOINT BLOCKING ANTIBODY PEMBROLIZUMAB: A PATHOPHYSIOLOGICAL STUDY

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**Background.** The immunotherapy has revolutionized the world of oncology in the last years with considerable advantages in terms of overall survival in cancer patients. The association of Pembrolizumab, an immune-checkpoint blocking antibody, and Trastuzumab, an anti-ErbB2 antibody, was recently proposed in clinical trials for the treatment of Trastuzumab-resistant advanced HER2-positive breast cancer. Although immunotherapies are frequently associated with a wide spectrum of immune-related adverse events, the cardiac toxicity has not been properly studied.
**Purpose.** We studied, for the first time, the cardiotoxic and pro-inflammatory effects of Pembrolizumab associated to Trastuzumab analyzing different physiopathological mechanisms involved
**Methods.** Cell viability, through analysis of mitochondrial dehydrogenase activity, intracellular calcium quantification and pro-inflammatory studies (analyzing the production of Interleukin 1β, 6 and 8, the expression of NF-kB and Leukotriene B4) were performed in human fetal cardiomyocytes. Preclinical studies were also performed in C57BL6 mice analyzing fibrosis (by quantifying collagen type II in cardiac longitudinal and transverse fibers) and pro-inflammatory cytokines in heart tissues of mice treated with Pembrolizumab and Trastuzumab alone or combined.
**Results.** The combination of Pembrolizumab and Trastuzumab leads to an increase of the intracellular calcium overload (of 3 times compared to untreated cells) and to a reduction of the cardiomyocytes viability (of 65 and 20-25%, compared to untreated and Pembrolizumab or Trastuzumab treated cells, respectively) indicating cardiotoxic effects. Notably, combination therapy increases the inflammation of cardiomyocytes by enhancing the expression of NF-kB and Interleukins. Moreover, in preclinical models, the association of Pembrolizumab and Trastuzumab increases the Interleukins expression of 40-50 % compared to the single treatments; the expression of NF-kB and Leukotriene B4 was also increased.
**Conclusion.** Pembrolizumab associated to Trastuzumab leads to strong cardiac pro-inflammatory effects mediated by overexpression of NF-kB and Leukotriene B4 related pathways.

### A67: CARDIOTOSSICITÀ DA 5-FLUOROURACILE: DUE DIVERSE RAPPRESENTAZIONI DI VASOSPASMO CORONARICO

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**Introduzione.** Vari farmaci oncologici, nonché la radioterapia, possono indurre ischemia o sintomi che fanno supporre una sindrome coronarica acuta (SCA). I farmaci più comunemente implicati sono le fluoropirimidine: il 5-fluorouracile (5-FU) e il suo pro-farmaco orale capecitabina, frequentemente utilizzati nel trattamento di tumori gastrointestinali, mammari, testa e collo. La frequenza di cardiotossicità è compresa tra 1,2- 18%. Nella nostra esperienza abbiamo individuato due diversi casi a breve distanza di tempo, caratterizzati da differenti presentazioni cliniche, ma entrambe riconducibili al medesimo spettro di manifestazioni che riconosce nella cardiotossicità da chemioterapici una causa non così rara e spesso sottostimata di vasospasmo coronarico. Il primo caso riguarda una donna di 55 anni, ricoverata in UTIC per sospetta SCA. In anamnesi: Ipertensione non in terapia e pregressa colectomia totale per rettocolite ulcerosa. Recente riscontro di carcinoma anale trattato con confezionamento di ileostomia ed indicazione a Radioterapia e Chemioterapia: iniziava il primo ciclo di CT con 5-FU tre giorni prima dell'evento.La mattina del ricovero episodi di dolore anterotoracico irradiato posteriormente durati circa 15 minuti e regrediti spontaneamente, durante infusione di 5-FU. In PS ripresa del dolore con evidenza di sopra-ST infero posteriore, regredito con carvasin sublinguale, l'ecocardiogramma mostrava: ipocinesia posteriore medio-basale.Il picco di Tn è stato 13 ng/L (v.n.< 11,6 ngL). La paziente è stata quindi sottoposta a coronarografia che ha mostrato coronarie angiograficamente indenni. Durante i tre giorni di ospedalizzazione la pz è rimasta asintomatica,ECG ed ecocardiogramma ripetuti in assenza di dolore erano nei limiti. La diagnosi di dimissione è stata pertanto di Angina pectoris a verosimile genesi vasospastica in corso di terapia con 5-FU e veniva perciò intrapresa terapia con TNT TD e b-bloccante da proseguire a domicilio.Il secondo caso coinvolge un uomo di 69 anni, senza fattori di rischio CV, ma affetto anch'esso da eteroplasia del retto sottoposta a chemioterapia con 5-FU in infusione e.v. continua e RT.Il pz giungeva alla nostra attenzione per essere sottoposto ad esame coronarografico in elezione, per episodi di dolore precordiale costrittivo (l' ultimo durato 30 minuti e regredito spontaneamente, in corso di infusione di 5-FU); in tale occasione il pz aveva effettuato accesso in PS, la determinazione seriata di Tn risultava negativa, nulla di rilievo si segnalava all' ECG e normale risultava la cinesi miocardica all'Ecocardiogramma. Tuttavia, nel sospetto di vasospasmo coronarico veniva interrotta l' infusione e.v. di 5-FU e consigliata l' esecuzione di test ergometrico che ha mostrato un risultato dubbio per ischemia miocardica inducibile. La coronarografia ha mostrato coronarie indenni. In considerazione delle caratteristiche del sintomo e del risultato dell' esame angiografico si considerava verosimile l' ipotesi di vasospasmo coronarico indotta dal suddetto chemioterapico. Entrambe i pazienti, dalla sospensione del farmaco, già concordata con l' oncologo di riferimento, non ha presentato ulteriori episodi di dolore toracico.
**Discussione.** Il meccanismo fisiopatologico non è del tutto chiaro e più ipotesi sono state formulate: una tossicità diretta sul miocardio,effetti trombogenici o una reazione immunoallergica. Questi casi supportano l'ipotesi vasospastica di 5-FU, indicando che la somministrazione di 5-FU può causare un vasospasmo coronarico che mima una SCA, e che per la prevenzione ed il trattamento della cardiotossicità da 5-FU può essere sufficiente la terapia medica con nitrati o calcio-antagonisti ma spesso è necessaria la sospensione e/o riformulazione del regime chemioterapico.

### A68: CARDIOGENIC SHOCK IN PATIENT WITH METASTATIC RENAL CELL CARCINOMA TREATED WITH CABOZANTINIB.

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Tyrosine kinase inhibitors (TKI) increases the risk of Heart Failure inducing the development of progressive dilated cardiomyopathy. A case

of acute cardiogenic shock in a man with metastatic renal cell carcinoma treated with Cabozantinib, is here presented: the condition originally misdiagnosed as acute myocardial infarction, was subsequently considered due cardiotoxic effect of TKI.
**Case report.** On April 2019, A 55-year-old man arrived at the Emergency Department (ED) because of acute cardiogenic shock. His medical history started in 2017 when a metastatic renal cell carcinoma (mRCC) was diagnosed. He started Sutinib, subsequently replaced by Pazopanib because of side effects (i.e. perianal abscesses complicated by sepsis-associated Escherichia Coli), subsequently replaced by Cabozantinib due to evidence of disease progression on\full-body CT scan. On December 2018, a routine follow-up Echocardiogram documented a normal left ventricular ejection fraction (LVEF). Two months later, at our ED, an emergency coronary angiography was performed because the ECG revealed the signs of acute myocardial ischemia. There were no significant coronary stenoses. However, after admission in Intensive Care Unit, the patient developed signs of severe multi-organ-failure so inotropic drugs were immediately started, and blood cultures and infective sierologies performed to exclude fulminant myocarditis. Cabozantinib was also stopped due to the possibility of acute cardiotoxicity of the drug. Transthoracic echocardiogram showed a severe left ventricular dilatation and dysfunction (LVEF < 15%), and a severe pericardial effusion with initial signs of right ventricular impairment. Urgent evacuative-pericardiocentesis was performed with drainage of 150 ml of serum hematic fluid negative at the cytological examination for the presence of neoplastic cells. The patient underwent a cardiac magnetic resonance that excluded inflammation or fibrotic reaction but only a diffuse pericardial effusion. Thus, an acute myocarditis was excluded. In the following days we observed progressive clinical improvement. One month later a control Echocardiogram showed a normal left ventricle ejection fraction. The patient was still septic.
**Discussion.** While several studies have found an increased risk of heart failure with drugs belonging to the pharmacological class of TKIs such as Sunitinib and Pazopanib, data regarding the cardiac toxicity of Cabozantinib are lacking. This clinical case allows us to speculate about the potential causative role of Cabozantinib in acute cardiogenic shock given the complete recovery of left ventricle ejection fraction after the interruption of Cabozantinib. To our knowledge, this is the first report of Cabozantinib-related acute cardiogenic shock.

## FARMACI CARDIOVASCOLARI E NUTRACEUTICI
## Sessione Poster

### A69: EFFETTI DI DIVERSE COMBINAZIONI DI NARTACEUTICI NEL TRATTAMENTO DELLA DISLIPIDEMIA E NELLA PROTEZIONE ENDOTELIALE: PROSPETTIVE NELLA PREVENZIONE PRIMARIA DELLE MALATTIE CARDIOVASCOLARI

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**Background.** Esiste un rapporto lineare tra i livelli di lipidi e il rischio cardiovascolare. Molti soggetti con colesterolemia normale traggono benefici dal raggiungimento di livelli ancora più bassi ("the lower is the better"). Le statine sono il farmaco di scelta non solo per il miglioramento del profilo lipidico ma anche per gli effetti "pleiotropici", tuttavia non sono esenti da effetti collaterali. Inoltre il SSN pone indicazione all'utilizzo in pazienti già infartuati oppure in prevenzione primaria solo se il rischio cardiovascolare risulti essere pari o superiore al 20%. In un precedente lavoro su volontari sani è stata valutata efficacia e sicurezza di alcune sostanze nutraceutiche contenenti: policosanoli da riso (10 mg), riso rosso, lievito (200 mg) monacolina K (3 mg), fitosteroli (50 mg), agenti antiossidanti, Extramel (succo di melone concentrato ricco di superossido dismutasi, 5 mg), polifenoli da oliva (10 mg), polifenoli da semi di uva (10 mg) e acido folico (0,2 mg). A 3 mesi abbiamo ottenuto una riduzione dell'11% della concentrazione media del colesterolo totale, del 18% del colesterolo LDL, con un buon profilo di tollerabilità e sicurezza. Pertanto abbiamo ritenuto utile eseguire un nuovo studio di comparazione fra due combinazioni di nutraceutici: una a più elevata concentrazione di monacolina K (10 mg) ed una con una concentrazione inferiore (3mg), come nel precedente studio ma con l'aggiunta di berberina.
**Metodi.** Studio prospettico, randomizzato finalizzato a verificare l'efficacia e la sicurezza di 2 composti nutraceutici: Composto A: costituito da monacolina K (3 mg), Berberina (500 mg), cromo, coenzima Q 10 e acido folico. Composto B: costituito da monacolina K (10 mg) e coenzima Q10 (10mg). Criteri di inclusione: pazienti con rischio cardiovascolare molto basso con valori di LDL>130 mg/dl nonostante almeno tre mesi di modificazione dello stile di vita. Almeno un altro fattore di sindrome metabolica. Sono stati valutati i livelli di: colesterolo tot, LDL, HDL, trigliceridi, CK, hs-PCR, IL-6, TNF-α, LDL-ox, glicemia, BMI, funzionalità endoteliale attraverso il calcolo dell'indice di iperemia reattiva (EndoPAT 2000) al tempo 0 e a 12 mesi.
**Risultati.** 60 pazienti, età tra i 38 e i 68 anni. Entrambi i trattamenti ben tollerati, nessun effetto collaterale. In tutti e due i gruppi si è verificata una riduzione del colesterolo totale, del colesterolo LDL, miglioramento della funzionalità endoteliale, decremento degli indici infiammatori (hs-CRP, IL-6, LDL ossidate e TNF-alfa). È stata evidenziata anche l'associazione tra incremento dell'indice di iperemia reattiva e la maggiore riduzione di hs-PCR. È emersa una superiorità statisticamente significativa della formulazione B rispetto alla formulazione A in termini di riduzione del colesterolo totale (p<0,005). La formulazione A ha indotto un decremento della glicemia pari all'8%; in un ridotto sottogruppo di pazienti (n=30) con alterata glicemia a digiuno è stato osservato un miglioramento del profilo glicemico dopo 12 settimane di trattamento.
**Conclusioni.** La conferma della nostra ipotesi di un effetto sinergico tra statine naturali e sostanze antiossidanti, antinfiammatorie ed attive sul profilo glicemico, favorisce l'approccio a pazienti dislipidemici a basso rischio cardiovascolare. Se confermati, questi risultati potrebbero portare ad un maggiore utilizzo di nutraceutici rispetto alle terapie convenzionali talora gravate da un'incidenza maggiore di effetti collaterali. Inoltre l'effetto cardiovascolare delle sostanze in studio va oltre la semplice riduzione dei lipidi e del profilo glicemico. In particolare l'evidenza di un miglioramento della funzione endoteliale in pazienti senza aterosclerosi manifesta, rappresenta un effetto sicuramente originale e favorevole nella prevenzione primaria delle malattie cardiovascolari.

### A70: PROPHYLACTIC PROPERTIES OF ORAL AMIODARONE AT THE DOSE OF 200 MG ONCE DAILY ON THE NON-VALVULAR ATRIAL FIBRILLATION RELAPSES: A RETROSPECTIVE COHORT STUDY

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**Introduction.** Secondary atrial fibrillation(AF) prevention with the use of drugs or of transcatheter ablation represents a cogent and well-established measure mainly for patients prone to frequent AF relapses rather than for those with history of an isolated episode of AF. Nevertheless, in our retrospective cohort study including patients with a history of one or more episodes of AF, we have evaluated the predictive effect of some preventive regimens on patients' clinical outcomes.
**Methods.** Contingency tables using Chi -squared test were employed, with the four modalities of AF secondary prevention, i.e., no specific medication, amiodarone, rivaroxaban, combined regimen with amiodarone and rivaroxaban being assumed as exposure variables within four separate tables, each applied to one of the four outcome variables investigated in the study, namely AF relapses, stroke or transient ischemic attacks (TIAs), all-cause death and hospital re-admissions
**Results.** 255 patients with a history of AF successfully treated with achievement of sinus rhythm have been collected. Amiodarone has been the most efficacious option for AF secondary prevention, with regard to the AF relapses as well as the rehospitalizations – p (Kruskal- Wallis test) < 0.05 for both-, over a median follow-up of 24 months.
**Conclusions.** Patients kept free from any specific drug therapy have been shown to experience more frequent AF recurrences and related hospitalizations. On the contrary, the amiodarone use has been associated with a decreased risk of AF relapses and hospitalizations. Thus, amiodarone might be an efficacious tool for long - term AF secondary prevention.

### A71: THE APULEIO STUDY: AN ITALIAN, MULTICENTER, PROSPECTIVE, OBSERVATIONAL EXPERIENCE EVALUATING THE PSYCHOLOGIC EFFECTS OF APIXABAN IN THE ELDERLY

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**Background.** Apixaban (APX) is a NOAC prescribed in patients with non-valvular atrial fibrillation (NVAF) and deep vein thrombosis (DVT) and pulmonary embolism (PE). The APULEIO study was specifically designed to describe, in an Italian elderly population with NVAF, DVT or PE, the effects of APX on health-related quality of life (HRQL), depressive symptoms and treatment satisfaction. Real-world data on these topics, essential to improve compliance and adherence to therapy, are effectively lacking.
**Methods.** APULEIO was a multicentre, prospective, observational, two-cohort study including patients eligible to anticoagulant therapy for either NVAF or DVT/PE (Italian participating centres – N=43; enrolment period: April 22nd, 2016 - January 31st, 2017). Patients, starting APX treatment, were followed-up at 3 and 6 months. The Anti-Clot Treatment Scale

(ACTS) was used to assess patient satisfaction; the 12-Item Short Form Health Survey (SF-12), the Beck Depression Inventory-II (BDI-II) and the FIND questionnaire were used to evaluate HRQL, depressive symptoms and frailty status, respectively. Continuous variables are expressed as median with interquartile (IQR) range.
**Results.** Out of 441 enrolled patients, 371 had the complete dataset and could be analysed (NVAF - N=285, 77%; DVT/PE - N=86, 23%). NVAF subjects were older (76 vs. 71 years; p<0.0001) with a higher prevalence of hypertension (83.5 vs. 52.3%, p<0.0001), cerebrovascular disease (16.1 vs. 7.0%, p=0.0330) and congestive heart failure (13.7 vs. 4.7%, p=0.0210); accordingly, their Charlson Comorbidity Index was higher. No differences were observed in gender, body mass index, resting heart rate and the prevalence of disabled and frail individuals (39.4 and 30.9% respectively). Median time from diagnosis was higher in NVAF patients (1.9 vs. 0.9 months; p=0.0002). The most used daily dosage of APX was 10 mg in both cohorts (IQR(10;10)). At the 6-month evaluation, SF-12 showed a significant improvement in the whole population, with an increase of both the Physical (difference: +2.0, IQR(-3.1;8.8), p<0.0001; Baseline: 40.4 IQR(33.3;47.7)) and the Mental Health Composite Score (difference: +2.1, IQR(-4.6;9.0), p=0.0002; Baseline: 47.1, IQR (38.9;54.4)). Also depressive symptoms, as evaluated with the BDI-II had a significant improvement (difference: -1.0, IQR(-6.0;2.0), p<0.0001; Baseline: 7.0, IQR (3.0;13.0)). Importantly, at 6 months, the psychologic burden of therapy, as measured with the ACTS score, did not change at all (difference: 0.0, IQR(-1.0;2.0), p=0.3351; Baseline: 57, IQR (53;59)). All these results were identical also separately analysing NVAF and DVT/PE subjects. HRQL and the presence of comorbidities influenced the degree of patients' satisfaction to therapy. Haemoglobin concentration (Baseline: 13.4 g/dL) and glomerular filtration rate (Baseline: 68 mL/min) did not vary during the follow-up (respectively, p=0.4365 and p=0.7104 vs. Baseline). The incidence of any adverse events was 9.2%.
**Conclusions.** The APULEIO Study shows that APX therapy in an elderly population with both NVAF and DVT/PE is well tolerated. In the first 6-month of treatment, HRQL and depressive symptoms significantly improve, while drug-related psychologic burden is unchanged. These findings are particularly important because of the high prevalence of a disabled and a frail condition in our population.

### A72: NUTRITIONAL INTERVENTIONS AND BLOOD PRESSURE CHANGES

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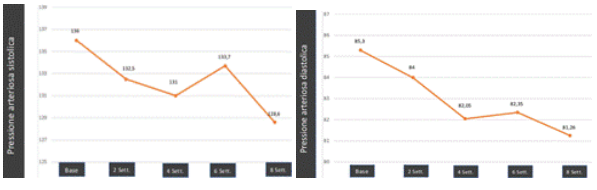
**Introduction.** Nattokinase is a serine protease isolated in 1987 from a fermented soy extract: Natto. The powerful fibrinolytic activity is linked to its property of activate plasmin and increase t-Pa levels. It is also stable after digestion and has no side effects or bleeding risk. The structure of the Nattokinase is identical to that of the subtilisin E and in experimental studies has inhibited ACE and clinical evidence has shown a reduction in blood pressure.
**Materials and methods.** Hypertensive patients (10 males and 10 females, 58 ± 8 and 56 ± 9 years of age) in good blood pressure control with the drugs in daily use, took 8 weeks Nattokinase NSK-SD (Reonat - AB Pharma - Italy) at a dose of 100 mg (2000 fibrinolytic units). The blood pressure was measured at home once, three times in a row, a day (Microlife AFIB - Colpharma). At the beginning of the study and after 2,4,6, 8 weeks the values recorded and sent via e-mail were checked. At the beginning of the study and after 8 weeks blood tests were performed.
RESULTS The mean systolic and diastolic pressures at the beginning and at the end of the study are shown into the graphs.




The mean values of the systolic pressures were significantly reduced from 136.0 mmHg (SEM ± 1.80) to 128.6 mmHg (SEM ± 1.83 - p <0.05), the average of the diastolic pressures was reduced from 85.3 mmHg (SEM ± 1.9) at 81.2 (SEM ± 1.6). No changes in blood chemistry or no adverse events were noted.
**Conclusions.** It is therefore a preliminary observation on a nutritional intervention that reduces blood pressure. The Nattokinase, in addition to fibrinolytic and thrombolytic properties with clinical evidence by now established, can be considered a support in the control of high blood pressure values.

### A73: SAFETY AND EFFICACY OF DUAL VS TRIPLE ABTITROMBOTIC THERAPY IN PATIENT WITH ATRIAL FIBRILLATION UNDERGOING PERCUTANEOUS CORONARY INTERVENTION: A META ANALYSIS OF RANDOMIZED TRIALS

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**Background.** The management of antithrombotic therapy in patients undergoing percutaneous coronary intervention (PCI) with an indication for long-term oral anticoagulant therapy (OAT) is still a matter of debate, due to the necessity of balancing the risk of ischemic and bleeding events. We aim to evaluate the safety and the efficacy of dual therapy (DT) compared to triple therapy (TT) in this clinical setting.
**Methods.** A study level meta-analysis of randomized trials selected using PubMed, Embase, EBSCO, Cochrane database of systematic reviews, Web of Science, and abstract from major cardiology congresses. Five randomized trials with 10,650 patients evaluating the strategy of DT vs. TT in patients treated with PCI with an indication for long-term OAT were included in this analysis.
**Results.** Patients treated with DT demonstrated a 46% relative reduction in the risk of TIMI major bleeding (1.67% vs. 2.96%; OR 0.54, 95% CI 0.41–0.71; P<0.0001) and a 53% of relative reduction in TIMI minor bleeding compared to TT arm (3.21% vs 6.35%, OR 0.47 95% CI 0.37-0.60, P<0.00001). All-cause mortality was similar in two arms (3.66% vs 3.58%, OR 0.92 95%CI 0.67, 1.26, P = 0.59), as well as cardiovascular mortality (2.20% vs 2.21%, P=0.71). Not significant differences were observed in occurrence of MI, stroke and definite ST.
**Conclusion.** Our meta-analysis of randomized trials on patients undergoing PCI with an indication to long-term OAT suggest that DT is safer than TT. DT consisting of a NOAC plus clopidogrel could be an effective therapeutic option in most patients in this clinical scenario.

### A74: MULTICENTRIC STUDY ON THE ANTI-INFLAMMATORY EFFECT OF A DIETARY SUPPLEMENT BASED ON RED YEAST RICE, GUGGUL, POLICOSANOLS AND MILK THISTLE IN HYPERLIPIDEMIC PATIENTS

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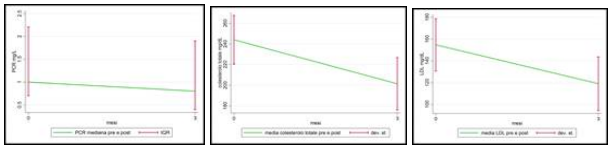
Inflammation plays a decisive role in all phases of atherogenesis, from initial inflammatory cell recruitment, to atherosclerotic lesion formation, progressive and eventual rupture of the atheromatous plaque. The inflammatory biomarker C-reactive protein (CRP) is considered a potential risk marker for cardiovascular disease and a strong predictor of future cardiovascular events. CRP is a particularly beneficial inflammatory biomarker as it is detected much faster than other markers in the blood. Dietary intervention effects on inflammatory markers, as CRP, have been demonstrated to be similar of those conferred by a statin starting dose. Over the past decades, a large number of secondary prevention trials (CARE, PRINCE, PROVE IT-TIMI 22, REVERSAAL) and primary prevention trials (JUPPITER, AFCAPS/TexCAPS), have established that statin therapy lowers LDL cholesterol and exerts anti-inflammatory effects, including the ability to lower CRP. This multicentric study (lasted from January to June 2017), which involved 44 centers/GPs from North-Eastern Italy, was conducted on 130 patients (64 women and 66 men; mean age 59.9±10.0 years), normotensive, free of cardiac symptoms, in primary CV prevention, with low-moderate hypercholesterolemia (CT<270 mg/dL; LDL-C<180 mg/dL), CRP >0.3 and <2.5, normal WBC, creatinine, AST/ALT/CPK and ESV. Patients enrolled in the study have been treated with a dietary supplement based on Red Yeast Rice, Guggul, Policosanols and Milk thistle, 1 capsule/day. At the beginning and after 12 weeks of treatment CT, LDL-cholesterol (LDL-C), CRP, WBC, creatinine, AST/ALT/CPK and ESV were measured. Results: The tested lipid-lowering nutraceutical significantly decreased CT, LDL-C and CRP from baseline (p< 0,001).



**Conclusions.** On the basis of our data, the tested lipid-lowering nutraceutical seems to significantly reduce CT, LDL-C and CRP in patients with low-moderate hypercholesterolemia.

### A75: BENEFIT OF BETA-GLUCAN RICH PASTA IN HEALTHY POST-MENOPAUSAL WOMEN WITH LOW CARDIOVASCULAR RISK

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**Aims.** Beta-glucans are found in high fiber foods such as oats and barley. We assessed their effects on lipid and glucose plasma concentration, body weight, blood pressure and endothelial function in post-menopausal women with a low cardiovascular risk.

**Methods.** 24 patients were randomized into two parallel groups and only one received beta-glucan rich pasta. Both groups followed a Mediterranean diet. Nutritional status, blood parameters, blood pressure and flow-mediated dilation were assessed at baseline and after 6 weeks.

**Results.** final population included 20 patients. In both groups there was no statistically significant decrease in total cholesterol levels: in group A 218 ± 25 mg/dl at baseline (T0) vs 216 ± 24 mg/dl after 6 weeks (T1) P=0.34; in group B 213 ± 24 mg/dl (T0) and 211 ± 23 mg/dl (T1) respectively at baseline and after 6 weeks (P=0.44). LDL-C decrease was not statistically significant either: 136 ± 22 mg/dl (T0) vs 135 ± 23 mg/dl (T1) (P=0.45) in group A and 136 ± 21 mg/dl (T0) vs 134 ± 17 mg/dl (T1) in group B, respectively (P=0.34). HDL-C levels were reduced with statistical significance in both groups: 70 ± 16 mg/dl (T0) vs 66 ± 15 mg/dl (T1) in group A (P=0.02) and 64 ± 12 mg/dl (T0) vs 59 ± 13 mg/d (TI) (P=0.01) in group B. No statistically significant changes were found in the triglycerides profile: 79 ± 21 mg/dl (T0) vs 84 ± 25 mg/dl (T1) (P =0.27) in group A and 107 ± 42 mg/dl (T0) vs 89 ± 26 mg/dl (T1) in group B (P=0.06). A statistically significant decrease in fasting blood glucose levels was found in both groups: 96 ± 7.8 mg/dl (T0) vs 90 ± 9.5 mg/dl (T1) for group A (P=0.02); 104 ± 8 mg/dl (T0) vs 98 ± 10 mg/dl (T1) (P= 0.04). BMI was reduced at 6 weeks in group A: 24,7 ± 3 (T0) vs 24,3 ± 3 (T1) (P=0.02). BMI did not decrease for patients in group B: 22 ± 9 (T0) vs 22,7 ± 7 (T1) (P=0.3). A good result was also observed regarding waist circumference for group A: from 89,9 ± 8 cm to 87 ± 9 cm (P =0.01); group B didn't experience the same reduction in waist circumference (from 91,8 ± 6 cm to 89,8 ± 6 cm - P=0.07). There also was a significant reduction in systolic blood pressure limited to group A: 123 ± 7.9 mmHg (T0) vs 117 ± 8 mmHg (T1) (P=0.03). No statistically significant diastolic pressure decrease was found: 78 ± 7 mmHg (T0) vs 77 ± 6 mmHg (T1) (P =0.37) in group A and 78 ± 5 mmHg (T0) vs 78 ± 11 mmHg (T1) in group B (P=0.44). The most important result we achieved was significant improvement in endothelial function after 6 weeks as assessed by FMD in group A: 2,8 ± 19% (T0) vs 13,5 ± 6% (T1) (P=0.03) in group A. There was no statistically significant improvement in FMD for group B: 4.8 ± 13% (T0) vs 10.8 ± 12% (T1) (P= 0.1).

**Conclusions.** Beta-glucan supplementation is associated with an improvement in FMD in post-menopausal healthy women as well as a reduction in systolic BP, glycemic values, BMI and waist circumference, with a potential to reduce the risk of cardiovascular events in this population.

## IPERTENSIONE ARTERIOSA
## Sessione Poster

### A76: COMPARATIVE EFFECTS OF 12-WEEKS OF AEROBIC VERSUS COMBINED EXERCISE TRAINING ON SHORT TERM BLOOD PRESSURE VARIABILITY IN PATIENTS WITH HYPERTENSION

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(a) S.RAFFAELE IRCCS, ROMA; (b) UNIVERSITÀ TOR VERGATA, ROMA

**Background.** Exercise training effectively reduces blood pressure (BP) values. However its effect on short term BP variability has not been clarified yet. Study aim: to compare the effects on BP variability of two different exercise modalities during a during a cardiac rehabilitation program in hypertensive patients.

**Methods.** We enrolled 56 males patients with arterial hypertension. Patients were randomly assigned either to an aerobic training (AT) group or to a combined training group (CT), this latter including aerobic and resistance training. The training program lasted 12 weeks for each group. Short term BP variability was evaluated, at baseline and after 12 weeks, by 24/h ambulatory BP monitoring (ABPM)

**Results.** Systolic and diastolic BP values decreased significantly in both groups, without between groups differences. 24/systolic BP variability decrease in both groups (AT= from 8.2±2.3 to 7.8±1.8, p0.07; CT= from 8.4±1.9 to 7.1±1.3, p 0.02)with a greater decrease in CT (between groups p= 0.04). Nocturnal BP variability decreased in CT (from 7.4±1.6 to 6.0±1.3, p=0.008) and remained unchanged in ACT (from 7.0±2.0 to 6.7±1.3, p=0.09). Diurnal BP variability decreased mildly in both groups without between groups differences.

**Conclusions.** 12 weeks of CT were more effective than AT on reducing short-term variability in hypertensive patients. CT appears the to be the more appropriate exercise modality when there is need for targeting both BP values and variability.

### A77: EFFECTS OF SODIUM INTAKE ON AORTIC STIFFNESS IN SALT-SENSITIVE YOUNG NORMOTENSIVE INDIVIDUALS

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(a) IRCCS FONDAZIONE DON CARLO GNOCCHI ONLUS-MILANO-ITALY;
(b) FONDAZIONE DON CARLO GNOCCHI ONLUS-PARMA-ITALY;
(c) DEPARTMENT OF MEDICINE AND SURGERY-UNIVERSITY OF PARMA-ITALY

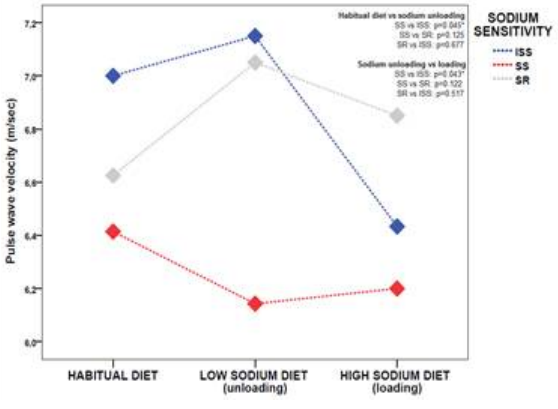
**Background.** Salt sensitivity (SS) is a condition by which blood pressure (BP) exhibits changes parallel to salt intake and represents an important and emerging cardiovascular risk factor with prognostic value independent of blood pressure levels.Recently has been proposed that salt intake may play a role not only on the rise of blood pressure levels but also on aortic stiffness.

**Aim.** To evaluate the effects of sodium intake on aortic stiffness in salt-sensitive young normotensive individuals.This was done comparing pulse wave analysis data between high and low sodium intake according to sodium sensitivity index.

**Methods.** We enrolled 21 consecutive healthy normotensive young volunteers recruited among medical students.Each subject underwent two experimental sessions: the first session was performed after 5 days of low sodium intake diet (30 mmol of NaCl per day) and the second after five days of a high sodium diet (200 mmol of NaCl per day). Body weight, 24-hour urinary collection for sodium and potassium excretion, Sodium Sensitivity Index (SSI), 24- hour Ambulatory Blood Pressure Monitoring (ABPM), 24-hour heart rate monitoring and Pulse Wave Analysis (PWA) were performed at the end of each diet period.

**Results.** No significant differences in Blood Pressure (BP) and Pulse Wave Analysis data were found between high and low sodium diet in the overall population. By dividing the population according to Sodium Sensitivity Index (SSI) values, 6 subjects (29%) were identified as Inverse Sodium Sensitive (ISS), 8 (38%) as Sodium Resistant (SR) and 7 (33%) as Sodium Sensitive (SS).Interestingly, analysing the population according to Sodium Sensitivity Index (SSI), opposite responses to sodium loading and unloading manoeuvresin ΔPulse Wave velocity (Δ PWV) have been found between groups (PWV= -0.72±0.46 in ISS, -0.20 ±0.70 in SR, 0.05±0.84 in SS; p=0.043 between ISS and SS). Finally, considering the whole population, a trend toward significance in the correlation between SSI and Δ PWV after sodium loading has been found (r=0.421 p= 0.057).

**Conclusion.** In young normotensive subjects, the effects of salt on arterial stiffness mainly depend on sodium sensitivity rather than on sodium intake.




### A78: EMERGENZE ED URGENZE IPERTENSIVE: GESTIONE DELLA PRESSIONE ARTERIOSA E RELAZIONI CON L'OUTCOME A BREVE E MEDIO TERMINE

Alessandro Maloberti (a, b), G. Magni (b), G. Cassano (b), N. Capsoni (b), S. Gheda (b), G. Magni (b), G.M. Azin (b), M. Zacchino (b), A. Rossi (b), C. Campanella (b), Marta Bergamaschi (b), Marta Battistini (b), Tommaso Valobra (b), A. Moreo (a), A. Beretta (c), A. Bellone (c), Cristina Giannattasio (a, b)
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**Obiettivo.** i dati che riguardano la prevalenza e la gestione clinica delle emergenze ed urgenze ipertensive sono scarsi ed eterogenei. Il nostro scopo è valutare questi dati nei pazienti con emergenze ed urgenze ipertensive ammessi al Pronto Soccorso (PS) dell'Ospedale Niguarda. Abbiamo anche valutato i fattori associati alla presenza di danno d'organo, la concordanza con le linee-guida e quanto l'impatto della gestione in PS della Pressione Arteriosa (PA) sull'outcome a breve termine (ricovero e mortalità ospedaliera) e a medio termine (recidiva di emergenze/urgenze ipertensive).

**Metodi.** Abbiamo valutato in modo retrospettivo i dati dei pazienti che accedevano al PS del nostro ospedale con PA sistolica ≥180 mmHg e/o PA diastolica ≥120 mmHg durante il 2017.
**Risultati.** Il numero di soggetti in studio era 706 (0.95% degli accessi in PS), di cui il 34.8% erano emergenze ed il 62.5% urgenze. I pazienti con emergenze ipertensive erano più anziani, soprattutto uomini, con più comorbidità e più sintomatici. Nelle emergenze ipertensive abbiamo osservato una riduzione della PA di 18.82±12.1% in 110.1±11.9 minuti; i farmaci più usati erano nitroglicerina, furosemide e labetalolo. Nelle urgenze, la riduzione era del 19% e il farmaco più usato era la nifedipina short-acting. Età, genere, fumo, anamnesi di scompenso cardiaco, BPCO ed eGFR sono stati riconosciuti come fattori associati al danno d'organo alla regressione lineare. Invece la PA all'ingresso e la sua gestione non sembrano avere un impatto significativo sull'outcome a breve e medio termine.
**Conclusioni.** Il nostro studio dimostra una buona aderenza alle linee-guida nel trattamento dell'emergenza ipertensiva più che dele urgenze ipertensive. Non abbiamo individuato nessuna associazione significativa tra la gestione della pressione in PS e l'outcome a breve e medio termine.

## A79: LEFT VENTRICULAR MASS DETERMINANTS IN FRAIL SARCOPENIC ELDERLY PATIENTS

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**Background.** Age is an important independent risk factor for cardiovascular diseases and sarcopenia, defined as the loss of muscle mass and function. The increased prevalence of cardiovascular diseases during aging potentially interface with sarcopenia, and frailty, a condition of increased vulnerability to stressors. Older persons also show a higher prevalence of left ventricular hypertrophy (LVH) with concentric remodeling, a pattern with the highest cardiovascular risk. To our knowledge, no study has fully evaluated which are the determinants of left ventricular mass (LVM) in frail sarcopenic older patients.
**Methods.** To address this hypothesis, we evaluated 100 sarcopenic and physical frail outpatients, 33 men (M), 67 women (F), aged ≥70 years (mean age 79±5), enrolled in the Parma site of *European multicenter SPRINTT* population. Sarcopenia was estimated by Dual X-ray absorptiometry appendicular lean mass (ALM) values below the FNIH cut off (ALM 21.4±3.0 M, 15.3±2.1 F). Physical frailty was defined on SPPB score between 3 and 9. Each participant underwent clinical assessment ECG and echocardiographic examination to calculate LVM according to Devereux formula, with relative wall thickness (RWT) as the remodelling index. 52 of 100 patients (34 F e 18 M) underwent ambulatory blood pressure monitoring (ABPM).
**Results.** 69% of participants had history of hypertension, 40% was chronically on β blockers, and 32% on ACE-inhibitor therapy. Both absolute LVM and indexed to body surface area (LVM/BSA) were increased in F (169±45g; indexed, 104±26g/m$^2$) and M (241±79; indexed, 128±39g/m$^2$). These data are compatible with aging and hypertension status with a tendency to a geometric remodelling demonstrated by RWT value (0.41 in both sexes).
LVM was positively and significantly associated to BSA (r=0.52; p<0.001), office systolic blood pressure (SBP) (r=0.24; p=0.01), average night-time SBP (r=0.30; p<0.05) and also to SBP variability during the day, assessed as standard deviation of daily SBP (r=0.27; p<0.05). The multiple regression analysis including as covariates age, sex, office or ABPM SBP, heart rate, BSA, β blockers therapy, ACE-inhibitor therapy, physical activity, hemoglobin level, confirmed the positive and significant relationship between LVM and BSA (β =213.12±32.73: p<0.0001), office (β=1.15±0.32: p=0.0005), and night-time SBP (β=1.24±0.61; p=0.05).
24-h (β=1.52±0.66; p=0.02), day-time (β=1.59±0.66; p=0.02), 24-h standard deviation of (β=5.33±2.56; p=0.04) and nightly SBP standard deviation (β=4.26±1.93; p=0.03) also influenced LVM.
**Conclusions.** Older sarcopenic and physical frail patients showed LVH with a tendency to concentric remodeling. The main determinant of LVM as well as BSA was SBP (mainly office SBP) suggesting the key role of hemodynamic condition (afterload) in the development of LVH in the elderly. Further analyzes are needed to better understand the pathophysiology of cardiac aging in order to reduce cardiovascular morbidity and mortality in this high risk population.

## A80: PROGNOSTIC VALUE OF DIFFERENT DEFINITIONS OF MASKED UNCONTROLLED HYPERTENSION BY AMBULATORY BLOOD PRESSURE

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**Background and aim.** Masked uncontrolled hypertension (MUCH) is characterized by normal clinic but high out-of-office blood pressure (BP) in treated hypertensive patients. It has been shown that patients with MUCH are at higher cardiovascular risk than those with normal clinic and out-of-office BP (controlled hypertension, CH). MUCH can be detected by ambulatory BP monitoring or home BP recording. Based on ambulatory BP, MUCH can be defined as daytime or nighttime or 24-hour BP above threshold values. It is unclear whether different definitions of MUCH convey similar prognostic information. The aim of this study was to assess the prognostic value of MUCH defined according to daytime or nighttime or 24-hour BP cutoff values.
**Methods.** The occurrence of a composite end-point (stroke, coronary events, heart failure and peripheral revascularization) was evaluated in 2264 treated hypertensive patients. Daytime, nighttime and 24-hour MUCH were defined as daytime BP ≥ 135/85 mmHg, nighttime BP ≥ 120/70 mmHg and 24-hour BP ≥ 130/80 mmHg, respectively. Patients were classified as having daytime MUCH (with normal nighttime BP) (Group 1), nighttime MUCH (with normal daytime BP) (Group 2), daytime and nighttime MUCH (Group 3), daytime MUCH (regardless of nighttime BP) (Group 4), nighttime MUCH (regardless of daytime BP) (Group 5) and 24-hour MUCH (regardless of daytime or nighttime BP) (Group 6).
**Results.** In this population, patients with MUCH were 42 (2%), 184 (8%), 173 (7.5%), 215 (9.5%), 357 (16%) and 275 (12%) in Group 1, 2, 3, 4, 5 and 6, respectively. During the follow-up (10 ± 5 years), 523 events occurred in the global population. Compared to patients with CH, the unadjusted hazard ratio (HR, 95% confidence interval, CI) for the composite end-point was 2.04 (1.07-3.86), 1.47 (0.94-2.29), 2.75 (1.85-4.08), 2.21 (1.60-3.06), 1.83 (1.31-2.55), and 1.90 (1.37-2.63) in Group 1, 2, 3, 4, 5 and 6, respectively. After adjustment for various covariates, compared to patients with CH, the adjusted HR (95% CI) for the composite end-point was 1.52 (0.80-2.91), 1.15 (0.74-1.80), 2.29 (1.53-3.42), 2.01 (1.45-2.79), 1.53 (1.09-2.15), and 1.69 (1.22-2.34) in Group 1, 2, 3, 4, 5 and 6, respectively.
**Conclusions.** The prognostic impact of MUCH defined according to various ambulatory BP cutoff values may be different. Definition of MUCH guided by daytime BP threshold values appears to capture the worst prognostic significance of this condition.

## A81: RIGIDITÀ AORTICA: RELAZIONE CON I VALORI DI PRESSIONE ARTERIOSA MISURATA CON APPROCCIO "ATTENDED" OD "UNATTENDED"

Anna Paini (a), Carlo Aggiusti (a), Fabio Bertacchini (a), Deborah Stassaldi (a), Sara Capellini (a), Giovanni Saccà (a), Chiara Arnoldi (a), Laura Verzeri (a), Enrico Agabiti Rosei (a), Maria Lorenza Muiesan (a), Massimo Salvetti (a)
(a) MEDICINA INTERNA E 2 MEDICINA, UNIVERSITÀ DI BRESCIA E ASST SPEDALI CIVILI DI BRESCIA

**Premesse.** Alcune Linee Guida internazionali hanno proposto la misurazione della pressione arteriosa(PA)"unattended"(o AOBP, automated office blood pressure measurement),quale standard di riferimento per la misurazione della PA in ambulatorio.I dati riguardanti la relazione fra AOBP ed eventi cardiovascolari sono tuttavia assai limitati;inoltre, gli studi che hanno analizzato la relazione fra danno d'organo preclinico e PA misurata mediante approccio "attended" od "unattended" hanno portato a conclusioni contrastanti.
**Scopo.** Valutare la relazione fra PA "attended" ed "unattended" e rigidità aortica in 285 soggetti afferenti a un Centro Ipertensione italiano. La PA "unattended"(paziente solo nella stanza, apparecchio oscillometrico programmato per effettuare 3 misurazioni ad intervalli di 1 minuto, dopo 5 minuti di riposo) e la PA "attended" sono state misurate con lo stesso apparecchio oscillometrico,lo stesso giorno della misurazione della rigidità aortica (PWV).
**Risultati.** L'età media era 63.5±13 anni,l'indice di massa corporea 26±4,il 54% erano maschi, il 76 % ipertesi(74% trattati).I valori di PA sistolica(PAS)"unattended" sono risultati inferiori rispetto a quelli rilevati con approccio "attended"(124±14vs131±16 mmHg). Le correlazioni fra PWV e PAS "unattended" o "attended" sono risultate simili(r=0.428 e r=0.404,p<0.0001,rispettivamente);anche le correlazioni fra PWV and PA media "unattended" od "attended" sono risultate sovrapponibili(r=0.211 e r=0.224,p<0.0001).Simili correlazioni sono state anche osservate fra PWV e pressione differenziale "unattended" od "attended" (r=0.484 and r=0.488, p<0.0001).Le differenze fra le correlazioni non erano statisticamente significative (Steiger's Z test). Non è stata osservata alcuna differenza fra le curve ROC per la PA sistolica "attended" ed "unattended"-per la presenza di aumentata rigidità aortica(AUC 0.665 vs. AUC 0.651, p per il confronto fra curve = ns).

**Conclusioni.** La misurazione della PA con approccio "unattended" fornisce valori assoluti inferiori rispetto a quelli misurati in presenza del medico.I nostri risultati tuttavia suggeriscono che la PA "attended" od "unattended" sono associate in maniera simile alla rigidità aortica.

### A82: BENEFICIAL EFFECTS OF THE HABITUAL USE OF MELATONINE IN HYPERTENSIVE POST-MENOPAUSAL WOMEN

Marisa Talarico (a), Cristina Rolando (a), Umberto Stefanelli (a), Francesca Coppi (a), Anna Maria Vittoria Mattioli (a), Giuseppe Boriani (a), Rosario Rossi (a), Andrea Pennacchioni (a)
(a) DIPARTIMENTO DI CARDIOLOGIA DELL'UNIVERSITÀ DI MODENA & REGGIO EMILIA

**Introduction.** The aim of this study was to demonstrate whether the habitual use of melatonin for sleep disorders is accompanied by an improved cardiovascular risk profile and blood pressure control, compared to the habitual use of other hypnotic drugs in the population of hypertensive post-menopausal women.
**Materials and methods.** Our study was conducted in the Policlinico of Modena Hospital. We enrolled 386 consecutive hypertensive post-menopausal women 55 ± 6 years of age (range 47 to 60 years) and divided them into three groups according to the usual pharmacological treatment for insomnia. The first group (Group M) counted 82 post-menopausal women (21.2%) taking melatonin; the second (Group B) 104 (26.9%) benzodiazepines; the third, control-group (Group C) 200 (51.8%) patients who did not take any medication for insomnia. We evaluated cardiovascular-risk profile, including the measurement of flow-mediated vasodilatation of the brachial artery.
**Results.** Habitual administration of melatonin, in the population of post-menopausal hypertensive women, is accompanied by a significative improvement of cardio-vascular risk profile compared to the use of other hypnotic drugs for sleep disorders.

## MALATTIE DEI VASI
## Sessione Poster

### A83: LEFT SIDED VULNERABLE CAROTID PLAQUE: A MIRROR OF UNSTABLE CORONARY PLAQUE?

Gaetana Ferro (a), Agnese Bevilacqua (a), Lorenzo Iuliano (a), Claudia Vicidomini (a), Luigi Tedesco (a)
(a) UO CARDIOLOGIA UTIC OSPEDALE "SANTA MARIA DELLA SPERANZA" BATTIPAGLIA (SA)

**Background.** The correlation between Carotid Atherosclerosis (CA), Carotid Plaque(CP) and Coronary Artery Disease (CAD) is widely known. Recent evidences highlight the difference between the compositionof right plaque and left plaque which presents a grater vulnerability as opposed to right and, consequently, it is likely responsible for most cases of ischemic stroke, more often diagnosed in the left hemisphere than in the right. With our study we aimed to explore the correlation between the side of carotid plaque and presence of Coronary artery disease.
**Methods and results.** We enrolled 200 patient which undergone Carotid ultrasound with evidence of carotid plaque. 130 patients (Group A) had one or more cardiovascular risk factors and performed the exam with preventive aim since they resulted as symptoms free and had a negative provocative stress test. 70 patient performed the exam during the hospitalization for Acute coronary Syndrome NSTEMI (Group B). In the Group A 20 patients had bilateral carotid plaque (15%), 80 patients had right sided plaque, mostly calcific, 30 patients has left sided plaque, mostly calcific (61% versus 23%). Degree of stenosis did not significantly differ. In Group B 20 patients presented bilateral carotid plaque (28%) while 45 presented left side plaque, mostly fibrotic and 5 patients had right sided plaque mostly calcific (64% versus 7%)
**Conclusions.** Our preliminary data suggest a correlation between left sided carotid plaque and Coronary Artery Disease. In particular the evidence of a more vulnerable plaque in the left carotid may justify the highest prevalence of Acute Coronary Syndrome in this population. The mechanisms at the base of this phenomena (hemodynamic factors, endothelial factors and biochemical factors) are still unknown. Further studies are needed to assess this correlation for a future use of carotid ultrasound in early detecting patients at risk of acute coronary syndrome.

### A84: KAWASAKI DISEASE IN A 12-WEEK OLD INFANT COMPLICATED BY CORONARY ARTERY ANEURISMS EFFECTIVELY MANAGED WITH ANAKINRA

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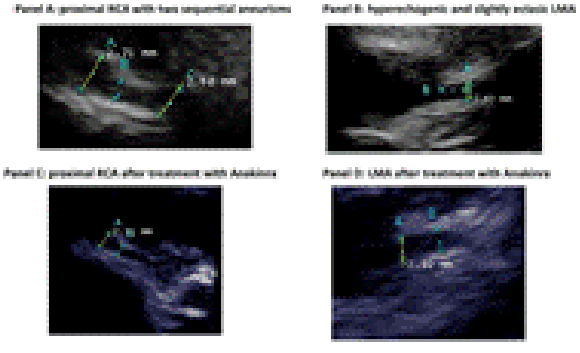
**Introduction.** Kawasaki disease (KD) is an acute inflammatory vasculitis that could affect the coronary arteries. It is more common in boys than girls, and it is the leading cause of acquired cardiac disease in children in developed countries. Coronary artery aneurysms are more common in those patients in whom treatment is delayed or missed. As a matter of fact, they develop in up to 25% of untreated cases of KD with 2-3% of them dying due to the complications of this condition underling the importance of a prompt diagnosis and treatment also to avoid further future sequelae.
**Case presentation.** In this case report, we present a striking case of incomplete KD complicated by coronary aneurisms effectively treated with Anakinra. A 2-month-old boy was admitted to the pediatric department for remittent fever lasting for a week, conjunctivitis, diffuse skin rash and cheilitis. The laboratory tests showed the presence of increased inflammatory indexes (C-reactive protein 12 mg/dl, procalcitonin 2 ng/ml), increased transaminases, hypoproteinemia, high platelet count and hyposideremia. 3 out of the 5 clinical criteria for KD were met therefore an incomplete KD was diagnosed. According to the guidelines of the Italian Society of Pediatrics high-dose intravenous Immunoglobulin (2 g/kg) were administered two times; and acetylsalicylic acid (ASA) and methylprednisolone were started. 2 days after the treatment was settled the clinical conditions and laboratory findings seemed to improve as the fever went away and inflammatory indexes started to decrease. However a transtorachic 2D echocardiogram was performed and showed the presence of an increased echogenicity at the level of the proximal right coronary artery (RCA); while the other coronary arteries did not exhibit any sign of inflammation and/or dilatation at this time. 5 days after our first evaluation the inflammatory indexes increased again and the fever reappeared. At this time the echocardiogram showed the presence of two saccular aneurisms at the proximal RCA (first aneurism diameter: 2.8 mm [Z-score 5.15]; second aneurism diameter: 2.7 mm [Z-score 4.80] – Fig. 1A) and the left main artery (LMA) appeared hyperechogenic and slightly ectasic (2.8 mm [Z-score: 3.05]- Fig. 1B). To avoid potentially fatal complications related to the aneurisms a dual antiplatelet therapy with clopidogrel and ASA was started. The clinical, laboratory and imaging features were suggestive for high risk of progression of the coronary aneurisms and therefore Anakinra was administered (0.2 mg/Kg/die SC). Moreover a total body CT scan with contrast medium was performed and excluded the presence of other aneurisms. After Anakinra was started the clinical conditions and laboratory tests steadily improved without any relapse. The echocardiograms showed a complete regression of the sings of inflammation at the coronary arteries, moreover, the second aneurism at the RCA regressed and the first aneurism at the RCA and the ectasia at LMA remained stable and did not progress (Fig 1 C-D).



**Discussion.** This clinical case highlights the importance to promptly diagnose KD in order to set up the right treatment. Moreover, it underlines the importance of following up these patients with echocardiograms to identify eventual progression of the disease and to properly tailor the medical therapy to avoid acute complications and further sequelae in the future related to the presence of coronary artery aneurisms.

### A85: FONDAPARINUX VERSUS ENOXAPARINA NEL TRATTAMENTO DEL TROMBOEMBOLISMO VENOSO IN PAZIENTI NEOPLASTICI: STUDIO RETROSPETTIVO DI COORTE "ONCOTEV"

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**Introduzione.** Il tromboembolismo venoso (TEV) nelle sue varie forme cliniche, embolia polmonare (EP), trombosi venosa profonda degli arti (TVP), trombosi venosa superficiale degli arti (TVS), trombosi venosa viscerale e dei siti inusuali (TVSI) è frequente nei pazienti neoplastici (incidenza 5 casi/1000 paz./anno), è correlata ad alto tasso di ospedalizzazione e rappresenta la seconda causa di morte. Alta è la frequenza di recidive di TEV e di complicanze emorragiche.
**Materiali e metodi.** Studio osservazionale, retrospettivo, monocentrico di coorte. Sono stati selezionati pazienti consecutivi affetti da TEV nelle varie forme cliniche e neoplasia attiva ovvero in fase di trattamento o

metastatica e non attiva ma in remissione completa da non più di sei mesi al momento del riscontro di TEV. I dati sono stati inseriti nel registro locale "ONCOTEV" della SOC di Medicina Cardiovascolare di Reggio Emilia su data base aziendale e-CRF Smarty. Sono state individuate due coorti di pazienti: gruppo A trattati con fondaparinux e gruppo B trattati con enoxaparina.
**Obiettivi primari dello studio.** 1) descrivere le caratteristiche demografiche delle coorti trattate ed in particolare la tipologia delle neoplasie e la curva di sopravvivenza. 2) valutare il beneficio netto del trattamento con fondaparinux e con enoxaparina attraverso l'esito composito di: recidive di TEV, emorragie maggiori (EM) e non maggiori ma clinicamente significative (ENMCS), morte per tutte le cause.
**Analisi statistica.** Le variabili categoriche sono state riportate come percentuali e confrontate utilizzando il chi-square test (two-sided) e il Fisher's exact test quando appropriato. Le variabili continue sono state confrontate con il test di Student. La comparazione delle curve di sopravvivenza calcolate con metodo di Kaplan-Meyer è stata effettuata con il log-rank test (SPSS vers. 15.0).
**Risultati.** Sono valutati 368 pazienti, 81 in gruppo A e 287 in gruppo B. L'età media è di 66 anni nel gruppo A e di 65.8 anni nel gruppo B. La patologia tumorale è in stadio avanzato nel 73% dei pazienti del gruppo A (56% fase metastatica) e 70% del gruppo B (52% fase metastatica). Gli eventi indice più frequenti sono la TVP degli arti superiori, la TVP degli arti inferiori e l'EP rispettivamente del 27.2%, 21.0% e 18.5% nel gruppo A e del 32.4%, 18.8%, 15.6% nel gruppo B (ns). Le curve di sopravvivenza mostrano che al termine del follow-up è ancora in vita il 68% dei pazienti del gruppo A vs 62% del gruppo B. La prima causa di morte è risultata la progressione neoplastica (69.2% nel gruppo A e 75% nel gruppo B). La curve di sopravvivenza libera da esiti primari (TEV + EM/ENMCS + morte per tutte le cause) mostrano un trend favorevole ma non statisticamente significativo per il gruppo enoxaparina. Da segnalare, tuttavia, che nel gruppo B si sono verificati il maggior numero di recidive di EP (11 vs 2) di cui tre fatali ($p < 0.05$) e che la maggior parte degli eventi si è verificata fra il 2^-6^mese nella fase di terapia a dosaggio personalizzato.
**Conclusioni.** Le caratteristiche demografiche della popolazione in oggetto sono sovrapponibili a quelle dei recenti studi internazionali Hokusai Cancer e Select-D che hanno esplorato l'efficacia del trattamento con DOACs (in particolare alta percentuale pazienti in stadio avanzato e con malattia metastatica). Nonostante i limiti di uno studio retrospettivo, osservazionale e monocentrico i dati mostrano simile efficacia, sicurezza e compliance di fondaparinux vs enoxaparina. Uno studio randomizzato, prospettico e multicentrico potrebbe essere utile per esplorare la reale differenza fra i due trattamenti in termini di EP ed EP fatale emerse nel presente studio. I dati suggeriscono come sia utile fare attenzione nel ridurre la posologia dal livello anticoagulante ad un livello personalizzato (50-75% della dose anticoagulante) nel periodo compreso fra il 2^-6^ mese soprattutto in caso di utilizzo di enoxaparina.

**Bibliografia**

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## A86: STRANE PERDITE DI COSCIENZA: SINCOPE CARDIOGENA O SINDROME DELL'ARCIERE?

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Paziente maschio, 60 anni, presenta da circa 2 anni episodi sincopali non preceduti da prodromi, di cui il primo al termine di uno sforzo fisico intenso, altri 4 comparsi dopo aver ruotato la testa verso sinistra nell'atto di girarsi. Nega dolore toracico, cardiopalmo, classe funzionale NYHA I. Tra i fattori di rischio cardiovascolare: ex forte fumatore, iperteso, dislipidemia, familiarità per cardiopatia ischemica.
Giunge alla nostra attenzione in ambulatorio per gli eseguire approfondimenti diagnostici del caso. Dopo valutazione clinica, vengono eseguiti massaggio del seno carotideo bilateralmente, prove di ipotensione ortostatica, test semeiologico per furto della succlavia, tutti negativi. ECG: ritmo sinusale con frequenza cardiaca 75bpm, non alterazioni della ripolarizzazione ventricolare. Ecocardiogramma transtoracico: cardiopatia ipertensiva in assenza di deficit della cinetica segmentaria, frazione di eiezione ventricolare sinistra 65%.
Come ulteriori approfondimenti si effettuano ECG 24h secondo Holter: ritmo sinusale, frequenza media 85bpm, assenza di pause patologiche, non alterazioni ST-T e test da sforzo, risultato positivo per ischemia miocardica inducibile a decorso asintomatico.
Si dispone pertanto ricovero per eseguire studio coronarografico che evidenzia malattia coronarica trivasale. Dopo discussione collegiale in Heart Team si pone indicazione a eseguire intervento cardiochirurgico di rivascolarizzazione miocardica attribuendo l'eziologia degli episodi sincopali verosimilmente alla coronaropatia.
Durante la degenza comparsa di nuovo episodio sincopale mentre il paziente si trovava a letto, riferito anche questa volta ruotando la testa verso sinistra, in assenza di eventi aritmici alla telemetria. A questo punto prima di procedere all'intervento chirurgico si decide di approfondire tale episodio richiedendo consulenza neurologica che esclude l'origine epilettica del quadro e angio TC delle arterie carotidi, cerebrali e TC cranio-collo con evidenza di "stenosi severa ostiale dell'arteria vertebrale destra in assenza di ulteriori alterazioni del circolo arterioso studiato".
Considerando la dinamica della comparsa della sincope (ruotando la testa verso sinistra) e il riscontro radiologico (stenosi arteria vertebrale destra), si attribuiscono gli episodi di perdita di coscienza anche alla cosiddetta *sindrome dell'arciere*, patologia causata dalla torsione forzata e protratta della testa che avrebbe come eziopatogenesi la compressione dell'arteria vertebrale da cause vascolari o extravscolari.
Il paziente è stato quindi sottoposto a intervento di quadruplice bypass aorto coronarico con decorso post operatorio esente da complicanze. Per quanto riguarda invece la *sindrome dell'arciere* è stato deciso in accordo con i chirurghi vascolari di porre il paziente in lista per eseguire l'intervento di rivascolarizzazione della vertebrale tramite reimpianto dell'arteria in carotide omolaterale.
Il caso clinico rappresenta un'occasione per rivisitare le cause di perdita di coscienza meno comuni che possono coesistere anche nello stesso paziente insieme a quelle più frequenti.

## A87: CORRELAZIONE TRA L'ANKLE BRACHIAL INDEX E LO STATODI FRAGILITÀ IN PAZIENTI ANZIANI OSPEDALIZZATI

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**Obiettivo.** La fragilità è uno stato di vulnerabilità dovuto alla scarsa ripresa dell'omeostasi dopo un evento stressante. Esso è una conseguenza di declino cumulativo in molti sistemi fisiologici, incluso quello cardiovascolare. L'aterosclerosi causa una riduzione cronica della vascolarizzazione dei tessuti, contribuendo in questo modo al declino funzionale e cognitivo tipico dell'anzianità. Scopo del nostro studio è dunque quello di valutare le associazioni tra l'Ankle-Brachial Index (ABI), in quanto indicatore di aterosclerosi, ed alcuni indici di fragilità in pazienti ospedalizzati presso il reparto di medicina del nostro ospedale.
**Metodi.** Abbiamo valutato 100 pazienti ultra 65-enni (età media 80 ± 6.9 anni) ospedalizzati nel Dipartimento di Medicina Interna del nostro istituto. Abbiamo valutato l'ABI ed i seguenti indici di fragilità (morte durante il ricovero, durata dell'ospedalizzazione, delirium, cadute, deficit cognitivo, indici ADL e I-ADL).
**Risultati.** All'analisi di correlazione dei vari indici di fragilità considerati, le uniche significative erano tra ABI e deficit cognitivo ($r=-0.298$; $p=0.003$) e indice ADL ($r=0.198$; $p=0.048$). Alla successiva regressione multivariata l'indice ABI rimaneva un determinante statisticamente significativo di deficit cognitivo ($\beta=-5.818$; $p=0.01$) manon dell'indice ADL ($\beta=0.328$; $p=0.729$).
**Conclusioni.** Un valore più basso di ABI è associato ad una peggiore performance cognitiva nell'età avanzata, probabilmente per l'esposizione ad un maggiore grado di ipoperfusione cerebrale.

## A88: SUBCLINICAL ATHEROSCLEROSIS AT PERIPHERAL ARTERIES IN OBESE SUBJECTS

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**Background.** Evidence on relationship between obesity and peripheral arterial disease (PAD) are controversial. The aim of the present study is to evaluate the presence of subclinical atherosclerosis at all level of the vascular segments with a systematic method in a selected population of young obese submitted to a comprehensive rehabilitation course.
**Methods.** A group of 50 consecutive morbidly obese (BMI >30) was included. All patients underwent Doppler evaluation including intima media thickness (IMT) and presence/absence of plaques al the level of all achievable arteries of both superior and inferior segments. ABI was evaluated in all subjects.
**Results.** Patients were significantly more obese and had greater waist circumference. They also had more risk factors compared to control group. We found that vessels in the upper segment of the body demonstrate the presence of thickening and/or plaques at the level of the carotid segments but not of the subclavian arteries. The IMT of the right Common Carotid Artery (CCA) (1.49 + 1.38 versus 0.62 + 0.23; $p=0.037$) and of the left CCA (1.66 + 1.89 versus 0.45 + 0.26; $p=0.034$) was greater in patients. Vessels of the lower segment demonstrate the presence of thickening and/or plaques in the right (1.97 ± 1.67 versus 0.65 ± 0.57; $p=0.011$) and left iliac arteries (2.42 ± 2.39 versus 0.55 ± 0.61; $p=0.011$) but not at femoral level. The control group did not present vessel thickening at any level. The ABI was significantly lower in patients compared to control (0.91 ± 0.02 versus 1 ± 0.01; $p<0.05$).

| | Patients | Controls | p |
|---|---|---|---|
| CCA Dx | 1.4 ± 1.3 | 0.6 ± 0.2 | 0.037 |
| ICA Dx | 0.73 ± 0.67 | 0.46 ± 0.42 | n.s. |
| CCA Sx | 1.6 ± 1.8 | 0.45 ± 0.26 | 0.034 |
| ICA Sx | 0.66 ± 0.87 | 0.25 ± 0.32 | n.s. |
| SA Dx | 0.47 ± 0.82 | 0.00 ± 0.00 | 0.057 (trend to) |
| SA Sx | 0.19 ± 0.47 | 0.00 ± 0.00 | n.s. |
| CIA Dx | 1.9 ± 1.6 | 0.6 ± 0.5 | 0.01 |
| CIA Sx | 2.4 ± 2.3 | 0.5 ± 0.6 | 0.01 |
| FA Dx | 0.7 ± 1.3 | 0.4 ± 0.4 | n.s. |
| FA Sx | 0.8 ± 1.6 | 0.3 ± 0.4 | n.s. |

CCA, common carotid arteries; ICA, internal carotid arteries; SA, subclavian arteries; CIA, common iliac arteries; FA, femoral arteries.

**Conclusions.** The major result of the present study is the likely existence of subclinical peripheral arterial disease in young obese subjects. This lead to conclusion that asymptomatic vascular damage may be present in different segment of peripheral vessels, thus suggesting an early risk for developing an overt vascular disease over time in obese.

### A89: EFFETTI DI COMPOSTI BIOATTIVI (CARDIOL FORTE) SULLA FUNZIONE ENDOTELIALE IN PAZIENTICON IPERCOLESTEROLEMIA MODERATA. RISULTATI PRELIMINARI

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La disfunzione endoteliale in pazienti ipercolesterolemici è in gran parte causata da una riduzione della biodisponibilità dell'ossido nitrico (NO). Scopo dello studio è valutare la capacità del nuovo nutraceutico combinato, Cardiol Forte® nel ridurre il colesterolo LDL in pazienti con ipercolesterolemia lieve-moderata e valutare la funzione endoteliale e il profilo di sicurezza generale del prodotto. In questo studio monocentrico, in doppio cieco, controllato con placebo, 80 pazienti ambulatoriali con ipercolesterolemia da lieve a moderata sono stati randomizzati e suddivisi in due gruppi: 40 pazienti sono stati assegnati ad assumere nutraceutico attivo per 8 settimane e 40 il placebo associati entrambi con una dieta standard a basso contenuto di grassi. I due gruppi di pazienti non hanno mostrato differenze tra i parametri del metabolismo del glucosio e dell'età della linea di base, della pressione sanguigna, dei lipidi e del glucosio
Nel confronto dell'effetto nel gruppo A trattato versus il gruppo di controllo B placebo, abbiamo osservato che l'assunzione di nutraceutico era associata a una riduzione significativamente più elevata di LDL-C (P <0,001 nel gruppo A vs 0,004 del gruppo B).
La misurazione della Flow Mediated Dilation ha evidenziato un incremento dei valori in entrambi i gruppi pur avendo una maggiore significatività nel gruppo trattato rispetto al controllo (18.8 %± 0,050, P <0.0001 per il gruppo trattato e 10.8 %± 0.03, P < 0.001 per il placebo).
Lo studio mostra che 8 settimane sono sufficienti per ottenere una riduzione dei livelli di colesterolo. È stata osservata una riduzione migliore di Colesterolo Totale e LDL- C rispetto al placebo. Questo risultato è stato associato a una migliore funzionalità endoteliale, come documentato dall'aumento più significativo di FMD. L'effetto sul miglioramento della funzione endoteliale è dato non solo dall'inibizione della monacolina K esercita sull'inibizione di HMG-CoA reduttasi ma soprattutto anche dalla somministrazione simultanea di antiossidanti come vitamina E, coenzima Q e polifenoli dell'olio di oliva.
Nel nostro studio, le monacoline 10 mg e i componenti principali del composto bioattivo (CARDIOL FORTE ®) sono stati ben tollerati: non sono state registrate variazioni dei parametri di sicurezza epatica, renale e muscolare.

## MISCELLANEA
## Sessione Poster

### A90: EXPERIMENTAL OBESITY ASSOCIATES WITH IN VIVO HYDROXYL RADICAL RELEASE IN ADIPOSE TISSUE

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**Objective.** Obesity represents one of the epidemic risk factors associated with cardiovascular diseases and included in metabolic syndrome. The aim of our study was the evaluation in vivo of a role for free radical in the development of obesity in awake and freely moving high-fat diet-treated rat. We also compared these interstitial observations with circulating inflammatory and lipid peroxidation parameters as well as the white adipose tissue content of Zinc Alpha 2 glicoprotein (ZAG), an adipokine also known as lipid mobilizing factor.
**Methods.** Eighteen male adult Sprague Dawley rats started a high fat diet for 24 weeks. The diet included 45% of total calories as fats and the remaining 55 % subdivided into 20 % as proteins and 35% as carbohydrates. A control group (n=11) was maintained on a standard diet. Rats, from both groups, underwent a microdialysis procedure of subcutaneous white adipose tissue after 3, 12 and 24 weeks. Oxidative stress was quantified in the interstitium of rat white adipose tissue by a microdialysis technique, evaluating hydroxyl radical generation by measuring 2,3 and 2,5 dihydroxybenzoic levels in the outlet of microdialysis probe after in vivo perfusion of salicylate. Blood samples were also obtained to evaluate circulating markers of lipid peroxidation (malondialdehyde), of inflammation (tumor necrosis factor alpha), and triglyceride and free fatty acid. ZAG was also determined in bioptic white adipose tissue sample.
**Results.** High fat-diet rats showed a body weight gain (13%) compared to controls associated with a significant rise in systolic blood pressure. Higher rate of interstitial hydroxyl radical generation, expressed by higher 2,3 and 2,5 dihydroxybenzoic acid in interscapular subcutaneous adipose tissue was observed. Higher serum levels of malodialdehyde were also observed after 12 and 24 weeks, but not at 3 weeks. A biphasic time course of tissue ZAG was observed with an increase after 3 weeks but a marked decrease after 12 and further reduction after 24 weeks of high-fat diet.
**Conclusions.** In vivo increased interstitial hydroxyl radical generation, an index of oxidative stress, associates with the time course of development of obesity in high-fat treated rats. Inflammatory markers are also increased and contribute to the progressive altered lipid metabolism in this experimental model of obesity.

### A91: IMAGING ECOCARDIOGRAFICO NELLO SCOMPENSO CARDIACO AD FE PRESERVATA: QUANDO LA CAUSA È UNA MALATTIA DA ACCUMULO

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**Introduzione.** L'imaging cardiovascolare ha un ruolo fondamentale nella diagnosi differenziale della dispnea da sforzo.
**Metodi.** Uomo di 73 anni, affetto da diabete mellito tipo II, ipertiroidismo, BPCO. Nel Luglio 2015, per dispnea da sforzo, effettuava ecocardiogramma (ipertrofia parietale con FE conservata, pattern diastolico nella norma), prova da sforzo (negativa) ed elettrocardiogramma (bassi voltaggi nelle derivazioni periferiche). Circa 6 mesi dopo, riscontro di macroglossia, proteinuria, creatinina 2.1 mg/dl (eGFR CKD-EPI: 30.3 ml/min per 1.73 $m^2$), NT-proBNP 6117 ng/l, Troponina T hs 87 ng/ml, PCR 206 mg/l, componente monoclonale IgAλ, per cui effettuava visita ematologica, ecografia addome (epatomegalia), radiografia dello scheletro in toto (negativa per lesioni osteolitiche) e, nel sospetto di una malattia da accumulo, biopsia escissionale cutanea (negativa per amiloidosi). Nel maggio 2016, per il persistere di elevati valori di NT-proBNP, Troponina I, proteinuria, componente monoclonale IgAλ con riscontro di proteinuria di Bence Jones, si procedeva a nuova biopsia di grasso periombelicale (negativa), aspirato midollare (infiltrato di plasmacellule del 15%), citofluorimetria su sangue midollare (2% di plasmacellule a fenotipo $CD19^-/CD56^+$ con restrizione clonale) e scintigrafia miocardica con $^{99m}$Tc-DPD (negativa). Nel Luglio 2016, per persistenza dei dati laboratoristici alterati con peggioramento del quadro clinico complicato da versamento pleurico, veniva ripetuta biopsia del grasso periombelicale che risultava diagnostica per amiloidosi AL ad interessamento renale e dei tessuti molli (macroglossia ed epatomegalia).
**Risultati.** Confermata la diagnosi di amiloidosi AL, è stata richiesta rivalutazione ecocardiografica che documentava marcata ipertrofia parietale (SIV 1.6 cm), ipocinesia dei segmenti medio-basali del SIV e della parete anterolaterale presentanti ecostruttura disomogenea, funzione sistolica globale conservata (FE 55% Simpson), riduzione della velocità sistolica al TDI (picco onda S 0.05 m/sec) e riduzione degli indici di deformazione miocardica (GLS -13% con tipico aspetto apical sparing), pattern diastolico restrittivo, dilatazione dell'atrio sinistro (45 ml/$m^2$). Il paziente iniziava pertanto terapia farmacologica come da linee guida (Bortezomib, Melphalan, Desametasone). Durante il follow up si riscontrava miglioramento dei parametri laboratoristici (NT-proBNP da 6117 ng/l a 2242 ng/l) e della sintomatologia, con remissione ematologica completa nel Novembre 2017. L'ultimo Ecocardiogramma, eseguito nel Gennaio 2019, evidenziava miglioramento degli indici di funzione sistolica

globale del ventricolo sinistro (FE da 55 a 60% Simpson), degli indici di deformazione miocardica GLS da -13 a -18%, della funzione diastolica (da pattern restrittivo a pattern da alterato rilasciamento) e riduzione delle dimensioni dell'atrio sinistro da 45 a 36 ml/m$^2$. Gli esami ematochimici ad un anno e tre mesi dalla sospensione della terapia evidenziano NT-proBNP in riduzione (da 6117 ng/l a 963ng/l), negatività di componenti monoclonali, rapporto κ/λ nella norma, proteinuria elevata ma non significativa, miglioramento della funzionalità renale (GFR: CKD-EPI da 30.3 ml/min a 64.9 ml/min per 1.73 m$^2$).
**Conclusioni.** Il caso clinico evidenzia come il dato ecocardiografico deve essere sempre contestualizzato con il quadro clinico del paziente nella sua complessità. Lo speckle tracking è pertanto di fondamentale importanza nella diagnosi e nel follow up dei pazienti affetti da malattie da accumulo.

### A92: RADIOTHERAPY AND ELECTROMAGNETIC INTERFERENCES IN LAST GENERATION PACEMAKERS: A MULTI-CENTRE, REAL-TIME, WIRELESS-ENABLED EVALUATION

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**Background.** The effects of high dose oncologic radiotherapy on cardiac pacemakers, at even less than 6 MV power, are unpredictable, depending on multiple variables. Normal pacemaker function may be transiently or permanently impaired during direct exposure, with potentially life-threatening malfunctions in pacemaker-dependent patients, and, unlike in magnetic resonance imaging setting, both manufacturers and guidelines discourage direct exposure.
**Purpose.** To evaluate transient pacemaker malfunctions during direct exposure to doses up to 10 Gy during radiotherapy course, actually not recommended or considered even unsafe, 17 wireless-telemetry-enabled pacemakers obtained after upgrade or extraction of the system, with sufficient residual battery charge for the purpose of the study (at least 1 year to elective replacement indicator, E.R.I.) were evaluated in a real-time, in-vitro session in two different centres.
**Methods.** All pacemakers underwent baseline interrogation. Single chamber devices were programmed in the VVI/40 mode while dual or triple chamber devices were programmed in the DDD/40 mode. To avoid the "run-away" phenomenon during exposure rate-adaptive function was disabled. A centering computed tomography was performed to build the corresponding treatment plan and the pacemakers were blinded randomized to receive either 2, 5 or 10 Gy exposure by a low photon-energy linear accelerator (6MV) in a homemade water phantom (600 Monitor Units/min). The effective dose received by the pacemakers was assessed by an in-vivo dosimetry. During radiotherapy course, the devices were observed in a real-time session using manufacturer specific equipment, and pacemaker function (pacing and sensing, programmed parameters) was recorder by a video camera in the bunker before (5 minutes), throughout, and after (5 minutes) the entire radiation exposure.
**Results.** During radiotherapy course, none of the pacemakers reported spontaneous changes in parameter settings. 13 pacemakers (76.5%) recorded not clinically relevant minor transient electromagnetic sensing interferences. No atrial and/or ventricular oversensing nor base-rate-pacing inhibition were observed. Only 4 pacemakers (23.5%) reported neither transient malfunction nor minor noise, withstanding direct radiation exposure. Transient oversensing-related malfunctions were observed regardless of either 2, 5 or 10 Gy exposure.
**Conclusions.** Minor, non relevant electromagnetic sensing interferences were observed in most of the pacemakers during direct exposure. Nevertheless, to avoid potentially life-threatening pacemaker malfunctions, magnet application on the pacemaker pocket site or reprogramming in the asynchronous mode are still suggested in pacemaker-dependent patients ongoing even low energy radiotherapy exposure.

### A93: TRANSIENT ICD MALFUNCTIONS DURING RADIOTHERAPY COURSES: A MULTI-CENTRE, RANDOMIZED, REAL-TIME, IN-VITRO STUDY

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**Background.** Direct exposure of implantable cardioverter-defibrillators (ICDs) during radiotherapy is still considered not recommended, or even unsafe, by manufacturers and guidelines. Photon beams may cause transient or permanent malfunctions on ICDs during exposure, their effects remaining still unpredictable.
**Purpose.** To evaluate transient ICD malfunctions by direct exposure to doses up to 10 Gy during low-energy radiotherapy, 33 contemporary wireless-enabled ICDs, from two different centres, with at least 4 months to elective replacement indicator (E.R.I.) were evaluated in a realtime in-vitro session.
**Methods.** All ICDs had baseline interrogation. Single chamber devices were programmed in the VVI/40 mode and dual or triple chamber devices were programmed in the DDD/40 mode. Rate response function and antitachycardia therapies were disabled, with the ventricular tachycardia (VT)/ventricular fibrillation (VF) detection windows still working. A centering computed tomography was performed to build the corresponding treatment plan and the ICDs were blinded randomized to receive either 2, 5 or 10 Gy exposure by a low photon-energy linear accelerator (6MV) in a homemade water phantom (600 MU/min). The effective dose received by the ICDs was assessed by an in-vivo dosimetry. During radiotherapy course, the devices were observed in a real-time session using manufacturer specific programmer, and ICD function (pacing, sensing, programmed parameters, detection) was recorder by the video camera in the bunker throughout the entire photon exposure. All ICDs had an interrogation session immediately after exposure.
**Results.** During radiotherapy course, almost all ICDs (90.9%) recorded major or minor transient electromagnetic interferences. On detail, 13 ICDs (39.4%) reported atrial and/or ventricular oversensing, with base-rate-pacing inhibition and VT/VF detection. 16 ICDs (48.5%) recorded non clinically relevant noise, and no detections were observed. Only 4 ICDs (12.1%) reported neither transient malfunction nor minor noise, withstanding direct radiation exposure. At immediate post-exposure interrogation, the ICDs that recorded major real-time malfunctions had VT/VF detections stored in the device memory. In none of the ICDs spontaneous changes in parameter settings were reported. Malfunctions occurred regardless of either 2, 5 or 10 Gy photon beam exposure.
**Conclusions.** Transient electromagnetic interferences were observed in most of the contemporary ICDs during radiotherapy course, regardless of photon dose. To avoid potentially life-threatening ICD malfunctions such as pacing inhibition or inappropriate shock delivery, magnet application on the pocket site or ICD reprogramming in the asynchronous mode are still suggested in ICD patients ongoing even low energy radiotherapy exposure.

### A94: A MULTI-CENTRE, IN-VITRO OBSERVATION OF PERMANENT CARDIAC IMPLANTABLE DEVICE MALFUNCTIONS DURING ONCOLOGIC RADIOTHERAPY UP TO 10 GY

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**Background.** Exposure to radiotherapy in patients with cardiac implantable electronic devices (CIEDs), both pacemakers (PMs) or implantable cardioverter defibrillators (ICDs) seems to be still troubleshooting. Unlike magnetic resonance imaging, high dose photon radiation at even less than 6MV power, a non-neutron-producing setting, may transiently or permanently affect normal device function. Malfunctions may be harmful and life-threatening in high risk patients, such as PM-dependent or ICD patients.
**Aims.** To evaluate CIED malfunctions by direct exposure to doses more

than 2 Gy in oncologic radiotherapy, 162 CIEDs (116 PMs and 46 ICDs) from two different centres, with at least 4 months to Elective Replacement Indicator (E.R.I.) were evaluated.
**Methods.** All CIEDs had a baseline telemetry interrogation. Single chamber devices were programmed in the VVI/40 mode and dual or triple chamber ones were programmed in the DDD/40 mode. Rate adaptive function was disabled. In ICDs, antitachycardia therapies were disabled with the ventricular tachycardia/fibrillation monitor still enabled. To build the corresponding treatment plan a centering CT was performed and CIEDs were blinded randomized (4:4:4) to either 2, 5 or 10 Gy direct exposure by a low photon-energy LINAC (6MV) in a water phantom. An in-vivo dosimetry assessed the effective dose received by the CIEDs. All CIEDs were interrogated immediately after exposure and monthly for a four-month follow-up.
**Results.** Immediately after exposure, 1 reset to emergency mode was observed in a PM (0·6% overall; 0·9% among PMs)), while 7 PMs reached the E.R.I immediately after exposure (4·3% overall; 6% among PMs). 10 ICDs (6·2% overall; 21·8% among ICDs) reported ventricular fibrillation detection stored in the device memory. During follow-up, 3 PMs (1·9% overall; 2·6% among PMs) and 1 ICD (0·6% overall; 2·2% among ICDs) reached the E.R.I. and 1 PM (0·6% overall; 0·9% among PMs) switched to emergency mode. All reported events occurred regardless of either 2, 5, or 10 Gy direct exposure. Malfunctions were observed in only older CIEDs.
**Conclusions.** Our data suggest recent CIEDs withstanding direct oncologic radiotherapy exposure up to 10 Gy, commonly considered not recommended or even unsafe by manufacturers statements and clinical guidelines. Malfunctions occurred in only older devices.

### A95: MALPOSIZIONAMENTO DI ELETTROCATETERE NELLE CAMERE DI SINISTRA: UNA RARA COMPLICANZA A CUI PENSARE

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(a) CITTÀ DELLA SALUTE E DELLA SCIENZA DI TORINO

**Caso clinico.** Presentiamo il caso clinico di una donna di 68 anni affetta da fibrillazione atriale (FA) parossistica in terapia antiaritimica con Ic (propafenone 150 mg bid) ed anticoagulante con Apixaban 5 mg x 2. CHADSVASC 6 (ipertensione, età, diabete, sesso, pregresso stroke ischemico). La paziente era stata sottoposta a recente impianto di pace-maker (PM) monocamerale per sick sinus syndrome con tempi di recupero del nodo seno-atriale patologici, previa esclusione di patologia coronarica. A 4 mesi dall'impianto sposizionamento dell'elettrocatetere (EC) in seguito a caduta accidentale con frattura del capitello radiale sinistro. Considerata l'impossibilità di riposizionamento, estratti il device e l' EC e reimpiantati a destra (fissazione passiva EC ventricolare). Al RX torace postero-anteriore a 48h EC normoposizionato. Al controllo ecocardiografico in post dimissione per monitoraggio di lieve versamento pericardico post estrazione, riscontro dell'EC in sede ventricolare sinistra attraverso il setto interatriale ed il piano valvolare mitralico. L' ecocardiografia transesofagea confermava la dislocazione dell'EC in presenza di difetto interatriale condizionante shunt sinistro-destro, assenti vegetazioni endocarditiche e/o formazioni trombotiche, insufficienza mitralica lieve. La paziente veniva inviata presso il nostro centro per revisione dell'impianto. All'accesso paziente asintomatica, parametri elettrici stabili, pacing ventricolare del 16%. All'ECG RS, ventricologramma elettroindotto con morfologia a BBD. Si procedeva quindi ad estrazione di EC e del dispositivo senza complicanze. Attestata la buona competenza cronotropa e l'assenza di pause patologiche al monitoraggio telemetrico continuo (nonostante terapia con propafenone) la paziente è stato sottoposta ad impianto loop recorder per valutazione burden FA e tempi di recupero del nodo del seno. Al fine di sospendere la profilassi antiaritmica eseguita inoltre ablazione transcatetere di FA mediante cryo-isolamento delle vene polmonari. Ai successivi controlli del loop recorder non documentate recidive aritmiche nè pause patologiche.

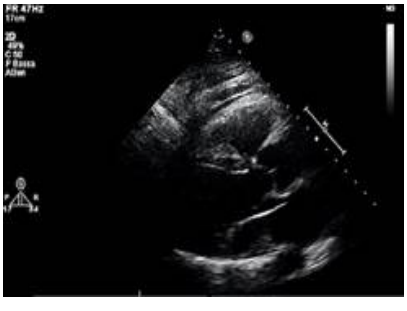

**Figura 1.** Proiezione asse lungo parasternale, la fraccia indica l'elettrocatetere in atrio sinistro e ventricolo sinistro attraverso piano valvolare mitralico.

**Discussione.** Il malposizionamento degli EC rappresenta la complicanza più frequente dell'impianto di PM ma la dislocazione nelle camere sinistre è raramente descritta. Tale dislocazione si verifica più frequentemente attraverso un difetto del setto interatriale o un forame ovale pervio. Sono riportati casi di malposizionamento a sinistra attraverso puntura diretta dell'aorta. Le principali complicanze che ne conseguono sono di natura trombo-embolica o secondarie ad insufficienza mitralica severa (alterazioni dell' anatomia valvolare, perforazione da EC o da endocardite). La diagnosi richiede elevato sospetto clinico e può essere confermata dall'RX torace in due proiezioni e dal riscontro ECG di stimolazione con morfologia BBD. Le opzioni terapeutiche prevedono o una strategia conservativa con necessità di avviare terapia anticoagulante a vita oppure un'opzione interventistica con estrazione e riposizionamento dell'elettrocatetere ed eventuale correzione percutanea del difetto.

### A96: "FREEZING J WAVES" LEADING TO A MISDIAGNOSIS OF ACUTE CORONARY SYNDROME

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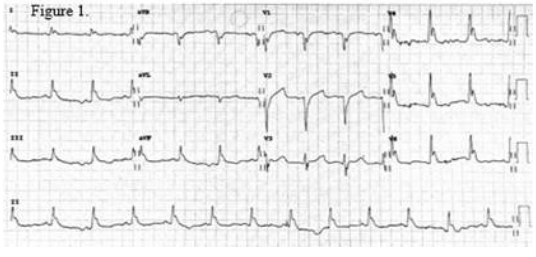
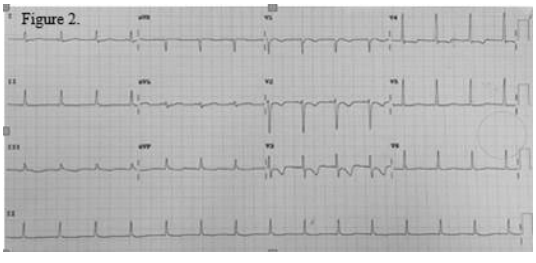
We report the clinical case of a 47-years-old male, affected by Latent Autoimmune Diabetes in Adults (LADA) with several admissions for diabetic ketoacidosis during systemic infections (urinary tract infection, pneumonia, gastroenteritis) in his past medical history. He was taken to our Emergency Room for a severe state of drowsiness and loss of consciousness, after about 4-5 hours he was lying on the floor. He arrived in a state of hypothermia (27.2°C) and hypotension; blood samples revealed leukocytosis, hyperglycemia (957 mg/dl), acute kidney failure, hyperkalemia (k 6.07 mEq/l); arterial-blood gas showed metabolic acidosis with hypoxic respiratory failure and chest x-ray revealed right basal pneumonia. The ECG during hypotermia (28°C) showed sinus rhythm, first-degree atrioventricular block, wide QRS complex and an atypical left bundle branch block, never stated in previous ECGs (Figure 1). Diagnosis of ab ingestis pneumonia complicated by diabetic ketoacidosis and hypotermia has been made. A routine ECG was repeated after few days and, even if PR interval and QRS complex were back to normal, ventricular repolarization showed widespread flat/negative T waves, mainly in the inferior-anteroseptal leads (Figure 2). Suspecting a previous acute coronary syndrome, echocardiography was performed and showed normal systolic function with no wall motion abnormalities; coronary angiography was made and revealed anatomically normal coronary arteries. No arrythmia was observed during the whole period of hospitalization. This electrocardiographic evolution can be explained by hypothermia-induced ECG abnormality called ''Osborne's J wave''. A decrease in temperature accelerates inactivation of the $Na^+$ channels and decreases the amplitude of the action potential in the epicardium but not in the endocardium; this difference in action potential activity leads to a transmural voltage gradient and a prominent J wave on ECG. The prevalence and clinical implications of J waves in hypothermic patients remain unclear. J waves amplitude increases with the level of hypothermia and might not be associated with fatal arrhythmic events.




### A97: SURGICAL SINGLE STAGE TREATMENT FOR OBSTRUCTIVE HYPERTROPHIC CARDIOMYOPATHY AND SACCULAR AORTIC ARCH ANEURYSM

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(a) POLICLINICO DI MONZA; (b) IRCCS POLICLINICO SAN MATTEO, PAVIA

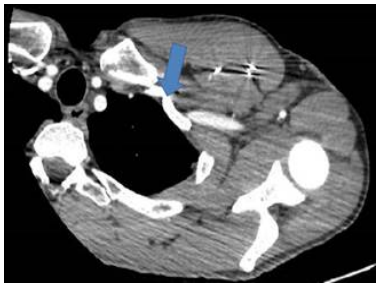
Hypertrophic cardiomyopathy (HCM) is the most common inheritable cardiovascular disease, affecting 1 out of 500 people: it is characterized by asymmetric left ventricular (LV) hypertrophy in the absence of a secondary cause, and by dynamic obstruction of the LV outflow tract

(LVOT). Aortic dilation is a major cause of morbidity and mortality, and its association with obstructive hypertrophic cardiomyopathy (OHCM) has recently been investigated because of common signaling pathways that may play a significant role in both of the diseases. We present a unique case report of a patient affected by OHCM and saccular aortic arch aneurysm treated by surgical septal myectomy, mitral valve plasty and ascending aortic replacement and aortic arch endoprosthesis with concomitant upper trunk rerouting during the same surgical procedure.
A 65 year old male with a history of OHCM was admitted to our cardiology department for elective surgical septal myectomy. OHCM was diagnosed in 2012 and treated with beta blockers: however, in the last year he had suffered from worsening dyspnea (NYHA class III), exercise intolerance and atrial fibrillation. Soon before admission a chest CT scan performed in another hospital showed a thrombosed sacciform aortic arch aneurysm, an ectasia of the initial part of the descending aorta, and a subrenal abdominal aortic aneurysm. Preoperative echocardiography showed interventricular septal hypertrophy (both anterior and posterior, 19 mm and 17 mm respectively), systolic anterior motion of the mitral valve with LVOT obstruction (basal LVOT gradient 33 mmHg, 77 mmHg after Valsalva maneuver) and normal biventricular contractility; coronary angiography revealed no significant obstruction. Considering the surgical approach for OHCM and the concomitant aortic arch aneurysm we decided to approach both the lesions in the same surgical time. Standard septal myectomy for OHCM has been completed by interventions on the subvalvular mitral apparatus, through resection of fibrous structures connecting the papillary muscles to the ventricular septum and of fibrous chordal structures attachments of the mitral leaflets to the ventricular septum. This intervention has been associated with ascending aorta graft repair, upper trunks rerouting with an aorto-carotid bypass, and complete arch endovascular repair. One month follow up showed vascular graft patency and complete sealing of the aortic lesion. To our knowledge, this is the first case report describing a combined surgical intervention on OHCM and aortic aneurysm. Our is a high-experienced center on OHCM, with around 570 cases surgically treated between 2013 and May 2019: however, never before we have faced the coexistence of both OHCM and aortic pathology requiring contemporary surgical treatment. Different factors could play a role in the association between aortic pathology and HCM: TGF beta's gene overexpression, neurohormonal disturbance, endothelial dysfunction and an abnormal baroreceptor response of the LV. For all these reasons, this exclusive subset of patients with both OHCM and aortic aneurysm could be at higher risk for adverse events such as aneurysm rupture and dissection, particularly during concomitant major surgery, where underlying aortic weakness could lead to surgical trauma from clamping or cannulation. Moreover, saccular aortic lesions are more prone to spontaneous rupture and standard surgical sizing are considered unfit when aortic bulging or penetrating aortic ulcer are evaluated. Therefore, the dynamic, unpredictable and global clinical picture of our patient has led us to the decision of a complete approach to both the cardiac and aortic disease.

### A98: ICD SOTTOCUTANEO E TROMBOSI DELL'ARTO SUPERIORE: INSOLITA COMPLICANZA IN PAZIENTE CON SINDROME DELLO STRETTO TORACICO SUPERIORE

Andrea Matteucci (a), Andrea Bezzeccheri (a), Martino Baluci (a), Domenico Sergi (a), Giuseppe Stifano (a), Lucy Barone (a), Francesco Romeo (a)
(a) POLICLINICO TOR VERGATA

Il rischio di complicanze legato alle procedure di elettrostimolazione transvenose varia tra 0.5-4%. Infezioni, ematomi, trombosi venosa, flebite, pneumotorace e versamenti rimangono le principali periprocedurali. Il defibrillatore sottocutaneo (S-ICD) può essere proposto a tutti i pazienti con indicazione a ICD che non necessitino di stimolazione cardiaca e nei pazienti con accesso venoso complesso o impraticabile (occlusione della vena succlavia/tronco anonimo) o anomalie anatomiche. Veniva alla nostra attenzione un paziente di 40 anni, fumatore, con Sindrome di Brugada, recentemente sottoposto ad impianto di S-ICD alloggiato lungo la linea ascellare posteriore in sostituzione di ICD transvenoso monocamerale impiantato circa 10 anni prima, per malfunzionamento dell'elettrocatetere (EC) endocavitario; veniva rimosso il solo generatore dell'ICD transvenoso, abbandonando l'EC ventricolare destro. Nei giorni successivi all'impianto il paziente lamentava torpore al braccio sinistro e importante discomfort legato alla posizione del generatore tale per cui veniva sottoposto a revisione di S-ICD con confezionamento di nuova tasca lungo la linea ascellare media, ventralmente alla precedente. Nonostante il riposizionamento, le algie all'arto superiore sinistro peggiorarono, associandosi a stasi venosa. Sottoposto dunque ad EcoDoppler degli arti superiori si evidenziava occlusione trombotica delle vene omerale e ascellare sinistre e la successiva Angio-TC mostrava estensione della trombosi al III medio-distale della vena succlavia sinistra, con evidenza di sindrome dello stretto toracico (TOS). Veniva impostata tempestivamente terapia anticoagulante con dicumarolici, con risoluzione del quadro clinico ai successivi follow up.



La posizione imposta al paziente durante inserimento di S-ICD, la presenza di EC abbandonato e la TOS hanno causato un'insolita complicanza in una procedura priva di impianti transvenosi, mostrando come la conoscenza di correlazioni poco frequenti possa ridurre le complicanze legate a procedure chirurgiche.

### A99: DUAL ANTI-PLATELET THERAPY AFTER CORONARY ANGIOPLASTY IN A PATIENT WITH PSEUDOXANTHOMA ELASTICUM AND GASTRIC BLEEDING

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Pseudoxanthoma elasticum (PXE) is an autosomal recessive connective tissue disorder characterized by calcification and progressive fragmentation of the elastic fibers of the skin, retina, gastrointestinal tract and artery wall. PXE is due to homozygous or compound heterozygous mutations of the ABCC6 gene (16p13.1), which encodes a transmembrane protein belonging to superfamily of the ABC transporter (ATP binding cassette). Estimated prevalence is between 1/25.000 and 1/100.000, F/M ratio is 2:1. PXE is clinically heterogeneous, often characterized by skin lesions with yellow papules that can converge and form plaques, mainly in the regions of flexion of the neck and elbows, in the popliteal space and in the umbilical region, accompanied by laxity of the skin around the inguinal and axillary folds. The clinical manifestation of retinal impairment is the presence of angioid stria (lacerations of Bruch's membrane of the retina) and formation of new vessels, whose bleeding causes retinal hemorrhages that can often lead to blindness. Cardiovascular manifestations lead to intermittent claudication of the lower and/or upper limbs. At later stages coronary artery disease may develop, leading to angina and myocardial infarction. Transient ischemic attacks are rarer. Gastrointestinal bleeding occurs in 5% of cases.
Our paper is about a 66-y.o. male PXE affected with compound heterozygous mutations (R518X and A950T). Previously, the patient manifested angioid striae treated with laser therapy, and severe periferal vessel disease treated with stenting of the left common iliac artery and left external iliac artery. Following an exacerbation of claudicatio intermittens associated with dyspnea and chest pain, a medical examination was performed by vascular surgeon that excluded vascular diseases. Recently, the patient was referred in our Cardiology for dyspnea and chest pain. Laboratory exams showed severe anemia (Hb 4,6 g/dl), treated with trasfusion therapy. Colonoscopy showed a small haemorrhoidal congestion, so a martial therapy was started. Gastroscopy showed antral hyperemic gastropathy. Echocardiogram showed a calcification of the aortic leaflets with moderate aortic stenosis (AVA 1.17 $cm^2$). Due to persistent chest pain, we decided to perform a coronary angiography that showed critical stenosis (70%) of the left anterior descendent artery and of the right coronary artery. A PCI was performed with implantation of two everolimus-eluting stents successfully. He was discharged with DAPT therapy for 3 months. In consideration of the patient's polyvasculopathy, we gave indication to perform a brain MRI, that the patient refused for claustrophobia.
This clinical case confirms that there is a strong correlation between PXE and coronary and peripheral artery disease. In addition, a massive calcification of aortic valve unexpected for the age of the patient was also found. We decided to perform multiple follow up examinations over a long period of time because there is not much literature or data about the long term effects of pharmacological treatment of DAPT in patients with PXE and gastric bleeding.

### A100: PACEMAKER LEAD MALPOSITION IN THE LEFT HEART

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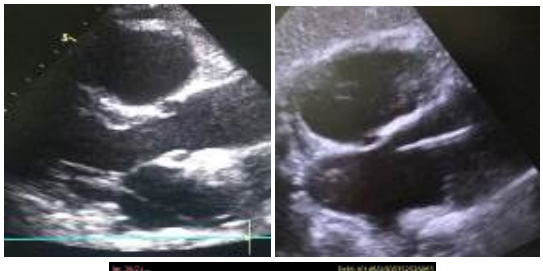
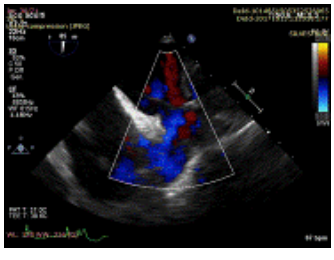
(a) UNIVERSITÀ DEGLI STUDI DI PERUGIA; (b) AOU DI PERUGIA - STRUTTURA COMPLESSA DI CARDIOLOGIA; (c) AOU DI PERUGIA - STRUTTURA COMPLESSA DI CARDIOLOGIA E FISIOPATOLOGIA CARDIOVASCOLARE

**Introduction.** Inadvertent lead malposition (ILM) in the left heart is a potential cause of thromboembolism and, therefore, a complication of heart rhythm device implantation. The incidence of ILM is 0.34% in a

german series (Ohlow et Al). Scoliosis, congenital heart desease (CHD), prior correction of CHD and limited operator experience were identified as risk factors.

**Case report.** We present the case of a male patient, 83 yo, affected by arterial hypertension and paroxysmal atrial fibrillation treated with Dabigatran 110 mg bid. He came to our Hospital for asthenia and dyspnea at rest. The electrocardiogram (EKG) showed sinus rythm with 2:1 atrio-ventricular block. The echocardiogram (TTE) showed interatrial septal aneurysm (already known) and dilated right chambers. Subsequently the patient was implanted with dual-chamber pacemaker. The post-procedure EKG showed electro-induced rythm with right bundle branch block appearance. The chest x-ray showed atypical lead position. The following TTE showed atrial lead in the left atrium and ventricular lead in the left ventricle. Furthermore TEE showed partial anomalous pulmonary venous return, superior vena cava placed above the inter-atrial septum and sinus venosus atrial septal defect. The computed tomography confirmed the CHD. Subsequently the lead-extraction option was escluded by the "heart team" for high surgical risk of the procedure and the patient refused to start vitamin K antagonist (VKA) therapy. As a result, the patient was discharged continuing dabigatran 110 mg bid. After two months he was hospitalized due to a right hemispheric stroke without permanent neurological deficits, so the therapy with NAO was stopped and replaced with VKA with INR target 2.5,-3.5. Since the pacemaker implantation was performed, no further embolic events was reported (follow-up 20 months).





**Conclusions.** Due to the increased thromboembolic risk the leads are generally extracted and ripositioned. The risk of cerebral thromboembolic complications for endocardial left heart leads is high (stroke 3,8% at 6 months) despite higher target values of INR than those recommended for non-valvular atrial fibrillation (Morgan et Al). In some cases, as the one reported in this abstract, the surgical risk connected to the estraction of the lead is very high, moreover the presence of cardiac malformations can make the repositioning procedure very complex, therefore anticoagulant therapy may be the only therapeutic option (Ling et Al). There are no data concerning NOACs use in this clinical setting. Accordingly NOACs should be avoided, preferring VKA.

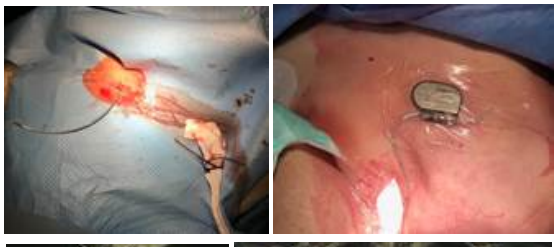
### A101: PACING PROVVISORIO MEDIANTE ELETTROCATATERE A FISSAGGIO ATTIVO E GENERATORE ESTERNO, POST-ESTRAZIONE DI CRT-D PER INFEZIONE, IN PAZIENTE PACEMAKER-DIPENDENTE

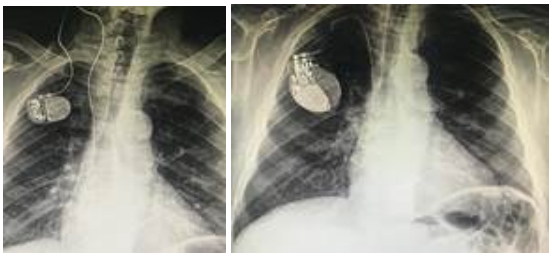
Lorenzo Spighi (a, c), Francesco Notaristefano (b), Roberto Annunziata (a, c), Matteo D'Ammando (a, c), Francesco Deluca (a, c), Luca Bearzot (a, c), Gianluca Zingarini (b), Giuseppe Ambrosio (a, c), Claudio Cavallini (b)
(a) UNIVERSITÀ DEGLI STUDI DI PERUGIA; (b) AOU DI PERUGIA - STRUTTURA COMPLESSA DI CARDIOLOGIA; (c) AOU DI PERUGIA - CARDIOLOGIA E FISIOPATOLOGIA CARDIOVASCOLARE

Dopo l'estrazione di device cardiaci impiantabili per infezione in pazienti (pz) pacemaker (PMK) dipendenti il pacing temporaneo prima del reimpianto può essere richiesto per lungo tempo durante la terapia antibiotica (TpA). Episodi di perdita di cattura e undersensing sono frequenti con l'utilizzo di PMK temporanei flottanti che inoltre limitano la mobilità dei pz. L'utilizzo di elettrocateteri (EC) a fissaggio attivo connessi a generatori di PMK permanenti esterni è più sicura e confortevole per il pz (Kawata et Al).

Caso clinico. Maschio di 69 aa con cardiomiopatia dilatativo-ipocinetica non ischemica e sottoposto, presso altro centro, ad impianto di CRT-D, precocemente complicatosi con infezione della tasca trattata con revisione e posizionamento di sacchetto antibiotico seguita da TpA sistemica per il riscontro di esame colturale positivo per MSSA. Veniva contestualmente eseguita ablazione del NAV. Dopo circa 2 mesi nuova recidiva sottoposta a revisione di tasca. A 4 mesi dall' impianto veniva ricoverato presso il nostro centro per ulteriore recidiva. L'ETE risultava negativo per vegetazioni a livello degli EC. In considerazione della storia clinica veniva posta indicazione ad espianto di CRT-D e posizionamento di PMK temporaneo. La positività dell'esame colturale per MSSA anche a livello degli EC estratti ha reso necessaria una TpA a medio termine ed è stato posizionato un PMK VVI provvisorio esterno, mediante accesso giugulare destro con EC a fissaggio attivo in ventricolo destro. Dopo 4 settimane di TpA il pz è stato sottoposto a reimpianto controlaterale di CRT-D.

L'utilizzo di PMK provvisorio esterno è efficace e sicuro nei pazienti che richiedano stimolazione a medio termine dopo estrazione di devices.





### A102: TREATMENT OF LONE PERSISTENT ATRIAL FIBRILLATION WITH LEFT ATRIAL APPENDAGE THROMBOSIS BY A BILATERAL TOTALLY THORACOSCOPIC APPROACH

Igoe Vendramin (a), Andrea Lechiancole (a), Daniela Piani (a), Ugolino Livi (a)
(a) CARDIO-THORACIC DEPARTMENT, UNIVERSITY HOSPITAL OF UDINE

**Background.** Catheter ablation (CA) and minimally invasive surgical ablation (SA) have become accepted therapy for atrial fibrillation (AF). Over the last decade several studies were published showing an increasing evidence of success with limited complications rates. Nevertheless, the presence of a thrombus in the left atrial appendage (LAA) is considered an exclusion criteria for both approaches and for LAA occlusion. We describe a new mini-invasive procedure for a combined radiofrequency treatment of AF and exclusion of left appendage with partial thrombosis through a bilateral totally thoracoscopic approach.

**Methods.** Three patients underwent bilateral totally thoracoscopic radiofrequency ablation of AF and LAA exclusion. Partial LAA thrombosis was firstly secured by encircling the LAA base with a 3/0 prolene Ethibinder. Ablation was obtained by encircling the pulmonary veins origin ("Box Lesion") with Estech COBRA Fusion device, delivering both bipolar and monopolar energy to create transmural lesions. LAA exclusion was finally achieved by deploying the Atricure AtriClip PRO2.

**Results.** Postoperative course was uneventful and the patient was discharged after 7days. At 1 year follow-up the sinus rhythm was stable.

**Conclusions.** This procedure represents a new mini-invasive method to concurrently treat AF and exclude the LAA in those cases in which a partial thrombosis contraindicate a percutaneous treatment.

## PREVENZIONE E RIABILITAZIONE – EPIDEMIOLOGIA E POLITICA SANITARIA
## Sessione Poster

### A103: CORRELATION BETWEEN CARDIOVASCULAR RISK FACTORS AND PRECLINICAL ANOMALIES OF THE AORTA AND OF THE LEFT VENTRICLE IN AN ECHOCARDIOGRAPHIC CARDIOLOGICAL SCREENING IN THE REAL LIFE PRACTICE

Flavio Acquistapace (a, b), Anastas Kick (b), Maria Grazia Canepa (b), Guido Robotti (b)
(a) SIC WORKING GROUP MEMBER; (b) MIP MEDICAL IN PRACTICE WORKING GROUP, LUGANO

The onset of dilatative morphological changes of the aorta (EA) and of the left ventricle such as left ventricular hypertrophy (IVS) configure the pre-clinical organ damage phase preliminary to the onset of complications. Early recognition is useful on the prognostic and therapeutic level. On the other hand, the use of diagnostic techniques such as echocardiography appears variable and inconstant in the stratification of the cardiovascular risk profile, even in the presence of a previous diagnosis of cardiovascular accident.

**Purpose.** To evaluate the presence of silent organic alterations, in particular parietal (IVS) and aortic (EA), in a clinical echocardiography screening program in an integrated model of general medicine.

**Methods.** 312 pts, 156 men (u) 156 women (d) assessed as part of an echocardiographic screening project (ETT) in an integrated outpatient model of General Medicine and Cardiology, Risk factors history symptoms: Hypertension (IA): 204 (65.4%: 104 de 100) Hypercolesterolemia 116 (37%: 58 u; 58 d) Smoking 58 (18.6% 30 u 28 d), Family 108 (34.5% 52 u, 56d), Anxiety Depression (AD) 118, 37.8%: 70 d (60%) 48 u (40%); Diabetes (DM) 30 (10%): 18u, 12d). Results. 50 aortic ectasies were detected (EA) 16%: 38u (76%) 12d (24%); Hypertrophy (IVS): 72 (23%): 36u (50%) 36d (50%). IA match with EA (IA/EA): 44 (14%): 32u (73%) and d12 (27%) IA with IVS (IA/IVS): 48 (15%): 22u (46%) 26d (54%) IA with EA and IVS (IA/EA/IVS): 16 (5%) 10u 6d; EA without IA 6 (2%) 4u, 2 d; IVS without IA 10 (3.2%): 6u; 4d; Ectasia/IVS without IA: none; DM/IVS: 6 (2%): 6u, 0 d; DM/EA: 2u (0.5%) none d; Smoke/EA: 10u (3.2%), 0d; Smoking/IVS: 22 (7%) 10u, 12d; AD/EA: 14 (4.5%) 10u 4d AD/IVS: 20 (6.5%) 6u; 14d

**Discussion and Conclusions.** Cardiac organic changes, EA and IVS are correlated with cardiovascular risk factors in a significantly higher, significant and homogeneous manner in males and females with hypertension. Less evident is DM compared to E/A and IVS, AD appears to be more correlated with IVS and EA more in women; smoking appears more 'accident with IVS equally between men and women, while more accident with E/A in men. In principle, clinical stratification and risk reflect an important role on the appropriateness of the diagnostic stratification of the prognostical relevant organic complications. Transthoracic echocardiocolo Doppler is confirmed as a first level technique and of appropriate predictive value in clinical reality.

### A104: PSYCHE AND HEART: INTERACTION BETWEEN NEUROPSYCHIC DISORDERS AND CARDIOVASCULAR RISK FACTORS: GENDER AND PROGNOSTIC PERSPECTIVE IN A REAL LIFE CLINICAL EXPERIENCE

Flavio Acquistapace (a, b)
(a) MIP - MEDICINE IN PRACTICE WORKING GROUP; (b) SIC WORKING GROUP MEMBER

Stress effects appears in society with psychosomatic and physiopathological implications and symptoms involving the cardiovascular sphere. The anxiety and depression tract are recognized as independent cardiovascular risk factors. How much the clinical manifestations accidents in the cardiovascular health and diagnostic therapeutic paths has not been well defined in the clinical reality, although the cardiologist is more often the first person called to answer these clinical needs.

**Aims.** To the purpose to evaluate the incidence of the neuropsychological implications and therapeutic cardiac pathways in the territorial clinical relationship, an observational experience started.

**Methods.** Cardiology outpatient analysis (pts) without major cardiovascular event in the history. Analysis and verification of risk factors, cardiovascular diagnosis, anamnestic and clinical presence of anxious depressive tract stress and frank depressive psychosis; ECG assessments, heart rate therapies Observational Period 2010 - open 2012 1680 pts observed Results 820 Primary evaluations (without major cardiovascular event) were analyzed: M 332 (40%); F 496 (60%) Risk factors: hypertension 480 (58%) 240 (50%) F 240 (50%) dyslipidemia: 220 (28%) M 72 (35%); F 140 (65%) diabetes 110 (13%) M 70 (60%) F 40 (40%) Anxiety syndrome Depression (SAD) 523 (60%) M 140 (28%); F 383 (70%), Depressive Psychosis 42: 20M (48%) 22 F (52%), Smoking 160 (20%) M 70 (43%) F 90 (57%) sedentary lifestyle 454 (54%) M135 (30 %) / F 320 (70%). The mean FCM Heart Rate detected is 85 / min M: 74 F 88 70% (340) of the pts with SAD correlates with the presence of hypertension, 450 pts (87%) has Symptoms and cardiopalmus/tachyarrhythmias/tachycardias 360 (80%) F vs 20 (20%) M, 70 (15%) associated with supraventricular tachyarrhythmia (TSV): women 85% (60) vs 15% (10) male therapies taken. antihypertensive in 60% (310) with SAD, 217 M (70%), F 90(30%). 12% (65) of pts with SAD take anxiolytic or antidepressive therapy.

**Conclusion.** Stress and SAD have clinical and cardiological relevance in cardiovascular health with implications in diagnostic and therapeutic appropriateness, quality of life and in the cardiovascular prognosis: The woman has higher cardioneuropsycological incidence regardless fertile or menopausal period and less cardiovascular therapeutic adherence.

### A105: PREDICTIVE FACTORS OF POST-OPERATIVE ATRIAL FIBRILLATION AFTER CARDIAC SURGERY

Alessandra Bonaccorso (a), Stefania Sacchi (b), Francesco Maranta (b), Sabina Pellegrino (a), Alessandro Castiglioni (b), Michele De Bonis (b), Ottavio Alfieri (b), Domenico Cianflone (b)
(a) SAN RAFFAELE UNIVERSITY HOSPITAL; (b) SAN RAFFAELE SCIENTIFIC INSTITUTE

**Background.** Post-operative atrial fibrillation (POAF) is a common complication after cardiac surgery. It may occur within 2-4 days after surgery (acute phase) as well as later, within 1 month (subacute phase). Atrial fibrillation occurring in the subacute phase (sPOAF) is linked with a higher rate of adverse clinical events both in the mid and long term.

**Aim.** The aim of the study was to assess predictors of sPOAF in patients undergoing cardiac surgery.

**Materials and methods.** We examined 737 cardiac surgical patients (408 male, 62 (52-71) years, in sinus rhythm at baseline) who underwent coronary artery bypass graft and/or valve surgery, followed by in-hospital rehabilitation. During the rehabilitation stay, all patients underwent continuous ECG monitoring. The relationship between anamnestic, clinical and laboratory variables and the occurrence of POAF in the subacute phase was evaluated.

**Results.** In the subacute phase, sPOAF occurred in 170 (23,1%) patients. At the multivariable logistic regression, advanced age (OR 1.027; 95% CI 1.01-1.044; p=0.002), previous history of atrial fibrillation (OR 1.652; 95% CI 1.068-2.555; p= 0.024), occurrence of POAF in the acute phase (OR 2.916; 95% CI 2.011-4.228; p<0.001), mitral valve surgery (OR 1.632, 95% CI 1.075-2.480;p=0.022) and higher values of NLR at baseline (OR 1.144; 95% CI 1.028-1.272; p=0.013) were found to be independent predictors of sPOAF after cardiac surgery.

**Conclusions.** Cardiac surgical patients with advanced age, previous history of atrial fibrillation, acute POAF, greater values of NLR at baseline and mitral surgery are at higher risk of POAF occurrence in the subacute phase during the rehabilitation period. These results may be useful to set up an individualized therapeutic strategy to prevent sPOAF occurrence and improve the mid and long term patients' outcome.

### A106: PROGETTO DI FORMAZIONE SUL CAMPO MEDICO INFERMIERISTICO PER IL MANAGEMENT DELLO SCOMPENSO CARDIACO CRONICO

Giuseppina Padovano (e), Armando Ferraretti (d), Michele Correale (a), Giuseppina Merolla (a), Angelina Libertazzi (a), Alessandra Leopizzi (a), Adriana Mallardi (a), Pietro Mazzeo (a), Lucia Tricarico (a), Salvatore Tucci (a), Matteo Di Biase (b), Natale Daniele Brunetti (a)
(a) DEPARTMENT OF CARDIOLOGY, UNIVERSITY OF FOGGIA; (b) BMV, SANTA MARIA HOSPITAL, BARI; (c) TATARELLA HOSPITAL, CERIGNOLA (FG), ITALY; (d) CIVIC HOSPITAL, CANOSA DI PUGLIA (BAT), ITALY; (e) ASL FOGGIA, FOGGIA, ITALY

**Introduzione.** Lo scompenso cardiaco (SC) è una sindrome cronica, ad elevato significato clinico e sociale a causa dell'elevata morbilità e mortalità e delle ripercussioni economiche, con notevole impatto sui servizi sanitari nazionali. Uno dei problemi più importanti nella gestione dello SC sono le frequenti riospedalizzazioni dovute alle riacutizzazioni della malattia. Il peggioramento del quadro clinico è legato anche al fatto che il paziente cardiopatico tende progressivamente a "non aderire" alle istruzioni o alle terapie ricevute al momento della dimissione, incorrendo inevitabilmente in frequenti instabilizzazioni cliniche. Nasce quindi l'esigenza di realizzare una continuità assistenziale efficace dopo una dimissione per scompenso cardiaco acuto, con una attività ambulatoriale ospedaliera ed extraospedaliera predefinita e coerente con le attuali linee guida. Fondamentale è anche l'educazione sanitaria al paziente, ai familiari o ai care-givers con raccomandazioni sui comportamenti per ottenere uno stile di vita adeguato, con l'insegnamento su come monitorare i sintomi e stressando l'importanza di non autosospendere i farmaci. A tal fine, il personale medico ed infermieristico deve seguire un training specifico e multidisciplinare. Scopo di questo progetto è dimostrare se un training specifico su personale medico ed infermieristico può portare ad una riduzione del numero delle riospedalizzazioni, del numero dei giorni di degenza in caso di ricoveri, della mortalità, della necessità di impianto di device e di eventi aritmici.

**Metodi.** Abbiamo ideato un progetto di formazione sul campo, la cui finalità è la formazione degli operatori sanitari operanti nell'ambulatorio dedicato allo scompenso cardiaco (ospedaliero ed extraospedaliero) per l'impostazione della organizzazione di luoghi, persone e procedure. Il corso sarà finalizzato ad un livello di apprendimento alto e complesso, allo scopo di lasciare una competenza teorica e pratica. La durata totale

del corso sarà di 240 ore svolte nell'arco di 6 mesi con diversi incontri settimanali. Un Tutor effettuerà un training a 3 medici cardiologi per migliorare l'approccio al paziente scompensato da un punto di vista diagnostico e terapeutico e a 2 infermieri, che saranno formati nella presa in carico e nel follow up del paziente scompensato, riportando variabili cliniche (frequenza cardiaca, pressione arteriosa, peso corporeo, saturazione O2, valutazione stato di idratazione, 6MWT), questionari sulla "quality of life" e verificando la riduzione/cessazione delle abitudini voluttuarie, l'aderenza ai programmi proposti, la corretta e continuativa assunzione della terapia, l'automonitoraggio dei parametri vitale e del peso corporeo.
**Conclusioni.** Come risultato atteso, a parità di terapie impiegate nei pazienti con scompenso cardiaco, attendiamo una significativa riduzione delle ospedalizzazioni per scompenso cardiaco rispetto ad un periodo di follow-up della stessa durata, eseguito precedentemente all'intervento in oggetto.

### A107: CRITERI DI VALUTAZIONE E CLASSIFICAZIONE DEL PAZIENTE CARDIOLOGICO

Antonella Maestri (a), Antonio Mazza (a), Federica Camera (a),
Roberto F.E. Pedretti (a)
(a) ICS MAUGERI

**Premessa.** Gli ultimi decenni si sono rivelati terreno particolarmente fertile per lo sviluppo della ricerca e delle tematiche legate all'ambito delle disabilità. Il dibattito è tutt'ora vivo, ma i responsi internazionali sono in progressiva fase di armonizzazione. La presenza di nuovi criteri per la valutazione e la classificazione delle menomazioni, più flessibili e multi-componenziali, il conclamato riconoscimento del valore dei modelli di "inclusione" sociale, l'erogazione di servizi sempre più efficienti e una qualità crescente dei trattamenti, rappresentano un guadagno non trascurabile.
**Metodi.** Sono stati valutati i dati di 13 pazienti ricoverati presso la nostra unità di riabilitazione cardiologica Per la valutazione clinica dei pazienti, al momento del ricovero, è stato utilizzato un "core set" di scale selezionate adattabili al regime di degenza ordinaria. Le funzioni da noi selezionate ed utilizzate nell'ambito della palestra di cardiologia riabilitativa sono state scelte in quanto maggiormente significative nell'individuazione della condizione di salute del paziente. La selezione del CORE SET cardiologico si basa quindi sulla frequenza di riscontro di determinate perdite di funzione e menomazioni riscontrate nei pazienti cardiologici, suddivisi nella palestra di cardiologia riabilitativa in quattro grandi categorie: scompenso cardiaco, sindromi coronariche croniche, cardio operati e cardiopatia ischemica.
**Risultati.** Al termine del trattamento riabilitativo, dal confronto tra i dati emersi dalla classificazione dello stato di salute dei pazienti è emerso un miglioramento in ogni singolo ricoverato sia per quanto riguarda le funzioni motorie che per quanto riguarda le funzioni respiratorie e psicologiche. Una valutazione universalmente interpretabile delle condizioni di salute del paziente al momento del ricovero ed al momento della dimissione, ci ha permesso di determinare uno specifico training riabilitativo per ogni paziente, che sostituirebbe il trattamento riabilitativo "standardizzato" ad oggi praticato.
**Conclusioni.** La scelta di scale di valutazione che prevedano test di esecuzione motoria facilmente comprensibili e realizzabili dai pazienti e che siano di uso pratico anche per i "valutatori" ha permesso di facilitare notevolmente sia la somministrazione che la raccolta dei dati.

### E: EFFETTI DI UN TRAINING DI FORZA IN UN CONTESTO DI CARDIOLOGIA RIABILITATIVA

Antonella Maestri (a), Pietro Apollaro (a), Antonio Mazza (a),
Federica Camera (a), Marco Ambrosetti (a), Roberto F.E. Pedretti (a)
(a) ICS MAUGERI

**Premessa.** L'obiettivo di questo studio è quello di valutare gli effetti benefici di un training di forza associato ad un training aerobico in un ambito di cardiologia riabilitativa al fine di migliorare lo stato globale di salute del paziente.
Sebbene i programmi di training in cardiologia riabilitativa siano improntati sull'allenamento dell'endurance cardiorespiratoria le più recenti linee guida affermano che l'allenamento di forza, complementare a quello di endurance, comporta effetti benevoli in termini di forza muscolare, resistenza cardiovascolare, metabolismo, fattori di rischio coronarico e benessere psicosociale. Entrambi i training possono promuovere sostanziali benefici in termini di fattori correlati alla salute.
**Metodi.** Abbiamo valutato 6 pazienti: 2 con scc, 2 cardioperati (bypass), 2 con cardiomiopatia ischemica. L'obiettivo è stato quello di determinare il corretto posizionamento di un training alla forza al fine di valutare eventuali miglioramenti in termini di forza muscolare, coordinazione, equilibrio, capacità funzionale, percezione della fatica, qualità della vita. I pz sono stati sottoposti ad un protocollo di allenamento della durata di 3 settimane e valutati attraverso 6MWT, Euroquol, misurazione di pressione arteriosa, frequenza cardiaca, saturazione a riposo e successivamente all'esecuzione training in palestra, valutazione della singola ripetuta massimale (1RM) per ogni esercizio attraverso uno sforzo dinamico con metodo diretto, valutazione della percezione della fatica attraverso somministrazione scala di Borg.
**Risultati.** La forza muscolare è aumentata in tutti i pazienti. La media dei chilogrammi sollevati durante i vari esercizi è aumentata: La distanza percorsa al 6MWT è aumentata in tutti i pazienti. La media dei metri percorsi al 6MWT in ingresso è stata di 420m ± 53,665 mentre in uscita di 494,166m ± 65,607. La percezione della fatica si è mantenuta entro i valori riportati dalle linee guida con una media di 12,489 ± 0,819. La percezione di qualità della vita, quantificata attraverso applicazione di EuroQol e PGIC scale, risulta migliorata. Il punteggio all'EuroQol in ingresso aveva una media di 58,34 ± 9,83, mentre all'uscita è stata di 86,67 ± 8,16. La media dei punteggi della PGIC scale è stata di 5,67 ± 0,52.
**Conclusioni.** Il training aerobico rappresenta la scelta primaria in tutte le cardiologie riabilitative, tuttavia il training alla forza si pone come trattamento complementare al miglioramento della forza muscolare, della capacità funzionale e della qualità del vita del paziente.. I pazienti hanno acquisito un miglioramento nel controllo motorio che ha contribuito ad una maggiore tolleranza allo sforzo fisico, come si evince dai risultati della scala di Borg e hanno rilevato un maggior senso di affaticamento durante il programma d'allenamento tollerando lo sforzo effettuato senza oltrepassare i limiti imposti dalle linee guida durante le varie fasi d'allenamento.

### A109: UTILITÀ DELLA DIETA MEDITERRANEA NEI PAZIENTI CON MALATTIA ATEROSCLEROTICA POLIVASCOLARE

Francesco Piccirillo (a), Costanza Goffredo (a), Annunziata Nusca (a),
Caterina Bono (a), Simona Mega (a), Alessia Delli Veneri (a),
Francesco Grigioni (a), Germano Di Sciascio (a)
(a) CAMPUS BIO MEDICO DI ROMA

**Introduzione.** Il paziente con polivasculopatia presenta contemporaneamente lesioni aterosclerotiche clinicamente rilevanti in almeno due distretti vascolari maggiori, quali quello cerebrale e/o coronarico e/o aortico addominale e/o arterioso degli arti inferiori. Questo paziente presenta una prognosi generalmente peggiore rispetto ad un paziente con aterosclerosi in un solo distretto vascolare; ne deriva la necessità di un approccio terapeutico più aggressivo in quest'ultimo sottogruppo. È ormai accertato come la dieta mediterranea sia associata ad una minore mortalità e morbilità cardiovascolare. Scopo del nostro lavoro è stato quindi quello di correlare la mortalità e morbilità dei pazienti con polivasculopatia con parametri clinici e con indici di aderenza alla dieta mediterranea.
**Materiali e metodi.** A tale scopo sono stati arruolati 80 pazienti con coinvolgimento aterosclerotico di due o più distretti vascolari. Sono stati presi in considerazione i principali fattori di rischio cardiovascolare (fumo, diabete, dislipidemia e ipertensione) ed è stato inoltre valutato il $CHA_2DS_2VASc$ come score di rischio per eventi cardio-cerebrovascolari. È stata quindi valutata la correlazione tra incidenza di eventi cardio-cerebrovascolari ed aderenza alla terapia, fattori di rischio cardiovascolare, indice MAI (Mediterranean Adequacy Index - che valuta l'aderenza della propria dieta a dei canoni prettamente della dieta mediterranea), orario e numero dei pasti giornalieri. Ai pazienti è stato somministrato un questionario validato tramite cui valutare il grado di aderenza alla dieta mediterranea.
**Risultati.** La maggior parte dei pazienti risultavano ipertesi (92.5%) e dislipidemici (81.9%), mentre diabete e tabagismo erano presenti nel 36.3% e 21.3% dei pazienti. Un CHA2DS2-VASc score superiore a 3 è stato registrato in 55 pazienti su 80 (71.8%); nello specifico, uno score = 4 è stato registrato in 26 pazienti (32.5%), uno score = 5 in 25 pazienti (31.3%) e infine uno score = 6 in 4 pazienti (5%). Considerando invece i due indici alimentari di aderenza alla dieta mediterranea (il questionario validato e il MAI index), si è notato come la dieta mediterranea sia un importante elemento protettivo: la coorte di pazienti che seguiva una dieta mediterranea sufficientemente adeguata, secondo i due score citati, non ha registrato eventi cardiovascolari maggiori (65 pazienti su 80 con un MAI index > 1.5, 55 pazienti su 80 con questionario validato> 10). I pazienti che non hanno presentato eventi cardiovascolari nel follow-up sono stati 56 (70%); di questi, il 73.2% (41 pazienti) presentava uno score di sufficiente adeguatezza alla dieta mediterranea.
**Conclusioni.** Questo studio ha dimostrato come la dieta mediterranea possa essere importante per prevenire l'aterosclerosi polivascolare. Obiettivo futuro dello studio sarà aumentare il numero dei pazienti e il periodo di osservazione per poter valutare se il miglioramento dell'aderenza alla dieta mediterranea, conseguito tramite un lavoro di equipe coinvolgente lo specialista cardiologo e il nutrizionista, possa ridurre gli eventi nel follow-up del paziente con polivasculopatia, intervenendo sul miglior controllo dei fattori di rischio cardiovascolare.

### A110: UTILIZATION OF IVABRADINE 10 YEARS AFTER APPROVAL: PATIENTS' CHARACTERISTICS AND RELATED COSTS IN AN ITALIAN COMMUNITY SETTING OF 17,610,196 SUBJECTS

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(a) FONDAZIONE RES (RICERCA E SALUTE); (b) ANMCO - FONDAZIONE PER IL TUO CUORE; (c) DRUGS AND HEALTH

**Background and aims.** In Italy, ivabradine was reimbursed for angina pectoris in 2004, extended to heart failure (HF) in 2009. This analysis of a database of more than 17 million subjects describes clinical profile, concomitant treatments, prescription continuity and the related costs of patients receiving a prescription of ivabradine.

**Methods.** Analyses were carried out from the ReS database, a population-based database linking demographic data, prescription records, hospital discharge records, outpatient specialty examinations/procedures. Healthcare costs were analysed over the 1-year follow-up by the following indicators: drug prescriptions (public prices reimbursed by the National Health Service - NHS), outpatient specialist services (Italian national tariffs) and hospitalizations (Italian national tariffs). Mean cost was calculated per capita up to the end of the 1-year follow-up or the death of the patient.

**Results.** Population with available demographic and administrative data consisted of 17,610,196 inhabitants. Among them, in 2014, 25,312 individuals were treated with ivabradine (1.4 per 1,000 individuals), 11,890 of them (47% of ivabradine prescriptions) in combination with beta-blockers, mainly bisoprolol and carvedilol. Table shows characteristics and costs of patients receiving a prescription of ivabradine with or without beta-blockers.

| | Ivabradine (n. 13,422) | Ivabradine plus a beta-blocker (n. 11,890) |
|---|---|---|
| Median age | 73 | 70 |
| Females % | 42.5 | 31.1 |
| Previous hospitalization for angina, % | 11.3 | 13.7 |
| Previous hospitalization for HF, % | 14.3 | 12.2 |
| Hypertension, % | 87.6 | 74.6 |
| Diabetes mellitus, % | 32.3 | 32.6 |
| Dyslipidaemia, % | 7.4 | 12.7 |
| COPD/Asthma, % | 46.5 | 25.7 |
| Depression, % | 16.4 | 10.9 |
| Neoplasia, % | 4.2 | 2.8 |
| Adherence at 1-year, % | 77.2 | 65.8 |
| Total yearly cost per patient, € | 4,413 | 5,862 |
| Ivabradine, € | 515 | 522 |
| Other CV drugs, € | 391 | 423 |
| Other non-CV drugs, € | 1,013 | 887 |
| Hospitalizations CV, € | 764 | 2,312 |
| Hospitalizations non-CV, € | 1,142 | 1,069 |
| Outpatient procedures, € | 588 | 648 |

**Conclusions.** Patients receiving ivabradine with or without beta-blockers are generally old, with severe comorbidities and hospitalizations. Costs for the NHS are relevant, mainly driven by the hospitalizations, particularly in patients treated with the combination. Costs for ivabradine is quantifiable in 9% of total costs when used in association with betablockers and 12% when not.

### A111: WHAT WOULD HAPPEN TO ESC GUIDELINES' LEVEL OF EVIDENCE IF THE P VALUE THRESHOLD WAS LOWERED TO 0.005?

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**Introduction.** A proposal to lower p thresholds to 0.005 was recently advanced, although with unknown impact on everyday scientific and clinical practice.

**Methods.** Recent European Society of Cardiology (ESC) guidelines of STEMI (ST Segment Elevation Myocardial Infarction) were analyzed. 28 main recommendations and each related Level of Evidence (LoE) were appraised. P value of each study was classified according to be above or below 0.005. Downgrade of evidence (defined as a shift towards lower level due to lack of significance with lower p thresholds) was the primary end point, while change in significance the secondary one.

**Results.** 107 studies were included: 13 observational, 24 meta-analysis and 70 randomized controlled trials (RCTs). P value was not available/not reported in 19 studies (17.8%), while it was > 0.005 in 24 (22.4%) and <0.005 in 64 (59.8%). 83.3% of studies with p>0.005 were RCTs, while 12.5% were meta-analysis and 4.2% observational.

Of 28 main guideline recommendations, in 18 (64.3%) of them at least one p value >0.005 was reported, while downgrade in level of evidence was potentially described only for 6 recommendations (21.4%): three downgrades from IA to IB, one from IB to IC, one from IIa A to IIa B and one from IIa B to IIa C. Impact factor (IF) was not different among studies with p > or < than 0.005, while was higher in those downgrading evidence.

**Conclusion.** A p value >0.005 was noted in 22.4% of studies of STEMI ESC guidelines, leading to a downgrade of evidence in 6 of 28 recommendations considered.

### A112: SEX-RELATED TRENDS OF CARDIOVASCULAR RISK PERCEPTION AND PREVENTION BEHAVIORS: RESULTS FROM THE ITALIAN SOCIETY OF CARDIOVASCULAR SURVEY

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**Background.** The purpose of this survey was to evaluate trends in awareness of cardiovascular risk, as well as knowledge of symptoms and preventive behaviors related to cardiovascular disease (CVD).

**Methods and results.** As part of *Vivi con il Cuore* (campaign with the goal of raising awareness about women's heart disease) a nationwide survey was conducted. Standardized questions on awareness of CVD risk, as well as prevention behaviors and barriers, were provided through a computer-assisted web interviewing platform to a large sample of Italians citizens ranging from 40 to 70 years old. The sample was representative of the population by age, sex, and area of geographical residence. A total of 1,000 subjects were included in this survey, of which 511 (51%) female. About 60% of women indicated cancer as the leading cause of death among female sex, while only 22% indicated cardiovascular disease. Similarly, when the same question was asked to men, 44% indicated cancer and 21% cardiovascular disease, observations that were consistent across age categories. Although a well sizable part of the population (90% of the interviewees) have consulted the general practitioner in the last year, only 45% of women and 56% of men declared to receive information about CVD risk. Almost 84% among men and women, recognized the importance of knowing how to understand the symptoms of a heart attack due to the possibility of survival. An additional survey was conducted among young cardiologists under 40 years old, including a total of 200 young cardiologists, similarly distributed among men and women (47% and 53% respectively). About 24% of young cardiologists indicated breast cancer as the leading cause of death in women, while only 70% reported cardiovascular diseases. Furthermore, 35% of participants reported that they did not have adequate training on the risks of heart disease in women.

**Conclusions.** In this survey, only 22% of women were aware that cardiovascular disease is the number one killer of women. Likewise, a well sizable part of young cardiologists (30%) does not recognize cardiovascular disease as the leading cause of death in women. These data should inform public health campaigns to focus on evidence-based strategies to prevent CVD and to help target messages that resonate and motivate women to take action.

## VALVULOPATIE
## Sessione Poster

### A113: LA VALVULOPLASTICA AORTICA MEDIANTE UTILIZZO DI SINGOLO ACCESSO RADIALE: UNA PROCEDURA SICURA ED EFFICACE

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**Introduzione.** La valvuloplastica aortica transradiale si sta diffondendo rapidamente nella pratica clinica, per la minore invasività, l'elevato profilo di sicurezza e la parità di efficacia rispetto all'approccio transfemorale. La tecnica standard, prevede l'impiego di due accessi arteriosi, uno dei quali 8-9 Fr per la procedura, l'altro 4-6 Fr per il monitoraggio angiografico e pressorio. L'impiego di un singolo accesso arterioso, può essere utile in generale per un'ulteriore riduzione dell'invasività procedurale e, in particolare in pazienti fragili, ad elevato rischio emorragico o con ostacoli al transito dell'arteria radiale controlaterale.

**Scopo.** Scopo del lavoro è quello di presentare la nostra esperienza nell'uso di un singolo accesso radiale (unico accesso) nella procedura di valvuloplastica aortica.

**Materiali e metodi.** La procedura di valvuloplastica aortica con utilizzo di singolo accesso radiale è stata effettuata in 10 pazienti con stenosi aortica severa sintomatica, su 30 arruolati nel registro SOFLTY II nel nostro centro. Sono posizionati in successione in arteria radiale

introduttori 6F e, previa somministrazione di nitrati e calcioantagonisti in bolo intra-arterioso, 8F. In 8 casi, il cateterismo di base, l'aortografia iniziale e di controllo ed il cateterismo di controllo sono stati eseguiti con 2 cateteri Pigtail 4Fr in parallelo introdotti attraverso il medesimo accesso, mentre in 2 casi è stato impiegato il PigTail Langston 6F a 2 lumi. In 4/10 casi, la dilatazione è stata effettuata con pallone CBV 18 mm; in 3 di questi, è stato necessario un upgrade con pallone CBV 20 mm. In 6/10 casi, è stato utilizzato un pallone CBV 20 mm. Il rapid pacing è stato sempre effettuato mediante stimolazione su guida del ventricolo sn. Per l'emostasi dell'arteria radiale è stata impiegata la tecnica dell'emostasi pervia associata ad applicazione del dispositivo TR-Band.
**Risultati.** Il successo procedurale è stato ottenuto in tutti e 10 i pazienti. Non si sono verificate complicanze peri o post-procedurali. L'ecocardiogramma pre-dimissione ha confermato una riduzione dei gradienti transvalvolari aortici. A 30 giorni di follow-up, si è ottenuto un significativo miglioramento della classe funzionale NYHA in tutti i pazienti e in 9/10 casi l'arteria radiale usata come accesso è risultata pervia. 2 pazienti sono successivamente stati trattati con TAVI.
**Conclusioni.** L'approccio radiale è un'alternativa sicura ed efficace per le procedure di valvuloplastica percutanea aortica. Il singolo accesso radiale contribuisce ad una ulteriore riduzione del grado d'invasività procedurale e non ha impatto negativo sull'efficacia procedurale.

### A114: PROGNOSTIC ACCURACY OF MULTIPARAMETRIC SCORES FOR HEART FAILURE WITH REDUCED EJECTION FRACTION IN PATIENTS WITH SEVERE MITRAL REGURGITATION UNDERGOING MITRACLIP TREATMENT

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**Background.** The selection of patients with severe functional mitral regurgitation (FMR) to candidate to MitraClip treatment is based on a multiparametric approach. To date, prognostic scores derived and externally validated in this particular clinical setting are not available.
**Aim.** To assess the discrimination and calibration accuracy in terms of cardiac death and all-cause death at long-term of heart failure with reduced ejection fraction (HFrEF) prognostic scores in patients with severe FMR undergoing percutaneous mitral valve repair with MitraClip device.
**Materials and methods.** We prospectively enrolled all patients with severe FMR who consecutively underwent percutaneous mitral valve repair with MitraClip from March 2012 to November 2018 at our Institution. Demographic, clinical, echocardiographic and laboratory data were collected. Cardiopulmonary exercise test (CPET) was performed in all patients before the procedure. The following HFrEF scores were retrospectively calculated: Metabolic Exercise, Cardiac, Kidney Index (MECKI), Cardiac and Comorbid Conditions Heart Failure (3C-HF), (HFSS), Heart Failure Survival Score (SHFM) and meta-analysis group in chronic heart failure (MAGGIC). Two outcomes were assessed at the longest available follow-up: all-cause death and cardiac death.
**Results.** The study population included 75 patients (mean age: 70.6±8.68 years; 79.5% males). The patients showed a high surgical risk (EuroSCORE logistic: 20.0±14.2%; EuroSCORE II: 8.0±6.0%) and impaired average CPET values (peak oxygen uptake, $VO_2$: 10.5±3.1 ml/kg/min; ventilation/carbon dioxide consumption ratio, $VE/VCO_2$: 44.8±12.2). Mean follow-up was 891.6 days. During the study period, 38 deaths were observed; of them, 24 were secondary to cardiac cause. In terms of cardiac death, the MECKI score showed a higher discrimination ability than the other scores. Moreover, an upward trend in the the area under the curve (AUC) values of the MECKI score from the first to the fifth year of observation was observed. The MECKI score showed the highest discriminative power for all-cause death for each time frame analyzed and increasing AUC values through the years of observation. The MECKI score had a significantly better discrimination ability than the other scores, except for the HFSS, for the occurrence of cardiac death and all-cause death at 3, 4 and 5 years ($p<0.05$). Hosmer-Lemeshow analysis showed a good calibration accuracy for all the scores in terms of cardiac death. MECKI score had a suboptimal calibration ability for all-cause death event.
**Conclusions.** HFrEF scores might improve the pre-procedural prognostic stratification in patients with FMR candidate to MitraClip treatment. The MECKI score, which includes two parameters from CPET, showed the best discriminative performance in terms of all-cause death and cardiac death, especially at long term follow-up.

### A115: A RARE CASE OF LACTOBACILLUS PLANTARUM PROSTHETIC VALVE ENDOCARDITIS

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**Introduction.** Lactobacillus species are facultatively anaerobic, Gram-positive rods normal human gastrointestinal and genitourinary flora. Lactobacillus spp. are rare human pathogens but have been implicated in a variety of infections, including bacteremia and endocarditis, with Lactobacillus casei and Lactobacillus rhamnosus among the most frequently isolated species. Endocarditis due to Lactobacillus represents <0.5% of all cases of endocarditis and are associated with structural heart diseases, recent surgery, extended antibiotic and probiotic use and immuno-deficiency. We report a case of Lactobacillus plantarum endocarditis in a patient with biological aortic prosthetic valve.
**Case report.** Our patient is a 48 year-old male with a past medical history of surgical aortic replacement with a biological prosthetic valve in 2013. He reports the onset of symptoms 4 months before with worsening asthenia. The patient presented to a cardiologist after 3 months from symptoms beginning. A transesophageal echocardiogram (TEE) described marked fibro-plastic thickening of the cusps with two elongated vegetations (12 mm and 7 mm) causing a moderate-to-severe aortic steno-regurgitation. A few days later he came to our emergency department. On admission, the patient was afebrile, eupnoeic on room air. The cardiac examination revealed a regular rate and rhythm with a grade 4 of 6 holosystolic murmur loudest at the aortic and pulmonary focus. Three sets of blood cultures were drawn on admission. Hence, he was transferred to the Infectious Diseases Department where he started antibiotic therapy with Ceftriaxone and Gentamicin. A 18F-FDG PET-CT total body showed tracer accumulation close to the prosthetic aortic valve. Few days later Lactobacillus Plantarum was isolated from blood cultures and, according to the antibiogram results, therapy was adjusted using G Penicillin, Vancomicyn and Gentamicin. The TEE, performed during the hospitalization, showed one mobile vegetation, reduced in size (5 mm), adherent to the anterior aortic cusp, which prolapsed in the left ventricular outflow tract and commissural fusion, causing severe steno-regurgitation (Gmax 84 mmHg, Gmed 54 mmHg). During hospitalization the serial blood cultures resulted negative. Serial TEEs were also performed (3rd and 6th week), showing a gradual reduction of the cusps thickening and disappearance of commissural fusion (Figure). In the last TEE no vegetations were described, and the transaortic mean gradient was reduced (Gmed 38 mmHg), persisting severe regurgitation. Hence the patient was discharged with oral antibiotic therapy (amoxicillin and clavulanic acid) and indication to redo aortic valve surgery. Written informed consent was obtained.
**Conclusions.** L. plantarum is a rare form of endocarditis. In our patient it caused fibro-plastic thickening of the bioprosthesis cusps and commissural fusion, determining severe steno-regurgitation. It also responded to targeted antibiotic therapy with improvement in cusp mobility but persistence of severe regurgitation.

### A116: ALIASING PLANIMETRY BY PHASE-CONTRAST IMAGING FOR GRADING OF AORTIC STENOSIS SEVERITY

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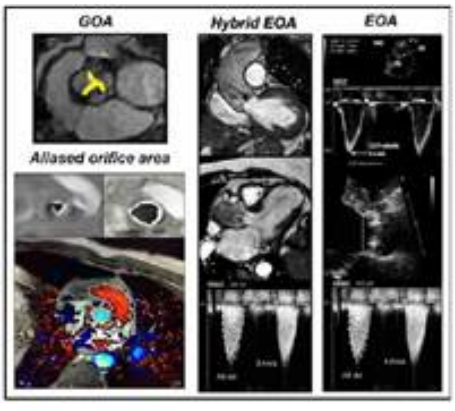
**Background and aims.** Transthoracic echocardiography (TTE) is the preferred technique for the assessment aortic stenosis (AS) and effective orifice area (EOA) is recommended as the best method for grading AS severity. Nevertheless, EOA is operator-dependent, influenced by a number of potential pitfalls and derived from the continuity equation, which requires three different measurements, yielding independent and random sources of error, increasing the propagation error probability eventually affecting the overall accuracy and precision of the measurement. In this study, we aimed to test the diagnostic accuracy of the aliased orifice area (AOA) planimetry, a novel non-invasive technique for grading of AS severity by low-VENC phase-contrast CMR imaging.
**Methods.** Twenty-two consecutive patients with a diagnosis of moderate (0.85cm2/m2 ≥ indexed EOA ≥ 0.6cm2/m2) or severe AS (indexed EOA < 0.6 cm2/m2) and 6 age- and sex-matched healthy volunteers underwent unenhanced CMR and TTE examinations. We performed a comprehensive analysis of the agreement and correlation among i) AOA planimetry by low-VENC phase-contrast CMR imaging, ii) geometrical orifice area (GOA) valve planimetry by CMR, iii) EOA by TTE (continuity equation method), and iv) multimodality hybrid EOA (EOAhybrid), as obtained by substituting the LVOT area by CMR into the Doppler continuity equation. Using a 3-chamber cine view for reference, a phase

contrast slice was prescribed through the tips of aortic valve leaflets, then by setting the VENC value down to 40-50 cm/s, with NEX of 5 and free-breathing acquisition, an aliased flow signal was detected. AOA planimetry was measured by contouring the aliasing artifact at its largest systolic appearance on phase-velocity maps. Correlations and agreement were assessed with the use of Pearson's correlation and Bland-Altman method.

**Results.** AOA showed excellent inter-examination, intra-rater and inter-rater reliability (ICC: 0.953; 0.997; 0.998, respectively). We observed excellent pairwise correlation among AOA, EOAhybrid, GOA and EOA (P < 0.001), AOA yielding the highest grade of correlation with EOAhybrid (R2 = 0.985, P < 0.001). Bland–Altman analysis demonstrated good agreement between different methods, with the lowest bias of 0,019 for the comparison between EOAhybrid and AOA. When assuming EOAhybrid as the gold standard, AOA exhibited the lowest discordant grading rate (11%) compared with EOA and GOA (21% and 31% respectively; P < 0.001).

**Conclusions.** Aliased orifice area planimetry by low-VENC phase-contrast imaging is a simple, reproducible and accurate one-off measurement technique for grading of severity of aortic stenosis. Larger studies are warranted to confirm our preliminary results.




### A117: IMPACT OF MITRACLIP INTERVENTION ON LEFT VENTRICULAR REMODELING AND CLINICAL OUTCOME: DATA FROM FLORENCE REGISTRY

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**Background.** Mitral valvular repair of severe mitral regurgitation (MR), either surgically or percutaneously, has been shown to prevent and even reverse adverse left ventricular (LV) remodeling, improve cardiac function and functional status and reduce the risk of heart failure. However, the role of ejection fraction (EF) in the selection of patients for MitraClip implantation as not been clarified.

**Purpose.** We sought to assess the impact of EF on LV remodeling and its relationship with outcome.

**Methods and results.** Among 24 patients treated with MitraClip, 2 patients switched to surgical intervention. Serial echocardiography before, one month and 6 months after MitraClip implantation was performed in 22 patients with severe mitral regurgitation (age 77±8 yrs, NYHA III/IV 95%, LV EF 34 ± 11%, logistic EuroSCORE I 23 ±11, STS score 5 ± 3, 3C-HF 30 ± 6.6, functional MR 79%). From baseline to 6-month LV reverse remodeling was defined as a ≥15 % decrease in LV end-systolic volume (LVESV) and an adverse remodeling as an increase of ≥10% in LVESV, respectively. Four patients were not included due to the short follow-up (<6-month). Patients were followed over a period of 12 months. At baseline, no significant differences were fuonded in term of EF between no reverse remodeling/adverse remodeling and reverse remodeling (33.77 ± 13.3 vs 33.66 ± 8.9, p=0.984). At 6 months, a sustained reduction of MR ≤ 2 post MitraClip implantation was observed in 88.8% of patients. The average decrease in LVEDV and LVESV 6 months after intervention was -10.6 ± 20.5 mL and -14 ± 16 mL, respectively. Reverse remodeling at six months occurred in 50% (9), adverse remodeling occurred in 11% (2) and no remodeling occurred in the remaining 39% (7) patients. Patients with adverse remodeling showed, on average, a 20.6 ± 13% increase of LVESV at one month versus an early and significant reduction in LVESV -14 ± 4.7% (p=.007) in patients with reverse remodeling. During follow-up, two patients died, one for lung cancer and one for heart failure, both no remodeling group. Patients with adverse remodeling/no reverse remodeling had more frequently a worse NYHA class III at 12 months than patients with reverse remodeling (44% vs. 11%, adjusted odds ratio of 23.2 (95% CI 1.04-517)).

**Conclusion.** In the real world, our findings show that half of patients undergoing MitraClip implantation showed LV reverse remodeling. However, there was half of patients in whom afterload mismatch resulted in sustained adverse remodeling or no remodeling associated with a high risk of heart failure recurrence. Beyond EF, other factors may help us to refine the selection of patients who may benefit from MitraClip implantation associated with reverse remodeling.

### A118: UN'ELEVATA VELOCITÀ CORONARICA INTRAMURALE CARATTERIZZA MOLTI PAZIENTI CON STENOSI AORTICA SEVERA MA ANCHE ALCUNI CON STENOSI MODERATA: POSSIBILI IMPLICAZIONI FISIOPATOLOGICHE

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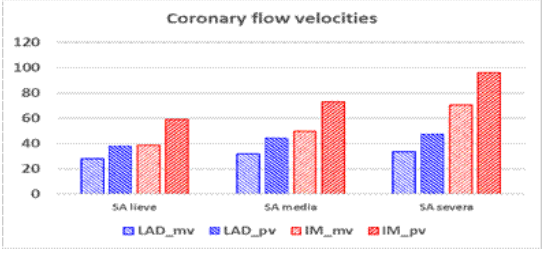
**Obiettivi.** I pazienti con stenosi della valvola aortica (SA) hanno una elevata prevalenza di malattia coronarica epicardica. Tuttavia, non esistono dati sul circolo intramiocardico (IM).

**Metodi.** Abbiamo selezionato un gruppo di pazienti con SA di vario grado, classificati in base al gradente medio. Sono stati esclusi tutti i pazienti che avessero una ischemia miocardica clinicamente manifesta o lesioni ischemizzanti dell'albero coronarico. Sono stati sottoposti a valutazione clinica ed ecocardiografica, con misurazione delle velocità coronariche sia nel distretto epicardico (discendente anteriore, DA) che in quello delle perforanti IM.

**Risultati.** 13 pazienti (21%) sono stati classificati con SA di grado lieve (gruppo A: gradiente medio ≤20mmHg), 29 (47%) moderato (gruppo B, gradiente tra 21 to 40 mmHg) e 20 (32%) severo (gruppo C, gradiente >40mmHg). La velocità sulla DA è risultata lievemente più elevata nei gruppi B e C (p=0.03), comunque sempre entro i limiti dei 50 cm/s. Nelle arterie IM, invece, si è registrato un significativo incremento delle velocità nell'85% dei pazienti del gruppo C e nel 53% di quelli del gruppo B, con valori ben superiori ai 65 cm/s, p<0.001 (Figura).




**Conclusioni.** Questo studio dimostra un notevole incremento della velocità coronarica IM rispetto alla DA in pazienti con SA, senza segni di cardiopatia ischemica clinicamente manifesta. Ciò potrebbe indicare un coinvolgimento funzionale dei piccoli vasi perforanti, indipendente dalla compromissione della DA, in relazione a vari meccanismi fisiopatologici, non solo nei pazienti con SA avanzata, ma anche in circa la metà di quelli con stenosi moderata. Il significato prognostico di questi dati rimane ancora da determinare.

### A119: LATE THROMBOSIS IN BIOPROSTHETIC AORTIC VALVE: THERAPEUTIC DILEMMAS

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A 72-year old man was referred to our institution for dyspnea and chest pain lasting one week. Additional comorbidities included arterial hypertension, diabetes mellitus II and previous total laryngectomy for laryngeal cancer. 9 months before the patient had aortic valve replacement (Hancock 23 biological prosthesis) and coronary artery bypass grafting (LIMA-LDA, SVG-LMA and PDA). He reported regular cardiological and echocardiographic follow-up.

At admission, one month after the last follow-up echocardiography, vital signs were: BP 120/60 mmHg, Pulse: 76 bpm, O2 sat: 98%) with initial clinical signs of congestive heart failure, even confirmed by full laboratory workups and imaging.

The was diagnosed with heart failure with preserved ejection fraction and plausible prosthetic aortic valve dysfunction; thansthoracic echocardiography showed a perfect anatomical positioning of the bioprosthetic aortic valve with apparently no evidence of unrestricted motion of aortic valve leaflets; a peak velocity of 4.5 m/s, a maximum pressure gradient of 83 mmHg, a mean transaortic pressure gradient of

57 mmHg and a aortic valve area calculated according to the continuity equation of 0,4-0.6 $cm^2$, not affected by other valve leak and intraventricular or left ventricular outflow tract obstruction (peak velocity LVOT 0,6 m/s).
Transoesophageal echocardiography showed an increased cusp thickness and a reduced mobility of the prosthetic valve. According to cardiac surgeons, given the clinical suspect of "late thrombosis" of the prosthetic valve, a coronary computed tomography (CT) was requested. At CT, a hypo-attenuating defect of the leaflets, also called hypoattenuating leaflet thickening, was described and pharmacological therapy with subcutaneous low-molecular weight heparin, followed by warfarin (INR target 2-3) was started in addition to diuretic therapy to treat heart failure.
Echocardiography follow-up showed a reduction of transvalvular gradient. He was discharged asymptomatic, in good haemodynamic compensation. Discharge echocardiography showed a peak velocity of 3.93 m/s, a maximum pressure gradient of 61.8 mmHg, a mean pressure gradient of 41,7 mmHg. Control CT after 4 weeks OAC treatment showed an improvement of the initial finding and a restoration of normal leaflet mobility.
The reccomended level of anticoagulation following bioprosthesis implantation remains unclear. Would it be appropriate increased the duration of antiplatelet therapy or would it be mandatory to associate anticoagulation therapy in patients with low risk of bleeding?

### A120: FEBRILE PATIENT WITH PLEURITIC CHEST PAIN, POLYARTHRALGIA, BILATERAL PULMONARY NODULES AND RECENT IV DRUG USE

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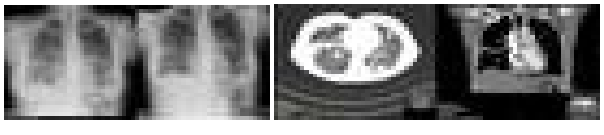
**Introduction and case report description.** A 33-year-old woman with no past cardiac disease presented febrile and unstable to the emergency department (ED) after experiencing new pleuritic right-sided chest pain in the last 48 hours associated with dyspnea and vomiting in addition to new bilateral polyarthralgia. She admitted two episodes of intravenous (IV) drug use nine days and three months before, respectively. Chest X-ray showed numerous bilateral pulmonary nodules, and blood cultures grew Staphylococcus aureus. She was stabilized, given antibiotics, and transferred to a hospital with echocardiography.
**Description of the problem and procedures.** On admission, she was afebrile and tachycardic, however still improved on appropriate antibiotic therapy guided by blood cultures and sensitivities. Before going for her echocardiogram, she had a worsening tachypneic episode of sudden onset pleuritic chest pain with pulse oximetry of 84% on room air, a heart rate of 152 beats per minute and a temperature of 39°C. She recovered from it when given an oxygen flow rate of 5-10 Liters/minute. A thoracic Computed Tomography angiography found small bilateral cavities in keeping with septic emboli, patchy bilateral consolidation and lymphadenopathy likely reactive. She then underwent transthoracic echocardiogram (TTE), which showed a thickened tricuspid valve (TV) with a possible echo-dense small mass and moderate TV regurgitation (TR). For the next two days, she had multiple febrile episodes with widely fluctuating blood pressure (from 88/58 to 172/145 mmHg) and a respiratory rate up to 40 per minute, with completely stable and asymptomatic periods in between. A transesophageal echocardiogram (TEE) was then completed, which reported a large mobile vegetation attached to the TV with severe TR (likely due to perforation of its posterior leaflet).
**Discussion.** This patient did not have pulmonary edema or septal perforation, two of the indications for surgical intervention. Cardiac Surgery considered there was no urgency for surgery as she was eventually asymptomatic on medical treatment. However, should she develop any sequelae, she may be a candidate for surgical therapy. Even though the clinical suspicion for this patient was very high, and TTE is noninvasive and specific, in 20% of patients the images are inadequate. It is not optimal for detecting intracardiac complications. TEE is the best method for the detection of a myocardial abscess, valve perforations, or intracardiac fistulae.
**Conclusions and implications for clinical practice.** This case report emphasizes the importance of the TEE to detect complications that cannot be adequately seen on a TTE. It also reminds that isolated tricuspid-valve S. aureus endocarditis, even with persistent fever, rarely requires surgery. However, patients with multiple septic pulmonary emboli should receive standard-duration therapy.



### A121: CT PRE-TAVI: IMAGE QUALITY AND RADIATION DOSE IN 13 DIFFERENT ACQUISITION PROTOCOLS

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**Background.** Degenerative aortic valvular stenosis is the most common valvulopathy in developed countries. Surgery replacement is still the gold standard for the treatment of this type of pathology, but TAVI (Transcatheter Aortic Valve Implantation) has emerged as an alternative treatment for high risk patients. The appropriate choice of the valve to implant is critical for TAVI procedure to ensure the best clinical benefit and minimize complications. This requires an accurate evaluation of the size of the aortic annulus and root, ascending aorta and the patency of the peripheral femoral vessels by computerized tomography (CT) for the highest diagnostic accuracy.
**Purpose.** Compare image quality and radiation dose of 13 different CT protocols for pre-operative TAVI planning, at the University Hospital of Parma.
**Methods.** From January 2009 to May 2017, 99 patients (63 males, 36 females, age 77.92 + 11.18) underwent pre-TAVI CT scan (SOMATOM Definition Flash, SIEMENS healthcare) were retrospectively selected. From data analysis, it found 13 pre-TAVI CT protocols (depends by Physics): 8 using standard mode (NO-ECG) and 5 with cardio-synchronization (ECG) (Table 1). Effective Dose (Eff), vascular attenuation and noise were calculated. CT vascular attenuation values [HU] were measured in: Ascending, Descending and Abdominal Aorta, respectively. Results were compared with Mann-Whitney U-test. S/N and C/N were calculated. A p-value of 0.05 was considered significant.
**Results.** Of the 99 patients included in the study, 14 were excluded for incomplete datasets. Significant differences were found between the 13 protocols for both image quality and radiation dose. The radiation dose was statistically higher in exams performed without ECG ($p<0.001$). While, the image quality showed a strong correlation with the 2nd administration of contrast agent in ECG protocols. No significant differences between S/N and C/N were found in NO-ECG vs. ECG protocols (Graphic 1). However, the values obtained are very close to the significance threshold.
**Conclusions.** The latest CT generation allows a pre-operative TAVI evaluation with an increased diagnostic accuracy and a concomitant radiation dose reduction. Furthermore, for a higher performance, it is better to use cardio-synchronization, as recommended by guidelines.

### A122: LA VALVULOPLASTICA PERCUTANEA EDGE-TO-EDGE IN PAZIENTI CON SCOMPENSO CARDIACO AVANZATO COME "BRIDGE" PER IL TRAPIANTO CARDIACO: UNA CASE SERIES DA UN CENTRO DI TERZO LIVELLO

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Alessandro Mandurino-Mirizzi (a), Romina Frassica (a),
Fabrizio Gazzoli (b), Raniero Covi (a), Martina Moschella (a),
Stefano Ghio (a), Giulia Magrini (a), Claudia Raineri (a),
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**Introduzione.** Recenti trial clinici hanno evidenziato come in pazienti con scompenso cardiaco (SC) e insufficienza mitralica (IM) funzionale severa il trattamento con valvuloplastica percutanea edge-to-edge con sistema MitraClip sia associato a migliori risultati clinici. Tuttavia, non sono noti disponibili dati sulla sua efficacia in pazienti con SC avanzato.
**Scopo.** Il nostro obiettivo è stato quello di indagare la fattibilità, le ricadute emodinamiche immediate e I risultati clinici dell'impianto di MitraClip in una coorte di pazienti con scompenso cardiaco avanzato.
**Metodi.** Abbiamo incluso retrospettivamente nello studio pazienti già in lista trapianto cardiaco (TC), o non candidabili a TC nonostante terapia medica ottimale e device, o se la procedura era considerata come "bridge" per l'entrata in lista TC.
**Risultati.** Tra i 10 pazienti inclusi, la IM era prevalentemente funzionale (n=7). Non si sono osservate complicazioni maggiori nel periodo peri-operatorio. A 6 mesi, una valutazione invasiva dell'emodinamica era disponibile per 8 pazienti. Si è osservato un significativo incremento dell'indice cardiaco (Least Square Mean Difference, LSMD = +0.47 L/min/m2; p = 0.03). Contestualmente si sono osservati una riduzione numerica della resistenza vascolare polmonare (LSMD = -1.02 WU; p = 0.3), ed un trend verso una minore pressione arteriosa polmonare (LSMD = -6.5 mmHg; p = 0.053) ed una minore frazione di eiezione ventricolare sinistra (LSMD = -6.5%; p = 0.053). Ad un follow-up mediano di 772 giorni (IQR 156-1,578), tutti e 3 I pazienti inizialmente non candidati a TC erano entrati in lista TC, ed uno di loro aveva ricevuto terapia con LVAD. Inoltre, 2 pazienti sono stati trapiantatni, 4 sono stati ospedalizzati per scompenso cardiaco, ed 1 è morto di cause non cardiache.
**Conclusioni.** La valvuloplastica percutanea edge-to-edge con sistema

MitraClip si dimostra sicura ed efficace in pazienti con SC avanzato, ha un impatto emodinamico e clinic, in termini di "decision-making", e dunque può essere considerate come un "bridge" prima di una strategia clinica definitiva.

### A123: CULTURE NEGATIVE INFECTIVE ENDOCARDITIS: IMPACT ON SURGICAL OUTCOMES

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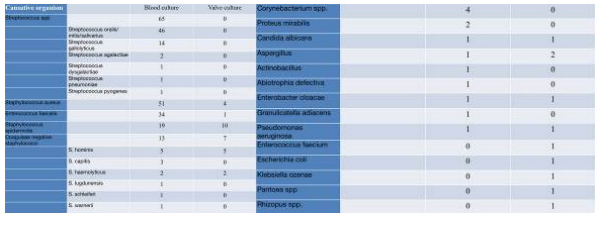
(b) OSPEDALE SAN MARTINO, DIPARTIMENTO DI CARDIOCHIRURGIA, GENOVA

**Introduction.** Infective endocarditis (IE) is still associated with a high rate of mortality and morbidity. Whether the absence of positive microbiological specimens, and in turn the subsequent empiric (possibly suboptimal) antibiotic therapy impacts on prognosis is still matter of discussion. The aim of this study is to evaluate in-hospital outcomes in culture negative infective endocarditis (CNIE) patients treated with surgery.

**Methods.** A retrospective study was conducted from January 2000 to December 2018 at our institution and includes 321 patients operated on for infected endocarditis. The primary endpoint was early mortality. Secondary endpoints were ICU stay, mechanical ventilation, sepsis, multi-organ failure, respiratory failure, stroke, acute kidney injury and atrial fibrillation.

**Results.** Among the 321 patients included in the study, 133 (41%) had CNIE and 188 (59%) had culture positive infective endocarditis (CPIE). Main age was 61.30±15.37. Patients were mostly male (75.39%), mean EuroScoreII was 6.55±0.34 and in 17.45% there was a multi-valvular involvement. Causative organisms are reported in Table. Overall in-hospital mortality was 13.08% (42/321 pts). CPIE had a lower early mortality compared to CNIE (9.0%, 17 pts vs 18.80%, 25 pts; p=0.02). One-to-one propensity matching resulted in 92 pairs with similar preoperative risk profile. Propensity score matched analysis showed that CNIE was associated with a higher risk of in-hospital death (6.50% versus 17.40%, p=0.04). No statistically significant differences in ICU stay (p=0.54), hours of mechanical ventilation (p=0.80), sepsis during ICU stay (p=0.14), multi-organ failure (p=0.24), respiratory failure (p=0.75), stroke (p=1), acute kidney injury (p=1) and atrial fibrillation (p=0.86) were observed between the two groups. At multivariable logistic regression analysis the absence of microbiological diagnosis was an independent risk factor for early mortality (OR 2.10, 95% CI 1.01-4.47, p=0.04) along with age (OR 1.03, 95% CI 1.003-1.06, p=0.03), de novo dialysis (OR 7.92, 95% CI 1.53-39.93, p=0.01), left ventricular ejection fraction (OR 0.93, 95% CI 0.90-0.97, p<0.01), associated CABG (OR 4.74 95% CI 1.01-20.55, p=0.04), multi-valvular disease (OR 2.36, 95% CI 1.00-5.40, p=0.04), and EuroScoreII (OR 1.03, 95% CI 1.00-1.06, p=0.04).



| Causative organism | Blood culture | Valve culture |
|---|---|---|
| Streptococcus spp. | 65 | 8 |
| Streptococcus oralis/ mitis/sanguinis | 46 | 6 |
| Streptococcus gallolyticus | 14 | 8 |
| Streptococcus agalactiae | 2 | 0 |
| Streptococcus dysgalactiae | 1 | 0 |
| Streptococcus pneumoniae | 1 | 0 |
| Streptococcus pyogenes | 1 | 0 |
| Staphylococcus aureus | 51 | 4 |
| Enterococcus faecalis | 34 | 1 |
| Staphylococcus coagulase-negative (staphylococci) | 19 | 10 |
| | 13 | 7 |
| S. hominis | 5 | 5 |
| S. capitis | 3 | 0 |
| S. haemolyticus | 2 | 2 |
| S. lugdunensis | 1 | 0 |
| S. schleiferi | 1 | 0 |
| S. warneri | 1 | 0 |

| | | |
|---|---|---|
| Corynebacterium spp. | 4 | 0 |
| Proteus mirabilis | 2 | 0 |
| Candida albicans | 1 | 1 |
| Aspergillus | 1 | 2 |
| Actinobacillus | 1 | 0 |
| Abiotrophia defectiva | 1 | 0 |
| Enterobacter cloacae | 1 | 1 |
| Granulicatella adiacens | 1 | 0 |
| Pseudomonas aeruginosa | 1 | 1 |
| Enterococcus faecium | 0 | 1 |
| Escherichia coli | 0 | 1 |
| Klebsiella oxanae | 0 | 1 |
| Pantoea spp. | 0 | 1 |
| Rhizopus spp. | 0 | 1 |

**Conclusions.** CNIE are associated with a remarkably high mortality rate after surgery in comparison with CPIE, possibly because of suboptimal empirical antibiotic therapy in some cases of CPIE. Efforts to increase the rates of pre-operative microbiological diagnosis might lead to better post-operative outcomes in this patients population.

### A124: TRICUSPID VALVE DISEASE: FOCUS ON THE FORGOTTEN ONE

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**Background.** I tumori neuroendocrini sono neoplasie rare che possono insorgere in qualsiasi distretto corporeo e che, nei due terzi dei casi, hanno origine nel tratto gastroenteropancreatico. Sul piano clinico, le GEP NEN sono distinte in funzionanti e non funzionanti, in relazione alla produzione e immissione in circolo di una o più sostanze ormonali e alle sindromi cliniche ad esse correlate.

**Caso clinico.** Paziente di 72 anni, affetta da ipertensione arteriosa. Nel 2011 diagnosi di tumore neuroendocrino del piccolo intestino metastatizzato (peritoneo, omento e fegato), G2 stadio IV, trattato con terapia medica (carbo-etoposide e analogo della somatostatina). Decorso clinico durante i follow up senza eventi significativi cardiologici legati a disfunzione cardiaca strutturale e/o cardiotossicità da antineoplastici. Nel luglio 2018, in occasione di controllo cardiologico, si presentava in buone condizioni generali ed emodinamiche. All' ECG: ritmo sinusale ed aspecifiche anomalie del recupero. L'ecocardiogramma transtoracico documentava un ventricolo sinistro di normali dimensioni e funzione contrattile, con spessori parietali ai limiti superiori della norma. Non anomalie della cinesi regionale. Piccolo jet da rigurgito mitralico e minima insufficienza tricuspidale. Nel febbraio 2019 la paziente si presentava astenica, adinamica, lamentava dispnea da sforzi lievi (NYHA II-III). L'esame obiettivo cardiologico mostrava: toni ritmici, soffio sistolico che aumentava con l'inspirio (soffio destro tricuspidale). Si repertavano inoltre rantoli bibasilari, edemi declivi bimalleolari, epatomegalia da stasi senza ascite. Veniva trattata con terapia medica. Nel Marzo 2019, la situazione clinica cardiologica non risultava migliorata nonostante terapia medica massimale. Si eseguiva TTE 2D e 3D che mostrava un ventricolo sinistro di normali dimensioni con lieve movimento paradosso del SIV come da sovraccarico sistodiastolico del ventricolo destro. Era presente dilatazione atriale destra (vol. indicizzato=34 ml/mq) e ventricolare destra (diametro basale M-L=42 mm, diametro A-P PLAX= 44 mm) con cinesi ispettiva conservata. Neo riscontro di valvola tricuspide marcatamente ispessita con movimento restrittivo dei lembi condizionante steno-insufficienza di grado moderato-severo (grad. medio=9 mmHg; grad. max=21 mmHg). Tale aspetto risultava compatibile con valvulopatia tossica (sindrome da carcinoide), nell'ambito di disfunzione valvolare di tipo IIIa della classificazione di Carpentier. Si è dunque proseguito l'iter diagnostico effettuando ETE che ha permesso di stimare: diametro diastolico dell'annulus tricuspidale pari a 33 mm, volume rigurgitante di 40 ml con ampio jet centrale, raggio PISA pari a 8 mm, larghezza della vena contracta: 7 mm, ottundimento sistolico del flusso in vena epatica. In considerazione dell'entità del rigurgito, della sintomaticità della paziente e della dilatazione delle camere cardiache destre in presenza di normale funzione sistolica del ventricolo destro (quest'ultima valutata mediante FAC, TAPSE e RMN cardiaca), poichè i pazienti con IT peggiorano e sviluppano uno scompenso cardiaco destro refrattario, sino all'exitus, a prescindere dalla presenza di disfunzione ventricolare sinistra o di ipertensione polmonare, in questa paziente è stata ottimizzata la terapia medica conservativa e posta indicazione ad intervento di plastica/sostituzione valvolare, con approccio mini invasivo, per via toracotomica destra, al fine di ridurre al minimo i rischi operatori e garantire la miglior prognosi a distanza possibile.

### A125: SIMULTANEOUS ENDOVASCULAR ANEURYSM REPAIR AND TRANSCATHETER AORTIC VALVE IMPLANTATION IN A PATIENT WITH SEVERE AORTIC STENOSIS AND ABDOMINAL AORTIC ANEURYSM

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(a) UNIVERSITÀ DEGLI STUDI DI ROMA TOR VERGATA

We describe the case of an 82 y.o. male, hypertensive, with chronic atrial fibrillation. He is also affected by severe COPD, CKD (GFR 40 ml/min). He was referred to our Emergency Department for severe dyspnea (NYHA 4). The EKG showed atrial fibrillation with a LBBB and normal heart rate. Echocardiography revealed a dilatation of the left ventricle, global hypokinesia with EF 30%, moderate mitral regurgitation, severe aortic stenosis (Gmax 95 mmHg, G med 59 mmHg) and moderate tricuspid regurgitation. During hospitalization, a chest CT scan was performed, that documented a dilated aortic bulb (49mm) and sino-tubular junction (51 mm), an ectasic ascending aorta (55 x 55 mm), and a giant infrarenal abdominal aortic aneurysm (83 x 88 x 106 mm) with a collar of 43 mm with a lot of thrombotic apposition inside; there was no evidence of critical coronary lesions. The clinical case was discussed by our Heart Team, that in consideration of the high-risk for aortic valve replacement (AVR), gave indication to perform a percutaneous transcatheter aortic valve implantation (TAVI). It was decided to perform in a first moment a balloon aortic valvuloplasty (BAV) and endovascular aneurysm repair (EVAR) to stabilize the patient, and in a second time the TAVI. The procedure was performed in deep sedation with spontaneous breathing using midazolam (0.02-0.03 mg/Kg) and fentanyl citrate (1 µg/kg) as anaesthesia inductors, followed by continuous infusion of remifentanil hydrochloride (0.04-0.06 µg/kg/min). An introducer 9 Fr and a ProGlide were positioned in the right femoral artery and an introducer 9 Fr in left femoral artery. A temporary PMK was placed in the right ventricle from the left femoral vein. We performed a BAV using a 25 mm balloon. Suddenly, a massive aortic insufficiency developed, followed by severe drop pressure and ventricular fibrillation, treated with DC shock 200 J, oral intubation and inotropic support. After stabilization of the patient, we decided to change strategy and to perform TAVI after EVAR simoultaneously to reduce the risks involved with sequential procedures. So, we implanted the aortic endoprosthesis (AB 30/98) straight below the emergency of the renal arteries, and the iliac endoprosthesis branch IL 20/14 from left iliac artery just above left internal iliac artery and the right branch IL 20/14 just above right internal iliac artery. At the angiography control, we found patency of the renal arteries in absence of endoleak. We positioned an introducer into the right femoral artery, we repeated the BAV with a 25 mm balloon and finally we performed TAVI using a CoreValve Revalving System 31 mm. At angiography and echocardiography controls the valve was well positioned, in absence of

trans-valvular gradient and there was no valve insufficiency, but in consideration of the massive valve calcification, we decided to expand the valve with a balloon 27/40 mm. In consideration of the normalization of the clinical picture, we performed patient extubation and awakening in the cath lab without complications. The patient was monitored for 3 days in intensive care unit and further 7 days in the department of Cardiology. The follow-up performed after 30 days documented a good result of both procedures, with a reduction in NYHA class 2.
In conclusion, a patient with very severe aortic stenosis and abdominal aortic aneurysm was successfully treated with combined TAVI and EVAR. In institutions with a high volume of procedures, TAVI and EVAR can be performed simultaneously, reducing the risks associated with the perioperative period and the time of hospitalization.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 2
## Sessione Orale

### A126: CARDIAC ELECTRICAL BIOMARKER IMPROVES ECG PREDICTION OF LEFT VENTRICULAR SCAR

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**Background.** Myocardial scar detected by cardiovascular myocardial resonance (CMR) with late gadolinium enhancement (LGE) imaging is associated with increased risk of major adverse cardiovascular events and all-cause mortality. The cardiac electrical biomarker (CEB) is an emerging ECG marker reflecting the multipolar versus dipolar activity of the heart and its use as predictor of irreversible myocardial fibrosis has not yet been explored.
**Purpose.** To test the diagnostic accuracy of CEB for the detection of myocardial fibrosis by LGE in unselected patients referred to CMR imaging.
**Methods.** We prospectively enrolled 102 consecutive patients (mean age 47±19; men 78%) undergoing CMR imaging. Digital 12-lead ECGs were recorded at presentation and the CEB values were calculated in a blinded fashion. From the individual ECG changes a score was calculated, assigning 5 points for ST-depression and 2 points for T-wave inversion to quantify conventional ECG changes. The final diagnosis was adjudicated by two independent cardiologists. Poor-quality ECGs (n=8) were excluded. We tested the incremental diagnostic value of CEB over conventional ECG criteria for the detection of myocardial LGE by receiver operating characteristics (ROC) curve analysis.
**Results.** Overall, 71 (75%) patients had myocardial LGE (13% subendocardial, 9% transmural, 49% midwall or subepicardial). LGE+ individuals were presenting more often with pathological Q waves (17% vs 0%, P=0.045) compared with LGE- (n=23). Transmural LGE was more frequent in subjects with top quartile levels of CEB (Q4 67% vs Q1-Q3 20%, P=0.02), while signs of myocardial edema were more frequent in subjects with bottom quartile levels of CEB (Q1 71% vs Q2-Q4 21%, P<0.001). The use of the CEB in addition to conventional ECG criteria significantly improved prediction of ischemic LGE as quantified by the area under the ROC curve (AUROC) from 0.66 to 0.72 (p <0.001). CEB showed only modest accuracy for prediction of non-ischemic LGE (AUROC 0.57). There was no significant relationship between CEB and T1/T2 parametric mapping indices.
**Conclusion.** Non-invasive ECG quantitative assessment of multipolar activity of the heart improves accuracy of conventional 12-lead ECG criteria for prediction of left ventricular ischemic scar. Further research is needed to test whether CEB might serve as a screening tool for the detection of silent myocardial infarction in asymptomatic patients.

### A127: STEMI OR NOT STEMI? THIS IS THE QUESTION

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A Caucasian 84-year-old woman was admitted to our hospital for cranial trauma following a syncope. A cranial tomography (CT) was performed and showed right paramedian fracture of occipital bone, left frontal subarachnoid hemorrhage and left frontal subdural hemorrhage. Patient was wakeful, partially oriented to time, place and person, collaborating; neurosurgeon gave no indication to evacuation so patient was admitted to a surgery ward. During surgical recovery, ECG showed atrial fibrillation, ST-segment elevation and T wave inversion associated with a raise in troponin value. Coronary angiography was not performed due to neurological bleeding.
On admission in the CCU the patient was hemodynamically stable (BP 110/60 mmHg), GCS was 11 with right hemiplegia. The EKG showed rapid ventricular rate atrial fibrillation with ST segment elevation in inferior and lateral leads with T wave inversion in the same leads and elevated serum troponin levels (TnT2,31 microg/l; normal value < 0.014 microg/l). Transthoracic echo showed: EF 30-35% with a global reduction of left ventricular systolic function with akinesis distributed to the apex, para-apical segments and medio-distal segments of inferior and lateral walls. Intravenous therapy with mannitol and corticosteroids for perilesional edema were started. Beta blockers were also started to control frequency and a class III antiarrhythmic drug. Cardiac enzymes remained stable in the CCU but hemodynamic conditions declined and acute kidney failure occurred. Starting from the first hours in the CCU the patient conditions declined with progressive hypotension followed by cardiogenic shock. The following day the patient had an episode of non-sustained ventricular tachycardia treated with antiarrhythmic drugs and magnesium sulfate. On the third day, ECG showed a normalization of the repolarization phase with regression of ST segment elevation and persistent T wave inversion. The patient's neurological conditions were complicated with epileptic seizures needing the introduction of anticonvulsant drugs. On the fifth day of hospitalization, the TTE revealed a slight improvement of global systolic function and the presence of an apical thrombotic apposition. The patient's clinical conditions worsened and led to exitus. Subarachnoid and intraparenchymal hemorrhage can be associated to neurogenic stress cardiomyopathy. Neurocardiogenic effects include EKG changes, regional wall motion abnormalities and cardiac enzymes elevation. The most common EKG changes are ST segment abnormalities, symmetric T wave inversion, QT interval prolongation, prominent U wave. Echocardiographic findings of transient global or segmental hypokinesis of left ventricle are generally associated with slight troponin elevation, but not as marked as in MI. Coronary angiography in these patients does not show any abnormalities. Global hypokinesi or basal/medioventricular Takotsubo are the most common wall motion abnormalities found at echocardiography. The cause of the different distribution of wall motion abnormalities remains unknown but could be related to the different distribution of myocardial adrenergic receptors or to interindividual segmental differences in catecholamines' susceptibility. This case report would like to show the potentially severe cardiac manifestations of cerebral hemorrhage and the necessity to consider cerebrovascular events as a cause of ECG changes mimicking myocardial infarction, cardiac enzymes elevation and ventricular wall motion abnormalities, in order to avoid inappropriate or delated therapies.

### A128: PREVALENCE AND CLINICAL IMPLICATIONS OF HYPERHOMOCYSTEINEMIA IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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**Background.** High homocysteine levels have been associated with adverse outcomes in patients with atherosclerotic cardiovascular disease. However, the impact of hyperhomocysteinemia in patients with hypertrophic cardiomyopathy (HCM) remains unexplored. The aim of this study was to evaluate prevalence and clinical implications of hyperhomocysteinemia in patients with HCM and MTHFR C677T polymorphism.
**Methods.** We investigated 65 consecutive patients with HCM and MTHFR C677T polymorphism. Based on plasma homocysteine levels, participants were classified as with or without hyperhomocysteinemia based on 12umol/L as cut-off. The primary endpoint was a composite of death, decompensated heart failure, syncope, arrhythmia, ICD implantation, or all-cause hospitalization.
**Results.** Of 65 patients, 32 (49.2%) showed hyperhomocysteinemia. The primary endpoint was higher in patients with hyperhomocysteinemia compared to those without both at 5-year (87% vs. 51%, p-value=0.002) and at 10-year follow-up (94% vs. 61%, p-value=0.002). At multivariate analysis, hyperhomocysteinemia was an independent predictor for the primary endpoint both at 5 year (odds ratio 5.8, 95%CI 1.4-23.9, p-value=0.015) and at 10-year follow-up (odds ratio 9.4, 95%CI 1.7-51.5, p-value=0.010).
**Conclusions.** In patients with HCM and MTHFR C677T polymorphism, hyperhomocysteinemia is associated with a significantly higher rate of adverse events during follow-up and emerged as modifier of clinical outcome.

### A129: CHARACTERISTICS AND CLINICAL PRESENTATION OF PRIMARY CARDIAC TUMORS IN PATIENTS UNDERGOING SURGICAL RESECTION

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**Introduction.** Primary cardiac tumors are very rare and among them myxoma is the most common histological type. Clinical presentation is very variable and ranges from incidental diagnosis in asymptomatic subjects to severe symptoms, such as syncope, congestive heart failure, arrhythmias, or those related to systemic embolization.

**Aim.** The aim of this study is to evaluate the morphologic characteristics and clinical presentation of primary cardiac tumors in patients undergoing surgery.

**Methods.** Patients who underwent surgical resection of a primary cardiac tumor in our center between December 2003 and October 2018 were retrospectively considered. Dimensions were evaluated by transthoracic or transesophageal echocardiogram; histology was evaluated in every case.

**Results.** Thirty-seven patients (20 F; mean age 64.5±12 yrs; range 41-86) were included: 29 (78%) were myxomas, 7 (19%) papillary fibroelastomas and one (3%) sarcoma. In the vast majority of the cases (27, 93%), myxomas were in the left atrium and only in 2 cases in the right atrium. Conversely, fibroelastomas had a variable location: 2 were in the left atrium, 2 in the right atrium, 2 on the ventricular aspect of the mitral leaflets and 1 on the aortic valve. Myxomas were by far larger compared to fibroelastomas (mean maximum diameter 35.2±15 mm vs. 17.7±16 mm, respectively: p=0.005). Seventy-two percent of the myxomas and 57% of the fibroelastomas were mobile. Twenty-one patients had symptoms related to the tumor, whereas 16 were asymptomatic or had symptoms not related to the tumor; moreover, 9 patients (5 myxomas, 3 fibroelastomas and 1 sarcoma) had ≥ 2 symptoms. As shown in the table, supraventricular arrhythmias (SVA) or atrial fibrillation (AF) were more frequently associated with myxomas, while fibroelastomas were often responsible for dyspnea. Surgical resection was complete in every case; removal of fibroelastomas was associated to mitral valve surgery.

| | Myxomas | Fibroelastomas |
|---|---|---|
| SVA/AF | 7 (24%) | 0 |
| Dyspnea | 5 (17%) | 4 (57%) |
| Syncope | 4 (14%) | 0 |
| Embolism | 3 (10%) | 0 |
| Systemic symptoms (fever or fatigue) | 3 (10%) | 2 (29%) |

**Conclusions.** Primary cardiac tumors are rare and incidental diagnosis is not infrequent. When associated to symptoms, these are aspecific and could be attributed to a variety of cardiovascular disease. Myxomas are predominantly located in the left atrium, while fibroelastomas have a variable location in the atria or cardiac valves.

### A130: HEART FAILURE IN AMYLOIDOTIC CARDIOMYOPATHY: A CENTRAL HEMODYNAMICAL AND INSTRUMENTAL CHARACTERIZATION OF THE THREE ETIOLOGIES

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**Background.** Heart failure (HF) is one of the main features of amyloidotic cardiomyopathy (AC) and it is supposed to carry important prognostic implications. Despite the intrinsic etiologic heterogeneity of AC, HF has been mainly attributed to diastolic dysfunction, but the role played by the different amyloid subtypes of AC and by the clinical and hemodynamical factors in the pathophysiology of HF remain unclear.

**Objectives.** We aimed to assess the hemodynamic profile and outcome of patients with or without advanced HF (i.e. NYHA class III-IV) at the time of first evaluation in light-chain (AL), hereditary transthyretin-related (h-ATTR) and non-mutant transthyretin-related (wt-ATTR) AC.

**Methods.** Among the 411 patients diagnosed with AC (156 AL, 131 h-ATTR, 124 wt-ATTR) at our Centre between 1990-2019, we analyzed central hemodynamic data, echocardiographic, clinical, ECG details and survival of the whole cohort. Cox regression analysis was used to stratify prognosis between patients with or without NYHA class III-IV at time of diagnosis.

**Results.** 112 (27%) patients presented advanced HF at first evaluation and showed severe symmetric left ventricle wall thickening (higher values in h-ATTR), non-dilated left ventricle, preserved ejection fraction and pathological myocardial contraction fraction (MCF) compared to patients in NYHA class I-II. At ECG, a significantly lower QRS voltage was present in advanced HF patients. Hemodynamically, elevated filing pressures on both cardiac sides were present in patients in NYHA III-IV class of the three etiologies. Survival at 2 years was 35% for AL, 83% for h-ATTR, 65% for wt-TTR. H-ATTR and wt-TTR were favorable predictors of survival, while reduced cardiac index and elevated filling pressures were negatively associated with overall survival.

**Conclusions.** The characterization of hemodynamic profile plays a central role in predicting the natural history of AC, since reduced stroke volume and elevated filling pressures are the best predictors of mortality, reflecting a physiopathological restrictive model of the disease. Conversely, left ventricular ejection fraction is rarely abnormal and it is not a reliable marker of poor prognosis. AL amyloidosis shows the worst outcome probably due to a combination of the underlying illness and light chains cardiotoxicity.

### A131: ECHOCARDIOGRAPHYC PHENOTYPE AND INDEPENDENT PREDICTORS OF PROGNOSIS IN TRANSTHYRETIN CARDIAC AMYLOIDOSIS

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**Aims.** Transthyretin amyloidosis cardiomyopathy (ATTR-CM) is an increasingly recognised cause of heart failure and can be classified as non-hereditary (wtATTR) or hereditary (hATTR). We sought to characterize the structural and functional echocardiographic phenotype across the spectrum of wtATTR-CM and hATTR-CM and to identify the independent echocardiographic predictors of mortality.

**Methods.** We studied patients with ATTR-CM who underwent prospective protocolised evaluation comprising full echocardiographic assessment and survival between 2000 and 2019 at a single referral centre. Only patients with definite cardiac involvement (as defined by endomyocardial biopsy or by a combination of echocardiography, DPD scintigraphy and presence of plasma cell dyscrasia – as per current recommendations) were included. Echocardiographic assessment was performed as per current guidelines. Endpoint of the study was all-cause death. Patients who received disease-modifying therapy were excluded.

**Results.** We identified 1240 patients, comprising 766 with wtATTR-CM and 474 with hATTR-CM, of whom 314 had the V122I variant and 127 the T60A variant. At diagnosis, patients with V122I-hATTR-CM had the most severe degree of systolic and diastolic dysfunction across all echocardiographic parameters (stroke volume [SV] index: 16±6 vs 20±7 vs 22±8 ml/m2, p <0.001; ejection fraction % 44±11 vs 49±11 vs 52±10, p<0.001; E/A: 2.4±1 vs 2.1±1.7 vs 1.6±0.9, p<0.001; longitudinal strain % (LS): -9.8±3.3 vs -11.4±3.9 vs -11.9±4, p<0.001; right atrial area [RAA] index: 13±4 vs 13±3 vs 11±3 cm2/m2, p<0.001; for V122I vs wild type vs T60A, respectively). Patients follow-up was 32±18 months and a total of 489 patients met the endpoint. On multivariable analysis, SV index (hazard ratio [HR] 0.97; 95% confidence interval [CI] 0.95-0.99, p:0.003), RAA index (HR 1.06; 95% CI 1.02-1.10 p:0.008), LS (HR 1.08; 95% CI 1.04 -1.12, p<0.001), E/e' (HR 1.02; 95% CI 1.00-1.03, p.0.026) were independently associated with patients survival in the overall population.

**Conclusion.** The three distinct genotypes of ATTR-CM present with varying degrees of severity. Echocardiography indicates that ATTR-CM, traditionally considered a predominantly diastolic heart disease, has a complex pathophysiology in which parameters of both systolic and diastolic function are independently associated with mortality.

## PREVENZIONE E RIABILITAZIONE
## Sessione Orale

### A132: SCREENING PER LA PREVENZIONE DELLA MORTE CARDIACA IMPROVVISA NEI GIOVANI: OLTRE L'ELETTROCARDIOGRAMMA

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**Introduzione.** Tra le principali cause di Morte Cardiaca Improvvisa (MCI) nei giovani vi sono le cardiomiopatie, le canalopatie e le anomalie di origine delle arterie coronarie. Tali patologie sono spesso asintomatiche e non sempre vengono diagnosticate prima dell'evento fatale. L'elettrocardiogramma (ECG) è efficace nella prevenzione della MCI, ma non è sufficiente per identificare tutte le patologie a rischio di MCI.

**Obiettivo dello studio.** Valutare se l'aggiunta di tecniche di imaging non-invasive (ecocardiogramma e risonanza magnetica cardiaca, RMC) nel

protocollo di screening per la prevenzione della MCI nei giovani possa incrementare il numero di patologie cardiovascolari identificate rispetto ad un protocollo con solo l'elettrocardiogramma (ECG).
**Materiali e metodi.** Sono stati arruolati consecutivamente gli studenti dell'ultimo anno di tre Scuole Superiori Secondarie della regione Lazio di età>18 anni che abbiano prestato il consenso a partecipare allo studio. Il criterio di esclusione era la controindicazione ad effettuare la RMC. Ogni studente è stato sottoposto a visita cardiologica, ECG, ecocardiogramma e RMC per la valutazione dell'origine delle arterie coronarie. Gli studenti sono stati suddivisi in tre gruppi: non sportivi, sportivi non agonisti e sportivi agonisti.
**Risultati.** Gli studenti arruolati sono stati 142 di cui il 49% maschi; l'età media era di 18±0.7 anni. I ragazzi che non praticano sport erano il 38% (n=54), gli sportivi non agonisti il 43% (n=61) e gli sportivi agonisti il 19% (n=27). Gli screening cardiovascolari che hanno rivelato almeno un'anomalia sono stati l'8% (n=11), di cui il 3% (n=4) sono stati identificati con l'ECG (blocco di branca destra, emiblocco anteriore sinistro, aritmia ventricolare) e il 5% (n=7) con le metodiche di imaging (prolasso della valvola mitralica, valvola aortica bicuspide, anomalia di origine della coronaria destra). Gli studenti con anomalie identificate all'imaging avevano ECG e storia familiare negativa.

**Tabella 1.** Risultati dello studio.

| Parametro | Totale | Non sportivi | Sportivi non agonisti | Sportivi Agonisti | p-value |
|---|---|---|---|---|---|
| PAS, mmHg | 120 ± 12 | 120 ± 11 | 120 ± 13 | 120 ± 11 | NS |
| PAD, mmHg | 74 ± 8 | 73 ± 8 | 75 ± 8 | 75 ± 8 | NS |
| FC, bpm | 71 ± 12 | 75 ± 12 | 71 ± 13 | 65 ± 10 | 0,003* |
| Asse elettrico, ° | 55 ± 23 | 54 ± 22 | 55 ± 23 | 58 ± 24 | NS |
| PR, msec | 144 ± 21 | 141 ± 24 | 145 ± 19 | 146 ± 19 | NS |
| QRS, msec | 88 ± 10 | 86 ± 10 | 89 ± 10 | 91 ± 12 | NS |
| QT, msec | 366 ± 29 | 359 ± 29 | 367 ± 30 | 374 ± 26 | NS |
| QTc, msec | 395 ± 27 | 399 ± 29 | 395 ± 25 | 388 ± 26 | NS |
| DTD, mm | 45 ± 4 | 43 ± 4 | 46 ± 4 | 47 ± 5 | 0,001* |
| SIV, mm | 8 ± 1 | 8 ± 1 | 8 ± 1 | 8,5 ± 2 | NS |
| PP, mm | 8 ± 1 | 8 ± 1 | 8 ± 1 | 8,5 ± 2 | NS |
| FE (%) | 61 ± 2 | 61 ± 2 | 61 ± 3 | 61 ± 3 | NS |
| Screening positivo, n (%) | 11 (8%) | 3 (6%) | 6 (10%) | 2 (8%) | NS |
| ECG patologico, n (%) | 4 (3%) | 1 (2%) | 2 (3%) | 1 (4%) | NS |
| Eco patologico, n (%) | 6 (4%) | 1 (2%) | 3 (5%) | 2 (7%) | NS |
| RMC patologica, n (%) | 1 (0,7%) | 0 | 1(2%) | 0 | NS |

*tra i non sportivi e gli sportivi agonisti.

**Conclusioni.** L'introduzione dell'ecocardiogramma e della RMC nello screening per la prevenzione della MCI nei giovani ha permesso di individuare patologie cardiovascolari che non sarebbero state identificate con la sola esecuzione dell'ECG. Studi futuri con popolazioni più ampie sono necessari per confermare tali risultati.

### A133: PREDICTORS OF MAJOR COMPLICATIONS DURING CARDIOVASCULAR REHABILITATION AFTER CARDIAC SURGERY

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**Background.** Valvular heart diseases are becoming a relevant and growing problem due to population aging. The natural history of valvular diseases often needs a surgical approach. Cardiovascular Rehabilitation following interventions is a fundamental moment for the post-surgical functional recovery and for the monitoring and management of complications that may occur after surgery.
**Aim.** The aim of this study is to identify predictors of major complications in patients who have taken part into as in-patients to a Cardiovascular Rehabilitation program after surgery.
**Methods.** We studied 1600 patients who have been hospitalized in the Cardiovascular Rehabilitation Unit after cardiac surgery. We evaluated the demographic and anamnestic data, the type of cardiac surgery intervention, the clinical course in the Cardiac Surgery Unit and in the Cardiovascular Rehabilitation Unit, the in-hospital length of stay of both admissions, the 6 minutes-walking test and blood tests.
**Results.** The multivariate analysis showed chronic renal dysfunction, complex cardiac surgery operation, sternal re-synthesis, early post-surgical transfusions to be the independent predictors of major complications. Furthermore, hemoglobin values resulted as related in a positive way with the outcomes taken into consideration.
**Conclusions.** The identification of predictors of major complications allows to identify the patients at major risk in order to individualize the rehabilitation program and the clinical and instrumental monitoring.

### A134: QUALITY OF LIFE ASSESSMENT IN PATIENTS TREATED WITH PCSK9 INHIBITORS

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**Introduction.** Lowering low-density lipoprotein cholesterol (LDL-C) is a critical intervention to contrast cardiovascular risk. The association of PCSK9 inhibitors (PCSK9i) with available therapies represents a successful therapeutic strategy in patients with high and very high cardiovascular risk who do not reach the target values despite standard therapy with statins and ezetimibe. Over the last years, data regarding health-related quality of life (HRQOL) and quality-adjusted life years (QALYs) has been increasingly taken into consideration to support medical decisions in clinical practice. The aim of our study is to assess the impact of treatment with PCSK9i on quality of life in high and very high cardiovascular risk patients.
**Materials and methods.** In this prospective single-center study, we evaluated patients at high or very high cardiovascular risk admitted to our Cardiology Center. Patients who did not reach recommended LDL-C goals despite maximal tolerated lipid-lowering therapy with statins and ezetimibe were treated additionally with evolocumab 140 mg or alirocumab 75 mg bi-weekly, according to National regulations. We measured the health status perceived by patients through the self-administered EuroQoL (or EQ- 5D-3L) in Italian language at enrolment (shortly prior to starting PCSK9 inhibitors therapy), and at 1-year follow-up.
**Results.** 51 patients were enrolled. The study population included 15 patients (29%) with a genetically-confirmed diagnosis heterozygous familial hypercholesterolemia. 34 patients (66%) received evolocumab and 17 patients (33%) alirocumab. At the time of follow-up evaluation, all patients were receiving PCSK9i therapy for 1-year, and all patients reached the recommended LDL-C target. The mean EQ-5D score improved from 0.49 (95% confidence interval (CI) 0.40 to 0.58) at enrollment to 0.85 (95%, CI 0.79 to 0.90) at 1-year follow-up (p<0.001). The mean EQ by visual analogue scale (VAS) improved from 63.5 at baseline (95% CI 60.5 to 66.5) to 80.2 at 1-year follow-up (95% CI 77.6 to 82.9) (p<0.001).
**Conclusion.** Our study showed that most patients treated with PCSK9i experienced an improvement in health related QoL. Most patients reported an improvement in all five dimensions of the EQ-5D. The greatest improvement was observed in patients' anxiety/depression dimension with potential psychological impact PCSK9i-based strategy in this setting.

### A135: PROFILING THE ACUTE EFFECTS OF MODIFIED RISK PRODUCTS: EVIDENCE FROM THE SUR-VAPES CLUSTER STUDY

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**Introduction.** Modified risk products (MRP) are promoted as a safer alternative to traditional combustion cigarettes (TCC) in chronic smokers. Evidence for their lower hazardous profile is building, despite several controversies. Yet, it is unclear whether individual responses to MRP differ among consumers. We hypothesized that different clusters of subjects exist in terms of acute effects of MRP.
**Materials and Methods.** Data from subjects exposed to electronic vaping cigarettes (EVC) and heat-not-burn cigarettes (HNBC) from two prospective studies were pooled.Cluster analysis was performed with hierarchical and k-means methods in the overall dataset for EVC effects, and in the SUR-VAPES 2 dataset for HNBC effects. Eventual clusters were compared using bivariate tests and percentile bootstrapping for hypothesis testing.
**Results.** Cluster analysis identified at least three clusters (labelled 1 to 3) of individuals with different EVC effects, and at least two clusters (labelled 4 to 5) of subjects with different HNBC effects (Figure). Specifically, oxidative stress, platelet aggregation and endothelial dysfunction after EVC were significantly different cluster-wise (all p<0.05), with Cluster 3 exhibiting the worst change in oxidative stress and flow-mediated dilation (FMD)(both p<0.05). Similarly, oxidative stress and platelet aggregation after HNBC were significantly different (all p<0.05), with Cluster 5 showing lower oxidative stress but greater platelet aggregation (all p<0.05). Results for main analyses were consistent employing different clusters, tests, and bootstrap.
**Conclusions.** Individual responses to MRP differ and smokers aiming at using EVC or HNBC as risk reduction strategy should consider trying different MRP aiming at finding the one which is less detrimental.

### A136: RELATIONSHIP BETWEEN ULTRA-LOW FREQUENCY OF HEART RATE VARIABILITY AND AUTONOMIC FUNCTION ASSESSED BY BOTH 24H HOLTER ECG MONITORING AND CARDIOPULMONARY EXERCISE TESTING

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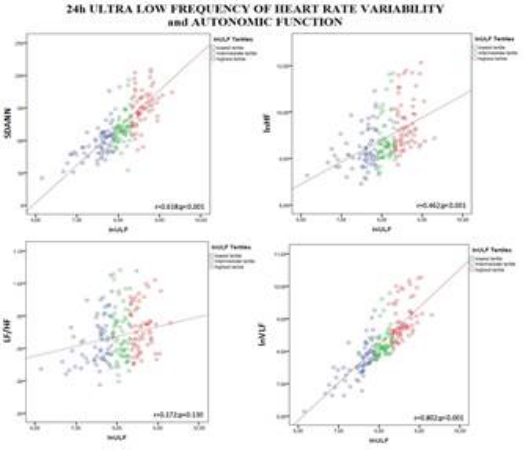
**Background.** Heart rate variability (HRV), a useful marker to assess autonomic nervous function, represents the fluctuation in the time intervals between adjacent heart beats and, considering frequency domain, has been historically separated into: ultra-low frequency (ULF), very-low frequency (VLF), low frequency (LF), and high frequency (HF). It is well known that HF, LF and VLF bands are strictly related to activity of parasympathetic nervous system (PNS), while LF/HF ratio to the sympathetic nervous system (SNS) tone. On the other hand, the physiological basis of ULF are far less clear, given that the Task Force Guidelines considered them as “noise” in the tachogram.
**Aim.** To investigate the autonomic mechanisms underlying ULF of HRV comparing ULF data to others autonomic variables derived from both 24h Holter ECG monitoring and Cardiopulmonary exercise testing (CPET).
**Methods.** we analysed a registry of 191 primary prevention hypertensive patients. All patients underwent 24h Holter ECG monitoring and CPET in the same day.
**Results.** A strong correlations between ULF and HRV vagal markers were found: SDANN (r=0.618, p<0.001), SDNN (r=0.562, p<0.001), SDNN index (r=0.450, p<0.001), RR mean (r=0.547, p<0.001), lnHF (r=0.462, p<0.001), lnLF (r=0.589, p<0.001), lnVLF (r=0.802, p<0.001). On the other hand, no correlation has been found between ULF and sympathetic markers of HRV, expressed as LF/HF ratio (p=0.130). In particular, it is worth noting that lnULF correlates strongly with night time HRV data rather than with daytime HRV data. Finally, considering CPET data, a correlation between ULF and HRR (p=0.017), a well known vagal marker, has been found.
**Conclusion.** Ultra low frequency represents a feasible and additional marker of vagal tone that better reflects circadian slow fluctuations of both heart rate and sympathovagal balance rather than HF, LF and VLF bands.




### A137: THE DIAGNOSTIC AND PROGNOSTIC IMPORTANCE OF THE ANKLE-BRACHIAL INDEX IN PRIMARY CARE: A PROSPECTIVE, SINGLE-CENTRE STUDY

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**Introduction.** Peripheral arterial disease (PAD) is a manifestation of systemic atherosclerosis that is common in the general population and that is associated with an increased risk of death and ischemic events, yet it is underdiagnosed in clinical practice. The Ankle-Brachial Index (ABI) is used for the diagnosis of lower extremity PAD. It is also an indicator of atherosclerosis at other vascular sites and a prognostic marker for future cardiovascular events and functional impairment. This study aims to propose a primary care PAD screening strategy in view of a subsequent implementation of risk modification strategies to minimise disease progression and reduce overall risk of cardiovascular mortality. The primary outcome is the estimation of the prevalence of asymptomatic PAD in primary care patients without a history of atherosclerotic cardiovascular disease (ASCVD). The secondary outcome is the identification of those patients who would mostly benefit from having their ABI measured.
**Methods.** A prospective, single-centre study design was adopted. Participants were patients receiving care from a general practice between November 2018 and April 2019. Included patients had to be between 20 and 79 years and without a history of ASCVD. Participants underwent ABI measurement, and their 10-year cardiovascular disease (CVD) risk was calculated using the American Heart Association ASCVD Risk Calculator. Measures of diagnostic accuracy of the ASCVD risk score for the detection of patients with a positive ABI were calculated. Sensitivity, specificity and accuracy were expressed as percentages. For the relative risk (RR), its standard error and 95% confidence interval were calculated. P values ≤0.05 were considered statistically significant *a priori*.
**Results.** A total of 207 patients participated in the study. PAD prevalence was 19% (n=39). Among patients with a calculable 10-year CVD risk (n=181) PAD prevalence was 21% (n=38). The sensitivity, specificity and diagnostic accuracy rates for a positive ABI of a borderline or higher 10-year ASCVD risk were respectively 92,1%, 38,5% and 49,7%. The relative risk (RR) was 5.50 (95% CI: 1.76-17.15, p=0.003). For an intermediate or higher 10-year ASCVD risk, the sensitivity, specificity and diagnostic accuracy rates were respectively 89,5%, 48,3% and 56,9% (RR: 5.74, 95% CI: 2.13-15.50, p<0.001). For high 10-year ASCVD risk patients only, the sensitivity, specificity and diagnostic accuracy rates for a positive ABI were respectively 60,5%, 72,7%, 70,2% (RR: 2.94, 95% CI: 1.66-5.22, p<0.001).
**Conclusion.** Our study suggests that ABI measurement can detect asymptomatic PAD among primary care patients not already known to have atherosclerotic cardiovascular disease. These patients, otherwise considered healthy, have a pathology that requires an aggressive treatment and preventive measures to reduce their cardiovascular disease risk. To identify those patients who would mostly benefit from having their ABI measured, we recommend screening patients that have an intermediate or high 10-year ASCVD risk, as this cut-off minimises the number of false negatives.

## ARITMIE – 2
## Sessione Orale

### A138: TRANSVENOUS LEAD EXTRACTION: EFFICACY AND SAFETY OF THE PROCEDURE IN OCTOGENARIAN PATIENTS

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**Aims.** The management of patients with infection or malfunction of a cardiac implantable electronic device (CIED) may be challenging. The aim of the study is to evaluate the safety and efficacy of transvenous lead extraction (TLE) in elderly patients.
**Methods.** A retrospective analysis of patients who underwent to TLE in our center was performed. Patients were divided in two groups: 1) patients 80 years of age or older, 2) patients younger than 80 years. All patients were treated with manual traction or mechanical dilatation.
**Results.** Our analysis included 1316 patients, with a total of 2513 leads extracted. Group 1 (≥80 years) counted 202 patients and group 2 (<80 years) 1114 patients. The group of elderly patients presented more comorbidities, as hypertension, chronic kidney disease, atrial fibrillation and pulmonary disease. Patients 80 years of age or older had more pacemakers than ICDs, whereas the dwelling time of the oldest lead, the number of leads and the presence of abandoned leads was similar despite patients age. In group 1 the rate of radiological success for lead was higher than in group 2 (99.0% vs 95.9%; P<0.001). The clinical success was obtained in 1273 patients (96.7%), without significative differences between groups (98.0% vs 96.4%; P=0.36). Major complications occurred in 10 patients (0.7%), without significative differences (1.5% vs 0.6%; P=0.24).
**Conclusion.** TLE in elderly patients is a safe and effective procedure. In patients older than 80 years there are not more major complications than in younger patients, and the efficacy of the procedure seems to be superior.

### A139: CLINICAL, GENETIC, FUNCTIONAL AND PHARMACOLOGICAL CHARACTERIZATION OF TWO NOVEL MUTATIONS IN THE NAV1.5 SODIUM CHANNEL UNDERLYING BRUGADA SYNDROME IN ITALIAN PATIENTS

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Brugada syndrome (BrS) is a dominantly inherited arrhythmia characterized by a coved ST-segment elevation at ECG in the right precordial leads, high susceptibility to ventricular arrhythmia and a family history of sudden cardiac death (SCD). Typical ECG pattern may be spontaneous or be unmasked by a provocative drug test. Arrhythmia typically occurs at rest, while sleeping, after heavy meals or during fever and is more frequent in males. Most BrS patients are asymptomatic and risk stratification is an unsolved issue. Among more than 20 genes associated with BrS, the *SCN5A* gene, encoding for the cardiac voltage-gated sodium channel Nav1.5, accounts for ~30% of BrS cases and is the unique considered as with clinical validity. Implantable cardioverter defibrillator (ICD), quinidine, ablation of the right ventricular outflow tract are existing therapeutic strategies to prevent the risk of SCD in BrS patients (Mazzanti et al., 2017; Gualandi et al., 2017).

We identified two novel *SCN5A* mutations in Italian BrS patients. The missense variant P1310L, was identified in a 64 years-old man who presented a typical ECG pattern at the age of 56 and received an ICD in primary prevention. During follow up, after an arrhythmic storm, he underwent a successful epicardial radiofrequency ablation. The proband's brother died for SCD at 51 years of age. The p.Gly1686_Ile1687insGlyArg insertion was identified in a 57 years-old female with a typical ECG pattern and who received an ICD in secondary prevention after an arrhythmic event. The proband's mother died suddenly at the age of 38 years. The mutation segregates in the 36 years-old asymptomatic son showing a spontaneous type 1 BrS pattern and implanted with an ICD.

We have functionally characterized both *SCN5A* mutations in order to prove their pathogenic role and to explore genotype-phenotype correlations. Nav1.5 WT and mutant cDNAs were transfected in HEK 293 cells and sodium currents were recorded through the patch-clamp technique.

P1310L mutation, at S4 DIII of the Nav1.5, significantly reduced sodium current density at -30mV more than 4-fold compared with Nav1.5 WT. In addition, the voltage dependence of activation of P1310L channels was shifted by ~ 15mV toward positive potentials with respect to WT, suggesting reduced sodium channel opening at physiological voltages. Conversely, the steady-state inactivation curve was shifted by ~ 6 mV toward positive voltages and recovery from fast inactivation was slightly faster for P1310L compared to WT. Furthermore, to correlate patients' genotype to the susceptibility to drug-induced arrhythmia, we are estimating the tonic and use-dependent block of P1310L channels by flecainide. The p.Gly1686_Ile1687insGlyArg insertion, in the S5-P extracellular loop of DIV of the channel, caused a complete loss of sodium channel function decreasing current density by 20-fold at -30mV.

The identified novel *SCN5A* mutations cause a loss of function of Nav1.5 channels as the molecular mechanism underlying BrS in the affected patients. The different degree of biophysical alterations shown by the two Nav1.5 mutant channels correlates with the aggressiveness of the clinical phenotype (Chen et al., 2019). At present, the main impact of genetic testing in BrS relies on the identification of at risk asymptomatic subjects among proband's family members. Overall, our results provide evidence that the genetic testing and the functional characterization of mutant Nav1.5 channels may contribute to risk stratification of patients and to address lifestyle modifications including sodium channels blocking drugs and fever avoidance.

### A140: VENTRICULAR ARRHYTHMIC RISK IN PATIENTS WITH BIOPSY-PROVEN MYOCARDITIS AND REPLACEMENT MYOCARDIAL FIBROSIS: FOCUS ON THE GREY ZONE

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**Background.** Myocarditis represent a major cause of sudden death in adults < 40 years age. In these patients, a complete diagnostic work-up including three-dimensional electroanatomic mapping (3D-EAM) and 3D-EAM-guided endomyocardial biopsy (EMB) for etiological diagnosis has not been assessed.

**Objectives.** We aimed to characterize baseline electroanatomical substrate in patients with complex VA and clinical criteria of myocarditis, using 3D-EAM and 3D-EAM-guided EMB. Subsequently, we aimed to evaluate predictors of VA occurrence at long-term follow-up.

**Methods.** We prospectively enrolled patients admitted to our hospital with VA (sustained ventricular tachycardia (VT) or fibrillation (VF) or premature ventricular contractions (PVC)≥25% recorded by 24h-Holter ECG) and at least one of the following: 3a. impaired global or regional left ventricular systolic function 3b. increased serum concentrations of troponin I, 3c. pericardial effusion 3d. clinical suspected myocarditis as for previous infection of the bronchial tree, the gut, or the urinary tract within the last 6 months before admission. Patients underwent 2D echo, stress test, cardiac magnetic resonance (CMR), coronary angiography, 3D-electroanatomic mapping (3D-EAM) and 3D-EAM guided endomyocardial biopsy (EMB). Clinical follow-up was performed by 24h ECG Holter monitoring or by ICD/loop recorder interrogation.

**Results.** From 2008 to 2016 54 patients were included (mean age was 41 years ±14, 60% male). in 31 patients (57%) histological diagnosis was myocarditis (M group), in 14 (26%) patients histological diagnosis was focal replacement myocardial fibrosis (FRMF group) and in 9 (17%) patients inadequate myocardial specimens. Clinical presentation and imaging baseline data were similar in the two histological groups. Left ventricular bipolar scar was significantly greater in M group compared to FRMF group (13± 5 vs 4 ± 2.7 cm2, p= 0.02, also considering LV bipolar scar percentage (8 ± 4 vs 2 ± 2 %, p= 0.05). Right ventricular bipolar scar area was significantly greater in M group compared to FRMF group (22 ± 16 vs 3 ± 2.6 cm2, p=0.02), also considering RV bipolar scar percentage (13 ± 11 vs 2 ± 2%, p=0.03). The survival freedom from VA in M group was 42% (13 patients out of 31) versus (12 out of 14 patients, 86%) in FRMF group at 40 months of follow-up (log-rank p= 0.008). Cox regression univariate analysis identified three variables as statistically significant predictors of VA occurrence: histological diagnosis of myocarditis (HR 5.5, 95% confidence interval [CI] 1.13-24 p= 0.02); scar areas at RV bipolar mapping (scar area cm2 HR 1.07, 95% CI 1.02 – 1.12, p= 0.008; scar area % HR 1.12, 95% CI 1.03 – 1.21, p=0.005) and at RV unipolar mapping (scar area cm2 HR 1.03, 95% CI 1.01 – 1.05, p= 0.02; scar area % HR 1.06, 95% CI 1.01 – 1.11, p=0.02).

At multivariate analysis, there was a trend for the presence of RV bipolar scar area as predictor of VA in overall population (RV bipolar scar % HR 1.05, 95% CI 1.01-1.11, p= 0.08).

**Conclusion.** Up to date myocarditis represents a major cause of sudden cardiac death among young patients. Our study defines the additional role of 3D-EAM guided EMB in diagnostic work-up of patients with complex VA and clinical criteria of myocarditis and identifies myocardial inflammation and electronatomic scar detection as possible predictors of VA occurrence in the long-term follow-up.

### A141: EFFICACY AND SAFETY OF CATHETER ABLATION OF POST-INCISIONAL ATRIAL TACHYCARDIAS IN PATIENTS WITH PRIOR HISTORY OF MITRAL VALVE SURGERY: A META-ANALYSIS

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**Introduction.** Data regarding catheter ablation (CA) of post-incisional atrial tachycardias (AT) are scarce in literature, especially in patients with prior history of mitral valve surgery (MVS) where mechanical protheses and thick fibrosis around the MV anulus may pose a challenge for a safe and effective procedure. Aim of this study is to assess the efficacy and safety of CA of post-incisional AT in these patients and to investigate specific features of these arrhythmias through a systematic review of the literature.

**Methods.** A systematic search on PubMed/MEDLINE, EMBASE, and Web of Science was performed. An adult population undergoing radiofrequency CA procedure for post-incisional AT with prior history of MVS and with/without concomitant Maze procedure was considered. Articles published before 2000 were excluded because the use of 3D electro-anatomic mapping systems was not well established yet. The haemorrhagic, thromboembolic complications and deaths were recorded. The periprocedural success rate (i.e. restoration to sinus rhythm due to radiofrequency delivery during CA procedure) and mid-long term outcome (i.e. persistence of sinus rhythm after single/multiple procedures on/off antiarrhythmic drugs) were carefully looked for. Finally, the most frequent pathophysiologic mechanism (focal vs. macro-reentrant), site of origin of the ablated AT (left atrium vs. right atrium) and association of the surgical scar location with specific AT morphologies were investigated.

**Results.** After systematic review, 8 studies were regarded as eligible for the analysis. One-hundred seventy-three patients without severely impaired FEVS (42-72.1%) and with mild-to-severe atrial dilatation (37 – 63 mm) were considered with prior history of MV replacement (59.5%) or

valvuloplasty (40.5%) and concomitant Maze procedure (56%). All the patients underwent 239 CA procedures (1.4 procedure/patient) and in all cases a 3D electro-anatomic mapping system was used. Major complications were recorded in 3/173 cases (1.7%) with 2 retroperitoneal haemorrhages (1.2%), 1 intracranial haemorrhage leading to death (0.06%). Acute success rate was achieved in 167/173 patients (95.6%) and 112/173 patients (65%) were in sinus rhythm at follow-up (2.1-60 months). In 97% of patients the whole number of AT morphologies were specified: 272 AT (92.2%) were macro-reentrant and 23 (7.8%) were focal in origin. In the macro-reentrant AT group, CA was performed in the right atrium in 144 morphologies (53%) and in most of these cases ablation was performed at the cavo-tricuspid isthmus (CTI) (63%). When CA was performed in the left atrium (47% of cases), mitral isthmus was the main target for ablation (55%). Type of surgical incision was reported in 112 patients (65%). In these patients, most of the AT were found in the right atrium (133/215 morphologies – 62%) with involvement of CTI in 55% of cases. In these patients a trans-septal approach was very frequently encountered (52%) either as superior trans-septal one or via a lateral free wall incision in the right atrium.

**Conclusions.** After a systematic literature review, CA of post-incisional AT in patients with prior MVS should be regarded as a safe and effective procedure. A trans-septal surgical incision is the main surgical approach in this population associated with late-onset macro-reentrant AT most frequently and quite surprisingly located in the right atrial chamber with involvement, in many cases, of the CTI.

### A142: DEVELOPMENT AND VALIDATION OF AN ECG ALGORITHM FOR PREDICTING THE SITE OF ORIGIN OF IDIOPATHIC RIGHT VENTRICULAR OUTFLOW TRACT ARRHYTHMIAS

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**Background and Aims.** Pre-operative identification of the site of origin of idiopathic right outflow tract ventricular arrhythmias (RVOT-VAs) is important to predict the site of successful ablation, particularly when the VAs are not inducible at the time of the procedure. We hypothesized that the ratio of Q wave amplitude in the unipolar leads aVL / aVR can be used to indicate anterior versus posterior origin of the VA in the RVOT region, and that the ratio between R wave amplitude in lead II and VA-QRS duration may be helpful to distinguish septal versus lateral origin.

**Methods.** Standard 12-lead ECGs were recorded and analyzed in a development cohort of patients undergoing successful RVOT-VAs ablation as guided by 3D electro-anatomical mapping at a single center. Patients with coronary artery disease, structural heart disease, preexisting bundle branch block and paced rhythm were excluded. The RVOT was divided into six sites: anterior, middle, and posterior septal sites and anterior, middle and posterior free wall sites. A novel localization algorithm based on the Q wave ratio in aVL/aVR and the ratio between R wave amplitude in lead II and QRS duration was derived from a consecutive series of 44 patients, and prospectively validated in 30 patients.

**Results.** In the development cohort (N=44, 28 female; mean age 43,7 ± 12,9 years; mean ejection fraction 53 ± 7,9 %) the successful ablation sites were RVOT septum (n= 33; 75 %), RVOT free wall (n= 11; 25%), RVOT anterior site (n= 24; 55%), RVOT middle site (n= 15; 34%) and RVOT posterior site (n= 5; 11%). The aVL/aVR ratio was significantly larger for anterior sites (1,36 ± 0,29) compared with middle (0,94 ± 0,14, p= 0,000) and posterior sites (0,62 ± 0,13, p=0,000). An aVL/aVR index > 1,12 predicted an RVOT anterior origin with 79% sensitivity and 93% specificity (AUC 0,899), whereas when the aVL/aVR ratio was > 0,77, a posterior origin could be excluded with 100% sensitivity and 100% specificity (AUC 1). The RVOT free wall sites presented significantly smaller R-wave amplitudes in lead DII (1,21 ± 0,32 mV) compared to septal sites (1,87 ± 0,4 mV, p=0.000), and significantly wider QRS duration (159 ± 18 ms) in comparison to septal sites (135 ± 8,7 ms, p=0,001). The DIIR-wave amplitude/VA-QRS duration ratio was significantly lower in free wall sites (8,55 ± 4,5 mV/s) compared to septal sites (13,9 ± 3,1 mV/s, p=0,000) and a value >10 predicted a septal origin with 97% sensitivity and 91 % specificity (AUC 0,904). In the validation cohort (N=30, 18 female; mean age 46,9 ± 13,3 years; mean ejection fraction 49,9 ± 10,7 %) the aVL/aVR ratio correctly identified anterior, middle and posterior locations in 25/30 patients (83 %), and the DIIR-wave amplitude/PVC-QRS duration ratio correctly predicted septal vs free wall locations in 29/30 patients (97%).

**Conclusions.** A simplified ECG algorithm based on aVL/aVR ratio and DIIR-wave amplitude/PVC-QRS duration ratio is a reliable and accurate tool in predicting the RVOT-VAs site of origin.

### A143: A REFINED RISK STRATIFICATION SCHEME FOR PATIENTS WITH TYPE 1 LONG QT SYNDROM

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**Background.** Type 1 Long QT Syndrome (LQT1) is an inheritable arrhythmogenic disorder that confers susceptibility to life-threatening arrhythmias (LAE) and is secondary to autosomal dominant loss-of-function mutations in the *KCNQ1* gene, encoding the alpha-subunit of potassium channel Kv7.1. In this work we assess whether the localization of different mutations over different regions of the *KCNQ1* gene influences the duration of the QT interval and the occurrence of arrhythmic events (LAE and syncopal spells).

**Methods.** We gathered data on 963 patients with the diagnosis of LQT1 and divided the KCNQ1 protein into 5 functional regions: the N-terminus (NT), the voltage sensor (VS, including transmembrane segments S1 to S4), the cytoplasmic loops (CL), the pore (PO, including the transmembrane segments S5 and S6 and the S5-S6 extracellular linker), the C-terminus (CT).

**Results.** The study population included 963 LQT1 patients: 518 (54%) females; average age 20±17 years; mean QTc at baseline ECG 465±38ms. The average follow-up was 8±7 years. During their life, 172 (18%) patients experienced arrhythmic manifestations typical of LQT1: 31 (3%) experienced one or more LAEs, while 141 (15%) experienced one or more syncopal spells. We identified 188 different mutations in the *KCNQ1* gene. The distribution of the mutations was as follows: 15 (8%) in the NT, 33 (18%) in the VS, 27 (14%) in the CL, 43 (23%) in the PO, 70 (37%) in the CT. The frequency of pathogenic variants per number of amino acids (a.a.) was higher in the CL region, as compared to the other domains (1 mutation every 1.44 a.a.). The duration of QTc interval was significantly longer for patients with mutations in the PO region (473±40 ms) and in the CL region (468±38 ms) as compared to the other regions ($p<0.01$). Furthermore, patients with PO and CL mutations also had a significantly higher probability of showing QTc values above 500 ms, as compared to others (PO 18%, CL 16% vs 8% all the others, $p<0.001$). Patients with mutations in the PO and the CL regions had a higher risk of LAE and syncopal spells (HR 2.89, 95% CI 1.95-4.29, p=0.019 and HR 1.61, 95% CI 1.0-2.49, p=0.05, respectively). Among 272 patients with mutations in the PO region, we found that those with mutations in the GYGD sequence (that is responsible for the channel selectivity) showed a higher risk of experiencing LAE (HR 19.32, 95% CI 1.02-365, p=0.048). Interestingly, the risk was independent from the duration of the QT interval and gender.

**Conclusion.** We found that *KCNQ1* loss-of-function mutations affecting the PO and the CL of the Kv7.1 potassium channel are associated with more severe form of LQT1. Among PO mutations, those affecting the GYGD sequence were associated with the most significant arrhythmic risk. Our findings provide a site-specific risk profile for the mutations responsible for Type 1 Long QT Syndrome.

## CARDIOPATIA ISCHEMICA – 1
## Sessione Orale

### A144: LONG-TERM PREDICTORS OF MYOCARDIAL INFARCTION RECURRENCE IN PATIENTS WITH ST-ELEVATION MYOCARDIAL INFARCTION TREATED WITH PRIMARY PERCUTANEOUS CORONARY INTERVENTION

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**Background.** Despite the improvement in the invasive revascularization therapy and secondary preventive measures, the recurrence of myocardial infarction (MI) in patients with ST-elevation myocardial infarction (STEMI) who underwent primary percutaneous coronary intervention (pPCI) is not irrelevant. The prognostic role of old and emerging cardiovascular risk factors for MI recurrence, such as Lipoprotein(a) [Lp(a)] levels, in this very high-risk population is still not fully understood.

**Aim.** To evaluate the baseline predictors of myocardial infarction recurrence in a cohort of patients admitted for STEMI and treated with pPCI.

**Methods.** Single-center, observational, retrospective analysis of consecutive patients admitted for STEMI who underwent pPCI from February 2013 to April 2019 at University Hospital of Salerno. Baseline demographic, clinical, echocardiographic and laboratory data were prospectively collected. Only patients with available Lp(a) values were included in the study. The study outcome was the recurrence of MI at three years follow-up. Univariable and multivariable Cox regression analysis were performed to identify the baseline variables correlated to the study outcome.

**Results.** The study population included 560 patients (mean age =

60.6±13.7 years; 79.5% males). Hypertension was observed in 351 patients (62.7%), diabetes in 134 (23.9%), dyslipidemia in 266 (47.5%), smoking status in 316 (56.4%), history of coronary artery disease (CAD) in 76 (13.6%), prior MI in 69 (12.3%), prior PCI in 62 (11.1%). The culprit lesion was detected in the left anterior descending (LAD) artery in 408 patients (72.9%). Multivessel disease (MVD) was reported in 211 (37.7%) cases. Total cholesterol mean value was 187.7±48.8 mg/dl; LDL cholesterol was 112.2±41.3 mg/dl and Lp(a) was 26.5±27.2 mg/dl. At three-year follow-up, MI occurred in 58 (10.4%) patients. In the multivariable analysis, Lp(a) (HR 1.015 95%CI: 1.008-1.022 p<0.001) and MVD (HR 1.994 95%CI 1.179-3.372 p=0.010) emerged as the only two independent predictors of MI recurrence at three years follow-up. The Kaplan-Meier analysis showed a significantly lower survival free from MI in patients with Lp(a) ≥50 mg/dl as compared to the subgroups with levels ≥30 and <50 mg/dL, and <30 mg/dL (Log-Rank=0.001). Also, MVD was able to identify patients with significantly lower survival free from MI for up to three years (Log-Rank=0.004). The Kaplan-Meier analysis combining these two parameters identified the patients with both MVD and Lp(a)≥50 mg/dl as the highest risk cohort for MI recurrence up to three years (incidence rate=22.2%; Log-Rank=0.002).
**Conclusions.** Among patients with STEMI who underwent pPCI, high Lp(a) level and MVD are associated with a higher risk of recurrent MI at long-term follow-up.

### A145: CRITICAL ANALYSIS OF THE POSSIBLE MECHANISMS UNDERLYING THE LOCALIZATION OF CORONARY ATHEROSCLEROTIC LESIONS: A MONOCENTRIC STUDY

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**Background.** Coronary artery disease (CAD) is due to the development of atherosclerotic lesions in the coronary arteries. The localization of CAD in the right coronary artery (RCA) or left coronary artery (LCA) leads to different clinical presentation and prognosis. Our purpose is to study patients with single vessel coronary disease, investigating the relationship between cardiovascular risk factors, comorbilities, echocardiographic parameters and lesion localization in the coronary arteries.
**Methods.** We retrospectively analyzed 200 patients who underwent coronary angiography in our institution between 2014 and 2018. They were divided into two groups: 100 with LCA-only disease, and 100 with RCA-only disease. Cardiovascular risk factors, comorbilities and echocardiographic parameters were evaluated for each patient.
**Results.** There were different correlations between risk factors and the two groups. Hypertension and diabetes mellitus resulted predictors of lesions in LCA [hypertension: odds ratio (OR) 0.31, 95% CI: 0.17-0.55, p 0.009; diabetes: OR 0.16, 95% CI: 0.07-0.34, p 0.003]. Smoking and dyslipidemia were related with RCA disease (smoke: OR 2.3, 95% CI:1.3-4.1, p < 0.0001; dyslipidemia: OR 2.18, 95% CI: 1.1-4.1, p < 0.0001).
Among the comorbilities, an interesting association was found between peptic ulcer and patients with RCA disease (OR 2.16, 95% CI:1.8-3.6, p 0.035). The analysis of the echocardiographic parameters, in particular left ventricular mass index and relative wall thickness showed that concentric ventricular remodeling and concentric hypertrophy were more common in patients with LCA lesions (p 0.0042).
**Conclusions.** Individual risk factors seem to correlate with the localization of atherosclerotic lesions in the coronary circulation. Patients with RCA disease may have a higher probability to present a concomitant gastric disease, suggesting also a possible role of the autonomic nervous system in the atherosclerosis process. The finding of specific patterns of ventricular geometry related with the localization of the lesions in LCA, highlights the importance of the interaction between cardiac mechanics and coronary vessels in the pathogenesis of CAD.

### A146: CORONARY BLOOD FLOW IN MYOCARDIAL INFARCTION WITH NON-OBSTRUCTIVE CORONARY ARTERIES

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**Background.** Myocardial infarction (MI) is mainly caused by atherosclerotic plaque thrombosis but several registries show that in 1-13% of cases MI occurs in the absence of obstructive coronary artery disease (MINOCA) utilizing the conventional cut-off of < 50% stenosis. MINOCA is generally related to coronary arteries abnormalities (epicardial or microvascular dysfunction – MINOCA-co). However, non-coronary conditions may underlie MINOCA as a consequence of supply-demand mismatch (MINOCA-nco). The TIMI flow gradient (TFG) and the corrected TIMI frame count (CTFC) are established methods able to respectively provide a qualitative and semiquantitative estimation of epicardial blood flow at rest. No studies have yet evaluated these indices in patients with MINOCA.
**Purpose.** To evaluate the clinical characteristics of patients with MINOCA and the angiographic indices in MINOCA-co versus MINOCA-nco.
**Methods.** Among all consecutive patients undergoing coronary angiogram at our Centre for MI based on the 4th Definition of Myocardial Infarction, the ones showing < 50% coronary artery stenosis were retrospectively analyzed; patients with previous coronary stenting were excluded from the study. According to the presence or absence of pre-specified criteria of supply-demand mismatch (SAP >180 mmHg, DAP >110 mmHg, HR > 110 bpm, Hb < 6 gr/dl, SatO2 <91% or P/F ratio <300), the study cohort was divided into MINOCA-nco and MINOCA-co, respectively. We defined as slow flow phenomenon a TFG < = 2 and/or a CTFC > 40 for the left anterior descending artery, >27 for the right coronary artery and >24 for the left circumflex.
**Results.** 453 patients were retrospectively evaluated and 112 (24.7%) met the inclusion criteria. Mean age was 68±13.2 years and 41 (36.6%) were males. MINOCA-co was the more prevalent entity accounting for 73 (65.2%) patients while 39 (34.8%) were MINOCA-nco. The two subgroups presented similar baseline characteristics with regards to gender and classic cardiovascular risk factors including hypertension, hypercholesterolemia, diabetes and smoking habit. Peripheral vasculopathy was more prevalent in MINOCA-nco patients (MINOCA-nco=15.4% vs. MINOCA-co=4.2%; p=0.04). Regarding the angiographic indices, there was no statistically significant difference in TFG between subgroups; conversely, the number of patients with a slow flow phenomenon as defined by CTFC was significantly higher in the MINOCA-nco group (MINOCA-nco=25.7% vs. MINOCA-co=9.8%; p=0.039).
**Conclusions.** Our data suggest that among patients with MINOCA clinical characteristics were not useful in differentiating between the two disease entities (MINOCA-nco vs. MINOCA-co). However, MINOCA-nco patients had higher coronary flow impairment as evaluated by CTFC. The pathophysiological reason is still not clear; we hypothesized that, in this clinical setting, an increased heart rate, systemic arterial pressure or low oxygen supply might worsen unbalanced coronary perfusion.

### A147: GRAFT PATENCY AND PROGRESSION OF CORONARY ARTERY DISEASE AFTER CABG ASSESSED BY ANGIOGRAPHY-DERIVED FRACTIONAL FLOW RESERVE

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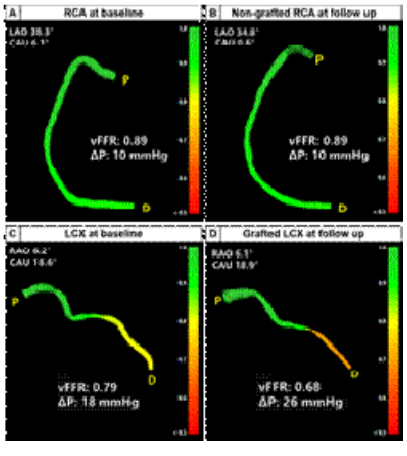
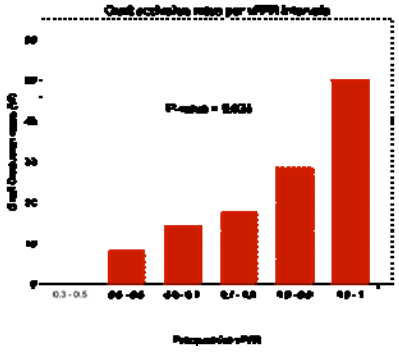
**Aims.** Graft occlusion after coronary artery bypass graft surgery (CABG) has been associated with native coronary artery competitive flow. The present study aims to characterize the functional progression of coronary artery disease (CAD) in native vessels after CABG, and to assess the relationship between preoperative FFR as derived from angiography and graft occlusion.
**Methods and results.** Retrospective, multicenter study of consecutive patients undergoing CABG between 2013 and 2018, in whom a follow-up angiogram had been performed. Serial vessel-fractional flow reserve (vFFR) analyses were obtained in each major native coronary vessel before and after CABG. In 73 patients, serial angiograms were suitable for





vFFR analysis, including 118 grafted (86 arterial and 32 saphenous grafts) and 64 non-grafted vessels. The median time between CABG and follow-up angiography was 2.4 years [IQR 1.5, 3.3]. Overall, vFFR significantly decreased over time (0.76 [IQR 0.67, 0.88] to 0.68 [IQR 0.50, 0.85], p<0.001). The functional CAD progression was significantly higher in grafted compared to non-grafted vessels (delta vFFR in grafted vessels 0.10 [IQR 0.05, 0.18] vs. 0.01 [IQR -0.01, 0.03], in non-grafted vessels, p<0.001). The median preoperative vFFR value in the native vessel was higher in occluded compared to patent grafts (0.75 [IQR 0.68, 0.80] vs. 0.69 [IQR 0.60, 0.76], p=0.028). Preoperative vFFR predicted graft occlusion (AUC: 0.66, 95% CI 0.52 to 0.80, p=0.031).

**Conclusion.** In patients undergoing CABG, preoperative vFFR derived from conventional angiograms without use of pressure wire predicted graft occlusion. Graft occlusion was more frequent in vessels with high vFFR values, irrespective of the underlying diameter stenosis. Grafted native coronary vessels exhibited accelerated functional CAD progression, whereas in non-grafted native coronaries the functional status remained unchanged.

### A148: INTRA-HOSPITAL MORTALITY IN STEMI PATIENTS:10 YEARS OF EXPERIENCE OF CLINICAL CARDIOLOGY UNIVERSITY OF CAGLIARI

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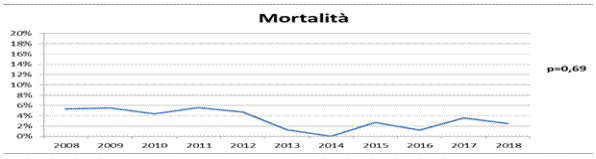
A good adherence to guidelines reduces the rate of in-hospital and long-term mortality. Furthermore, it is associated with a lower rate of complications such as heart failure, reinfarction and stent' stenosis. The aim of our study was to verify in our center the compliance with the guidelines in terms of reperfusion therapy and intra-hospital mortality in patients admitted for STEMI in the last 10 years.

**Methods.** The in-hospital outcomes were evaluated in 922 patients, consecutively enrolled in our centre from 1st January 2008 to 31th March 2019. All eligible patients have had persistent chest pain for more than 20 minutes but less than 12 hours, a 12-lead ECG with ST-segment elevation or the presence of a (presumed) new LBBB.

**Results.** The average age of our population is 63,8 ± 12,6, of which 197 patients (21,4%) with age ≥ 75 years. Male population is prevalent (697 patients, 75,6%). The most frequent cadiovascular risk factors (FdR CV) were cigarette smoke in 47,3% of patients, hypertension in 54,3%, hypercholesterolemia in 49,1%, diabetes mellitus in 23,9%, familiarity in 19,2%, obesity (BMI> 30 Kg/m2) in 11,2%. Most patients arrived with stable clinical conditions with a Killip class=1 (706 patients, 83,6%) only 45 patients 4,9% had cardiogenic shock at presentation. All the patients were destined to a primary PCI, but 2 procedures failed; nobody received a fibrinolytic therapy. 35,4% (326) received a dual antiplatelet therapy and 21,9% (202) a dual antiplatelet therapy + a bolus of unfractionated heparin before entering into the catheter laboratory. Considering the trend over the time, we observed a significant increase of pretreatement: in 2008, 7.9% of patients were pretreated with DAPT and only 1.3% with DAPT + heparin; in 2018 40.8% of patients were pretreated with DAPT and even 42.5% with DAPT + heparin. The peak of total CPK was evaluated, to obtain information about extension of necrotic myocardial tissue: the median value found was 1649 (Q1 911 - Q3 3948). The CPK peak tends to be lower in patients reperfused within 120 minutes. After the reperfusion the mean FEVS % was 52.76 ± 10.1. Only 59 (6.4%) patients had a LVEF ≤35% and 236 patients (25.6%) had a LVEF between 35% and 50%. In our study, the average hospital stay of our patients was 8.72 ± 4.8 days. A significant difference was assessed in patients transferred by other hospitals that have a longer hospitalisation than the others (9.79 ± 6.5, p=.005). 31 patients died (3.4%) during the hospitalization. The grafic shows the mortality trend in a period of 10 years. We observed a decrease I mortality over the years (from 4.5 in the 2008 to 2,5% in the 2018). We observed a significant increase of mortality in patients reperfused beyond 90 minutes (4.4% vs 2.2%, p= 0.036).




**Conclusions:** our study shows a good adherence to the ESC guidelines regarding the reperfusion therapy and the use of DAPT in STEMI patients admitted to our center. We confirm a very low intra-hospital mortality rate.

### A149: GAP BETWEEN SCIENTIFIC GUIDELINES AND HEALTH SYSTEM RECOMMENDATIONS: THE CASE OF PCSK9 INHIBITORS

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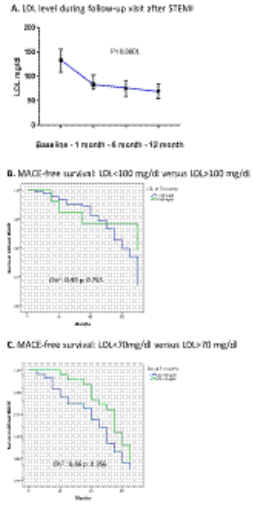
(a) CORONARY CARE UNIT AND LABORATORY OF CLINICAL AND EXPERIMENTAL CARDIOLOGY, FONDAZIONE IRCCS POLICLINICO SAN MATTEO, PAVIA (ITALY); (b) UNIVERSITY OF PAVIA, PAVIA (ITALY); (c) DIVISION OF CARDIOLOGY, UNIVERSITY OF TORINO, CITTÀ DELLA SALUTE E DELLA SCIENZA HOSPITAL, TURIN (ITALY)

**Background.** Recent European Society of Cardiology (ESC) guidelines on the management of dyslipidemias recommended an even lower target for low-density lipoprotein (LDL) cholesterol (from <70 mg/dl to <55 mg/dl) for patients at very high cardiovascular risk, such as subjects after an acute coronary syndrome (ACS). We performed an exploratory analysis of the prevalence and characteristics of the patients referred to our outpatient clinic whose LDL cholesterol was above the target (>70 mg/dl) during the first year after an ST-elevation myocardial infarction (STEMI).

**Methods.** We enrolled all consecutive patients referred to our outpatient clinic after a STEMI whose LDL cholesterol was >70 mg/dl either at first (1st month) or second (6th month) follow-up visit between January 2013 and December 2015. We divided the patients according to their LDL cholesterol at 12 months based on different LDL targets_(LDL targets explored: <100 mg/dl, <70 mg/dl, <55 mg/dl) and we compared their demographic characteristics, lipid lowering therapy (LLT) and cardiovascular risk factor prevalence. Moreover we performed Kaplan-Meier analyses with Log-rank test to explore the difference in the incidence of major adverse cardiovascular events (MACE, intended as: cardiovascular death, any myocardial revascularization, non-fatal myocardial infarction or stroke) between the patients that reached different LDL targets at 12th month visit as previously specified.

**Results.** Between January 2013 and December 2015 646 patients were referred to our outpatient clinic after an ACS, among them 323 (96% STEMI confirmed diagnosis) had LDL cholesterol >70 mg/dl either at 1st or 6th month visit. As showed in the figure (Fig. 1A) their LDL cholesterol steadily decreased during the follow-up visits and at 12 months the majority of patients were on high intensity statin therapy (86%) and a small proportion was on ezetimibe (22%). At 12 months 15% of patients had an LDL cholesterol >100 mg/dl and 19% of them were on maximal LLT (high dose statin + ezetimibe) and could be therefore candidate for Proprotein Convertase Subtilisin/Kexin type 9 inhibitors (PCSK9i) according to the Italian medicines agency (AIFA) recommendations. However, 49% of the patients had an LDL between 70 and 100 mg/dl at 12 months and 19% of them were on maximal LLT and according to ESC guidelines the use of PCSK9i should be considered but they could not be prescribed according to AIFA recommendations. Kaplan-Meir curves during a mean follow-up of 57 ± 16 months (Fig. 1B-C) show a, albeit non-significant, decrease in MACE with more aggressive LDL targets.



**Discussion.** Our analysis shows that follow-up visits after STEMI are determinant to reduce LDL cholesterol. However, an important proportion of patients did not reach the ESC recommended target at 12 months even on maximal LLT. The increasing gap between AIFA recommendations and ESC guidelines make arduous for Italian high risk patients to receive the best treatment available.

## INTERVENTISTICA VALVOLA AORTICA – 1
## Sessione Orale

### A150: POSTPROCEDURAL MANAGEMENT OF PATIENTS AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION PROCEDURE WITH SELF-EXPANDING BIOPROTHESIS: AN UPDATE

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(a) POLICLINICO TOR VERGATA

**Background.** Transcatheter aortic valve implantation (TAVI) is the therapeutic choice to surgical aortic valve replacement (SAVR) for patients with severe aortic stenosis who have intermedium to high surgical risk. TAVI continues to have more complications than conventional percutaneous cardiovascular interventions, especially in the first 48-72 hours after procedure. We want to present the experience gained over the years of post-operative management protocols for patients undergoing TAVI in our institution.
**Methods.** Four hundred and twenty-nine patients underwent TAVI and than were transferred to the cardiac intensive care unit (CICU) after procedure. During the first 48-72 hours, vital parameters were monitored continuously. Particular attentions ware paid to renal function, vascular access, rhythm disturbances, systemic blood pressure, fluid balance, and neurological symptoms.
**Results.** The average post-operative length of stay was 6.2 days, of which 3.2 days in intensive care. During the procedure the most frequent hemodynamic complication was hypotension (10%); all procedure were performed in deep sedation except in 9 patients (2%) in which general anesthesia was need; in 3.9% a laryngeal mask was placed, in 4.19% a conversion in oral tracheal intubation was performed. Cardiopulmonary resuscitation was performed in 19 patients (4.4%). In 3 patients (0.69%) IABP was positioned for hemodynamic support. Five patients (1.16%) reported pericardial effusion, and 3 patients (0.69%) acute pulmonary edema after the procedure. The most frequent complication was the decrease in the hemoglobin and hematocrit value (23.07%) for which two units of red blood cells were transfused in 57 patients, and one unit in 42 patients, of which 61% women and 39% men (0,004). In 29 patients (5.3%) percutaneous angioplasty was performed on the femoral artery. The most common infectious complication was pneumonia (0.69%). In 88 patients (20.5%) an increase in blood creatinine values was observed, but only 5 patients (1.1%) reported AKI. The most frequent arrhythmic complication was the onset of a new left bundle branch block (21.4%), I degree AVB in 6.7%, II degree AVB in 1.86% and III degree AVB in 12.5%, for which 67 (15.6%) permanent pace-maker were implanted and 3 (0.69) ICD. New onset AF was found in 25 patients (5.8%); of these 9 were subjected to electrical cardioversion, and 13 to pharmacological cardioversion.
**Conclusions.** TAVI was introduced 15 years ago and post-operative management of TAVI patients still remain essentials and requires continuous monitoring especially in the first 48 hours. The early diagnosis of the complication allows a better management of them reducing the hospital stay.

### A151: BALLOON AORTIC VALVULOPLASTY FOR DECOMPENSATED SEVERE AORTIC STENOSIS

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(a) POLICLINICO S.ORSOLA-MALPIGHI, BOLOGNA

**Background and aims.** At our institution elderly and/or high-risk patients admitted with decompensated heart failure and severe aortic stenosis undergo balloon aortic valvuloplasty (BAV) as a bridge to decision: palliation or destination therapy with transcatheter aortic valve implantation (TAVI) or surgical aortic valve replacement (SAVR). There is no universal agreement on how to select patients for destination therapy in this high risk group. 'Direct TAVI' can have major healthsystems implications. We present our experience and compare clinical characteristics between both groups.
**Results.** Between January 2016 and December 2018 we identified 110 patients admitted with decompensated heart failure and severe aortic stenosis who underwent their first BAV. 18 patients in shock, cardiac arrest and/or haemodynamic instability were excluded from this analysis. Out of remaining 92 patients the reason for admission was acute pulmonary oedema (57.6%) or NYHA class IV (42.4%). 32 patients (34.8%) underwent TAVI or SAVR in follow-up. The clinical characteristics of the 2 groups are presented in Table 1.

**Table 1.** Patient characteristics.

| | Destination TAVI/SAVR (n=32) | Palliation (n=60) | p-value |
|---|---|---|---|
| Clinical data | | | |
| Age (yrs) | 80.6 (±8.8) | 87.9 (±5.9) | p<0.0001 |
| Females, n (%) | 20 (63%) | 36 (60%) | p=0.99 |
| Comorbidities, % (n) | | | |
| Diabetes | 37,5 (8) | 31.2 (19) | P=0.66 |
| FA | 37.5 (8) | 61.7 (37) | P=0.001 |
| CAD | 46.8 (15) | 41.7 (25) | P=0.66 |
| COPD | 18 (6) | 30 (18) | P=0.32 |
| Previous MI | 15.6 (5) | 26.7 (16) | P=0.31 |
| Previous CABG | 9 (3) | 3 (2) | P=022 |
| Neurological* | 6 (2) | 43 (26) | P=0.0006 |
| Laboratory data | | | |
| Hemoglobin (g/dl) | 12.1 (±1.8) | 11.1 (±2.4) | P=0.05 |
| Admission BNP (pg/ml) | 1443 (±1566) | 1908 (±1849) | P=0.36 |
| Creatinine (mg/dl) | 1.11 (±0.32) | 1.46(±0.66) | P = 0.0061 |
| GFR (ml/min/m$^2$) | 50.1 (±19.4) | 34.9 (±16.1) | P= 0.0001 |
| Echo and haemodynamic data | | | |
| LVEF (%) | 46.5 (±15.5) | 49.2 (±12.8) | P= 0.3908 |
| LVEF <50%, n (%) | 18 (56) | 28 (47) | P= 0.51 |
| Mean AV gradients (mmHg) | | | |
| - invasive | 44.97 (±17.1) | 40.56 (±18.9) | P=0.2829 |
| - echo | 41.6 (±15.9) | 38.57 (±14.1) | P=0.3985 |
| Admission data | | | |
| Total admission time (days) | 11 (±5) | 17 (±12) | P=0.032 |
| IV Furosemide dose (mg/24hrs) | 202 (±177) | 201 (±175) | P=0.99 |

AF – atrial fibrillation, CAD – coronary artery disease, COPD – chronic obstructive pulmonary disease, MI – myocardial infarction, CABG – coronary artery by-pass grafting, GFR – glomerular filtration rate (Cockcroft-Gault), LVEF – left ventricular ejection fraction, AV – aortic valve, IV – intravenous, PO – per os;
*Neurological: previous CVA/TIA, dementia, frailty.
Continuous data are presented as mean±SD.

Patients who underwent destination therapy were younger and had less renal dysfunction. The largest difference was noted in the presence of comorbidities (neurological, renal) and longer total admission time. There were no differences between groups in clinical presentation, in echocardiographic parameters including left ventricular ejection fraction (LVEF) or mean transaortic gradients or diuretic dose. In median follow-up of 285 days in patients who underwent palliative BAV there were 12 deaths and 7 underwent repeat BAV.
**Conclusions.** Among patients admitted with decompensated severe aortic stenosis older age, renal and neurological dysfunction were more common in patients who underwent palliative BAV compared with patients who underwent TAVI/SAVR. Interestingly, echocardiographic or haemodynamic parameters did not differ between the two groups and were not used as selection criteria.

### A152: VARIAZIONE DELL'EFFICIENZA DELLA FUNZIONALITÀ RENALE PRE E POST-INTERVENTO NEI PAZIENTI SOTTOPOSTI A TAVI

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(a) UNIVERSITÀ DEGLI STUDI DI ROMA "TOR VERGATA"

Numerosi lavori scientifici hanno documentato come in pazienti affetti da stenosi aortica severa, ci sia una continua e progressiva ipoperfusione renale, dovuta sia alla minore quota di sangue eiettato, sia ad un marcato incremento delle resistenze periferiche, responsabili dell'innesco del meccanismo di "compenso" attuato dal sistema renina-angiotensina-aldosterone. L'attivazione di questo sistema determina un marcato incremento delle resistenze periferiche e l'accumulo di liquidi, provocando un circolo vizioso che si conclude con l'edema polmonare acuto e lo shock cardiogeno. Recenti studi hanno documentato che, nonostante la procedura TAVI venga eseguita in pazienti con policomorbidità e spesso un'insufficienza renale cronica di partenza, questa tecnica provoca in una quota variabile di popolazione trattata, un incremento ed un miglioramento della funzionalità renale nonostante sia una procedura che necessiti dell'uso del mdc sia per la TC di screening pre-esame che durante la TAVI.
In questo studio sono stati arruolati un totale di 316 pz, di cui 160 maschi (50,6%), con età media di 81,7±7,1 anni; con LogES (media± SD) di 25,4±18,1; STS score di 13,7±14,2. Tra le comorbidità risultavano: ipertensione in 267 pazienti (84,5%); dislipidemia in 184 pz (58,2%); GFR ridotta in 221 pz (69,9%); diabete in 98 pz (31,0%); BPCO severa in 150 pz (47,5%); eventi cerebrovascolari maggiori in 36 pz (11,4%) di cui stroke/TIA in 16 pz (5,1%)/20 (6,3%); neoplasia in 72 pz (22,8%); liver disease in 18 pz (5,7%), sanguinamenti maggiori in 18 pz (5,7%); fragilità in 3,2±1,4 (media±SD).
È stata studiata l'associazione esistente fra il mdc utilizzato (pre /post procedura) confrontandolo con la Creatinina pre e post esame al fine di

stimare la reale incidenza di AKI. Sono stati inoltre valutati l'attività Reninica plasmatica in ortostatismo, l'Angiotensina I plasmatica, e la Cistatina C sierica, che sono risultati pari a: 0,33±0,03 (Cistatina C pre), 0,11± 0,17 (Cistatina C post), con un p-value statisticamente significativo, di 0,00005***; Renina pre di 1,40 e Renina post di 3,2 nei pazienti sottoposti a terapia con ACE-I e ARBs, con un incremento statisticamente significativo, p-value di 0,031*; angiotensina I pre di 0,22 ed angiotensina I post di 0,67 nei pazienti sottoposti a terapia con ACE-I e ARBs con un p-value di 0,57; esaminati al fine di studiare le eventuali modificazioni tra la fase di ricovero del paziente e le dimissioni. Ne deriva che la TAVI è una procedura che, in centri esperti, può essere effettuata anche in pazienti con IRC con un bassissimo rischio di sviluppare AKI; un protocollo farmaco-terapeutico mediante terapie antiaggreganti combinate sia pre che post-trattamento ha ulteriormente contribuito al successo procedurale nella casistica in esame, ed alla riduzione di complicanze post-operatorie; l'esame sui nuovi biomarker di funzionalità renale ha ottenuto esito positivo nonostante il limite dato dall'esiguità del campione ed allo studio monocentrico.

### A153: ADVERSE IMPACT OF TRANSFUSION AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT: A PROPENSITY-MATCHED COMPARISON FROM TRITAVI REGISTRY

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**Objectives.** To test how red blood cell (RBC) transfusion influences the outcome after transcatheter aortic valve replacement (TAVR).

**Background.** There is no consensus on the relative benefit of RBC transfusion after TAVR.

**Methods.** The multicenter TRITAVI (Transfusion Requirements in Transcatheter Aortic Valve Implantation) registry retrospectively included 3,187 patients who underwent TAVR at 7 centers between 2012 and 2018. One-to-one propensity score matching resulted in 548 overall pairs of patients with and without RBC transfusion, in 536 pairs stratified according to nadir Hb and in 249 "uncomplicated" pairs, without major vascular complications or major bleeding. The primary endpoint was mortality. Secondary endpoints were 30-day Valve Academic Research Consortium (VARC)–2 defined events.

**Results.** RBC transfusion was associated with an increased risk of death (HR 1.37, 95% CI 1.09-1.70, p=0.0006) at 12 months (IQR 4-24) among the matched population, as well as death (HR 1.74, 95% CI 1.06-2.88, p=0.028) and stage 2-3 acute kidney injury (HR 1.80, 95% CI 1.14-2.83, p=0.011) at 30 days. The association between RBC transfusion and the risk of death was consistent in patients with nadir Hb>9.5 g/dl (HR 2.03, 95% CI 1.25-3.29, p=0.004) and in those with "uncomplicated" TAVR (HR 1.67, 95% CI 1.19-2.34, p=0.003). Propensity score (p=0.002), major vascular complications (p=0.029) and RBC transfusion (p=0.047) were independently correlated with mortality.

**Conclusions.** RBC transfusion is an independent predictor of mortality after TAVR, irrespective of periprocedural major vascular complications or bleeding events. Most of the detrimental impact of RBC transfusion on outcome seems mediated by acute kidney injury.

### A154: CORONARY EMBOLISM: A CASE REPORT

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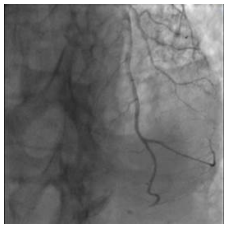
**Introduction.** Coronary embolism consists in an occlusion of a coronary vessel due to a thrombus traveling through the blood stream. It is called "direct" coronary embolus when it comes from the left arterial appendage. Embolic occlusion is a rare cause of ST elevation myocardial infarction (STEMI) (3-24% of cases) and it generally has a poor prognosis. It is classified as type 2 myocardial infarction, as it is caused by a mismatch between the oxygen supply and its demand. In this cases, it is important to investigate about the cause of the thrombotic origin.

**Case report.** We present a case of an 88-year-old male patient with no cardiac history, who came to the Emergency Room (ER) complaining severe chest pain. The ECG showed ST segment elevation in V3-V4 and time 0 troponin I level was elevated (0.623 ng/L-nv). The Echocardiogram showed a severe reduced ejection fraction (EF). The patient was immediately transferred to our cath-lab and coronary angiography was performed, showing an embolic obstruction of the small recurrent segment of the Left anterior descending coronary artery (LAD), without further pathological findings. During the recovery, the cardiac telemetry recorded multiple phases of atrial fibrillation (AF) not known in anamnesis; therefore, treatment with apixaban (non-vitamin K antagonist oral anticoagulant – NOAC) was started.



**Discussion.** This case has two peculiarities: first of all, in consideration of the coronary angiography, it is difficult to explain the severe reduced EF; we may assume that the findings of the coronary angiography showed just the remaining of a bigger embolic occlusion in the LAD that had already undergone partial spontaneous thrombolysis. Thanks to the cardiac telemetry, we can also explain the origin of the embolism; several episodes of AF may generate atrial thrombi that rarely goes to the coronary arteries causing vasal occlusion. Moreover, the presence of an embolus in the LAD is even rarer; it is far more common in the right coronary artery, due to its origin and the course of this vessel. This case shows the importance of suspecting coronary embolism when relative normal coronary arteries are found out while performing a coronary angiography; it may lead to further investigations to find out where these emboli come from, and how to manage it and improve the outcome of these patients.

### A155: DIFFERENT RESPONSES OF THE MYOCARDIAL CONTRACTILITY BY LAYER FOLLOWING ACUTE PRESSURE UNLOADING IN SEVERE AORTIC STENOSIS PATIENTS AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION

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**Background.** Transcatheter aortic valve implantation (TAVI) is an effective therapeutic option for severe symptomatic aortic stenosis (AS) with intermediate/high surgical risk. The aim of this study was to examine the acute effect of TAVI in terms of pressure unloading, on left ventricular (LV) mechanics using multilayer global longitudinal strain (GLS) by 2D speckle-tracking echocardiography (ST-E).

**Methods.** A total of 44 patients (mean age 81.8±2, 34% male) with severe symptomatic AS and preserved LV ejection fraction (LVEF) underwent 2D echocardiography at baseline and 5±2 days after TAVI. GLS was measured from the endocardial layer (Endo-LS), epicardial layer (Epi-LS) and full thickness of myocardium before and after the procedure. Analysis included other parameters such as age, sex, LV volumes and ejection fraction (LVEF), type of prosthesis implanted, right ventricular (RV) dimension and function.

**Results.** By dividing patients in two groups accordingly with LV geometry assessed with RWT measurement (concentric vs eccentric hypertrophy), better values of Endo-LS were recorded at baseline, in patients with concentric hypertrophy (-12.9±2 vs -11±3, p=0.048). After TAVI, was observed a significant improvement in Endo-LS, but only in patients with concentric hypertrophy (-12.9±2 vs -14.2±2, p=0.003).

| Parameter | RWT > 0.42 31 pz (70%) | RWT ≤ 0.42 13 pz (30%) | p |
|---|---|---|---|
| Male sex (n, %) | 8 (25%) | 7 (53%) | NS |
| Age (y.o) | 81 ± 6 | 83 ± 7 | NS |
| CAD (n, %) | 3 (9%) | 8 (61%) | NS |
| LVEDV (ml) | 97 ± 29 | 134 ± 14 | ***0.002*** |
| LVESV (ml) | 43 ± 15 | 72 ± 38 | ***0.001*** |
| LVEF(%) | 56.2 ± 6 | 50 ± 12 | NS |
| E/e' | 12.9 ± 7 | 18.6 ± 9 | NS |
| Mean gradient trans-aortic flow (mmHg) | 50 ± 17 | 43 ± 12 | NS |
| AVA ($cm^2$) | 0.8 ± 0.2 | 0.8 ± 0.3 | NS |
| TTG (mmHg) | 25 ± 1 | 28 ± 6 | NS |
| GLS (%) | -11.4 ± 3 | -10.5 ± 3 | NS |
| Endo-LS (%) | -12.9 ± 2 | -11 ± 3 | ***0.048*** |
| Epi-LS (%) | -10.8 ± 4 | -9.9 ± 3 | NS |

**Conclusion.** The improvement in LS was more prominent in the endocardium, which was evident even at an early time point after TAVI only in patients with concentric hypertrophy. Evaluation of multilayer strain may provide new insights into the LV mechanics in the future, potentially useful to characterize patients with better outcomes.

## ARITMIE – 3
## Sessione Orale

### A156: SUCCESSFUL TRANSVENOUS EXTRACTION OF THE OLDEST ENDOCARDIAL DEFIBRILLATOR LEADS IMPLANTED THROUGH SUBCLAVIAN VEIN

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Transvenous lead extraction is generally considered a difficult and high risk procedure due to the adhesion of implantable cardioverter defibrillator leads to a major vein, the right atrium, the superior vena cava and the apex of right ventricle. Number, type, duration of implant and position are lead characteristics to take into account for procedure's difficulty of lead extraction and the chances of complications.
In 1992, the patient, when she was 33 years old, was resuscitated from cardiac arrest due to ventricular fibrillation and then was referred to our department. At that time, the technique of implantation of cardioverter defibrillator provides the insertion of subcutaneous patch lead and the tunneling of the leads to the abdomen. That was the first case of a cardioverter defibrillator being implanted in the infraclavicular region and connected to a lead (Endotak C double coil with passive-fixation system) inserted in the right ventricle through the left subclavian vein. In 1993, almost one year later, due to a failure of the previous implanted lead, a new lead (Medtronic Sprint 6945 double coil) with active-fixation was implanted in the right ventricle and the lead with passive-fixation was left in place. Until 2015 three device replacement procedures were performed. In December 2016 the patient had isolated pocket erosion with local pain. Then, the patient was admitted in our department and transesophageal echocardiogram didn't show any intracardial mass. Therefore a procedure of pocket surgery was executed. In June 2019, the patient had on the device pocket local sign of inflammation as pain and erythema without erosion and without symptoms and signs of systemic infection. She was admitted in our department and transesophageal echocardiogram revealed the presence of two vegetations on the atrial segment of one of the two leads. Therefore, following this finding, a procedure of cardioverter defibrillator and leads extraction using locking stylets and dilator sheats was successfully completed without any complication. Before the discharge, in the light of the cardiac arrest due to ventricular fibrillation, a subcutaneous implantable cardioverter defibrillator (S-ICD) was implanted.
We reported a case of successfully transvenous leads extraction of 27 years old defibrillator leads by conventional traction and counter-traction techniques. The procedure was challenging owing to the characteristics of the defibrillator leads (both double coil) and the duration of the implant (27 years) of the two leads. Indeed, the extraction of old leads is particularly challenging due to the high level of adherence to adjacent tissue. To the best of our knowledge this case reports the extraction of the oldest transvenous defibrillator leads performed so far.

### A157: LEAD EXTRACTION IN CONGENITAL HEART DISEASE PATIENTS. INITIAL EXPERIENCE OF SINGLE CENTER

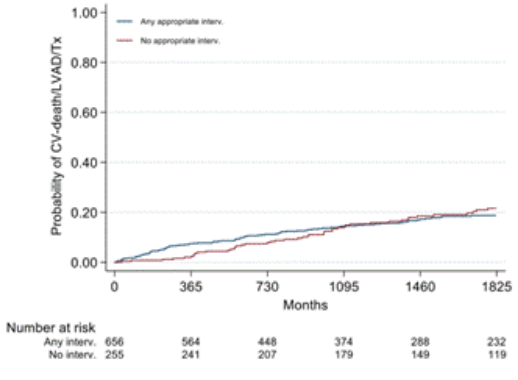
Sonia B Albanese (a), Vincenzo Pazzano (a), Corrado Di Mambro (a), Massimo Silvetti (a), Gabriele Rinelli (a), Alessia Del Pasqua (a), Davide Curione (a), Aurelio Secinaro (a), Adriano Carotti (a), Fabrizio Drago (a)
(a) OSPEDALE PEDIATRICO BAMBINO GESÙ

Over the past decade, transvenous pacemaker (PM) and defibrillator (ICD) treatment in patient with congenital heart disease (CHD) has markedly increased.The number of these patients is expected to grow, and a subset of them will ultimately face the need for lead revision. Presently many patients with mandatory indications are not referred for transvenous lead extractions due to the misperception of the risk associated with the procedure.
**Material and method.** We treated consecutively from September 2017 to June 2019 ten patients with an median age of 13.5 years a median weight of 52 kgs. Seven patients had congenital atrioventricular block, one patient had long Qt syndrome and in two cases the patient had stenosis of the Mustard baffle for treatment of transposition of the great arteries.
The average age of the electrodes extracted was of 9,8 years and a average lead extraction score was 7.4. All patients were evaluated by transthoracic and transesophageal echocardiography and CT scan to assess for residual intracardiac shunts, vegetations, valve function, chamber sizes, and basic lead courses and locations.
**Results.** All electrodes were extracted using through a left-handed subclavian approach in nine cases and through a combined femoral-suclavian approach in one case using 40-80 Hz laser energy with a SPECTRANETICS® Glidelight 12-14 Fr. sheats, alternated with A SPECTRANETICS® TightRail 11 Fr. In the two patients with prior Mustard operations through a femoral approach, a 45 mm length covered stent was positioned and a left atrial lead was implanted through the stent by a left subclavian approach. All cases were managed in the hybrid operating theater according to a safety management protocol between electrophysiologists, cardiac surgeons, anesthesiologists, hemodynamists and laser, radiology and perfusion technicians.The Bridge Ballon® (BB) was available for every procedure. No major complications occurred. In one patient it was necessary to reposition the atrial lead four hours from the procedure.
**Conclusions.** Some CHD patients carry a long history of device- Lead extraction is a safe procedure in this patient population. Due to the highly variable anatomic substrates all device extractions require meticulous pre-procedural planning. Comprehensive review of the clinical and surgical history, inclusion of appropriate advanced imaging studies, incorporation of available tools as well as involvement of surgical and interventional services is mandatory.

### A158: ICD SHOCKS: PREDICTIVE FACTORS AND PROGNOSIS IN A SINGLE-CENTER LARGE COHORT OF PATIENTS

Alessandro Andreis (a), Davide Castagno (a), Arianna Bissolino (a), Carlo Budano (a), Pier Giorgio Golzio (a), Edoardo Roagna (a), Simone Mattivi (a), Silvia Mazzilli (a), Andrea Saglietto (a), Mattia Peyracchia (a), Francesco Fioravanti (a), Massimo Magnano S.lio (a), Matteo Anselmino (a), Federico Ferraris (a), Fiorenzo Gaita (a), Mauro Rinaldi (a), Carla Giustetto (a), Gaetano Maria De Ferrari (a)
(a) DIVISION OF CARDIOLOGY, A.O.U. CITTÀ DELLA SALUTE E DELLA SCIENZA DI TORINO

**Aims.** Implantable cardioverter-defibrillators (ICDs) may prevent arrhythmic sudden death (SD), although imply a not negligible risk of complications and inappropriate shocks (IS) over time. This real-world registry aimed to identify prognosis and predictors of shocks over a long-term follow-up.
**Methods.** All patients undergoing transvenous ICD implantation at our centre between 2005 and 2017 were enrolled in the registry. Appropriate shocks (AS), appropriate interventions (AI - shock and/or antitachycardia pacing) and IS were primary end-points. ICDs complications (cardiac perforation, haemothorax, pneumothorax, haematoma, infection, pacing lead dislodgement) and a composite of cardiac death/LVAD implantation/heart transplant were secondary end-points.
**Results.** 920 consecutive patients were enrolled: 167 (18%) females, 609 (66%) hypertensives, 223 (24%) diabetics, 265 (29%) with history of atrial fibrillation, 287 (31%) with NYHA III/IV class. Median age was 68 (IQR, 59-74); ejection fraction 28% (25-33), left atrial volume index (LAVi) 48 ml/sqm (38;61). 494 (54%) patients had ischemic cardiomyopathy, while 277 (30%) had idiopathic dilated cardiomyopathy. 685 (74%) patients received ICD for primary prevention of SD. One or more shock occurred in 232 (25%) patients, AI in 256 (28%) patients, AS in 162 (18%) patients, IS in 95 (10%) patients. Complications were observed in 229 (25%) patients: the most common early complication (<30 days) was mild hematoma (5.5%), while the most frequent late complication (>30 days) was pacing lead dislodgement (4.7%). An invasive treatment was required in 110 patients (12%). The composite end-point of cardiac death/LVAD implantation/heart transplant was observed in 37% patients at 5-years following ICD implantation, 69% at 12-years, without any differences between patients receiving AI or not (p=0.50, as shown in Figure below). All-cause mortality was 35% at 5-years, 67% at 12-years following ICD implantation. A worse NYHA class (HR=1.5, 95% CI 1.01-2.22), greater LAVi (HR=1.02, 95% CI 1.01-1.04), worse ejection fraction (HR=1.04, 95% CI 1.01-1.08) and ICD indication for secondary prevention (HR=2.04, 95% CI 1.05-3.85) were pre-procedural predictors of AS during the follow-up.



Male sex (HR=2.85, 95% CI 1.28-6.25), greater LAVi (HR=1.02, 95% CI 1.01-1.03), worse ejection fraction (HR=1.03, 95% CI 1.01-1.05) and ICD indication for secondary prevention (HR=2.44, 95% CI 1.43-4) were predictors of AI. History of atrial fibrillation (HR=2.73, 95% CI 1.64-4.54) and lack of treatment with beta-blockers (HR=2.04, 95% CI 1.27-3.33) were predictors of IS. A decreasing incidence of IS was observed over time, according to the year of implantation (2005-2017), from 17% to 11% (p<0.001).
**Conclusions.** The factors associated with appropriate and inappropriate ICD shocks may be considered at the time of patient selection to further improve patient selection before device implantation.

### A159: RETRIVIAL OF LEAD TIP FRAGMENT INTO RIGHT ATRIUM DURING LEAD EXTRACTION

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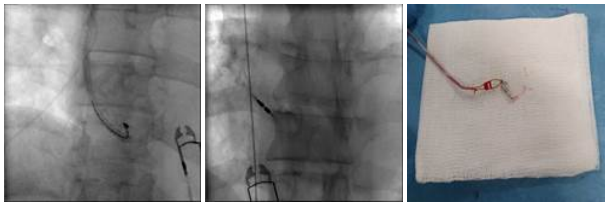
(a) S.C. CARDIOLOGIA E FISIOPATOLOGIA CARDIOVASCOLARE, UNIVERSITÀ DEGLI STUDI DI PERUGIA; (b) S.C. CARDIOLOGIA, OSPEDALE SANTA MARIA DELLA MISERICORDIA, PERUGIA

**Background.** Extraction of chronically implanted transvenous lead systems is a complex procedure and is associated with considerable morbidity and mortality. There is sometimes fragmentation of leads and migration in thoracic cardiovascular system or mediastinum that leads to failure of extraction and it could provoke pulmonary embolism, sepsis, heart/big vessels perforation.
**Case description.** We present a case of a male patient, 58 year old, that went at our attention to fistula and pocket erosion. He suffered of chronic ischemic cardiopathy treated with percutaneous revascularization. In 2013 he was treated with implant of CRT-D after recovery for congestive heart failure in optimal medical therapy; in 2015 he received inappropriate defibrillator's shock by lead fracture so it was implanted new defibrillator lead. Considering the pocket disease, we performed leads and generator extraction and, later, new CRT-D implant in right side. The procedure was performed with invasive monitoring of the BP and positioning of a metallic guide in right jugular vein (possible bridge balloon). After incision of the pocket and debridement of the leads, the working right catheter was extracted by manual traction. After that, atrial catheter and fractured right ventricular catheter were extracted with mechanical and laser devices. During laser extraction of the atrial lead, the tip of the lead was broking and floating in the right atrium. Then the fragment was recovered percutaneously, using a gooseneck catheter, a sort of lace that, after having surrounded the abandoned fragment, trapped it and allowed it to be extracted. At the end of the procedure, phlebography showed no continuity solutions of the hollow-subclavian venous tree. No post-procedural complication. After 10 days, a bicameral ICD implant was performed via right subclavian, because the coronary sinus for CRT-D was inaccessible.



**Conclusion.** The exposed case wants to show a possible complication during the extraction procedure and its percutaneous treatment.

### A160: SUCCESSFUL LEAD EXTRACTION IN A PATIENT WITH LEFT VENTRICULAR ASSIST DEVICE

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A 70-year-old man with a left ventricular assist device (LVAD) for end-stage-heart failure with severe left ventricular systolic dysfunction (ejection fraction 25%) and persistent atrial fibrillation, was admitted to perform an elective generator replacement of his implanted cardiac resynchronization therapy-defibrillator (CRT-D) device at the end of expected battery life.
During the post-operative follow up, hematoma with serohematic secretions was observed at the surgical site and, after some weeks, an implantable defibrillator pocket decubitus was observed too. So patient was readmitted in order to submit a pocket revision with removal of all the infected and necrotic tissue; during the procedure, samples of the pocket were obtained for cultural and antibiogram examination. Echocardiography performed during hospitalization showed a round shaped pedicular growth (5 x 3 mm) around the coronary sinus lead and a Positron Emission Tomography showed a radioactivity uptake in left paramedian anterior thoracic wall. Cultural examination of pocket samples showed oxacillin-resistant Staphylococcus epidermidis and Streptococcus parasanguinis infection and an appropriate antibiotic therapy was prescribed.
Two weeks later, patient presented with a massive bleeding from the surgical site and then he was urgently hospitalized. For this reason, our team performed a transvenous lead extraction of cardiac implantable device. Three leads (a passive fixation atrial lead, a passive fixation ventricular lead and a coronary sinus lead, implanted seven years before) were detached from the device (St Jude, Quadra Assura MP CD3361-40QC) and extracted with a manual traction, using locking stylet and dilator sheats. For persistence of tip of right ventricular electrode (cathode), a locking stylet was used. No postoperative complications were observed. Cultures of extracted lead showed Morganella morganii infection. Two weeks later patient was submitted to implant of a single-chamber implantable cardioverter defibrillator; the incision was made in the right pectoral region, and right subclavian vein was isolated to introduce an active fixation right ventricular catheter (Boston Scientific, Reliance 4Front 0692-59, USA) for septal pacing. The device (Boston Scientific, Resonate EL ICD, USA) was inserted in a right pectoral pocket and connected to the lead.
Routine follow up of the device showed correct device function with optimized parameters. A transesophageal echocardiography, performed six weeks later, showed absence of vegetations.
In view of a Resonate device, a HeartLogic-enabled device, patient was also remotely monitored thanks to a multisensor algorithm that predicts heart failure events in patients with implanted device, in order to adjust the treatment and avoid potential re-hospitalisations.
Infection is a serious complication of cardiovascular implantable electronic device (CIED) and is associated with significant morbidity and mortality. The optimal management of these patients becomes more challenging when CIED infection is present in a patient with LVAD and careful considerations as well as further research are needed.

### A161: AN UTSTEIN-BASED MODEL SCORE TO PREDICT SURVIVAL TO HOSPITAL ADMISSION: THE UB-ROSC SCORE

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**Purpose.** Resuscitation success after an out-of-hospital cardiac arrest (OHCA) is affected by several variables, most of them available at pre-hospital time and included in Utstein style data reporting. The study aims to develop and validate a multi-parametric practical score to predict the probability of survival to hospital admission of an OHCA victim by using Utstein Style-based variables.
**Methods.** All consecutive OHCAs of any etiology occurring from 2015 to 2017 in two regions, Pavia Province (Italy) and Canton Ticino (Switzerland), were included. We used random effect logistic regression to model survival to hospital admission after an OHCA. We computed the model area under the ROC curve (AUC ROC) for discrimination and we performed both internal validation and external validation by considering all OHCAs occurring in the same regions in 2018. The Utstein-Based ROSC score (UB-ROSC score) was derived using the coefficients estimated in the regression model. The score value was obtained adding the pertinent score components calculated for each variable. The score was then plotted against the probability of survival to hospital admission.
**Results.** 1962 patients were included in our analysis (62% males, mean age 73 ± 16 years). Age, aetiology, location, witnessed OHCA, bystander CPR, EMS arrival time and shockable rhythm were independently associated with survival to hospital admission. The model showed excellent discrimination (AUC 0.83, 95%CI 0.81-0.85) for predicting survival to hospital admission, also at internal cross-validation (AUC 0.82, 95%CI 0.80-0.84). The model maintained good discrimination after external validation by using the OHCA cohort occurring in year 2018 (AUC 0.77, 95%CI 0.74-0.80).
**Conclusions.** UB-ROSC score is a novel practical score that predicts the probability of survival to hospital admission of an OHCA victim. UB-ROSC score shall help in setting realistic expectations about sustained ROSC achievement during resuscitation maneuvers, an important target for paramedics, rescue team and for family members.

## CUORE E RENE: UN BINOMIO INSCINDIBILE
## Sessione Orale

### A162: PREVENTION OF CONTRAST-INDUCED NEPHROPATHY WITH URINE ALKALINIZATION: THE TEATE STUDY

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**Background.** The growing incidence of contrast-induced acute kidney injury (CI-AKI) has become a prognostically relevant problem, due to the prolonged hospitalization and significant morbidity/mortality. Pre-procedural hydration is the best-known and mostly accepted strategy for preventing CI-AKI. The administration of sodium bicarbonate (SB) is an attractive alternative, since alkaline pH suppresses the production of free radicals, but likely ineffective when the infused dose is unable to achieve adequate urine alkalinization.

**Objectives.** The primary endpoint of this study was to demonstrate that urine alkalinization is associated with CI-AKI prevention. The secondary endpoints were: superiority of the groups receiving SB in achieving urine alkalinization as compared with control group, non-inferiority of oral vs. i.v. SB in the ability to achieve adequate urine alkalinization.

**Methods.** In a randomized multicenter clinical trial, candidates to coronary angiography and/or angioplasty with moderate to severe chronic kidney disease were randomly assigned to one of the three arms of the study: hydration group (control group), hydration and oral SB (oral intervention group) hydration and i.v. SB (i.v. intervention group). We evaluated the urinary pH at the time of hospitalization, immediately before coronography and 24-48 hours after angiography. At the hospital admission and after 24-48 hours from the procedure we evaluated: 1) sCr; 2) serum electrolytes; 3) cystatin C 4) eGFR with MDRD formula. According to the rate of urine alkalinization immediately before the procedure, patients were divided in two groups using a cut-off of pH 6. The CI-AKI was defined as an increase > 25% of sCr and/or a decrease > 25% in eGFR and/or an increase > 44 mmol/l (0.5 mg/dL) in sCr and/or an increase > 10% in serum Cystatin C.

**Results.** As the number of the enrolled patients is half of the estimated sample, this study has to be considered a preliminar analysis. Of the 114 patients, 37 were randomly assigned to the control group, 40 to the SB I.V. and 37 patients to the oral SB group. For the primary endpoint, patients with a urinary pH ≥ 6 before angiography had an incidence of CI-AKI statistically lower than patients with an urinary pH < 6 before the procedure. The percentage of CI-AKI in patient with pH ≥ 6 was of 15% while in patients with pH < 6 was of 48%, [OR=0.185 (95%CI 0.070-0.494) p < 0.001]. For the secondary endopoint, the number of patients with urine pH ≥ 6 was superior in both iv and oral SB groups, as compared with hydration alone (88%, 84%, 62% respectively, p = 0.003).Oral was non-inferior to i.v. SB in the ability to achieve adequate urine alkalinization (p= 0.897).

**Conclusions.** In this preliminary study we demonstrated that the efficacy of the SB in the prevention of CI-AKI is due to an adequate urine alkalinization. The rate of alkalinization in the patients treated with SB was statistically superior compared to the control group. We experienced the non-inferiority between the oral and the i.v. routes of SB administration.

### A163: VALIDATION OF A NEW SCORE FOR THE DETECTION OF CONTRAST-INDUCED ACUTE KIDNEY INJURY INCLUDING MEHRAN SCORE AND PRE-PROCEDURAL GLYCEMIC LEVELS IN PATIENTS UNDERGOING PERCUTANEOUS CORONARY REVASCULARIZATION: THE GLYMEHR SCORE

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**Aims.** The Mehran score is a reliable tool to assess the individual risk of contrast-induced acute kidney injury (CI-AKI) following percutaneous coronary intervention (PCI). Furthermore, it correlates with long-term mortality and with the need of post-PCI dialysis. At the same time, hyperglycemia and peri-procedural glycemic variability were associated with a higher incidence of CI-AKI in the acute setting. Thus, the aim of this analysis was to verify the diagnostic role of both the Mehran score and pre-procedural glycemic levels in the development of CI-AKI in a wide real-world cohort of patients undergoing elective PCI and, successively, to validate a new score, composed by the combination of pre-procedural glycemia and Mehran score, in the same cohort.

**Methods.** We retrospectively enrolled 830 consecutive patients, both diabetic and non-diabetic, treated with PCI for stable angina or acute coronary syndromes. Serum creatinine was measured at the time of admission, at 24 hours from PCI and, in case of constantly increasing values, even at 48, 72 and 96 hours. The glomerular filtration rate (GFR) was calculated with the MDRD equation before the PCI and at 24 hours. CI-AKI was defined as an increase in serum creatinine ≥ 0.30 mg/dl at 24 hours from contrast media administration.

**Results.** The overall incidence of CI-AKI was 2.4% (n = 20). Patients with higher Mehran score and greater pre-procedural blood glucose levels showed increased incidence of this complication (p = 0.019 and p <0.001, respectively). The mean pre-PCI glycemia in patients developing CI-AKI was higher than in patients without post-stenting renal function deterioration (134.0 ± 45.2 mg/dl and 109.2 ± 35.8 mg/dl, respectively; p = 0.002). The ROC curve analysis confirmed Mehran score's predictive value for the development of CI-AKI with an area under the curve (AUC) of 0.659 (95% CI; 0.535-0.782; p = 0.015). Similarly, pre-procedural glycemia presented an AUC of 0.698 (95% CI; 0.557-0.838; p = 0.003). A glycemic cut-off ≥ 124 mg/dl was identified as the value with the higher sensitivity (65%) and specificity (81%), also associated with increased CI-AKI occurrence compared with patients below this threshold (7.7% vs. 1.1%; p <0.001). Thus, another ROC analysis confirmed also this glycemic cut-off as good predictive value of CI-AKI (AUC = 0.729; 0.605-0.852; p <0.001). Finally, the combination of Mehran score and pre-procedural glycemia showed a significantly improved predictive value compared with the Mehran score alone (AUC 0.740, 95% CI 0.639-0.841; p = 0.037). This evaluation allowed to reassess the 26.4% of patients with a Net Reclassification Improvement (NRI) of 0.264 (p = 0.009). Finally, we created a new score, the GlyMehr score, consisted of Mehran score plus 4 points for a glycemia ≥ 124 mg/dl (calculated using the Z-score). This new tool showed a significant prognostic power among patients with and without CI-AKI (AUC of 0.751, 95% CI 0.648-0.854), that was higher compared with the Mehran score (p = 0.006).

**Conclusion.** This new instrument showed an increased predictive value compared with the only Mehran score. This underlines the importance of an optimal glycemic control during PCI. Further studies are needed to investigate the long-term prognostic value of this new score.

### A164: RISK OF ACUTE KIDNEY INJURY IN TAVI PROCEDURES AND IMPACT ON 30-DAY OUTCOME

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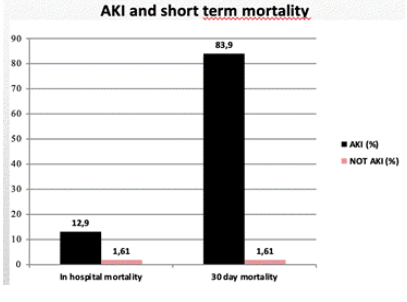
**Background.** Transcatheter aortic valve implantation (TAVI) is a safe and effective procedure for patients with symptomatic aortic stenosis who do not qualify for surgery. Nevertheless, post-procedure acute kidney injury (AKI) is a frequent complication and it is associated with worse outcomes.

**Aim.** To assess the impact of acute kidney injury (AKI) occurring immediately after the TAVI procedure on patients' outcome.

**Methods.** We conducted a multicenter retrospective study on patients treated with TAVI from 2010 to 2018. The assigned treatment, the selection of the device (self-expandable/balloon-expandable valve) and the type of approach used were determined by each individual Center on the basis of the patient's characteristics and the choice of the operator. All patients had an intermediate or high Society of Thoracic Surgeons (STS) score. Basal creatinine and glomerular filtrate (using the body mass index, sex and age) were evaluated for each patient. According to the KDIGO criteria, AKI is defined as an increase in serum creatinine (SCr) ≥0,3 mg/dl within 48 hours or an increase in SCr ≥ 1.5 times baseline or urine volume <0,5 ml/kg/h for 6 hours. The incidence of post procedural AKI and its correlation with the short-term mortality and outcomes was evaluated as primary end point (stroke/TIA/RIND, cardiac tamponade, bleeding, vascular complications, cardiocirculatory arrest with subsequent ROSC, definitive pacemaker implantation, postoperative atrial fibrillation, left bundle branch block de novo). Postoperative outcomes were defined according to the updated Valve Academic Research Consortium 2 definitions.



**Results.** a total of 371 pts were analysed. Mean age was 82.3 ± 5.9 and the majority of the pts had an STS score>10 (97.6%). Incidence of Acute kidney Injury (AKI) stage 3 post TAVI, according to VARC-2 criteria, was 16,2%. In patient with AKI the hospitalization time was longer 18,7 ± 6,1 days vs 8,4 ± 6,1 days without AKI (p<0,01). Patients with AKI had an increased risk of in hospital mortality (OR 50,0; 95% CI 5,2-390,16; p<0,01) and 30 day mortality (OR:5,88; 95% CI 2,08-16,60; p<0,01). Acute Kidney Injury instead was more common in patients treated with transapical access (OD 3,9-CI 95% 2,16-7,07; p<0,01) or with PAD (OR 1,87 - CI 95% 1,03-3,41; p=0,03).
**Conclusion.** Acute kidney injury is a frequent complication after TAVI and is the strongest predictor for 30 day mortality and increase the hospitalization time. AKI is more common in patients treated with a transapical approach or if they present a PAD. In contrast, pre-procedural chronic kidney disease did not seem to correlate directly with an increased risk of AKI.

### A165: L'INCLUSIONE DELLA DISFUNZIONE RENALE NEL CHA2DS2-VASC SCORE AUMENTA LA CAPACITÀ PREDITTIVA DELLO SCORE PER LA MORTALITÀ NEI PAZIENTI CON SINDROME CORONARICA ACUTA

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**Introduzione.** Il CHA2DS2-VASc score, inizialmente ideato per valutare il rischio di eventi cerebrovascolari in pazienti con fibrillazione atriale, si è dimostrato utile anche nella previsione della mortalità in pazienti con sindromi coronariche acuta (SCA). Questa scala consiste di parametri che sono ben noti come fattori di rischio generali per la malattia cardiovascolare ischemica, ma non prende in considerazione la funzionalità renale.
**Obiettivi.** Valutare il ruolo del punteggio CHA2DS2-VASc e del punteggio CHA2DS2-VASc con inclusione della disfunzione renale (R-CHA2DS2-VASc) nel predire la mortalità in pazienti con SCA.
**Metodi.** 908 pazienti consecutivi ricoverati presso l'Unità Coronarica del nostro istituto (70% M, età mediana 68 anni IQR 58-78) con diagnosi di NSTE-SCA (51%) e STEMI (49%) hanno composto la popolazione di studio. 616 pazienti hanno concluso un follow-up di 12 mesi e sono quindi stati considerati per l'analisi della mortalità extraospedaliera. Per ogni paziente, lo score classico CHA2DS2-VASc (CH) e tre diversi score R-CHA2DS2-VASc sono stati calcolati aggiungendo 1 punto al CHA2DS2-VASc se il paziente aveva un eGFR (calcolato con la formula CKD-EPI) <30 ml/min (R30) o eGFR <60 ml/min (R60) o eGFR <90 ml/min (R90). L'analisi delle curve ROC per i diversi score ha permesso di valutare prestazioni predittive per la mortalità intraospedaliera ed extraospedaliera degli stessi e stabilire se l'integrazione della funzione renale potesse migliorarne tali prestazioni.
**Risultati.** Il CHA2DS2-VASc score classico ed i diversi punteggi R-CHA2DS2-VASc hanno dimostrato una performance predittiva da discreta a buona per la mortalità nella nostra popolazione (AUC riportate in tabella). Come evidente, R60 ha dimostrato di essere statisticamente superiore a CH nel predire la mortalità sia intra che extraospedaliera e R90 ha mostrato superiorità rispetto a CH solo nel predire la mortalità extraospedaliera.

**Tabella 1**

| | CH | R90 | R60 | R30 |
|---|---|---|---|---|
| Mortalità intraospedaliera (n=908) | 0.75 (0.72-0.78) | 0.77 (0.74-0.79) | 0.78 (0.75-0.80)* | 0.77 (0.74-0.80) |
| Mortalità extraospedaliera (n=616) | 0.73 (0.69-0.76) | 0.76 (0.72-0.79)* | 0.76 (0.72-0.79)* | 0.73 (0.69-0.76) |

**Conclusioni.** Gli score CHA2DS2-VASc e R-CHA2DS2-VASc hanno una buona capacità predittiva per la mortalità sia intra che extraospedaliera nei pazienti con SCA. L'inclusione della disfunzione renale nello score classico ha portato ad un aumento statisticamente significativo della capacità predittiva dello score quando viene utilizzato come cutoff un eGFR di 60 ml/min.

### A166: NOVEL GLUCOSE LOWERINGAGENTS AND CONTRAST-INDUCED KIDNEY INJURY IN PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTIONS

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**Background.** Type II diabetes mellitus (T2DM) represents an important predictor of outcome in patients with coronary artery disease undergoing percutaneous coronary intervention (PCI). Several large randomized trials demonstrated the cardiovascular benefit of new hypoglycemic drugs, such as glucagon-like peptide-1 (GLP1) agonists, sodium/glucose cotransporter 2 (SGLT-2) inhibitors and dipeptidyl peptidase-4 (DPP4) inhibitors. Moreover, these drugs have been demonstrated to have also significant reno-protective effects. Otherwise, contrast-induced acute kidney injury (CI-AKI) is associated with increased morbidity and mortality in patients undergoing PCI, and T2DM patients are at higher risk for developing this complication.
**Purpose.** To investigate whether long-term treatment with new hypoglycemic drugs was associated with an improved incidence of CI-AKI compared to metformin in patients undergoing PCI.
**Methods.** We retrospectively enrolled patients with T2DM on metformin or new antidiabetic agents (GLP-1, SGLT-2 or DPP-4) undergoing PCI. Metformin was stopped 48h before PCI whereas other drugs were continued. Blood samples were collected before and at 24 and 48 hours after PCI in order to evaluate the incidence of CI-AKI, defined as a post-intervention increase in serum creatinine ≥ 0.3 mg/dl or > 25% from baseline.
**Results.** We enrolled 220 diabetic patients, 110 patients received novel glucose lowering agents and 110 patients were treated with metformin at the time of the procedure. The amount of contrast medium administered was the same for both patient groups. Patients treated with new hypoglycemic drugs had lower left ventricle ejection fraction and higher prevalence of multivessel disease. No other significant difference was identified in baseline characteristic between two groups. The incidence of CI-AKI (>25% from baseline) was 2.7% (3 patients) in patients treated with new agents versus 11.8% (13 patients) of those receiving metformin (p=0.009). Also considering the other definition (≥0.3 mg/dl), a trend towards a reduced occurrence of CI-AKI was observed in patients on GLP-1, SGLT-2 or DPP-4 (0.9% vs 4.5%; p=0.098).
**Conclusions.** These preliminary results suggest that patient on long-term treatment with novel glucose lowering agents are exposed to lower incidence of renal damage after PCI compared with those treated with metformin. These findings may be firstly explained by an improved glycemic control reported with these drugs, but also by their positive effects on inflammation and oxidative stress, factors that have been demonstrated to be involved in the CI-AKI pathophysiology. Larger prospective studies are needed to confirm this potential benefit.

### A167: THREE-YEAR ECHOCARDIOGRAPHIC OUTCOMES IN MITRACLIP PATIENTS WITH CHRONIC KIDNEY DISEASE

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**Background.** Chronic kidney disease (CKD) has been shown to impact negatively the prognosis of patients with heart failure, coronary artery or valvular heart disease and emerged as predictor of poor outcomes in mitraclip population.
**Purpose.** Aim of our study was to evaluate three-year echocardiographic outcomes in CKD patients with severe mitral regurgitation (MR) treated with mitraclip.
**Methods.** This in an observational study including patients treated with mitraclip in our institution, who completed three years of follow up. Patients population was divided into two groups according to basal creatinine clearance (CrCl): group A, including patients with normal/mild decline of renal function (CrCl > 60 ml/min) and group B, including patients with CKD (CrCl < 60 ml/min). Demographic and procedural characteristics were compared, as well as echocardiographic data, including grade of MR, left ventricular ejection fraction (LVEF), mean transmitral gradient and systolic pulmonary artery pressure (sPAP). Kaplan-Meier survival curves were obtained.
**Results.** The study population consists of 107 patients (mean age 71 ± 9 years, 69% male): 57 belonging to group A and 50 to group B. Patients of group B had higher values of LogEuroScore (22±10 vs.15±9 p=0,0002), systemic hypertension (92% vs. 74%, p=0,026), complicated diabetes (46% vs. 24% p=0,034) and NYHA IV before the procedure (24% vs 9 %, p=0,059). Additionally, patients of group B had lower baseline LVEF (35±11 vs. 41±13; p=0,012). Procedural success was similar between the two groups without significant difference in degree of MR reduction after mitraclip implantation. Echocardiographic follow-up showed that in group B, the LVEF did not improve after the treatment (more than 50% had LVEF<35% at 1,2 and 3 years) while in the group A it improved significantly (LVEF<35% from 47,6% at discharge to 29%, 32% and 31% at 1, 2 and 3 years, respectively). In comparison to group A, in group B a progressive increase in residual MR grade was observed (moderate-to-severe MR from 2% at discharge to 14%, 15%, and 27% at 1, 2 and 3 years, respectively) as well as in the mean transmitral gradient (from 3,90 ±1,6 mmHg after the mitraclip implantation to 5,28±1,7; 5,73±1,75; 6,06 ±1,75 at 1, 2 and 3 years, respectively) and sPAP (from 47±12 mmHg at discharge to 49±21; 51±20; 48±22 at 1, 2 and 3 years, respectively). Kaplan Meier estimate of survival free from in-hospital readmission was 77% in group A and 61% in group B (Log-Rank 4.563, p=0,033) and survival free from cardiovascular death was 95% and 81,5%, in group A and B, respectively (Log-Rank 4.806, p=0,028).

**Conclusions.** Our results suggest that CKD patients have poorer outcomes after mitraclip implantation with worsening of some echocardiographic parameters, particularly for residual MR degree, mean transmitral gradient and sPAP, without improvement in LVEF at one, two and three years of follow-up.

## SCOMPENSO CARDIACO – 1
## Sessione Poster

### A168: ST2, NT-PROBNP AND HIGH-SENSITIVITY TROPONIN T PREDICT DEATH AND HOSPITALIZATION IN ELDERLY PATIENTS WITH HEART FAILURE

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**Background.** Soluble suppression of tumorigenesis 2 (sST2) predicts outcome in chronic heart failure (HF). The influence of age on sST2 levels and prognostic value is not well understood.

**Methods.** Individual patient data from 13 cohorts of chronic HF patients with information on N-terminal fragment of pro-B-type natriuretic peptide (NT-proBNP), high-sensitivity troponin T (hs-TnT), sST2, and left ventricular ejection fraction (LVEF) were evaluated (n=5,301).

**Results.** Patients (median age 66 years, 75% men, 76% Caucasian, median LVEF 28%, 64% with ischemic HF) had median NT-proBNP, hs-TnT, and sST2 of 1,564 ng/L, 21 ng/L, and 29 ng/mL, respectively. NT-proBNP and hs-TnT displayed a closer correlation with age (r=0.314 and 0.250, respectively; p<0.001) than sST2 (r=0.027; p=0.007); accordingly, age independently predicted NT-proBNP and hs-TnT, but not sST2. Among elderly patients (75-84 years), sST2 improved risk reclassification for 1- and 5-year all-cause mortality and 3-, 6-, and 12-month HF hospitalization over NT-proBNP and hs-TnT. The best sST2, NT-proBNP and hs-TnT cut-offs for 5-year all-cause mortality and 12-month hospitalization were then calculated. When stratifying elderly and very elderly patients (≥85 years) based on these cut-offs, patients with the 3 biomarkers ≥cut-offs had a much higher frequency of all-cause and cardiovascular mortality and HF hospitalization than patients with all biomarkers <cut-offs or only NT-proBNP and hs-TnT ≥cut-offs.

**Conclusions.** sST2 levels are less influenced by age than NT-proBNP or hs-TnT in chronic HF. sST2 independently predicts outcome in elderly patients, and stratification of elderly and very elderly patients based on age- and outcome-specific biomarker cut-offs holds prognostic significance.

### A169: EFFECTS OF SACUBITRIL/VALSARTAN ON METABOLIC PARAMETERS AND INSULIN RESISTANCE IN PATIENTS WITH HEART FAILURE

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**Background.** Sacubitril/Valsartan has been shown to improve mortality and reduce hospitalizations in patients with heart failure with reduced ejection fraction (HFrEF). A post hoc analysis of the PARADIGM-HF study in diabetic patients showed a significantly reduction in the HbA1c. The effect of Sacubitril/Valsartan on metabolic parameter and insulin resistence in both, non obese and non diabetic patients, have not been previously described.

**Aim.** We evaluated the effects of the Sacubitril/Valsartan on both glycaemic and metabolic parameter and HOMA-IR in patients with HFrEF. Also, we evaluated, in the same patients, the effects of the Sacubitril/Valsartan on echocardiographic parameters.

**Methods.** A total of 59 patients have been enrolled consecutively and the eligibility criteria for the study were based on a diagnosis of HFrEF (EF<35%), absence of both, obesity (BMI<30 KG/m2) and type 2 DM. Have been excluded patients that used drugs which could interfere with glucose levels, including systemic corticosteroids.

All the patients at baseline and at weeks 24 underwent a complete anthropometrical evaluation, laboratory determinations including fasting glucose, fasting insulin, HbA1c and echocardiogram evaluation. The insulin resistance has been assessed by HOMA-IR.

**Results.** At the moment 38 out 59 patients enrolled completed the 24-week of treatment, the others are still in progress. The data analysis is restricted only at the patients that completed 24-week of treatment. After 24-week of treatment with Sacubitril/Valsartan a significant reduction in fasting plasma glucose (111.4±11.5 vs 106±10 mg/dl, $P$ = 0.03), fasting plasma insulin (13.6±5.9 vs 10.5±4.4 µUI/ml) and HbA1c value (6.14±0.5% vs 5.9±0.3%, $P$ <0.01) were observed. Similarly, we observed a significant improvement in insulin resistance (HOMA-IR, 3.74±2.2 vs 2.7±2.1, $P$ =0.03). No differences in anthropometrical parameters (weight, body mass index, waist circumference) and blood pressure were observed. The echocardiogram evaluation showed a significant reduction of the end-diastolic left ventricular volume (168±44 vs 150±38 ml, $P$ <0.05), a no significant reduction of the end-systolic left ventricular volume (98±26 vs 88±22 ml, $P$ =0.07) and a significant reduction of E/e[1] ratio. No differences in interventricular septal (IVS) thickness, posterior wall (PW) thickness, A-wave, E-wave and E/A ratio have been observed. Sacubitril/Valsartan use was also associated with an average 7.8% increase in ejection fraction (EF), from a mean baseline of 32.3±2.4 to 40.1±3.8 % ($P$ <0.0001).

**Conclusions.** Our data, even if preliminary, seem to indicate that sacubitril/valsartan might enhance glycaemic control and improve insulin resistance in non obese/non diabetic patients with HFrEF. Also, our data confirm that sacubitril/valsartan treatment is able to improve ejection fraction in HFrEF patients. Though these results are encouraging, our small sample, observational study requires confirmation in larger cohorts with longer follow-up period.

### A170: THE EFFECTS OF SACUBITRIL/VALSARTAN ON CARDIOVASCULAR HEMODYNAMICS RETRIEVED BY SPHIGMOCORE IN PATIENTS AFFECTED BY HEART FAILURE WITH REDUCED EJECTION FRACTION:PRELIMINARY DATA ANALYSIS

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**Introduction.** Recent introduction of sacubitril/valsartan has markedly improved pharmacological treatment of heart failure with reduced ejection fraction (HFrEF). Little is known about the effects of sacubitril/valsartan on cardiovascular haemodynamic parameters.

Aim: To investigate the effects of sacubitril/valsartan on cardiac performance and vascular function in patients affected by HFrEF.

**Methods.** We consecutively enrolled HFrEF patients attending to our HF unit and who were still symptomatic despite optimal medical therapy (NYHA class II or III) and without contraindications to sacubitril/valsartan-based therapy. All patients underwent clinical evaluation, routine lab tests, and office blood pressure (BP) measurement before starting sacubitril/valsartan therapy and three months after the titration to the maximal tolerated dose. Also, vascular indexes, including pulse wave velocity (PWV), central blood pressure and vascular age, were measured with Mobil-O-Graph.

**Results.** In this preliminary analysis, 5 consecutive patients (F 20%; mean age 66 years; mean left ventricular ejection fraction 27,6%) were enrolled. At start, mean brachial systolic (SBP) and diastolic (DBP) BP were 120/66 mmHg. After three months of treatment, there was a significant reduction in both SBP (91 mmHg; p=0,035) and DPB (56,8 mmHg; p=0,002). Mean central SBP and DBP were 106,6/67,7mmHg at start and significantly decreased after 3 months (80,8 mmHg, p 0,009 and

Figura 1

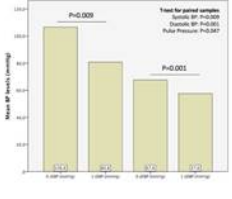
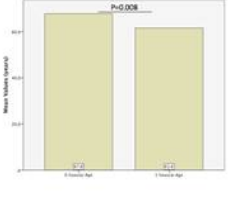


Figura 2



DBP 56,6 mmHg p=0,001, respectively) (Figure 1). Mean resting heart rate did not differ during follow-up. Stroke volume, peripheral resistances, cardiac output and cardiac index did not significantly differ between two time points, whereas PWV decreased from 9,82 to 8,86 m/sec (p=0,002). Vascular age decreased from 67,8 to 61,6 years (p=0,008) (Figure 2).
**Conclusions.** Our preliminary data indicate that sacubutril/valsartan, when added to optimal medical therapy, in patients affected by HFrEF may have favorable effects on vascular function. The decrease in BP is more evident for brachial one than central one. Accordingly, there is also a decrease of PWV whereas cardiac functional indexes do not change significantly. This evidence seems to indicate a beneficial effect on vessels, which is consistent with the reduction in vascular age.

### A171: IN-HOSPITAL PREDICTORS OF REHOSPITALIZATION FOR HEART FAILURE IN PATIENTS WITH INFECTIVE ENDOCARDITIS

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**Introduction.** The Heart Failure (HF) is the most frequently in-hospital complication of the patients with Infective Endocarditis (IE) and constituted the major indication for cardiac surgery. Few studies have investigated the incidence of HF at follow-up in patients with IE. The aim of our study is to investigate the in-hospital predictors of rehospitalization for HF in this subset of patients.
**Methods.** We retrospectively analysed a population of 375 pts, enrolled between 1992 to 2017 at our dedicated outpatients clinic, with at least 1 year follow-up.
**Results.** 87 patients (23% of the total population) underwent to rehospitalization for HF, with a mean age of 69 ± 13 years, 56% were male; according to the predisposing condition: 25% had a valvular prothesis and 11% an intracardiac device. 68% of population had arterial hypertension, 45% diabetes mellitus, 26% previous myocardial infarction, 55% had a chronic kidney disease (Stade>II), with a mean Charlson Comorbidity Index (CCI) of 3,7 ± 2,3. The NYHA class at in-hospital admission was 2,63±0,9. Enterococchi were the microorganisms major isolated (22% of the positive blood culture), followed by Staphylococcus Aureus (20%) and Staphylococci Coagulase Negative (18%); Candida was isolated in the 4% of cases. The mitral valve was involved in the 43% of cases and Aortic valve in the 47%; the Ejection Fraction (EF) was 53 ± 12%. An embolic event was detected in the 32% of cases. 19 pts (22%) underwent to a cardiac surgery. At univariate analysis: age (HR:1.050; p<0.0001), prosthetic valve (HR:1,679;p=0.040), diabetes mellitus (HR:2.295; p<0.0001), previous hospitalization for HF (HR:2.199; p=0.002), chronic kidney disease >II stadium (HR:2,736; p<0.0001), CCI (HR:1.258; p<0.0001), Candida (HR:4.021; p=0.020), pseudoaneurysm (HR: 2.729; p=0.013), NYHA at admission (HR: 1.732; p<0.0001) were associated to rehospitalization for HF. At multivariate analysis resulted an independent predictors of rehospitalization for HF: age (HR: 1.034; p<0.0001), CCI (HR:1.166; p=0.002), Candidemia (HR: 5.802; p=0.005) and NYHA at admission (HR:1.996; p=0.004). The in-hospital cardiac surgery (HR:0.455; p=0.012) was not associated to rehospitalization for HF.
**Conclusion.** Age, candidemia and NYHA class at admission are associated to rehospitalization for HF in patients with IE, while cardiac surgery exert a protective effect in this subset of patients.

### A172: LEVOSIMENDAN AND ACUTE HEART FAILURE: ESPERIENZA DI UN CENTRO CARDIOLOGICO DI RIFERIMENTO

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Acute heart failure (AHF) is characterized by rapid onset or worsening of symptoms and/or signs of HF occurring as first episode or more often consequent to an acute decompensation of chronic HF. Literature data suggest that 5-8% of pts with AHF present a low systolic blood pressure (<90 mmHg), also often associated to hypoperfusion. In this case, an inodilatator, like Levosimendan (LSD), can play a crucial role. However, ESC-HF-Guidelines published in 2016 attribute to LSD only a class IIb of recommendation, but recent papers showed its utility especially in pts with cardiorenal syndrome (CRS). Our aim is to perform a retrospective analysis of clinical and hemodynamic features and outcomes of pts hospitalized in last 3 years for acute HF associated to hypoperfusion in a referral cardiological Centre and treated with levosimendan infusion (0,1 µg/kg/min) on the basis of clinical, hemodynamic and laboratoristic parameters. LSD treated pts as preparation of a specific procedure (MitraClip, LVAD…) were excluded to analysis.
We identified 39 pts hospitalized for AHF and treated with LSD. Male were 74% (n:29) and about 1/3 were diabetics. Decompensation of chronic HF represented 74% of cases. Ischemic origin of HF was predominant 51% (n: 20); 10 pts (25%) had an acute coronary syndrome and 17 (44%) presented a cardiogenic shock. 77% was in B-blocker treatment. A history of chronic kidney disease before hospitalization was present in 17 pts (44%). Mean value of LV ejection fraction was 21±7.9%. 8 pts (20%) need a vasopressor support with norepinephrine, but no significant variations of blood pressure were registered during LSD treatment. At 48 hours from LSD onset, a significant reduction of lactic acid was observed (2,44 ± 1,7 mmol/l; *p<0.05*), also BNP values decreased (1857±1279 pg/ml vs 931±578 pg/ml; *p<0.05*). Before start LSD infusion, a significant worsening of renal function was detected compared to before hospitalization (eGFR 53 ± 34 ml/min vs 44± 31 ml/min; p<0.05), but after LSD use, recording an improvement of renal function after 6 days from LSD start (eGFR 46,7 ± 32 ml/min vs 55 ± 35 ml/min p<0.05). Also a significant reduction of furosemide dosage was noted (328 ± 290 mg/die vs 168 ± 132mg/die after 72 hours; p: 0.01). A non significant trend of increasing of urinary output (64 vs 75 cc/hour, p=0.7). Mortality rate was 28% (n: 11). Our study, besides retrospective and small sample size, shows as LSD could have a wider range of use in HF population compared to ESC-HF-guidelines suggestion. Our data show its usefulness especially in a context of worsening of renal function associated to reduction of diuretic efficacy. Moreover, actually no drugs or procedure have been demonstrated efficacy in CRS pts, so, on the basis of our data on LSD, it is auspicable a multicentric randomized trial on its use in this scenario.

### A173: SPOT URINARY SODIUM IN ADVANCED CHRONIC HEART FAILURE AND DILUTIONAL HYPONATREMIA

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(a) CITTÀ DELLA SALUTE E DELLA SCIENZA DI TORINO

**Background.** Diuretic resistance portends a poor prognosis in patients with acute heart failure. Early identification of patients with a poor response to diuretics may help to improve treatment and outcomes. Spot natriuresis at 2 hours from the start of intravenous furosemide has been proposed as an early indicator of diuretic response. Our paper aimed to determine the role of early natriuresis in patients hospitalized with advanced chronic heart failure (ACHF) and high risk of diuretic resistance.
**Methods.** This was a post hoc analysis of the DRAIN trial, a randomized clinical trial on patients with acute decompensation of ACHF (NYHA IV, EF≤30%) with low systolic blood pressure (≤110 mmHg) and dilutional hyponatremia (sodium ≤135 mMol/L) at admission. Patients were divided in 2 groups according to spot urinary sodium excretion (high: UNa+ > 50 or low: ≤ 50 mEq/L) at 2 hours from furosemide administration.
**Results.** Of 80 patients enrolled, 28 (35%) showed a low early natriuretic response. As compared to the other patients, this group showed lower daily urinary output (2275±790 vs 3849±2034 ml, p<0.001), lower body weight reduction after 48 hours (-1.55±-1.66 vs -3.55±-2.93 kg, p<0.001), higher incidence of worsening renal function (32% vs 10%, p 0.02) and increasing rather than reducing NT-proBNP at 72 hours (p 0.02).
**Conclusions.** In patients with ACHF and dilutional hyponatremia, an early low natriuretic response to furosemide is a marker of poor diuretic response and correlates with higher NT-proBNP levels and higher incidence of worsening renal function at 72 hours.

### A174: BENEFIT OF BUSPIRONE ON CHEMOREFLEX AND CENTRAL APNEAS IN HEART FAILURE: A RANDOMIZED, PLACEBO CONTROLLED, CROSS OVER, PHASE II STUDY

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**Background.** Increased chemosensitivity to carbon dioxide ($CO_2$) is an important trigger of central apneas (CA) in heart failure (HF), with negative impact on outcome. We hypothesized that buspirone, a $5HT_{1A}$ receptor agonist that inhibits serotonergic chemoreceptor neuron firing in animals, can decrease $CO_2$ chemosensitivity and CA in patients with HF.
**Methods.** The BREATH study was a single centre (Italy), double-blind, placebo-controlled, cross-over, phase 2 randomized study. Outpatients with systolic HF (left ventricular ejection fraction < 50%) and moderate-severe CA (nocturnal apnoea-hypopnea index –AHI ≥ 15 events/hour during cardiorespiratory monitoring) were randomly assigned by a computer-generated method by site to either oral buspirone (15 mg thrice daily) or placebo for 1 week, with a cross-over design (1 week of washout). The primary effectiveness endpoint was a decrease in $CO_2$ chemosensitivity (rebreathing technique) > 0.5 L/min/mmHg. The primary safety endpoint was freedom from serious adverse events related to the treatment, evaluated in all patients. This trial is closed and registered at EU Clinical Trials Register (EudraCT code 2015-005383-42).
**Results.** From December 2016 to March 2018, 16 eligible patients were randomly assigned to either buspirone or placebo. In the intention-to-treat analysis, significantly more patients treated with buspirone (8 [50%] of 16) had a $CO_2$ chemosensitivity reduction from baseline > 0.5 L/min/mmHg at 1 week than those treated with placebo (1 [6.7%] of 16); difference between group 43%, 95% CI (14-73), p=0.016. Furthermore, buspirone compared to placebo improved CA, as expressed by reduction in the AHI at nighttime (p=0.002) and daytime (p=0.006), the central apnoea index at nighttime (p=0.016) and daytime (p=0.010), and the oxygen desaturation

index at nighttime (p=0.005) and daytime (p=0.006). No patient treated with buspirone reported related-serious adverse events.
**Conclusions.** Buspirone reduces $CO_2$ chemosensitivity and improves central apneas and oxygen saturation both during the day and the night in patients with HF.
**Clinical Trial Registration.** EudraCT code 2015-005383-42 (https://www.clinicaltrialsregister.eu/ctr-search/search?query=2015-005383-42).

### A175: CENTRAL AND OBSTRUCTIVE APNEAS IN HEART FAILURE WITH REDUCED, MID-RANGE AND PRESERVED EJECTION FRACTION

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**Background.** Although central apneas (CA) and obstructive apneas (OA) are highly prevalent in heart failure (HF), a comparison of apnea prevalence, predictors and clinical correlates in the whole HF spectrum, including HF with reduced ejection fraction (HFrEF), mid-range EF (HFmrEF) and preserved EF (HFpEF) has never been carried out so far.
**Materials and methods.** 700 HF patients were prospectively enrolled and then divided according to left ventricular EF (408 HFrEF, 117 HFmrEF, 175 HFpEF). All patients underwent a thorough evaluation including: 2D echocardiography; 24-hours Holter-ECG monitoring; cardiopulmonary exercise testing; neuro-hormonal assessment and 24-hour cardiorespiratory monitoring.
**Results.** In the whole population, prevalence of normal breathing (NB), CA and OA at daytime was 40%, 51%, and 9%, respectively, while at nighttime 15%, 55%, and 30%, respectively. When stratified according to left ventricular EF, CA prevalence decreased (daytime: 57% vs. 43% vs. 42%, p=0.001; nighttime: 66% vs. 48% vs. 34%, p<0.0001) from HFrEF to HFmrEF and HFpEF, while OA prevalence increased (daytime: 5% vs. 8% vs. 18%, p<0.0001; nighttime 20% vs. 29% vs. 53%, p<0.0001).
In HFrEF, male gender and body mass index (BMI) were independent predictors of both CA and OA at nighttime, while age, New York Heart Association functional class and diastolic dysfunction of daytime CA. In HFmrEF and HFpEF male gender and systolic pulmonary artery pressure were independent predictors of CA at daytime, while hypertension predicted nighttime OA in HFpEF patients; no predictor of nighttime CA was identified. When compared to patients with NB, those with CA had higher neuro-hormonal activation in all HF subgroups. Moreover, in the HFrEF subgroup, patients with CA were older, more comorbid and with greater hemodynamic impairment while, in the HFmrEF and HFpEF subgroups, they had higher left atrial volumes and more severe diastolic dysfunction, respectively. When compared to patients with NB, those with OA were older and more comorbid independently from background EF.
**Conclusions.** Across the whole spectrum of HF, CA prevalence increases and OA decreases as left ventricular systolic dysfunction progresses. Different predictors and specific clinical characteristics might help to identify patients at risk of developing CA or OA in different HF phenotypes.

### A176: WITH SEVERE MITRAL REGURGITATION AND LEFT VENTRICULAR DYSFUNCTION UNDERGOING MITRACLIP REPAIR

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(a) DEPARTMENT OF CARDIOLOGY - UNIVERSITY OF ROME "TOR VERGATA", ROME, ITALY; (b) DEPARTMENT OF ANAESTHESIA - UNIVERSITY OF ROME "TOR VERGATA", ROME, ITALY

**Background.** MitraClip system has developed as a valid therapeutic option in patients affected by moderate to severe and severe mitral regurgitation, low left ventricular ejection fraction (LVEF) and high surgical risk. Often, after the procedure occurs afterload mismatch, an acute and transient worsening of LVEF. Inotropic drugs can improve hemodynamic values at the prize of severe side effects. Levosimendan increases myocardial contractility without an elevation of intracellular calcium concentration, tachyarrhythmia and cardiomyocytes necrosis.
**Purpose.** Aim of our study was to assess the acute Levosimendan effects on LVEF of patients who underwent MitraClip procedure
**Methods.** Among 160 patients who underwent MitraClip procedure in our institute, 99 patients, with LVEF ≤35%, were included in the study. Transthoracic echocardiogram was performed in all patients, at moment of hospital admission and at discharge; transesophageal echocardiogram was performed during the procedure. We recorded the LVEF by modified Simpson's rule. Periprocedural hemodynamic parameters were also recorded. 59 patients received Levosimendan during and early after the procedure (L-group) and 40 patients did not (no-L-group). Levosimendan perfusion was started at 0.01 µg/kg/min 1 h before the procedure without a loading dose, and maintained for 12h, according to hemodynamics.
**Results.** In the overall population, patients suffered from a severe reduction of LVEF (29.5±5.3%) and high systolic pulmonary arterial pressure (sPAP) (51±14.2 mmHg), without significant difference between the two groups. Acute procedural success was achieved in 98% of the study population, with 2 procedural failures in no-L-group (p=0.16). During the procedure we observed a significant improvement of LVEF compared to baseline values only in L-group (from 29.6±5.7% to 32.1±7.6%, p=0.046); in no-L-group the LVEF improved from 29.4±5% to 30.2±4.9% (p=0.47); at discharge the LVEF was 31.3±4.9% and 30.8±5.7%, in L-group and no-L-group, respectively (p=ns compared to baseline and procedure). At discharge the sPAP significantly reduced in the overall population to 46.3±12.7 mmHg (p 0.015): from 50.8±12.3 mmHg vs 48.7±11.9 in L-group (p=0.35); from 51.2±16 to 44.3±13.2 mmHg (p=0.04) in no-L-group. In-hospital mortality was 1.7% in L-group (1 patient die) and 0% in no-L-group. No relevant arrhythmias were reported in any patient during the hospital recovery.
**Conclusions.** In MitraClip patients with severe reduction of LVEF, Levosimendan has proven to improve hemodynamic outcome, increasing myocardial contractility during and early after procedure.

### A177: UN CASO PARTICOLARE DI MIOCARDITE

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Paziente (pz) di 69 anni di sesso maschile, fumatore con familiarità per malattie cerebrovascolari con in anamnesi nulla di rilevante ove si eccettui allergia a pollini. Il pz veniva ricoverato in seguito alla comparsa di dispnea ed ortopnea circa 15 giorni dopo aver accusato flogosi delle vie respiratorie con iperpiressia. In Pronto Soccorso veniva fatta diagnosi di scompenso cardiaco in seguito all'evidenza ecocardiografica di cardiopatia dilatativa con severa compromissione della funzione globale del ventricolo sinistro con frazione di eiezione (EF) del 24%, rigurgito mitralico di entità moderata-severa e pressioni arteriose polmonari pari a 60 mm Hg. Si riscontrava incremento di BNP (362.4 pg/ml), Troponina I hs (108 pg/ml), PCR (7.5 mg/L). I valori di pressione arteriosa erano normali ed all'ECG era presente ritmo sinusale frequenza cardiaca 65 b/m con segni di ipertrofia e sovraccarico ventricolare sinistro. Il pz apirettico, ma ancora sintomatico per dispnea, veniva trattato con diuretici, nitrati, beta-bloccanti, ace-inibitori. Veniva effettuata risonanza magnetica cardiaca (MRI) con evidenza di ventricolo sinistro dilatato (volume telediastolico 280 ml, volume telesistolico 216 ml) con acinesia della parete inferiore, ipoacinesia dell'apice vero e del segmento apicale del setto interventricolare, ipocinesia delle restanti pareti miocardiche; assenza di aree di flogosi alle sequenze STIR T2; allo studio di perfusione (primo passaggio) assenza di perfusione a carico della porzione subendocardica della parete inferiore medio-basale, vasta area di ipoperfusione a carico del segmento apicale del setto; al late enhancemente: piccola area di late enhancement con distribuzione trans murale a carico del segmento apicale della parete postero inferiore, late enhancement della porzione subepicardica della parete inferiore medio-basale giudicata verosimilmente espressione di necrosi inferiore trans murale con area subendocardica di no-reflow. Veniva successivamente effettuata coronarografia con riscontro di stenosi critica del tratto prossimale dell'art. interventricolare anteriore (99%), stenosi subcritica del segmento prossimale dell'art. circonflessa (60%) ed occlusione dell'art. coronaria destra. Il paziente veniva quindi trasferito in cardiochirurgia.
Conclusioni: è naturale pensare ad una miocardite quando visitiamo un paziente con febbre, scompenso cardiaco e disfunzione ventricolare sinistra ma la cardiopatia ischemica può talora presentarsi in assenza di angina e di alterazioni ECGgrafiche significative.

### A178: OSSERVAZIONI NUTRIZIONLI NELL'INSUFFICIENZA CARDIACA

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**Background.** L'insufficienza cardiaca è un problema sanitario estremamente rilevante. Si tratta di una sindrome clinica complessa, spesso sono presenti malnutrizione, infiammazione, stress ossidativo. Nel trattamento dell'insufficienza cardiaca vi è scarsa considerazione per il ruolo della nutrizione, mentre in letteratura sono ormai numerosi i contributi che ne evidenziano l'importanza.
**Scopo.** L'obiettivo dello studio è stato quello di identificare una strategia nutrizionale per i pazienti con insufficienza cardiaca.
**Materiali e metodi.** Ho indagato Medline utilizzando come termini di ricerca: Heart, Failure, Nutrition. Ho ottenuto 2635 items e ne ho giudicati pertinenti 101. Sulla base dei dati desunti ho tratto conclusioni circa i suggerimenti nutrizionali più opportuni per i pazienti con insufficienza cardiaca.

**Risultati.** Mancano le evidenze utili per formulare indicazioni nutrizionali precise. È sempre più chiara l'importanza che la nutrizione gioca nella progressione dell'insufficienza cardiaca. Sono suggerite una quota proteica consistente, anticatabolica, con proteina della soia e ricco profilo aminoacidico, carboidrati a basso indice glicemico, quindi frutta e verdura, grassi mono e polinsaturi e supplementazione con PUFA n-3. I fattori più importanti che influenzano le richieste nutrizionali sono il catabolismo, l'infiammazione, lo stress ossidativo, l'uso dei diuretici, la presenza di comorbidità. Tra i fattori di rischio per lo sviluppo di insufficienza cardiaca è indicato come rilevante l'aumentato consumo di cibi proinfiammatori, come le graminacee raffinate, gli zuccheri, gli acidi grassi trans, gli acidi grassi omega 6 e gli acidi grassi saturi. Sono presenti dati a favore dell'effetto dei policosanoli. Intricata la relazione con l'obesità, è descritto il "paradosso" dell'obesità, peraltro il calo ponderale dei pazienti sovrappeso/obesi con insufficienza cardiaca ne migliora la prognosi. Bidirezionale la relazione con diabete e sindrome metabolica. La supplementazione con miscele di aminoacidi ha fornito risultati positivi sia nella sperimentazione animale che in clinica, migliorando lo stato di malnurtizione, il rimodellamento, la funzione ventricolare sinistra ed il livello prestativo. La supplementazione con PUFA n-3 ha dimostrato di ottenere una riduzione della mortalità nei pazienti con insufficienza cardiaca. L'assunzione di cibi vegetali ricchi di antiossidanti naturali, quali peperoni pomodori e carote, previene gli effetti negativi sull'endotelio di pasti ricchi di grassi o ad elevato carico glicemico e pare possa migliorare la prognosi dello scompenso cardiacoIl quadro complessivo che emerge dalla letteratura mette in evidenza il ruolo del microbiota intestinale e degli interventi dietetici nel controllo dell'infiammazione nei pazienti con HF, l'importanza cruciale della "percezione" del paziente sull'impatto del controllo nutrizionale nella terapia dello scompenso, l'importanza della valutazione dello stato nutrizionale, l'importanza della restrizione del sale, il ruolo dei micronutrienti, il ruolo della disfunzione epatica, il ruolo della nutrizione ed integrazione, il ruolo degli omega 3, il ruolo del coenzima Q10, il ruolo della vitamina D, il ruolo della vitamina C, il ruolo degli aminoacidi, il ruolo del cioccolato, il ruolo della carnitina, il ruolo della funzione mitocondriale, il ruolo dell'insegnamento, il ruolo della nutrizione nella HFpEF (insufficienza cardiaca con frazione di eiezione conservata), il ruolo di diete specifiche.
**Conclusioni.** Quale strategia nutrizionale allora per i pazienti con insufficienza cardiaca? Apporto proteico consistente, in parte tratto dalla soia, con ampia varietà di aminoacidi, eventualmente assunti come miscela.Apporto di carboidrati tratti prevalentemente da frutta e verdura, con basso IG, ricchi di antiossidanti, steroli naturali ed oligoelementi. Apporto lipidico caratterizzato da grassi mono e polinsaturi, sicuramente supplementato con PUFA n-3. Tutte queste indicazioni sono rappresentate nella Dieta Zona e nelle linee guida di Jolslin Diabetes Center.

### A179: HAEMOCHROMATOSIS: A REVERSIBLE CAUSE OF HEART FAILURE

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A 27 year old male PhD student presented with a short history of breathless and fatigue. There was no past medical history and no background of smoking or substance misuse. There were signs of heart failure, including elevated central venous pressure and bilateral pleural effusions. An echocardiogram showed a non-dilated left ventricle (LV), severe biventricular dysfunction with an LV ejection fraction (LVEF) of 15%, moderate mitral regurgitation and severe tricuspid regurgitation. His cardiac Troponin-I was slightly elevated at 65 ng/L. There was concern about his outlook because of tachycardia and hypotension. He was transferred to our hospital for ongoing management.
On arrival at our hospital, he was treated with intravenous diuretics and required a period of inotropic support because of hypotension and renal dysfunction. We undertook a cardiac MRI scan to investigate the etiology of heart failure. The MRI showed a dark liver and mid wall late gadolinium enhancement, raising the possibility of an iron-overload cardiomyopathy. Iron studies were abnormal with serum Ferritin 6654 mcg/L and transferrin saturation (TSAT) 100%. We repeated the MRI scan with T2* sequences and this showed iron overload in the heart (T2* 10ms) and liver (T2* 2.1ms). We made a diagnosis of iron overload cardiomyopathy with probable juvenile form of hemochromatosis. Genetic studies have confirmed this with compound heterozygosis for 2 mutations in HJV gene.
He was treated with iron chelation therapy, comprising intravenous Desferioxamine 50 mg/kg/day as a continuous infusion and oral Deferriprone 100mg/kg/day. We looked for endocrine manifestations of haemochromatosis and found evidence of hypogonadotrophic hypogonadism. He was started on Testosterone supplementation. As his heart failure settled, we were able to wean inotropic support and establish conventional oral medical therapy for heart failure. He was eventually discharged from hospital with a peripherally inserted central cannula and continuous IV Desferioxamine.
There was a dramatic response over three months, with complete resolution of heart failure symptoms, improvement in biventricular function (LVEF 40%, normalization of RV function) and complete suppression of NTproBNP levels. As his Ferritin level reduced, we stopped Desferioxamine and then Deferriprone, converting to regular venesection for control of iron overload. He has returned to his studies.
**Conclusions.** Reversible causes of heart failure must be considered in any case of new-onset heart failure. Iron-overload cardiomyopathies may be diagnosed by a combination of iron studies, cardiac MRI assessment and genetic testing. Correct diagnosis and treatment may lead to complete recovery of cardiac function, avoiding treatments such as ICD implantation, mechanical circulatory support and heart transplantation.

## SCOMPENSO CARDIACO – 2
## Sessione Poster

### A180: MULTIPARAMETRIC APPROACH TO CONGESTION FOR PREDICTING LONG TERM SURVIVAL IN HEART FAILURE

Marco Matteo Ciccone (a), Maria Consiglia Bellino (a), Aldo Agea (a), Rossella Nitti (a), Roberta Ruggeri (a), Francesco Massari (b), Massimo Iacoviello (a), Andrea Passantino (c), Mariella Sanasi (b), Assunta Piscopo (b), Roberto Valle (d), Micaela De Palo (e), Pasquale Caldarola (f), Pietro Scicchitano (a, b)
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**Background.** Congestion is a marker of adverse prognosis in patients with heart failure (HF). In addition to brain natriuretic peptides (BNPs), estimated plasma volume status (ePVS), bioimpedance vector analysis (BIVA), and BUN/creatinine ratio (BUN/Cr) are emerging as new markers for congestion. To evaluate the prognostic value of BNP, ePVS, BIVA, and BUN/Cr in HF.
**Methods.** We analysed the data from 436 patients with acute or chronic heart failure (AHF, n=184, and CHF, n=252, respectively). BNP, e PVS, hydration index (HI%), and BUN/Cr were collected from all patients at admission. The endpoint was all-cause mortality.
**Results.** Ninety-two patients died after a median follow-up of 463 days (IQR: 287-669). The cumulative mortality of all of the patients was 21% (31% and 13% in AHF and CHF, respectively, $P$<0.0001). The optimal cut-offs for death occurrence were BNP: >441 pg/mL, eVPS: >5.3 dL/gr, HI: >73.8%, BUN/Cr: >25. Multivariate Cox regression analysis maintained an independent predictive value for mortality (HR 2. 1, HR 2.2, HR 2.1 and HR 1.7; C-index 0.756). AHF status was no longer associated with death. Together, these variables explained 40% of the risk of death ($R^2$ adjusted = 0.40). Patients with all four parameters below or above their optimal cut-off had mortality rates of 4% and 59%, respectively.
**Conclusions.** BNP, eVPS, BIVA, and BUN/Cr at admission provide independent and complementary prognostic information in patients with HF and, when combined, explain the 40% risk of death in these patients independent from the acute or chronic HF condition.

### A181: SERUM BIOCHEMICAL DETERMINANTS OF PERIPHERAL CONGESTION ASSESSED BY BIOIMPEDANCE VECTOR ANALYSIS IN ACUTE HEART FAILURE

Marco Matteo Ciccone (a), Rossella Nitti (a), Maria Consiglia Bellino (a), Aldo Agea (a), Annagrazia Cecere (a), Roberta Ruggeri (a), Francesco Massari (b), Mariella Sanasi (b), Assunta Piscopo (b), Micaela De Palo (c), Pasquale Caldarola (d), Pietro Scicchitano (a, b)
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**Background.** The pathophysiology of peripheral congestion is poorly investigated in patients with acute heart failure (AHF).
**Objectives.** To evaluate the relative contribution of serum colloid osmotic pressure (COP), relative plasma volume status (PVS), biomarkers of renal function, electrolytes, haemoglobin, and brain natriuretic peptide (BNP) in peripheral fluid overload using bioimpedance vector analysis (BIVA).
**Methods.** We retrospectively analysed data from 485 patients with AHF. Hydration status was evaluated by semiquantitative and quantitative approach using BIVA (R/Xc graph) and Hydration Index (HI), respectively. COP was calculated from albumin and total protein concentration, while relative PVS was calculated from validated equations.
**Results.** Congestion assessed by BIVA was observed in 304 (63%) patients and classified as mild (30%), moderate (42%), and severe (28%). On univariate analysis, HI was inversely correlated with COP ($P < 0.01$), glomerular filtration rate ($P < 0.01$), and haemoglobin ($P < 0.01$), while positive correlations were found for relative PVS ($P < 0.05$), BNP ($P < 0.01$), and blood urea nitrogen (BUN; $P < 0.01$). On stepwise multivariate analysis, COP explained 12% of the total variability, while BUN, PVS, haemoglobin, and BNP added a further 6%, 4%, 2%, and 1%, respectively, to the final explanatory model.
**Conclusions.** COP was the major determinant of the presence and entity

of peripheral congestion assessed by BIVA. BUN, PVS, haemoglobin, and BNP revealed reduced influence on congestion as compared with COP. Routine laboratory testing could be useful in peripheral fluid accumulation. Future studies should evaluate the relationship between COP and pharmacological target therapies for the fluid management of AHF patients.

### A182: CONGESTION AND NUTRITION AS DETERMINANTS OF BIOELECTRICAL PHASE ANGLE IN HEART FAILURE

Pietro Scicchitano (a, b), Michele Milo (a), Rosa Nitti (a), Roberta Ruggeri (a), Maria Consiglia Bellino (a), Aldo Agea (a), Andrea Passantino (e), Roberto Valle (d), Micaela De Palo (f), Paolo Sasanelli (b), Mariella Sanasi (b), Assunta Piscopo (b), Piero Guida (e), Pasquale Caldarola (c), Francesco Massari (b), Marco Matteo Ciccone (a)
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**Objective.** The whole-body bioelectrical phase angle (PhA) is emerging as a new tool in stratifying prognosis in patients with both acute (AHF) and chronic heart failure (CHF). The aim of the study was to evaluate the determinants of PhA in HF patients.

**Methods.** We analyzed data from 900 patients with AHF or CHF (mean age: 76±10 years, 54% AHF). Clinical, serum biochemical, echocardiographic and bioelectrical measurements were collected from all of patients. PhA was quantified in degrees. Congestion was assessed by a multiparametric approach, including the presence of peripheral edema, brain natriuretic peptides (BNP) plasma levels, blood urea nitrogen to creatinine ratio (BUN/Cr), and relative plasma volume status (PVS) calculated by Kaplan-Hakim's formula. Geriatric Nutritional Risk Index (GNRI) was adopted as indicator for nutritional status.

**Results.** At univariate analysis, PhA was significantly lower in females, in patients with peripheral edema, and AHF. PhA significantly correlates age, BNP, PVS, BUN/Cr, and GNRI. At multivariate analysis, congestion biomarkers emerged as the major determinant of PhA as they explained the 34% of data variability, while age, GNRI, and gender only explained 6%, 0.5%, and 0.5%, respectively (adjusted R2 = 0.41). In particular, PVS (regression of coefficient B=-0.17) explained the 20% of PhA variability, while peripheral congestion (B=-0.27) and BNP (B=-0.15) contributed to 10% and 2%, respectively.

**Conclusions.** The main determinant of bioelectrical PhA in patients with HF is congestion and PVS in particular, while nutritional status has marginal impact. This will ameliorate strategies for the management and prognostic evaluation of patients with HF.

### A183: LEFT VENTRICLE REMODELLING IN REAL-LIFE POPULATION OF PATIENTS WITH CHRONIC HEART FAILURE IN TREATMENT WITH SACUBITRIL/VALSARTAN

Lucia Tricarico (a), Adriana Mallardi (a), Michele Correale (a), Pietro Mazzeo (a), Armando Ferraretti (b), Claudia Diella (a), Valentina Romano (a), Giuseppina Merolla (a), Matteo Di Biase (c), Natale Daniele Brunetti (a)
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**Background.** Left ventricular remodeling is a major mechanism underlying disease progression in patients with Heart Failure with reduced Ejection Fraction. Previous studies and case-series have demonstrated the left ventricle ejection fraction (LVEF) improvement and reverse remodeling achieved with Sacubitril/Valsartan in a real-world setting. Therefore, as there is little scientific evidence on the subject, we decided to conduct a study on remodeling, taking into consideration other parameters not previously analyzed, including some clinical parameters, laboratory data and echocardiographic parameters derived by Tissue Doppler Imaging.

**Methods.** Patients with CHF in NYHA functional class II-III were followed up between September 2017 and January 2019. Enrollment criteria included LVEF≤35%, systolic blood pressure ≥100 mmHg, eGFR ≥30 ml/min/1.73m², potassium levels ≤5.4 mmol/l. All patients were treated with stable ACE-inhibitor or angiotensin receptor antagonist doses for at least 6 months and started treatment with sacubitril/valsartan therapy. Medical history, heart rate, systolic blood pressure, Body Mass Index, NYHA functional class, and medications were recorded and monitored. All patients underwent blood analysis, ECG, conventional and TDI echocardiography in an ambulatory setting under resting conditions, at the beginning and after 12 months of therapy with sacubitril/valsartan.

**Results.** Fifty-four consecutive CHF outpatients (mean age 66,46 ± 9,1 years, LVEF: 33,62 ± 5,54%, male: 91%, III NYHA class 33%) were enrolled in the study. At the follow-up visit the following parameters changed compared to the baseline value: NYHA class (2.31 ± 0.50 vs 2.29 ± 0.53, p = 0.79); systolic blood pressure (114.53 ± 24.03 vs 123.14 ± 19.43, p = 0.001791); HR (67.38 ± 10.10 vs 71.98 ± 15.37, p = 0.002); LVEF (36.90 ± 8.16 vs 33.18 ± 5.63, p = 0.0001); LVEDV (183.25 ± 52.11 vs 187.68 ± 50.12, p = 0.44); LVESV (114.97 ± 41.39 vs 117.89 ± 38.80, p = 0.51); E/E' ratio (14.90 ± 6.29 vs 16.10 ± 5.94, p = 0.002); NT-proBNP (713.62 ± 561.12 vs 928.12 ± 719.52, p = 0.09); Sacubitril/Valsartan dose (2.01 ± 0.83 vs 1.66 ± 0.51, p = 0.000111). The HF patients with an increased LVEF compared to patients who did not show improvement in LVEF showed: reduced HR (67.68 ± 9.76 vs 76.72 ± 17.95, p 0.03), LVEDV (157.59 ± 32.96 vs 171.48 ± 40.60, p 0.002), LVESV (93.55 ± 30.77 vs 104 ± 33.26, p 0.001), and E/E' ratio (12, 86 ± 4.719 vs 14.58 ± 4.401, p 0.046170). Changes in LVEF (between basal and follow-up) were inversely correlated with basal ESV (r -0.30, p: 0.002) and directly correlated with basal HR (r: 0.26, p: 0.05).

**Conclusions.** The treatment with Sacubitril/Valsartan in patients with HFrEF is associated with an improvement in LVEF, E/E' ratio and NT-BNP values. Furthermore, the treatment is also associated with a positive remodeling of the left ventricle, underlined by the reduction of the end-systolic and end-diastolic volumes. Some clinical variables can predict the occurrence of this positive remodeling in HFrEF: it can be found in subjects with smaller left ventricle volumes and less impaired myocardial tissue Doppler function.

### A184: PREDICTORS OF CLINICAL IMPROVEMENT IN A REAL WORLD POPULATION WITH CHRONIC HEART FAILURE IN TREATMENT WITH SACUBITRIL/VALSARTAN

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**Background.** Sacubitril/valsartan reduced mortality and re-hospitalizations in randomized trials, consistently across a number of clinical variables. Less is known, however, on real world scenarios; the aim of this study was therefore to identify possible predictors of clinical response to sacubitril/valsartan therapy in this clinical context.

**Methods.** A total of 73 consecutive patients with CHF in treatment with sacubitril/valsartan enrolled in the Daunia Heart Failure Registry were followed up. The indexed the number of hospitalizations before and after therapy with sacubitril/valsartan was compared and analyzed according to clinical and laboratory variables.

**Results.** Mean number of indexed per year hospitalizations decreased from 0.9±1.7 before treatment with sacubitril/valsartan to 0.2±0.7 after (p<0.001). A reduction in the number of indexed per year hospitalizations was observed in 38% of subjects. Differences between responders vs non responders were found for CA-125 levels (p 0.025), heart rate (p 0.01), and number of indexed hospitalizations per year (p<0.0001). At multivariate logistic regression, indexed number of hospitalizations per year remained the only significant predictor of reduced rates of hospitalization. A simple three point score (presence of at least 1 indexed hospitalization per year before treatment, CA-125 and heart rate) can be used to predict the reduction of hospitalizations after sacubitril/valsartan therapy (area under the curve 0.894).

**Conclusions.** In a real world scenario, the indexed per year number of hospitalizations may predict clinical response to sacubitril/valsartan therapy. In association to other clinical and laboratory variables, indexed number of hospitalizations may be useful in identifying best candidates to therapy with sacubitril/valsartan.

### A185: ECHOCARDIOGRAFIC FOLLOW-UP IN OUTPATIENTS WITH CHRONIC HEART FAILURE IN TREATMENT WITH SACUBITRIL/VALSARTAN

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**Background.** Sacubitril/valsartan (S/V) reduced heart failure (HF) admissions and cardiovascular mortality in clinical trial. However, there are few real-life studies on daily practice patients. We decided to conduct a study on echocardiographic follow-up in outpatients with chronic HF, taking into consideration clinical parameters, laboratory data and echocardiographic parameters in order to correlate any differences between pre and post-therapy with S/V with basal echocardiographic parameters and basal clinical parameters.

**Methods.** Patients with CHF in NYHA functional class II-III were followed up between September 2016 and June 2019. Medical history, heart rate, systolic blood pressure, Body Mass Index, NYHA functional class, and medications were recorded and monitored. All patients underwent echocardiography in an ambulatory setting under resting conditions, at the

beginning and after 12 months of therapy with S/V. We have evaluated differences between pre and post-therapy with S/V and correlations with basal echocardiographic parameters and basal clinical parameters.
**Results.** Seventy-four consecutive CHF outpatients (mean age 66±9,26 years, LVEF: 34,04 ± 9,12%, male: 88%, II-III NYHA class 97%) were enrolled in the study. At the follow-up visit the following parameters changed compared to the baseline value: LVEF (34,04±9,19% vs 39,45±9,76%; p=0,00); LVESV (121,55±55,94 mm vs 108,58±56,15 mm; p=0,001); LVEDD (61,39 ±7,66 mm vs 59,80 ±8,06 mm; p=0,01); LA area (24,88±6,86 mm vs 23,38±6,30 mm; p =0,01); PAsP (34,70±12,50 mmHg vs 31,00 mmHg ±12,75 mmHg; p=0,01) and MR degree (1,55±0,65 mm vs 1,23±0,62 mm; p= 0,000010). Difference in LVESV (between basal and follow-up) were inversely correlated with basal LVEF (r: -0,28; p: 0,029), with basal NTproBNP values (r: - 0,45; p: 0,10) and with exitus (r: - 0,28; p: 0,30). Also difference in NYHA class (between basal and follow-up) were inversely correlated with basal SIV(r: 0,24, p: 0,46) and with exitus (r: - 0,24; p: 0,41) and directly correlated with PAsP (r: 0,26; p: 0,45). Moreover, also difference in MR degree (between basal and follow-up) inversely correlated with LA area (r: - 0,26; p: 0,03).
**Conclusions.** In a real-world scenario, our results showed that S/V treatment in patients with HFrEF is associated with an improvement in multiple echocardiographic parameters and the greatest differences between pre and post S/V treatment are observed in patients with larger volumes and lowest LVEF.

### A186: FUNCTIONAL CAPACITY IN OUTPATIENTS WITH CHRONIC HEART FAILURE AND DIABETES

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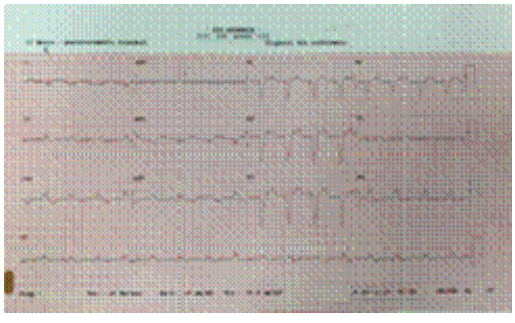
**Background.** Exercise capacity is one of the most powerful predicting factors of life expectancy in patient with HF. CPET has a pivotal role in HF prognosis and therapy management. Diabetes is the most common comorbidity of HF patients. The aim of our study was to evaluate the exercise capacity of patients with diabetes and HF taking into consideration the different antidiabetic drugs.
**Methods.** Ninety-three patients with CHF and diabetes were followed up between September 2018 and May 2019. Enrollment criteria included only patients able to perform a CPET. An initial comparison between patients with insulin therapy against oral antidiabetic drugs (OAD) was done. Furthermore, only patients with Sodium-glucose linked transporter 2 inhibitor (SGLT2) were selected and were evaluated the possible correlation between their dosage and the different parameters of CPET. Medical history, heart rate, systolic blood pressure, BMI, NYHA functional class, and medications were recorded and monitored. All patients underwent blood analysis, ECG, conventional and CPET.
**Results.** Forty-four consecutive CHF and diabetes outpatients able to perform a CPET were enrolled in the study. The population was divided into two subgroups: patients with insulin therapy (mean age: 62,25 ± 7,17 years; male 100%; LVEF: 37,25 ± 11,69%) and OAD therapy ones (mean age: 66,92 ± 8,05 years; male: 100%; LVEF: 38,67 ± 8,77). This comparison showed that the patient with insulin therapy had a better functional capacity with statistically significance of the following parameters: VO2AT (970,1 ± 410,2 vs 739,6 ± 235,3 mL/min; p = 0,036); O2 Pulse (AT) (11,48 ± 5,26 vs 8,49 ± 2,47 mL/b; p = 0,016) and peak Pulse O2 (14,46 ± 6,34 vs 11,27 ± 2,66 mL/b; p = 0,026). Furthermore in the patients treated with SGLT2 there was a direct statistically significant correlation between their dosage and the VO2AT (R = 0,61; p = 0,0057) and the O2 Pulse (AT) (R = 0,53; p = 0,019).
**Conclusions.** In a real-world scenario, our results showed that the treatment with Insulin in patients with HF and diabetes is associated with a better functional capacity compared to those with OAD therapy. Furthermore, our study was able to demonstrate, according to recent studies, that the improvement in exercise capacity in patients treated with SGLT2 was associated with the dosage.

### A187: L'EFFICACIA DELLA RESINCRONIZZAZIONE NELLA CARDIOMIOPATIA DILATATIVA

Diletta Cristaudo (b), Arcangelo Maurizio Palermo (b), Marialaura Mungo (b), Jolanda Sabatino (a), Salvatore De Rosa (a), Ennio Abramo (b), Ciro Indolfi (a)
(a) AOU MATER DOMINI UOC CARDIOLOGIA. DIPARTIMENTO SCIENZE MEDICO-CHIRURGICHE UMG CATANZARO; (b) AOU MATER DOMINI. UOC MEDICINA INTERNA. DIPARTIMENTO SCIENZE MEDICO-CHIRURGICHE UMG CATANZARO

La cardiomiopatia dilatativa è una malattia del muscolo cardiaco associata con dilatazione e distensione ventricolare sinistra associata ad eventuali segni e sintomi di scompenso cardiaco e aritmie ventricolari. Colpisce soggetti prevalentemente giovani con una lunga aspettativa di vita. In questi pazienti una terapia farmacologica è di fondamentale importanza ma a volte non sufficiente. La resincronizzazione cardiaca ha un notevole impatto sulla prognosi di questi pazienti nella prevenzione di aritmie fatali. Viene descritto il caso di una donna di 54 anni che giunge alla nostra osservazione per la comparsa di dispnea ed edemi declivi. In anamnesi non patologie prossime né remote, solo in terapia con clorazepam 1 mg, clomipramina 75 mg, flurazepam 15 mg per stato depressivo. All'ingresso la paziente si presentava dispnoica a riposo. All'esame obbiettivo cardiaco: soffio sistolico 4/6, al centrum ed all'itto. Edemi declivi improntabili fino al 1/3 superiore della coscia. All'obiettività toracica ottusità basale destra. Parametri vitali: Pa 125/90 mm hg, FC 116 bpm, SpO2 90% in aa. La paziente viene cateterizzata e si somministrano in estemporanea 3 fiale di furosemide ev. Viene impostata terapia medica a base di carvedilolo 6,25 mg x 2, enalapril 5 mg, acido acetilsalicilico 100 mg, omeprazolo 20 mg, potassio canreonato 200 mg, furosemide 20 mg x 3 ev, atorvastatina 20 mg, albumina 20% 1 fiala. Si esegue in urgenza rx torace che mette in evidenza versamento pleurico destro. Si effettua monitoraggio ECG continuo ed un ecocardiogramma che mostra cardiopatia dilatativa con severa riduzione degli indici di funzionalità sistolica ventricolare (FE 24%), insufficienza mitraglia di grado severo, insufficienza tricuspidalica di grado severo con PAPS 75 mm hg. Si avviano indagini seriologiche per Coxsackievirus, Echovirus, Adenovirus, HHV-6, Influenza e Parainfluenza, Citomegalovirus, Parvovirus B19, Chlamydia, Mycoplasma, Toxoplasma e indagini per escludere autoimmunità. Si decide di effettuare esame coronarografico che mostra coronarie esenti da lesioni. In seguito, per positività del riscontro di IgM anti CMV, si richiede test di avidità di IgG per CMV e CMV DNA e si avvia terapia con Gancyclovir 500 mg x 2. Nel corso della degenza la paziente viene monitorizzata mediante monitoraggio ecocardiografico frequente. L'obiettività clinica migliora, scompare la dispnea e si riducono gli edemi declivi, ma permane la bassa FE (25%), per cui si decide di impiantare un CRT-D con modalità di programmazione DDD a 60 bpm. Per un decorso post operatorio privo di complicanze, la paziente viene dimessa in quarta giornata. La CRT si è confermata in questo caso utile nel migliorare l'evoluzione clinica dello scompenso, la qualità di vita della paziente e nella riduzione del rischio di ospedalizzazione.



### A188: ECHO- AND B-TYPE NATRIURETIC PEPTIDE-GUIDED FOLLOW-UP VERSUS SYMPTOM-GUIDED FOLLOW-UP: COMPARISON OF THE OUTCOME IN AMBULATORY HEART FAILURE PATIENTS

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**Background and aim.** Combination of echocardiography and B-type natriuretic peptide (BNP) may be potentially valuable in guiding ambulatory heart failure (HF) management, since they can be useful in distinguishing stable patients from those at high risk of decompensation, optimizing treatment, reducing hospitalization, and consequently improving prognosis. Our objective was to determine the impact of an echo and BNP guided follow-up strategy on outcomes of patients with chronic HF.
**Methods and patients.** This was a retrospective study that involved 794 consecutive outpatients with reduced left ventricular (LV) ejection fraction (EF). In a group of 224 (Group I), follow-up care was guided by echo-Doppler signs of elevated LV filling pressure and BNP levels, in 293 patients (Group II), follow-up was clinically-guided and the remaining 277 patients (Group III) received no follow-up visits for cardiovascular care.
**Results.** At 60 months, survival free from all-cause mortality was 88% in Group I compared to 75% in Group II and 54% in Group III ($\chi^2$ 53.5; p<0.0001) patients. The three Kaplan-Meier curves exhibited statistically significant differences using Mantel-Cox analysis. The number needed to treat to spare one death was 7.9 (Group I vs Group II) and 3.8 (Group I vs Group III). At multivariate Cox regression analyses, major predictors of all-cause mortality were follow-up E/e' (HR: 1.05; p= 0.0054) and BNP > 125 pg/ml or decrease ≤30% (HR: 1.55; p= 0.0038), while BNP > 125 pg/ml or

decrease ≤ 30% and B-line numbers ≥15 were associated with the combined end point of death and HF hospitalization.
**Conclusions.** Follow-up care directed by echo and BNP improved survival in ambulatory patients with HF and reduced or mildly reduced LVEF with respect to patients followed by conventional clinical parameters and those who received no dedicated follow-up.

### A189: LEVOSIMENDAN INFUSION IN PATIENTS WITH ACUTE HEART FAILURE: ROLE OF HLM CLASSIFICATION IN THE IDENTIFICATION OF RESPONDERS AND NON RESPONDERS

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**Purpose.** Levosimendan (Levo) reduces mortality of patients affected by Acute Heart Failure (AHF) and consequent dysfunction of the main organs. We proposed HLM staging system, similar to TNM used in oncology, to assess prognosis of HF patients evaluating heart damage (H), lung involvement (L) and malfunction (M) of peripheral organs. The aim is to evaluate the outcomes of Levo infusion in AHF patients and identify the predictors of cardiac mortality and rehospitalization for major cardiovascular and cerebrovascular events (MACCE) by using HLM classification.
**Methods.** All 300 AHF enrolled patients received 24 h Levo iv infusion (0.05- 0.2 µg/kg/min, no bolus) in addition to standard therapy. Pre and post Levo infusion data for HLM classification were collected. We checked MACCE and cardiac death rate at 6 and 12 months follow up.
**Results.** Levo infusion improved HLM stages with a greater impact on L and M parameters (L, M pre vs L, M post $p < 0.001$). Patients were divided into Group A (no improvement or only in L or M) and Group B (improvement of L and M). At 6 and 12 months Group B had significant better outcomes in term of cardiac mortality and MACCE compared with Group A.
**Conclusions.** Levo infusion improves clinical status of AHF patients. HLM identifies patient responder to Levo, with a significant reduction of mortality and rehospitalization risk at 6 and 12 months beyond risk factors and AHF etiology. Using HLM it may be possible to identify patients with a poorer prognosis who need repetitive use of Levo or advanced therapy.

### A190: EFFECTS OF SACUBITRIL/VALSARTAN ON RIGHT VENTRICULAR FUNCTION IN PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION

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**Background.** In recent years, introduction of sacubitril/valsartan (S/V) has been a game-changer in heart failure (HF) therapy. While benefits on left ventricular (LV) function are well renowned, less is known about the effects on right ventricular (RV) function in patients with heart failure and reduced ejection fraction (HFrEF). The aim of our study was to evaluate the effects of S/V on RV function in a population of HFrEF (EF < 40%) patients.
**Methods.** A number of 87 HFrEF patients treated with S/V were prospectively enrolled in a two years period (June 2016 - May 2018). Our study population was divided in two arms according to their RV function: 20 patients with reduced RV function (TAPSE ≤ 15 mm; Group 1) versus 67 patients with preserved RV function (TAPSE > 15 mm, Group 2). Clinical, laboratoristic and echocardiographic parameters were evaluated at baseline and at 6 months follow-up; clinical outcome was evaluated at 12 months follow-up in terms of death for all causes, death for cardiac causes, rehospitalization for HF and a composite endpoint (cardiac death and HF rehospitalization).
**Results.** At baseline, group 2 had a higher BMI and hypertension incidence, (BMI group 1: 26,6 ± 3,5 vs group 2: 29,0 ± 5,6; p = 0,049; hypertension group 1: 80% vs group 2: 95,5%, p = 0,025). BNP and NTproBNP values were higher in group 1 than group 2 (BNP: 1211 vs 488, p = 0,008; NT-proBNP: 3570 vs 953, p = 0,029). Furthermore, patients in group 1 had lower LVEF (26,9% ± 4,9 vs 33,4% ± 5,4, p <0,001), higher sPAP values (45,0 mmHg ± 13,5 vs 32,8 mmHg ± 11,9, p <0,001) and higher E/E' ratio (20,8 ± 9,0 vs 14,2 ± 8,5, p = 0,008). At 6 months follow-up, both groups had a reduction in HF symptoms in terms of NYHA functional class (group 1 NYHA I-II 40% vs 87,5%, p= 0,001; group 2 NYHA I-II 62,7% vs 81,3%, p = 0,004). As a result, a reduction in furosemide daily dose was observed (Group 1: 87 vs 50 mg/die, p=0,014; Group 2: 50 vs 25 mg/die, p< 0,0001). The 6 months follow-up echocardiographic evaluation showed a LVEF improvement in both groups (in group 1 from 26,9 %± 4,9 to 29,9 %± 6,4, p=0,041; in group 2 from 33,4%±5,4 to 35,4%±7,9, p=0,011), with no significative improvement in RV function in group 1 (TAPSE: 13±1 mm at baseline vs 16±1 mm at 6 months follow-up, p=0,138) and in diastolic function in both groups. At 12 month follow-up, group 1 had higher incidence of death for all causes (HR 4,721; 95% CI, 1,056-21,098; p = 0,042), HF rehospitalization (HR 5,041; 95% CI, 1,348-18,859; p = 0,016) and composite endpoint (HR 3,620; 95% CI, 1,348-18,859; p = 0,026) than group 2.
**Conclusions.** S/V treatment significantly improves HF symptoms in terms of NYHA functional class in HFrEF patients, with or without RV disfunction, leading to LV reverse remodelling and to a reduction of furosemide dose at 6 months. In patients with reduced RV function (TAPSE ≤ 15 mm), S/V does not significantly improve RV systolic function. At 12 months, patients with RV disfunction had a higher rate of HF rehospitalizations, death for all causes and composite endpoint of cardiac death and rehospitalizations for HF.

### A191: DIAPHRAGMATIC FUNCTION IN ACUTE HEART FAILURE

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**Introduction.** In patients with Heart Failure (HF) the function of striated muscles can be altered. The muscles that allow ventilation have been poor studied Ventilation is dependent on the characteristics of the lung, the thoracic cavity, the ventilatory drive and diaphragmatic function and the accessory ventilator muscles.. In vitro studies demonstrate the structural and functional modification of the diaphragm in HF.
Moreover, signs of muscular exhaustion of the diaphragm could be useful to indicate the need for mechanical ventilation.
**Objectives.** The aim of our study is to analyse the prevalence of diaphragmatic dysfunction in patients with heart failure and any correlations with possible risk factors.
**Methods.** We studied the function of the diaphragm and its correlation with some nutritional parameters in a group of 14 patients suffering from heart failure and in a group of 15 control subjects. The patients were admitted to our Unit for Acute Heart Failure, with FE <50%, age> 18 years. Vitamin D, albumin, TSH, BNP, BMI, respiratory rate, serum iron, transferrin values and transferrin saturation were measured. All patients underwent chest X-ray, echocardiogram, pulmonary ultrasound at entry and discharge. Diaphragmatic thickness was measured with a high-frequency probe at the spaces between the VIII and IX ribs on the posterior axillary line. The oscillation of the diaphragm was measured with a Convex 3.5 MHz probe placed in a subdiaphragmatic seat.
**Results.** The average age of the 11 male subjects was 72.8 ± 9 and the 3 women 80.7 ± 1.1. 30% of patients had an abnormal diaphragmatic excursion. Patients with diaphragmatic dysfunction had lower values of Vitamin D, albumin and Hb than others.
**Conclusions.** The measurement of the diaphragmatic function was fast and easy to perform. 30% of patients had a reduced diaphragmatic oscillation. The diaphragm oscillation was correlated with the patient's nutritional status. These data, if confirmed by a larger sample, suggest that the function of the diaphragm and the nutritional status of patients affected from HF should be investigated to guide some therapeutic choices.

## SCOMPENSO CARDIACO – 3
## Sessione Poster

### A192: VITAMIN D DEFICIENCY IN ACUTE HEART FAILURE

Luciano De Biase (a), Maurizio Renda (a), Michelangelo Luciani (b), Valerio Pittoni (a), Alessandro Pierleoni (a), Guido Lollio (a), Simone Caffio (a), Lorenzo Chiarion Casoni (a)
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**Introduction.** Several studies have shown that a deficiency of vitamin D acts at the level of the cardiovascular system causing specifically a hyperactivation of the renin-angiotensin-aldosterone system, that can lead to an increase in blood volume and blood pressure, up to a condition of increase of vascular resistance which is one of the main risk factors for heart failure. Vitamin D induces endothelial dysfunction, interstitial fibrosis, myocardial hypertrophy, alteration of the contractility of cardiomyocytes due to alteration of the physiological flow of calcium. At

systemic level, vitamin deficiency induces an increase in the inflammatory response and a dysregulation of the immune system.
**Objectives.** the aim of our study was to measure the prevalence of vitamin D deficiency in patients with Acute Heart Failure and the relation with malnutrition.
**Methods.** We enrolled 80 patients admitted to our Department with clinical and instrumental diagnosis of Acute Heart Failure. Clinical history, physical examination, instrumental examinations and blood chemistry tests have been performed. Patients had a mean age of 74 years and more than 70% had a reduction in the glomerular filtration rate, demonstrating a possible reduced renal function: both these parameters could cause reduced vitamin D levels.
**Results.** we measured the prevalence of vitamin D deficiency in patients with Acute Heart Failure. 6.3% of patients have physiological vitamin D levels (> 30 ng / dl). 35.5% have "insufficiency" values, ranging from> 10 ng / dl to <30 ng / dl. Finally, 58.2% had levels of "deficiency" <10 ng / dl. This analysis shows that as many as 93.7% of patients have non-physiological values of vitamin D. There was a correlation (P <0.05) between vitamin D values and plasma albumin levels.
**Conclusions.** Our study showed that the deficiency of Vitamin D is very common in Acute Heart Failure. Another result of our study concerns the positive correlation between reduced levels of vitamin D and albumin which suggest the presence of global malnutrition.

### A193: EFFECT OF 1-YEAR SACUBITRIL-VALSARTAN TREATMENT ON MYOCARDIAL DEFORMATION AND LEFT VENTRICULAR EJECTION FRACTION IN PATIENTS WITH CONGESTIVE HEART FAILURE

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(a) AZIENDA OSPEDALIERA UNIVERSITARIA DI MESSINA, UOC DI CARDIOLOGIA, MESSINA, ITALY; (b) DIP. MEDICINA CLINICA E SPERIMENTALE, SCUOLA DI SPECIALIZZAZIONE IN CARDIOLOGIA, UNIVERSITÀ DI MESSINA, ITALY

**Purposes.** Only scanty “real life” information about the effect of Sacubitril-Valsartan (ARNI) on cardiac function are available yet. In this study, we sought to evaluate the effects of one-year ARNI treatment on left ventricular (LV) systolic function and myocardial longitudinal strain in patients with heart failure and reduced ejection fraction (HFrEF).
**Methods.** This was an open-label, single-center, observational study on consecutive adult patients (93% recently implanted with defibrillator) fulfilling the same inclusion and exclusion criteria as from the PARADIGM-HF trial. They were regularly followed-up with a clinical check-up and strain-echocardiography imaging.
**Results.** 42 patients (32 males), aged 61.5±11.0 years were enrolled. 93% of them had been implanted with a defibrillator device. An ischemic etiology was present in 67% of cases. Over the follow-up period, clinical conditions dramatically ameliorated, whereas repeated echocardiography investigations revealed a more gradual improvement in LV ejection fraction (from 0.27±0.04 to 0.32±0.04, p=0.01) and global longitudinal strain (from 9.5±1.3% to 12.4±1.4%, p=0.01) during the follow-up.
**Conclusions.** One-year ARNI treatment was demonstrated to improve LV ejection and GLS deformation, but in a more gradual way than their clinical benefit. The intricate relationship among clinical, biological and functional markers remains to be further elucidated.

### A194: UTILITY OF REMOTE INTRATHORACIC IMPEDANCE ALERTS IN ECHO-GUIDED CRT OPTIMIZATION: A SINGLE CENTRE EXPERIENCE

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Cardiac resynchronization therapy (CRT) is a class I recommendation in heart failure (HF) patients having sinus rhythm, left bundle branch block, QRS duration ≥120 ms and left ventricular (LV) EF ≤ 35%, despite optimized medical therapy. CRT may improve overall contraction, increase global LV ventricular efficiency and decrease the severity of secondary mitral regurgitation, thus reducing mortality and hospitalization. Echocardiographic measures of dyssynchrony still have a controversial role in the selection of patient ongoing CRT, and no single parameter is recommended to identify a positive CRT response. Even the role of echocardiographic parameters in the management of CRT patients after implantation is still troubleshooting. Atrioventricular (AV) delay reprogramming could be a variable that may influence CRT response and, although a systematic AV optimization is not required, it could be useful in selected patients not responding to CRT. Remote monitoring networks allow CRT patients to be constantly monitored, and notifications of some intrathoracic impedance index, seems to be helpful in their management, given the possibility of increasing diuretic therapy days before clinically evident HF decompensation.
**Purpose.** To evaluate the effectiveness of intrathoracic impedance alert notifications in echocardiography-guided optimization of the atrioventricular (AV) and interventricular (VV) intervals, the following study was undertaken.
**Methods.** Twenty-seven HF patients implanted with an intrathoracic impedance-enabled remote-monitoring network, and at least one specific notification after the first six months post-implantation, were enrolled for study. The primary endpoint was a composite of improvement of NYHA functional class and EF, reduction of LV end-systolic volume and re-hospitalization for decompensated HF. Secondary endpoint was the effectiveness of echo-guided delay optimization based on intrathoracic impedance alerts. The AV delay optimization was mainly driven by mitral inflow pattern while the VV delay optimization was guided by the assessment of LV synchrony using color tissue Doppler imaging (TDI). Through remote monitoring network, patients were weekly evaluated over a six-month follow-up. LVEF and LV end-systolic volume were determined at baseline and after six months (median 7.2 ± 2.4 months) of follow-up.
**Results.** After the six-month follow-up, an improvement of at least one NYHA functional class was observed in 23 patients (85%), while 2 patients (7.4%) experienced an improvements of two NYHA class. In 21 patients (77.7%) EF increased by five percentage points; delay optimization was associated with an average 11.9 % (± 6.4) increase in EF, from a mean baseline of 28.2 (± 3.2)% to 37.8 (± 6.2)%. End-systolic volume decreased from 161.56 (± 9.87) mL to 143.22 (± 15.83) mL, after optimization. Among the 27 patients with impedance alerts at baseline, only 6 (22.2%) reported new notifications during follow-up, with a statistically significant reduction (p<0.03) after optimization.
**Conclusions.** Intrathoracic impedance monitoring improved to identify non responders to CRT. Among patients having impedance notifications, echo-guided optimization of pacing intervals (through AV and VV delay reprogramming) improved functional status and increased ejection fraction. This multidisciplinary network may increase collaboration between electrophysiologists and HF physicians to better manage HF patients having a CRT system implanted.

### A195: ROLE OF ADVANCED ANALYSIS OF MYOCARDIAL FUNCTION WITH SPECKLE TRACKING ECHOCARDIOGRAPHY IN CHILDREN AFFECTED BY END STAGE HEART FAILURE

Martina Di Iorio (a), Marcello Chinali (a), Roberta Iacobelli (a), Luca Di Chiara (a), Cosimo Marco Campanale (a), Rachele Adorisio (a), Fiore Salvatore Iorio (a), Pietro Bagolan (a), Luciano Pasquini (a), Alessandra Toscano (a)
(a) OSPEDALE PEDIATRICO BAMBINO GESÙ

**Objective.** Left ventricular ejection fraction (EF) is the most commonly used parameter of systolic function but in the last years there has been great interest in development of a new quantitative methods to assess systolic function, the Global Longitudinal Strain (GLS). In adult population GLS showed a superior prognosticator for all-cause mortality compared with all other echocardiographic parameters in patients with heart failure and reduced ejection fraction, but there are no data in children. First aim of our study is to correlate GLS and EF2D in prediction of a composite endpoint of death, ventricular assist device (VAD), extracorporeal membrane oxygenation (ECMO) and cardiac transplantation in pediatric patients affected by end-stage heart failure secondary to dilated cardiomyopathy. Second aim of our study is to verify concordance between cardiac output, espressed by cardiac index, calculated with the pressure recording analytical method (PRAM) and the Doppler echocardiography method.
**Methods.** 17 patients with echocardiographic diagnosis of dilated cardiomiopathy and ventricular sistolic disfunction were enrolled in our restrospective study. All patients were admitted to Cardiac Intensive Care Unit of Bambino Gesù Children’s Research Hospital (Rome). An endomyocardial biopsy were performed in 15/17 patients. Echocardiography were performed during PRAM monitoring with Philips iE33 or EPIC 7 (Philips Medical Systems, Bothell, USA), according to American Society of Echocardiography (ASE) guidelines. Calculation of EF and strain analysis were performed in off-line modality with QLab software (Philips Medical Systems, Bothell, USA): EF is calculated with Simpson’s byplane method, GLS measurements was performed in the three standard apical views. Cardiac output is calculated with Doppler echocardiography method according to ASE guidelines. A standard arterial catheter was inserted in the radial or femoral artery and connected to pressure transducer PRAM (Mostcare, BioSi, Florence, Italy) for estimation of cardiac output.
**Results and conclusions.** Population’s study is composed by 6 males and 11 females, age between 3 month and 14 years. All patients were affected by dilated cardiomyopathy. Etiology was varies: myocarditis (7), primitive dilated cardiomyopathy (7), chemiotoxicity (1), idiopathic (2). A mitral regurgitation in 16/17 patients was present: mild (5), moderate (7), severe (4). We had two deaths, nine patients on VAD, two patients on ECMO, 3 patients on heart transplantation. We demonstrate that GLS were correlated to EF2D (p > 0,015) and that calculation of CI by echocardiographic method were significantly correlated to CI by PRAM method (p = 0,010). The correlation GLS and EF2D confirms that there is a great association between this parameters, as already demonstrated in

adults, in children with altered ventricular geometry but in our patient GLS proved to be a better predictor of adverse events (composite of death, VAD, ECMO and heart transplantation). In fact, in the events group we observed a lower GLS and a more severe mitral regurgitation. Correlation CI echo/CI PRAM was already demonstrated in children with septic shock, neuromuscular disorders and primitive respiratory insufficiency but we demonstrate that in this group of children with severe left ventricular disfunction CI measurements taken by the Doppler echocardiography method and the PRAM method were in good agreement. In conclusion, our preliminary study demonstrates that GLS is a stronger predictor of adverse events than EF in children affected by end stage heart failure. Also, calculation of cardiac output with doppler echocardiography is comparable to PRAM, therefore it could be used in reproducible and reliable way in clinical practice in pediatric patients with severe altered ventricular geometry.

### A196: EFFECTS OF SACUBITRIL/VALSARTAN ON LEFT VENTRICULAR VOLUMES AND FUNCTION IN PATIENTS WITH CHRONIC HEART FAILURE WITH REDUCED EJECTION FRACTION

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(a) AZIENDA SANITARIA DELL'ALTO ADIGE - OSPEDALE DI BOLZANO - CARDIOLOGIA E PROVE FUNZIONALI

**Aims.** Sacubitril/Valsartan reduces the rate of hospitalization and cardiovascular death in chronic heart failure patients when compared to the traditional therapy. Its action on cardiac function hasn't been completely understood yet, with only few small observational studies demonstrating a positive effect in terms of left ventricular (LV) reverse remodeling and systolic function improvement.
**Methods.** We conducted an observational prospective "real life" study on patients affected by left ventricular systolic dysfunction of different etiology. Patients were clinically followed by our Hearth Failure outpatient Center. Inclusion criteria were symptomatic severe LV systolic dysfunction (NYHA class II or III) despite optimized heart failure therapy according to the latest international guidelines. Sacubitril/Valsartan was started at enrollment replacing ACE-inhibitors or Angiotensin receptor blockers. Clinical evaluation and a complete echocardiogram were performed at enrollment and after 1, 3, 6, 9 and 12 months. Left ventricular volumes were assessed with the two-dimensional echocardiographic Simpson's biplane method. Ejection fraction (EF) was therefore derived and used as LV systolic function parameter. Statistical analysis was performed using comparison of the means (paired sample t-test).
**Results.** After an average follow-up period of 220±150 days, 50 patients (average age of 68±11 years, 68% males) underwent at least one echocardiographic evaluation after baseline. Mean end-diastolic (EDV) and end-systolic volumes (ESV) were respectively 126 ml/m$^2$ and 92 ml/m$^2$ at baseline resulting in a mean EF of 29%. At the end of the follow-up period LV volumes showed a significant reduction (EDV 112 ml/m$^2$ and ESV 79 ml/m$^2$, p<0.0001 for both, figure 1) and EF significantly increased (33.6%, meaning an effective increase of +4.6%, p < 0.0001, figure 2). Analyzing the time variation of volumes and EF. ESV significantly decreased (p=0.04) and EF significantly improved (p=0.05) starting from the third month. A significant decrease of EDV could be noticed only from the sixth month (p=0.046).
**Conclusions.** In our population, the introduction of Sacubitril/Valsartan in heart failure patients with reduced EF takes to significant LV reverse remodeling. EF improvement is, at least initially, due to a significant reduction of ESV, while the reduction of EDV is appreciable only after six months of therapy.

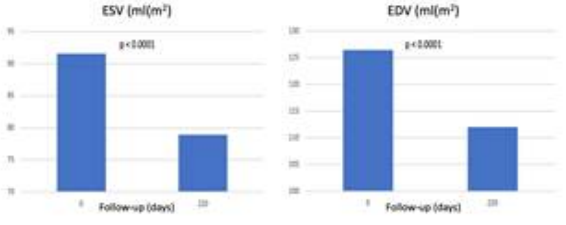



**Figure 1.** Left ventricular volumes at baseline and after a mean follow-up of 220 days since the introduction of Sacubitril/Valsartan therapy. EDV: end-diastolic volume; ESV: end-systolic volume.

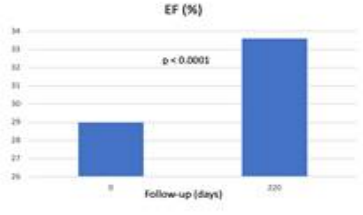



**Figure 2.** Left ventricular EF at baseline and after a mean follow-up of 220 days since the introduction of Sacubitril/Valsartan therapy. EF: ejection fraction.

### A197: EFFECTS OF SACUBITRIL/VALSARTAN ON LEFT VENTRICULAR DIASTOLIC FUNCTION IN PATIENTS WITH CHRONIC HEART FAILURE WITH REDUCED EJECTION FRACTION

Davide Ermacora (a), Luca Donazzan (a), Simona Casablanca (a), Mara Prinoth (a), Elisabeth Schoepf (a), Edoardo Bonsante (a), Elisa Apuzzo (a), Carmen Ladurner (a), Margherita Bodini (a), Andrea Erlicher (a), Renato Di Gaetano (a)
(a) AZIENDA SANITARIA DELL'ALTO ADIGE - OSPEDALE DI BOLZANO - CARDIOLOGIA E PROVE FUNZIONALI

**Aims.** Sacubitril/Valsartan showed to reduce the rate of hospitalization and cardiovascular death when compared to the traditional heart failure therapy. Currently, there is no evidence about its role on left ventricular (LV) diastolic function.
**Methods.** We conducted an observational prospective "real life" study on patients affected by left ventricular systolic dysfunction of different etiology. Patients were clinically followed by our Hearth Failure outpatient Center. Inclusion criteria were symptomatic severe LV systolic dysfunction (NYHA class II or III) despite optimized heart failure therapy according to the latest international guidelines. Sacubitril/Valsartan was started at enrollment replacing ACE-inhibitors or Angiotensin receptor blockers. Clinical evaluation and a complete echocardiogram were performed at enrollment and after 1, 3, 6, 9 and 12 months. E-wave, A-wave, E/A ratio, e'-wave (mean value between e' medial and lateral waves), E/e' ratio and systolic pulmonary artery pressure (sPAP), obtained from the continuous wave (CW) Doppler value on tricuspidal regurgitation added to right atrial pressure derived from dimensions and collapsability of inferior vena cava, were considered as parameters of diastolic function. Statistical analysis was performed using comparison of the means (paired sample t-test).
**Results.** After an average follow-up period of 220±150 days, 50 patients (average age of 68±11 years, 68% males) underwent at least one echocardiographic evaluation after baseline. At baseline mean E/e' was 15 and mean sPAP was 38 mmHg. At the end of the follow-up period both parameters showed a significant reduction, respectively 12 (p<0.0001, figure 1) and 30 mmHg (p=0.006, figure 2). The remaining parameters didn't show significant differences. Moreover, analyzing the time variation of E/e' and sPAP, both parameters started to decrease significantly from the sixth month (respectively, p<0.0001 e p=0.012).
**Conclusions.** The introduction of Sacubitril/Valsartan in the therapy of patients with systolic LV dysfunction seems to be related with an improvement of the echocardiographic diastolic parameters that describe the LV filling pressures. Particularly, this variation becomes significant after the sixth month of therapy.

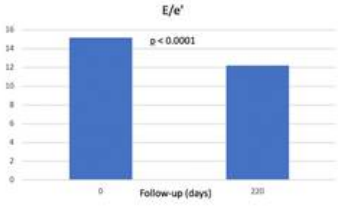



**Figure 1.** E/e' at baseline and after a mean follow-up of 220 days since the introduction of Sacubitril/Valsartan therapy.

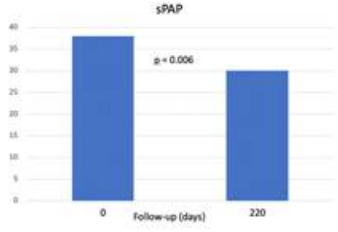



**Figure 2.** sPAP at baseline and after a mean follow-up of 220 days since the introduction of Sacubitril/Valsartan therapy. sPAP: systolic pulmonary artery pressure.

### A198: HEART RATE AT HOSPITAL DISCHARGE IN PATIENTS WITH HEART FAILURE IS ASSOCIATED WITH CARDIOVASCULAR MORTALITY AND RE-HOSPITALIZATION

Alessandro Faragli (c), Stefano Maggiolini (b), Giada Confortola (c), Burkert Pieske (c), Alessio Alogna (c), Carlo Campana (a)
(a) ASST OSPEDALE SANT'ANNA DI COMO - DIPARTIMENTO DI CARDIOLOGIA; (b) ASST OSPEDALE DI MERATE LECCO - DIPARTIMENTO DI CARDIOLOGIA; (c) CHARITE UNIVERSITÄTSMEDIZIN IN BERLIN - KARDIOLOGIE

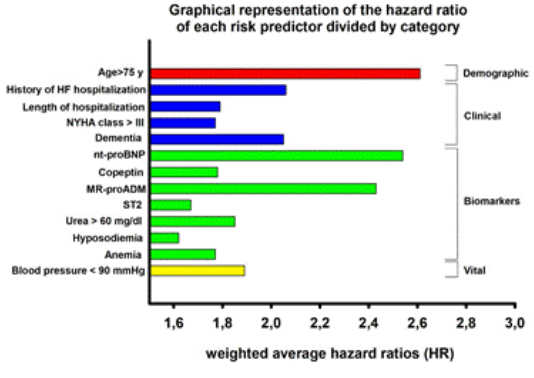
**Background.** Heart failure (HF) represents the most common cause of hospitalization in Europe and is characterized by a high morbidity and mortality. Heart rate has emerged in the past years as a potential modifiable risk factor. However, most of the clinical trials so far evaluated

patients with stable chronic heart failure and reduced ejection fraction. Aim of the study was to find out i) whether heart rate upon discharge following hospitalization for heart failure is associated with adverse outcomes at 6 months ii) the prognostic impact of heart rate lowering drugs such as ivabradine and beta-blockers.
**Methods.** In this prospective, multicenter, observational study we investigated incidence and predictors of mortality or rehospitalizations at 6 months of 241 heart failure patients discharged alive after admission for de-novo as well as worsening of heart failure in the north of Italy. The endpoints studied were death, cardiovascular death, re-hospitalizations, re-hospitalizations for HF and a combined endpoint of cardiovascular death and hospitalization. Characteristics significantly ($p < 0.05$) or nearly significantly ($p < 0.1$) associated with the observed endpoints in the univariable analysis were first entered as candidate variables in a multivariable Cox proportional hazards regression analysis. The final multivariable model was selected using a backward-elimination algorithm (retention threshold $p < 0.05$). Prognostic impact of ivabradine, beta-blockers and a combination of both were assessed by comparing event rates at follow-up.
**Results.** Of the 289 patients at hospital admission, 241 (83%) were observed at follow-up. At 6 months after discharge, 63 patients (26%) were readmitted (55% for cardiovascular causes) and 40 (17%, 55% of which for cardiovascular causes) patients died. Overall, 103 patients (43%) met the combined endpoint. By multivariate analysis, heart rate (HR) at discharge (hazard ratio [hr]=2.78; p=0.028) independently predicted cardiovascular death as well as the combined endpoint of cardiovascular death and hospitalization for HF (hr=1.94; p=0.041). At discharge, the number of patients on ivabradine and/or beta-blockers (46% vs 60%) increased, resulting in a decrease in resting HR (85±24 vs 70±12). The event rates for all-causes mortality, cardiovascular mortality as well as for the combined endpoint of patients on both ivabradine and beta blocker were lower compared to ivabradine only or beta-blockers only.
**Conclusion.** Among patients hospitalized with heart failure, higher discharge HR is associated with cardiovascular mortality and rehospitalization. The combination of the heart rate lowering drugs ivabradine and beta-blockers beneficially impacts on cardiovascular death and hospitalizations for HF.

### A199: DEVELOPMENT OF A NEW RISK PREDICTION ALGORITHM FOR HEART FAILURE PATIENTS: A SYSTEMATIC REVIEW

Alessandro Faragli (a, b), Katherine Kivimaki (b), Alandra Lopez (b), Emily Nevens (b), Dawud Abawi (a), Burkert Pieske (a), Carlo Campana (c), Alessio Alogna (a)
(a) CHARITE UNIVERSITÄTSMEDIZIN IN BERLIN - KARDIOLOGIE; (b) BOCAHEALTHCARE GMBH - CLNICAL RESEARCH UNIT; (c) ASST OSPEDALE SANT'ANNA DI COMO - DIPARTIMENTO DI CARDIOLOGIA

**Background.** Although advances have been made regarding the prediction of decompensation events in heart failure (HF) patients, the mortality risk in this group of patients is still extremely high. Current algorithms and risk prediction schemes are difficult to use and poorly utilized in the everyday clinical ward. The aim of this study is to systematically review the published studies in the last 5 years that have identified parameters predictive of major cardiovascular events to create a new risk prediction score based on the weighted average hazard ratios (HR).
**Methods.** We performed a systematic review in order to identify the most relevant risk predictors parameters for major cardiovascular events published in the last 5 years. The research criteria encompassed the combination of the key words: heart failure, risk prediction, risk stratification, algorithm, metanalysis and multivariate analysis. Data was only extracted from papers that exhibited primary endpoints involving cardiovascular hospitalization, cardiovascular death or all-cause death in heart failure populations. The final inclusion criteria encompassed the presence for each risk prediction parameter of a hazard ratio of at least 1.5 and the presence of the parameter in at least 2 published studies. The final included papers were n=19.
**Results.** The parameters that were found positive for multivariate analysis in at least 2 different studies are represented in the Figure below.




**Conclusion.** The present study shows that a possible risk prediction algorithm based on previous published literature can be implemented and should consider the size of the population analyzed. Such score can be utilized for the testing and validation of new prospective studies analyzing risk predictors. A further validation study is planned to integrate this score in an everyday clinical routine.

### A200: THE ANALYSIS OF ARTERIAL STIFFNESS IN HEART FAILURE PATIENTS AFTER AN ACUTE EPISODE OF ACUTE DECOMPENSATION

Mauro Feola (a), Marzia Testa (a), Cinzia Ferreri (a), Arianna Rossi (b), Gaetano Ruocco (a)
(a) CARDIOLOGIA OSPEDALE REGINA MONTIS REGALIS MONDOVI' (CN); (b) SCUOLA DI SPECIALIZZAZIONE IN GERIATRIA UNIVERSITÀ DI TORINO

The role of arterial stiffness in the pathogenesis and clinical outcome in heart failure (HF) patients should be elucidated yet. An increased pulse wave velocity (PWV) in HF patients in comparison with healthy subjects and cardiovascular risk factors (CVRF) patients has been demonstrated. The aim of this study was to evaluate the arterial stiffness in HF patients in comparison to control populations.
**Methods.** Consecutive patients admitted for acute decompensated heart failure (ADHF) underwent echocardiogram and evaluation of arterial stiffness by measuring the PWV and the augmentation index (AIx75). The arterial stiffness was also calculated in a control group formed by healthy volunteers and in CVRF subjects.
**Results.** 59 HF patients (62% males; age 75 years) with mean LVEF 38% and NT-proBNP (8111 pg/ml) entered the study. The HF population were compared with 22 healthy controls (age 58 ys) and 20 CVRF patients (age 72 ys). The analysis of PWV demonstrated a velocity of 10.6 m/s (9-12.1m/s), 11.7 m/sec (10.4-12.8m/s) and 10.1 m/sec (8.6-10.8m/s) in controls, CVRF and HF patients (p=0.01). AIx75 demonstrated to be higher in CVRF group vs HF patients (34% vs 22%, p=0.001). Analyzing the entire population, we showed that PWV was significantly correlated with Brachial systolic pressure (BSP) (R=0,49; p<0,001), central systolic pressure (CSP) (R=0,46; p<0,001), Brachial pulsatory pressure (BPP) (R=0,36; p<0,001) and central pulsatory pressure (CPP) (R=0,29; p<0,001). In the HF group (59 patients) PWV demonstrated a positive significant correlation with creatinine (r=0.33; p=0.01), RDW (r=0.31; p=0.02); NTpro-BNP (r=0.28; p=0.049), brachial SP (r=0.33; p=0.01), central SP (r=0.29; p=0.02) and a negative significant correlation with eGFR (r=-0.40; p=0.002). The AIx75 showed a positive, significant correlation with creatinine (r=0.27; p=0.04), sodium (r=0.28; p=0.04), central PP (r=0.43; p=0.001) and a negative significant correlation with eGFR (r=-0.33; p=0.01). Dividing our population according LVEF (HFrEF =30/59 pts; mid-range HF=16/59pts and HFpEF=13/59 pts) the median of PWV (10.8 m/s; 10.1 m/s; 10.5m/s respectively) and the Aix75 (21%; 24.5%; 25% respectively) did not change significantly (p=0.7 and p=0.6) among subgroups. The analysis of PWV and AIx75 divided for left ventricular diastolic function (0=normal, type 1-2-3) did not show significant differences (p=0.45 and p=0.73 respectively) as well.
**Conclusion.** PWV proved to be different in HF patients in comparison with CVRF/healthy population. The strongest correlation was revealed between the values of PWV/Aix75 and renal function.

### A201: PROGNOSTIC ROLE OF HLM CLASSIFICATION IN PATIENTS WITH HEART FAILURE UNDERGOING TRANSCATHETER VALVE INTERVENTION

Paolo Severino (a), Mariateresa Pucci (a), Rossana Scarpati (a), Andrea D'Amato (a), Claudia Notari (a), Marco Mariani (a), Fabio Infusino (a), Sara Cimino (a), Viviana Maestrini (a), Massimo Mancone (a), Francesco Fedele (a)
(a) UNIVERSITÀ DEGLI STUDI DI ROMA LA SAPIENZA

**Introduction.** Severe valvulopathy as aortic stenosis (AS) and mitral insufficiency (MI) usually worsen the prognosis of patients affected by Heart failure (HF), with higher rehospitalization and mortality rates. New transcatheter approaches have been introduced for patients with a very high surgical risk. To better classify HF patients in term of prognosis, we recently proposed the HLM staging system, analogous to TNM used in Oncology, which evaluates heart damage (H), lung involvement (L) and malfunction (M) of peripheral organs (JACC 2014;20;63(19):1959-60). The aim of this study is to compare HLM and NHYA classification in order to assess the most accurate prognosis of HF patients candidates for transcatheter valve implantation/repair in term of rehospitalization for major cardiovascular and cerebrovascular events (MACCE) and cardiovascular mortality.
**Methods.** The present study, intended as pilot, enrolled patients suffering from HF due to severe aortic stenosis or mitral insufficiency candidates to transcatheter valve intervention according to guidelines. Each patient was classified according to NYHA and HLM, at the entrance and at the discharge. Clinical follow-up was performed at 6 and 12 months to verify re-hospitalization for MACCE and cardiovascular mortality.
**Results.** 152 patients with HF and severe valvulopathy were enrolled (50% male, mean age 79.6 ± 9.3 years). The percentage related to severe aortic stenosis were: 72,37%, severe mitral regurgitation: 27,63%.

At 6 months of follow-up after transcatheter valve implantation/repair, the HLM showed a greater area under the ROC curve (AUC) than NYHA, in terms of rehospitalization (HLM = 0.799 vs NYHA = 0.518) and mortality (HLM = 0.808 vs NYHA = 0.522); similar results were observed at 12 months of follow-up, for rehospitalization (AUC for HLM = 0.846 vs NYHA = 0.509) and mortality (AUC for HLM = 0.866 vs NYHA = 0.517).
**Conclusions.** According to our preliminary results, HLM classification has a greater prognostic power compared to NYHA in terms of re-hospitalization and cardiovascular mortality in patients with HF undergone transcatheter valve intervention. HLM provides a more comprehensive assessment of cardiac, pulmonary and peripheral organs involvement, rather than only cardio-pulmonary symptoms evaluation. HLM might be extremely useful in patients with HF and severe valvopathy in order to better identify the right patient at the right moment to undergo intervention.

### A202: LE RISPOSTE DELLA RISONANZA MAGNETICA CARDIACA:PROGNOSI DEI PAZIENTI A RIDOTTA FRAZIONE DI EIEZIONE IN TERAPIA CON ARNI

Marta Focardi (a), Annalaura Gismondi (a), Lucia Spera (a),
Luna Cavigli (a), Flavio D'Ascenzi (a), Matteo Cameli (a),
Francesco Contorni (a), Sergio Mondillo (a)
(a) UOC DIAGNOSTICA CARDIOVASCOLARE, UNIVERSITÀ DEGLI STUDI DI SIENA

**Introduzione.** Diversi studi randomizzati hanno dimostrato la superiorità della combinazione Sacubitril-Valsartan (inibitore della neprilisina e del recettore per l'angiotensina, ARNI) rispetto al solo utilizzo di ACE inibitori, nel ridurre il tasso di mortalità cardiovascolare e di ospedalizzazione per scompenso cardiaco acuto in pazienti con scompenso cardiaco a ridotta frazione di eiezione.
**Scopo.** L'obiettivo principale dello studio è stato quello di analizzare la base fisiopatologica della risposta alla terapia con ARNI in pazienti con scompenso cardiaco a frazione di eiezione ridotta, valutata mediante risonanza magnetica cardiaca, ecocardiografia standard e test cardiopolmonare.
**Metodi.** Nello studio, prospettico osservazionale sono stati arruolati 16 pazienti maggiorenni con ridotta frazione di eiezione del ventricolo sinistro (FE ≤35%). I criteri di esclusione erano: ipotensione sintomatica, insufficienza renale stadio IV (eGFR < 30 ml/min/1.73 m2), storia di angioedema o intolleranza ad ACE inibitori e sartani, finestra acustica inadeguata, rifiuto del paziente ad essere incluso nello studio. Al momento dell'arruolamento (T0) tutti i pazienti erano in trattamento con un ACE inibitore o un sartano. Ciascun paziente è stato sottoposto ad esame obiettivo, esami ematochimici (incluso il dosaggio del NT-proBNP), ecocardiografia transtoracica standard, test da sforzo cardiopolmonare e risonanza magnetica cardiaca (RMC). In accordo con quanto raccomandato dalle linee guida per lo scompenso cardiaco, la terapia con ARNI è stata introdotta in aggiunta alla restante terapia medica standard dopo opportuna sospensione dell'ACE inibitore o del sartano. I pazienti sono stati quindi rivalutati, mediante esami ematochimici, ecocardiografia transtoracica standard e test da sforzo cardiopolmonare a distanza di 12 mesi.
**Risultati.** La popolazione analizzata era costituita per il 94% da soggetti di sesso maschile, con un'età media di 63±9 anni; in tutti si è evidenziata una significativa riduzione dei valori di NTproBNP (512.2 ± 518.5 vs 431.2 ± 330.1 ng/l, p 0,001). Il 68% (*responders*) hanno mostrato una risposta positiva a sacubitril-valsartan definita come un miglioramento della classe NYHA ed un miglioramento della funzione ventricolare sinistra (da 31.7 ± 3.4% a 36.2 ± 7.2%, p 0.01). Tra gli indici di capacità funzionale valutati con il test cardiopolmonare, solo il VE/VCO2 slope ha mostrato un miglioramento (32.7 ± 5.3 vs 29.7 ± 6.8, p 0.04). Il 32% dei pazienti (*non-responders*) non hanno mostrato significativo miglioramento dei parametri ecocardiografici di funzionalità ventricolare sinistra (da 28.4 ± 4.2% a 30.2 ± 3.5%, p>0.05), né significativo miglioramento soggettivo della capacità funzionale valutata come classe NYHA e come variazione del VE/VCO2 slope (p>0.05) al test cardiopolmonare. Nei *responders* la RMC mostravano assenza di aree di delayed enhancement (9 soggetti) o una percentuale di fibrosi inferiore al 25% (2 soggetti). Tra i *non-responders*, l'85% mostravano alla risonanza magnetica aree di delayed enhancement, di questi 3 presentavano una percentuale di fibrosi superiore al 50% con piu di 5 segmenti di fibrosi.
**Conclusioni.** Questo studio preliminare valuta gli effetti del sacubitril/valsartan su parametri sia ecocardiografici che di capacità funzionale e li correla con dati di risonanza magnetica cardiaca. I risultati pongono in evidenza la base anatomopatologica della differente risposta clinica alla terapia con ARNI sulla base della presenza e della percentuale di fibrosi miocardica alla Risonanza Magnetica Cardiaca. Ulteriori studi saranno necessari per meglio identificare il valore predittivo della risonanza magnetica sulla differente risposta alla terapia con ARNI.

## SCOMPENSO CARDIACO – 4
## Sessione Poster

### A203: HEART FAILURE MANAGEMENT IN AN OUT PATIENT CLINIC. A SEVEN YEAR EXPERIENCE IN A PERIPHERAL HOSPITAL IN PIEDMONT

Erica Franco (a), Cristina Solaro (a), Sara Quassolo (a),
Claudio Moretti (a), Francesco Pinneri (a)
(a) OSPEDALE CIVICO DI CHIVASSO

**Introduction.** Continuity of care is essential to appropriately manage patients affected by chronic heart failure (CHF). Since 2012 we follow CHF patients in an outpatient management program. Aim of this of this work is to illustrate our clinical records in a seven year out patient experience, thus highlighting a slice of clinical reality about chronic heart failure in a sub urban area of northern Italy.
**Materials and method.** An observational retrospective analysis was made about characteristics, cardiomypathy aetiology, treatments, complications and mortality of a single-centre consecutive CHF patients, examined in our HF clinic in the period between January 2012 and December 2018. Patients were evaluated though medical examination, ECG, echocardiogram.
**Results.** 191 consecutive patients were evaluated; 88 patients (46%) were affected by ischaemic cardiomyopathy; mean EF at the first examination was 34.4 %. 59 patients died with a mortality rate of 31%. 94 patients had theoretical indication for ICD implantation, 73 ICD were implanted. 29 of ICD were biventricular, and among these 23 were responders. 3 patients underwent heart transplantation and one is actually in active list. 3 patients were treated with mitral clip. VAD was implanted in 3 patients.
**Conclusions.** Patients with CHF are at high risk of mortality and rehospitalization. We takled this problem offering to these patients a strict follow-up, a personalized and careful treatment. We present our little, but prolonged experience of CHF outpatients clinic, that is a cross section of reality about CHF management in a sub urban area of northern Italy.

### A204: SIMPLE IS BETTER: A CLINICAL SCORE TO PREDICT ARRHYTHMIC EVENTS IN PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION

Domitilla Gentile (a), Gloria Santangelo (a), Francesca Bursi (a),
Maria Silvia Negroni (a), Giovanni Provenzale (a), Laura Turriziani (a),
Daniel Luigi Zambelli (a), Lorenzo Quintino Fiorista (a),
Giuseppe Bacchioni (a), Laura Massironi (a),
Diego Giacinto Tarricone (a), Stefano Carugo (a)
(a) SAN PAOLO HOSPITAL, DIVISION OF CARDIOLOGY, DEPARTMENT OF HEALTH SCIENCES, UNIVERSITY OF MILAN, ITALY

**Background.** Implantable cardioverter defibrillator (ICD) is an effective treatment to reduce mortality in patients with symptomatic heart failure (HF) with left ventricular ejection fraction (LVEF) ≤ 35%. Unfortunately, LVEF presents a low sensitivity for predicting arrhythmic events.
**Aim.** To identify predictors of sustained ventricular arrhythmias (SVAs), overall and according to the etiology of HF.
**Methods.** We performed a single center, retrospective, cohort study of 193 patients (51 non-ischemic HF and 142 ischemic HF patients) with a diagnosis of chronic HF and reduced LVEF who had received ICD for primary prevention of sudden cardiac death. We collected clinical data, echocardiographic parameters and SVAs detected by the ICD. During a median follow-up of 1440 days, 32 (16.2%) patients had SVAs, of these 19 were treated by antitachycardia pacing (ATP), 10 by DC-shock, and 3 were on ventricular tachycardia monitoring zone.
**Results.** SVAs were similar in patients with non-ischemic HF (n. 8, 15.7%) and in patients with ischemic etiology (n. 24, 16.9%). Hypertension, diabetes, chronic renal failure, atrial fibrillation, chronic obstructive pulmonary disease, New York Heart Association class ≥III were predictors at univariate analyses of SVAs. A clinical score, assigning one point to each of these variables, was associated with a significant increased risk of SVAs (OR for each point increase= 1.92, 95% CI 1.40-2.65, p<0.0001, AUC 0.73), with 72% sensitivity and 60% specificity for a cut-off ≥ 3 and remained significant both in non-ischemic (AUC 0.84 – Fig. 1) and ischemic (AUC 0.68) patients.

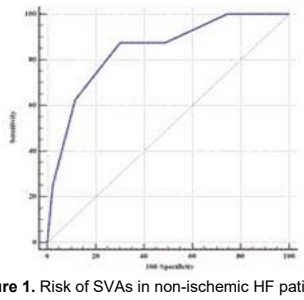


**Figure 1.** Risk of SVAs in non-ischemic HF patients.

**Conclusion.** These results show the benefit of ICD implantation in primary prevention and its independency of etiology. A simple clinical score, based on comorbidities, identifies patients with more benefits from ICD implantation.

### A205: PERSISTENCE OF CHEYNE-STOKES RESPIRATION AFTER TILT-TABLE TEST PREDICTS APNEA-HYPOPNEA INDEX AND PROGNOSIS IN SYSTOLIC HEART FAILURE

Francesco Gentile (a), Paolo Sciarrone (a), Chiara Borrelli (a, b), Guido Pasero (a), Gianluca Mirizzi (a, b), Giuseppe Vergaro (a, b), Francesca Bramanti (a), Giovanni Iudice (a), Claudio Passino (a, b), Michele Emdin (a, b), Alberto Giannoni (a, b)
(a) FONDAZIONE TOSCANA G. MONASTERIO, PISA, ITALY; (b) SCUOLA SUPERIORE SANT'ANNA, PISA, ITALY

**Background.** Cheyne-Stokes respiration (CSR) is a 24-hour phenomenon in heart failure (HF), frequently occurring also during the daytime. However, the effects of postural transitions on CSR are still unknown.

**Methods.** Stable out-patients with systolic HF (left ventricular ejection fraction–LVEF<50%) prospectively underwent a full cardiorespiratory assessment, including: 24-hour cardiorespiratory monitoring (from which apnea-hypopnea index–AHI, central apnea index–CAI, and time spent with oxygen saturation <90%–T90, were computed), and short-term cardiorespiratory monitoring on a tilt-table test (SRM), stratifying patients with a score according to the presence of normal breathing (SRM-0), CSR only when supine (SRM-1), or CSR also after tilting (SRM-2). Cardiac death was the primary endpoint at follow-up collection.

**Results.** Out of the 574 patients enrolled (age 67 [58-74] years; 80% males, LVEF 31 [25-38]%), 297 (51.8%) were SRM-0, 195 (33.9%) SRM-1, 82 (14.3%) SRM-2. Patients with SRM-2 had greater AHI, CAI and T90, worse diastolic function, neurohormonal activation, exercise tolerance, and increased chemoreflex sensitivity to hypercapnia, which was also the only multivariate independent predictor of SRM-2 compared to both SRM-0 (OR 4.04 [95%CI 1.52-10.76]; p=0.005) and SRM-1 (OR 4.23 [95%CI 1.67-10.77]; p=0.002). At 2-years follow-up, SRM-2 was related to a greater risk of cardiac death compared to both SRM-0 (hazard ratio–HR, 2.74 [95%CI 1.31-5.75]; p=0.007) and SRM-1 (HR 2.38 [95%CI 1.07-5.30], p=0.034).

**Conclusions.** Persistence of daytime CSR in orthostatic condition could be observed in a subgroup of HF patients, it is related to worse clinical condition and outcome, and independently predicted by increased chemosensitivity to hypercapnia.

### A206: OBESITY PARADOX ACROSS THE WHOLE SPECTRUM OF SYSTOLIC FUNCTION IN HEART FAILURE

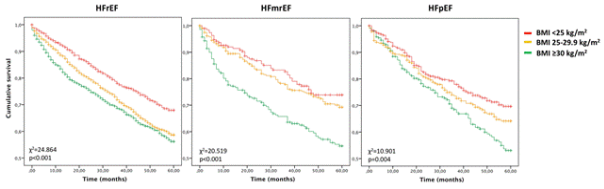
Francesco Gentile (a), Paolo Sciarrone (a), Elisabet Zamora (b), Marta De Antonio (b), Evelyn Santiago (b), Pau Codina (b), Claudio Passino (a, c), Antoni Bayes-Genis (b), Josep Lupón (b), Michele Emdin (a, c), Giuseppe Vergaro (a, c)
(a) FONDAZIONE TOSCANA G. MONASTERIO, PISA, ITALY; (b) HOSPITAL UNIVERSITARI GERMANS TRIAS I PUJOL, BADALONA (BARCELONA), SPAIN; (c) SCUOLA SUPERIORE SANT'ANNA, PISA, ITALY

**Background.** Obesity, defined as high body-mass index (BMI), is related to better prognosis and lower levels of N-terminal pro-B-type natriuretic peptide (NT-proBNP) in heart failure with either reduced (HFrEF, EF <40%) or preserved ejection fraction (HFpEF, EF ≥50%). Whether such "obesity paradox" (OP) also exists in patients with HF and mid-range EF (HFmrEF, EF 40-49%) has never been addressed. Therefore, this study aimed to assess the prognostic value of BMI in a large cohort of HF across the whole spectrum of left ventricular EF.

**Methods.** Consecutive patients with chronic stable HF were enrolled in two tertiary Centers in Italy (Fondazione Toscana Gabriele Monasterio, Pisa) and Spain (Hospital Universitari Germans Trias i Pujol, Badalona) and classified as having HFrEF, HFmrEF or HFpEF. BMI data were collected to further stratify patients into low-normal weight (<25 kg/m$^2$), overweight (25-29.9 kg/m$^2$), and obese (≥30 kg/m$^2$). After enrolment, patients were followed-up for the primary endpoint of 5-year all-cause mortality.

**Results.** We enrolled 5,155 patients (2,763 in Pisa and 2,392 in Badalona; age 70 [60-77] years; 71% males; ejection fraction 35% [27-45]). The prevalence of HFrEF, HFmrEF, and HFpEF was 63% (n=3,226), 18% (n=947), 19% (n=982), respectively. Obese patients were 725 (22%), 250 (26%) and 354 (36%) in HFrEF, HFmrEF, and HFpEF (p<0.001). At Kaplan-Meier survival analysis, obese patients had the lowest 5-year all-cause mortality (Figure 1) in HFrEF, HFmrEF and in HFpEF (p<0.001 in all groups). Similar results were observed considering cardiac and non-cardiac mortality separately. After adjustment for age, gender, therapy with β-blockers, ACEi/ARBs, aldosterone antagonists, furosemide, NYHA class, and renal function, obesity independently predicted better survival when the HF etiology was non-ischemic but not when etiology was ischemic in either HFrEF, HFmrEF and HFpEF.

**Conclusions.** Obesity is independently associated with better survival in patients with HFmrEF. The prognostic benefit of obesity is lost in the subgroup of patients with HF of ischemic etiology.




### A207: CONTRIBUTION OF THE LUNG TO THE GENESIS OF CHEYNE-STOKES RESPIRATION IN HEART FAILURE: PLANT GAIN BEYOND CHEMOREFLEX GAIN AND CIRCULATION TIME

Alberto Giannoni (a, b), Francesco Gentile (a), Alessandro Navari (a), Chiara Borrelli (a, b), Gianluca Mirizzi (a, b), Giosuè Catapano (a), Giuseppe Vergaro (a, b), Francesco Grotti (a), Monica Betta (c), Massimo F. Piepoli (d), Darrel P. Francis (e), Claudio Passino (a, b), Michele Emdin (a, b)
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**Background.** The contribution of the lung or the plant gain (PG; i.e., change in blood gases per unit change in ventilation) to Cheyne-Stokes respiration (CSR) in heart failure has only been hypothesized by mathematical models, but never been directly evaluated.

**Methods.** Twenty patients with systolic heart failure (age, 72.4±6.4 years; left ventricular ejection fraction, 31.5±5.8%), 10 with relevant CSR (24-hour apnea-hypopnea index [AHI] ≥10 events/h) and 10 without (AHI <10 events/h) at 24-hour cardiorespiratory monitoring, underwent evaluation of chemoreflex gain (CG) to hypoxia ($CG_{O2}$) and hypercapnia ($CG_{CO2}$) by rebreathing technique, lung-to-finger circulation time, and PG assessment through a visual system.

**Results.** PG test was feasible and reproducible (intraclass correlation coefficient, 0.98; 95% CI, 0.91–0.99); the best-fitting curve to express the PG was a hyperbola ($R^2$ ≥0.98). Patients with CSR showed increased PG, $CG_{CO2}$ (but not $CG_{O2}$), and lung-to-finger circulation time, compared with patients without CSR (all P <0.05). PG was the only predictor of the daytime AHI (R=0.56, P=0.01) and together with the $CG_{CO2}$ also predicted the nighttime AHI (R=0.81, P=0.0003) and the 24-hour AHI (R=0.71, P=0.001). Lung-to-finger circulation time was the only predictor of CSR cycle length (R=0.82, P=0.00006).

**Conclusions.** PG is a powerful contributor of CSR and should be evaluated together with the CG and circulation time to individualize treatments aimed at stabilizing breathing in heart failure.

### A208: CHARACTERISTICS AND OUTCOMES OF HEART FAILURE PATIENTS WITH A HISTORY OF CANCER

Stefano Giovinazzo (a), Matteo Toma (a), Giovanni La Malfa (a), Ginevra Rizzola (a), Vincenzo De Marzo (a), Amedeo Tirandi (a), Italo Porto (a), Marco Canepa (a), Pietro Ameri (a)
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**Background.** Patients with cancer and HF face an increased risk of mortality, which may be related to under-treatment of either disease in the presence of the other one.

**Methods.** By reviewing the records of 612 consecutive HF outpatients referred to a tertiary clinic between Oct. 2014 and May 2019, we selected those meeting the following criteria: ≥2 visits over the study period with a ≥90 days of follow-up; available information regarding HF therapy at both the basal and last evaluation, as well as about hospitalizations and death, if any. Doses of renin-angiotensin-system inhibitors (RASi) and beta-blockers (BB) were calculated as enalapril and bisoprolol equivalent. The characteristics of patients with vs. without a history of cancer were compared by chi-square or t-test, as appropriate. The correlates of RASi omission were investigated by means of a logistic regression model including the variables significantly different between subjects without vs. with a history of cancer (non-cancer and cancer patients, respectively).

**Results.** 377 non-cancer and 62 cancer patients were eligible for the study. In most cases (83.9%), cancer was in remission or cured at the time of the first visit. During follow-up, 21 non-cancer subjects were diagnosed with new malignancies and, therefore, were not taken into account. Patients excluded from the analysis had significantly higher serum creatinine concentrations (sCr) and left ventricular ejection fraction and lower systolic blood pressure than those retained; use of RASi was also less common in these subjects. As compared with non-cancer patients, cancer ones were older (73.5±9.9 vs. 68.7±13.6 years; P=0.01) and more symptomatic (NYHA class 2.1±0.9 vs. 1.8±0.7, P=0.01), and had higher sCr (1.4±0.9 vs. 1.3±0.5 mg/dL, P=0.02) at the baseline evaluation. Furthermore, they were significantly less often on RASi [38 (61.3 %) vs. 268 (75.3%); P=0.02]. The underuse of RASi persisted at the last visit [37 (59.7%) vs. 273 (76.7%); P=0.01]. While there were no other differences in the frequency of other disease-modifying drugs, the mean

beta-blocker dose at the last observation was significantly lower in the cancer than non-cancer group (3.5±2.2 mg/d vs. 4.3±2.8 mg/d; P=0.04). The association between history of cancer and RASi omission was confirmed in univariate analysis (OR 2.22, 95%CI 1.27-3.91; P=0.04), but did not persist after adjusting for age, NYHA class and sCr (OR 1.76, 95%CI 0.84-3.67; P=0.14). By contrast, age (OR 0.97, 95%CI 0.94-0.99; P=0.02) and NYHA class (OR 0.61, 95%CI 0.41-0.88; P=0.01) were significantly associated with RASi non-prescription. Over a median follow-up of 555 days, 53 (12.7%) subjects died or underwent implantation of LVAD or cardiac transplantation, whereas 159 (38%) were hospitalized at least once: no differences in major outcomes were found between the cancer and non-cancer groups.

**Conclusions.** In our sample, there was no independent association of a history of cancer with under-use of HF medications or worse outcomes. Further studies with larger cohorts are needed to understand whether and how cancer affects the management and prognosis of HF.

### A209: LONGITUDINAL CHANGES IN RENAL FUNCTION IN HEART FAILURE PATIENTS RECEIVING ORAL ANTICOAGULATION FOR ATRIAL FIBRILLATION

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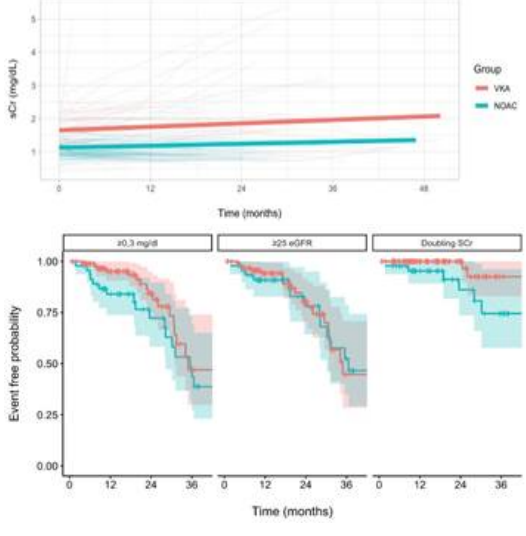
**Background.** It has been reported that deterioration in renal function is less common in subjects receiving non-vitamin K antagonist oral anticoagulant (NOAC) for non-valvular atrial fibrillation (NVAF) than in those taking vitamin K antagonist (VKA). This effect may be particularly relevant in heart failure (HF), which is associated with substantial rates of worsening renal function (WRF).

**Methods.** By reviewing the records of 612 consecutive HF outpatients referred to our tertiary clinic from October 2014 through April 2019, we selected those on VKA or NOAC for NVAF and ≥2 visits with serum creatinine (sCr) assessed. Their characteristics at the first evaluation were compared by chi-square or t-test, as appropriate. The relationship between changes in sCr or estimated glomerular filtration rate (eGFR, as obtained by means of the CDK-EPI equation) over time and type of anticoagulation was investigated by a linear mixed effect model, adjusted for a propensity score calculated from the baseline variables. The following WRF outcomes were studied by Kaplan-Meier analysis and propensity score-adjusted Cox regression: increase by ≥0.3 mg/dL or doubling of sCr (hereafter increased sCr and doubled sCr, respectively) and reduction in eGFR ≥25% (reduced eGFR).

**Results.** 46 patients on VKA and 99 on NOAC were included in the analysis. The former were older (76.4±8.4 vs. 73±12.4 years, P=0.09) and had more often left ventricular ejection fraction ≥40% (56.5% vs. 38.4%, P=0.06) than the latter, although not a significant extent. They also had more frequently diabetes (41.3% vs. 22.2%, P=0.03), chronic kidney disease (63% vs. 19.2%, P<0.001) and anaemia (23.9% vs. 9.1%, P=0.03). During a median follow-up of 568 days (IR 556), the mean annual increase in sCr was higher in VKA than NOAC users (0.06 mg/dL vs. 0.03 mg/dL, P<0.001; Figure), but there was no significant interaction




between sCr or eGFR changes over time and treatment group. Increased sCr and doubled sCr were more common in patients on VKA than on NOAC (respectively: 39.1% vs. 19.3%, P=0.01; and 13% vs. 2%, P=0.007), while reduced eGFR did not differ between the two groups (30.4% vs. 22.2%, P=0.29; Figure). After adjustment, the probability of any WRF outcome was also not different between VKA and NOAC recipients (increased sCr: HR 0.73, CI95% 0.33-1.65, P=0.45; doubled sCr: HR 0.55, CI95% 0.08-3.88, P=0.55; reduced eGFR: HR 0.90, CI95% 0.39-2.08, P=0.81).

**Conclusions.** Larger studies are needed to understand whether renal function is differently affected by VKA or NOAC in HF patients with NVAF.

### A210: EXPLORING THE ROLE OF RENAL ION CHANNELS IN THE PATHOGENESIS OF HEART FAILURE AND RELATED MULTIORGAN DYSFUNCTION: TOWARD THE IDENTIFICATION OF NEW THERAPEUTIC TARGETS

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Declining renal function is one important comorbidity of heart failure (HF). The crosstalk between heart and kidney in HF involves multiple mechanisms including hemodynamic alterations and activation of neurohormonal and pro-inflammatory pathways. Various stimuli including angiotensin II, aldosterone and catecholamine activated in HF, increases the count of T cells, which, together with various cytokines, infiltrate renal tissue and contribute to sodium chloride retention, water imbalance and elevated vascular resistance (Azzam et al., *Front Immun* 2017). Along nephron segments, renal ion channels, including chloride (ClC-K) and potassium channels (Kir4.1, Kir5.1, ROMK), are the actual actors of the tubular salt and water reabsorption. Thus, the definite role played by cytokines and inflammatory mediators in modulating the activity of renal ion channels is arising growing interest in HF. Kidney ClC-K/barttin channels govern chloride absorption and urine concentration. ClC-Ks gain of function polymorphisms could predispose to human hypertension while a ClC-K loss of function variant can modify HF risk (Barlassina et al., *Human Mol Genet* 2007; Cappola et al., *PNAS* 2011). T cells direct interaction with nephron cells, leading to chloride efflux mediated by Kir4.1-ClC-K pathway, seems to be central for the development of salt-sensitive hypertension (Liu et al, *Nat Commun* 2017). Furthermore, ClC-2 channel is involved in aldosterone synthesis and release from adrenal gland, and gain of function mutations in *CLCN2* cause forms of primary aldosteronism (Fernandes-Rosa et al, *Nat Genet* 2018), with increased cardiovascular risk for HF. Taking into account the importance of ion channels deregulation in HF-induced renal dysfunction, understanding the underlying mechanisms could trigger the development of diagnostic procedures and targeted treatment. Indeed, although diuretics are of indisputable importance for HF patients, unfortunately, diuretic resistance, is commonly encountered. Sequential nephron diuretic therapy has been recently recommended to overcome diuretic resistance and ClC-K and Kir channels are proposed as appealing targets (Cheng et al, *Clin Pharmacol Ther* 2017). In this regard, we identified benzofuran derivatives and sartans as powerful ClC-K blockers capable to cause a diuretic and antihypertensive effects in hypertensive rats (Liantonio et al, *PNAS* 2008; *J Hypertens* 2016; Imbrici et al, *Br J Pharmacol* 2017), thus suggesting that ion channels may represent reliable targets in the management of HF. In order to gain insight into the mechanisms involved in the development of HF and of related multi organ dysfunction with a focus on treatments, we are currently characterizing the Dahl salt-sensitive (SS) hypertensive rat model. Preliminary results indicated a peculiar gene expression profile for ClC-K/barttin, with a significant reduced expression of ClC-K1 isoform in kidney inner medulla of Dahl/SS rat model. Importantly, a decrease of mRNA expression of *CYP11B2* encoding aldosterone synthase was not associated to change in *CLCN2* expression in adrenal gland of Dahl/SS rat, thus likely indicating a CLC-2-independent regulation of aldosterone production in HF. Furthermore, on the basis of the "cytokines hypothesis" in HF, in order to assess the direct effects of cytokines on ionic transports, we are performing a parallel electrophysiological *in vitro* study aimed to evaluate the effects of some cytokines (TNF-□, IL-6, TGF-□) on heterologously expressed renal ion channels (ClC-K, Kir). In conclusion, recognizing that renal ion channels could play key roles in HF is important because modulation of their activity could likely influence renal function and would impact HF disease management.

### A211: IN-HOSPITAL AND LONG TERM MORTALITY AFTER HOSPITALIZATION FOR ACUTE HEART FAILURE

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**Background.** Acute heart failure (AHF) is a major cause of hospitalization and is associated with a dramatic increase in mortality and morbidity.

Prognostic variables have been identified using data from registries and clinical trials. However, most of these analyses were based on selected patients enrolled in a clinical trial and/or admitted to a cardiology department.
**Aims.** We have analyzed a series of 728 consecutive patients admitted at our emergency department for severe breathlessness and with a final diagnosis of acute heart failure. We also analyzed the differences between patients hospitalized in Cardiology or Medicine Units.
**Methods.** From 2014 and 2016 728 consecutive patients admitted to the Emergency Department (ED) with a diagnosis of AHF were enrolled. We include patients with either de-novo AHF or acute decompensated HF, presenting with clinical signs and symptoms of congestion or hypoperfusion. Congestion was confirmed by echocardiography evaluation and/or chest x-ray. All patients were evaluated in the Emergency Department by a cardiologist before admission in Cardiology or Medicine units. The primary endpoint was mortality for all causes and for CV cause. The outcomes of interest were: 1) mortality during the entire follow up, and 2) in-hospital mortality. At last, we tried to seek any independent predictor factor of mortality among those we examined.
**Results.** Among the 728 patients, 63 (8,7%) died during the index hospitalization, 42 due to cardiovascular causes. After discharge, 157 (21,6%) patients experienced re-hospitalization in the first 180 days. During the entire follow-up 193 more patients died, 98 due to cardiovascular disease. Death occurred after a median of 11 (IQR: 5-17) days for in-hospital deaths. Median hospitalization time was 11 (IQR: 7-15) days among all patients. Considering all follow-up time, estimated overall 1-year and 3-year mortality were, respectively, 0.20 (95% CI: 0.17-0.23) and 0.33 (95% CI: 0.30-0.37), and cumulative incidence of CV deaths after one and three years were respectively 0.12 (95% CI 0.10-0.15) and 0.19 (95% CI: 0.16-0.22). In-hospital mortality estimate after 30 days was 0.08 (95% CI: 0.06-0.10), and cumulative incidence of CV deaths was 0.05 (0.04-0.07). We divided the patients into two groups: survivors and non-survivors at index hospitalization. Some variables turned out to be statistically significant: elderly age, low oxygen saturation and low DBP were associated with a poorer outcome in all-causes mortality, but not in CV-mortality. Elderly age, low DBP and SBP, low oxygen saturation and NYHA class IV were associated with a higher mortality, while no significant difference in heart rate were found.
**Conclusion.** This is a retrospective analysis focused on the impact of hospitalization for acute heart failure (AHF) on long-term clinical outcomes and potential predictors of these. The all-cause mortality rate was higher in patients hospitalized in the Medicine department (p 0.004). This is supposed to be related to the different characteristics of patients admitted. The one-year crude mortality rate in the entire cohort was 20%, with the highest risk of death during the index hospitalization (with 8% estimate in-hospital mortality). A higher risk of events during the index hospitalization was more evident for the CV deaths, for which we found a cumulative one-year incidence of 12% with a cumulative incidence in the first 30 days about 5%. At the multivariable analysis, we found for our cohort six independent predictors of long term all-cause mortality: age, NYHA IV, systolic blood pressure, creatinine levels, sodium levels and ejection fraction.

## A212: RUOLO DEI FATTORI PRECIPITANTI NELLA PROGNOSI DELLO SCOMPENSO CARDIACO ACUTO

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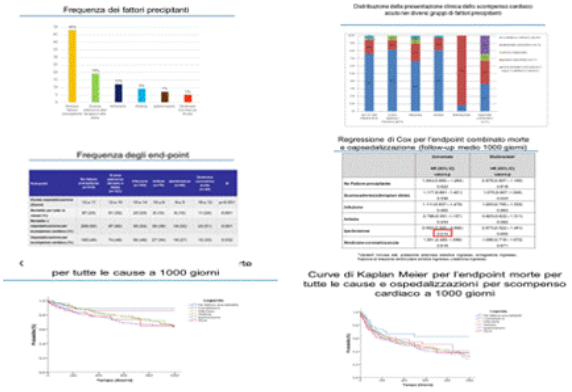
**Background.** lo scompenso cardiaco (AHF) è una patologia molto frequente e caratterizzata da alta mortalità e morbidità. Riconoscere i fattori che possono fare precipitare il quadro clinico, loro frequenza e il ruolo nella prognosi diventa fondamentale per garantire una migliore gestione dei pz.
**Scopo.** Valutare la frequenza ed il ruolo prognostico dei fattori precipitanti in pz ricoverati per AHF.
**Metodi.** 963 pz ricoverati sono stati analizzati. Sono state esaminate le cartelle cliniche dei pz e sono stati registrati, mediante database elettronico, i dati clinico-anamnestici, bioumorali, strumentali e terapeutici. Gli end-point valutati nello studio sono stati i seguenti: Durata dell'ospedalizzazione, Mortalità per tutte le cause a 1000 giorni, Mortalità o ospedalizzazione per scompenso cardiaco a 1000 giorni, Ospedalizzazione per scompenso cardiaco a 1000 giorni.
**Risultati.** I pazienti sono stati suddivisi in sei gruppi sulla base dei fattori precipitanti: nessun fattore precipitante, scarsa aderenza alla terapia e alla dieta, infezione, aritmia, ipertensione e sindrome coronarica acuta.
**Conclusioni.** In circa la metà dei pazienti ricoverati per scompenso cardiaco acuto è presente almeno un fattore precipitante, quello di più frequente riscontro è la scarsa aderenza alle indicazioni terapeutiche e dietetiche. I fattori precipitanti delineano sottopopolazioni di pazienti con diverse caratteristiche cliniche e di conseguenza diversi profili di rischio. L'ipertensione arteriosa è l'unico fattore precipitante lo scompenso cardiaco acuto significativamente associato a una minore frequenza di morte e ospedalizzazione nel lungo termine, sebbene il suo effetto venga limitato dopo aggiustamento per le variabili confondenti tra cui lo stesso valore di pressione sistolica all'ingresso.




## A213: IMPATTO PROGNOSTICO DEL VALORE DI VOLUME PLASMATICO ALLA DIMISSIONE IN PAZIENTI OSPEDALIZZATI PER SCOMPENSO CARDIACO ACUTO

Carlo Lombardi (a), Daniela Tomasoni (a), Valentina Carubelli (a), Dario Cani (a), Federica Latta (a), Marco Sbolli (a), Alice Ravera (a), Andrea Bonelli (a), Mariangela Tancredi (a), Marco Metra (a)
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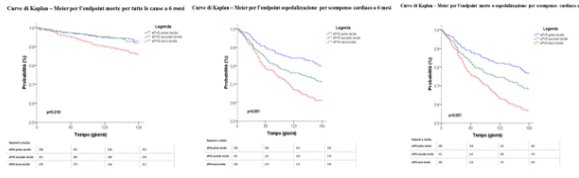
**Background.** La riospedalizzazione nei pazienti affetti da scompenso cardiaco è un problema rilevante. La principale causa della riospedalizzazione è la congestione. Il valore del volume plasmatico stimato, calcolato da un semplice esame emocromocitometrico, rappresenta un semplice metodo, applicabile al momento della dimissione per identificare i pazienti ad alto rischio di eventi.
**Scopo.** Valutare l'impatto prognostico del valore di volume plasmatico (ePVS) alla dimissione in pazienti ricoverati per con scompenso cardiaco acuto.
**Metodi.** È uno studio osservazionale retrospettivo condotto su 1021 pz ricoverati con per scompenso cardiaco acuto, dal gennaio 2003 al 2019. Il follow-up massimo è stato di 180 giorni. Gli *endpoints* considerati erano: mortalità per tutte le cause, mortalità per tutte le cause o ospedalizzazione per scompenso cardiaco, ospedalizzazione per scompenso cardiaco. Il volume plasmatico stimato è stata calcolato utilizzando la formula di Strauss Duarte-derivata, basata sui valori di HB e di ematocrito: ePVS= (100 – ematocrito (%)) / HB (g/dl). L'analisi è stata condotta su un totale di 898 pz, distinti in 3 gruppi secondo terzili del valore di ePVS alla dimissione. Il primo terzile includeva pz con ePVS <4.65 dl/g (n=298; 33,2%), il secondo terzile con ePVS ≥4.65 dl/g e <5.79 dl/g (n=301; 33.5%), il terzo terzile con ePVS ≥5.79 dl/g (n=299; 33.3%).
**Risultati.** 30 sono deceduti durante il ricovero indice (n=30; 2.9%) e per 93 di essi non è stato possibile calcolare un valore di ePVS (n=93; 9,1%), per un totale complessivo di n=123 pazienti esclusi dallo studio (n=123; 12%). All'interno dei tre gruppi, i pazienti inclusi nel terzo terzile erano più anziani (primo terzile 66.8 ± 12.1 vs. secondo terzile 72.5 ± 10.2 vs. terzo terzile 73.5 ± 10.3, p<0.001). Più della metà dei soggetti arruolati nello studio erano maschi, diversamente distribuiti nei tre gruppi (primo terzile n=245; 82.2 % vs. secondo terzile n=205; 68.1% vs. terzo terzile n=180; 60.2%, p<0.001); nello specifico i pazienti con alto ePVS erano più frequentemente donne con valori di BMI (kg/m2) più bassi rispetto agli altri pazienti (primo terzile 27.8 ± 5.6 vs. secondo terzile 26.4 ± 5.1 vs. terzo terzile 26.6 ± 4.9, p=0.012).



**Conclusioni.** Nel nostro studio il volume plasmatico stimato, calcolato al momento della dimissione, è un forte predittore indipendente di mortalità per tutte le cause e ospedalizzazione per scompenso cardiaco, a sei mesi dal ricovero indice. Il suo valore prognostico, dimostrato nel nostro studio, ne giustifica il possibile utilizzo clinico per la stratificazione del rischio post-dimissione, nei pazienti con scompenso cardiaco acuto.

### A214: RUOLO PROGNOSTICO DELLA OTTIMIZZAZIONE TERAPEUTICA IN PAZIENTI RICOVERATI PER SCOMPENSO CARDIACO ACUTO

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**Background.** L'ottimizzazione terapeutica rimane un obbiettivo anche durante un ricovero per scompenso cardiaco acuto.
**Scopo.** Identificare il significato clinico e prognostico dell'ottimizzazione della terapia medica alla dimissione in una casistica di pazienti ricoverati per SC acuto.
**Metodi.** Studio retrospettivo su 1021 pazienti ricoverati per SC acuto dal gennaio 2003 al febbraio 2019. Sono stati analizzati i dati relativi a: anamnesi, obiettività clinica, esami ematochimici, terapia medcia domiciliare e alla dimissione, parametri ecocardiografici. Tra i parametri vitali sono stati considerati pressione arteriosa sistolica (PAS) e frequenza cardiaca (FC). Sono stati infine integrati i seguenti parametri biochimici: N-terminal pro-B natriuretic peptide (NT-proBNP), emoglobina, creatinina. La funzionalità renale è stata ricavata a partire dalla creatininemia attraverso la formula Modification of Diet in Renal Disease (MDRD). L'indagine è stata incentrata sull'assunzione dei farmaci raccomandati dalle linee guida ESC 2016 per la diagnosi e il trattamento dello scompenso cardiaco acuto e cronico: ACE-inibitore (ACEi) o in alternativa sartano (ARB), antialdosteronico (AA), betabloccante (BB). Per ciascuna classe sono stati indagati il principio attivo, la dose prescritta e il suo valore percentuale rispetto alla dose target raccomandata (TD). È stato inoltre l'uso di furosemide (o equivalenti) all'ingresso ed alla dimissione ed il relativo dosaggio. Il follow-up è stato effettuato mediante contatto diretto con il paziente, contatto telefonico con il paziente o con il medico di base. La durata del follow-up è stata di 90 giorni dalla dimissione. Gli endpoint sono: morte per tutte le cause; ospedalizzazione per SC; morte/ospedalizzazione per SC.
**Risultati.** La valutazione della prescrizione alla dimissione della terapia guideline-directed per lo SC ha mostrato percentuali variabili di aderenza: il 78.7% dei pz assumeva ACEi o ARBs; l'85.7% beta bloccanti; gli antialdosteronici sono stati prescritti nel 76,2% dei pz. L'assunzione di furosemide risultava invece del 96.2%. I beta bloccanti sono stati prescritti in 534 (85.7%) pz. Tra questi, 331 (53.1%) pz hanno ricevu.to un dosaggio <50% TD, 147 (23.6%) pz ≥50% <100% TD, 56 (9.0%) pz 100% TD. La percentuale di morte per tutte le cause a 90 giorni dalla dimissione non è stata influenzata dall'utilizzo di TMO. Risulta invece statisticamente significativa la frequenza di riospedalizzazione per SC (20.8% No TMO vs. 9.5% TMO; p=0.021); anche per l'endpoint combinato morte per tutte le cause o ospedalizzazione per SC il rischio di eventi è risultato maggiore nei pz senza TMO (23.3% No TMO vs. 12.2 TMO; p=0.030). All'analisi di regressione di Cox il trattamento con TMO alla dimissione è risultato essere un fattore protettivo per l'endpoint combinato a 90 giorni soltanto all'analisi univariata. Il depotenziamento del trattamento (passando da TMO all'ingresso al non raggiungimento dei criteri per TMO alla dimissione) è stato associato indipendentemente ad un outcome peggiore (HR 2.76, 95% IC 1.01-7.54, p=0.047).
**Conclusioni.** Nei pazienti affetti da scompenso cardiaco a bassa frazione di eiezione (HFrEF) e ricoverati con diagnosi di SC acuto, l'ottimizzazione terapeutica migliora l'outcome in termini di sopravvivenza e previene la riospedalizzazione a 90 giorni dalla dimissione. I dati mostrati dimostrano l'importanza della revisione terapeutica nei pazienti affetti da HFrEF, per cui l'ospedalizzazione può rappresentare un'ottima opportunità, e ha dimostrato l'impatto clinico e prognostico rilevante di un atteggiamento prescrittivo aderente alle raccomandazioni internazionali.

## SCOMPENSO CARDIACO – 5
## Sessione Poster

### A215: MELAS SYNDROME PRESENTING WITH ACUTE CONGESTIVE HEART FAILURE: A RARE GENETIC CAUSE OF DILATED-HYPERTROPHIC CARDIOMYOPATHY

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**Background.** Mitochondrial Encephalomyopathy, Lactic Acidosis and Stroke-like episodes (MELAS) syndrome is a mitochondrial genetic disorder, associated to different clinical presentations: stroke-like episodes, dementia, epilepsy, lactic acidosis, myopathy, recurrent headaches, hearing impairment, diabetes mellitus (DM), short stature and hypertrophic cardiomyopathy. This syndrome is usually diagnosed in the second decade of life for the neuro-muscolar complications and episodes of lactic acidosis.
**Case report.** *Medical history.* A 48-years old man suffered from severe DM (complicated by nephropathy, retinopathy and neuropathy), short stature, hypoacusis since childhood and visual impairment due to neovascular glaucoma at the right eye and bilateral cataract. He received oral anticoagulants because of a previous thrombotic retinal vein occlusion. Furthermore he had a cognitive impairment. His mother died from complications of DM and one of his two sisters had epilepsy and social problems. *Clinical presentation.* The patient presented to Emergency Department with minimal effort dyspnea and abdominal pain. The physical examination revealed signs of congestive heart failure and painful hepatomegaly. Electrocardiogram showed sinus tachycardia and left ventricular hypertrophy. Echocardiography revealed biventricular dysfunction (left ventricular ejection fraction, LVEF<20%), severe left ventricular hypertrophy, grade III diastolic dysfunction, moderate mitral regurgitation, severe tricuspid regurgitation and increased pulmonary artery pressure. Chest X-ray confirmed bilateral pleural effusion and blood test showed creatinine 2,75 mg/dL, troponin T 255 ng/L and Nt-proBNP 8212 ng/L. *Clinical course.* The patient was hospitalized in our Cardiology Department and was treated with i.v. diuretic, but his conditions worsened in few hours with mental confusion, tremors and diuresis contraction. Blood tests showed marked increase of creatine-phosphokinase (CPK=17454 mg/dL), hepatic transaminases, myoglobin (>3000 ng/mL), creatinine (3.5 mg/dL), Nt-proBNP (16727 ng/L) and lactate level (5.2 mmol/L). Brain CT scan ruled out an acute neurological event and documented cortical atrophy, cerebellar atrophy and calcification of the basal ganglia. The patient was transferred to the Intensive Cardiologic Care Unit and i.v. idratation, dopamine infusion and i.v. furosemide were administered. His clinical condition gradually improved. NT-proBNP, CPK, hepatic transaminases and creatinine decreased and lactic acidosis resolved. Therapy of chronic heart failure according to European Society of Cardiology Guidelines was started. Echocardiographic signs of congestion improved and pre-disharge LVEF was 25%. The patient refused to perform cardiac magnetic resonance imaging. He was transferred to cardiological rehabilitation clinic. Based on his family history, comorbilities and clinical course MELAS syndrome was suspected. Genetic testing showed a DNA mutation in heteroplasmic form in 10% of the mitochondrial genome and diagnosis of MELAS syndrome was confirmed.

### A216: MIR-200C IS UPREGULATED IN PSORIASIS AND CORRELATES WITH DISEASE SEVERITY AND DETERMINANTS OF CARDIOVASCULAR RISK

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**Background.** Psoriasis is a chronic inflammatory skin disease associated with increased risk of cardiovascular events. We previously showed that miR-200 family (miR-200s) is induced by oxidative stress, miR-200c being the most upregulated member responsible for apoptosis, senescence and endothelial dysfunction. miR-200c increases in plaques and plasma of carotid atherosclerotic patients.
**Purpose.** Given miR-200s role in endothelial dysfunction and inflammation, we hypothesized that miR-200s were modulated in lesional skin (LS) and plasma of psoriatic patients (Pso) and that their levels correlated with CV risk.
**Methods.** 29 Pso were compared to 29 control subjects (Ctrl) age- and sex-matched. All Pso had a severe psoriasis, i.e. Psoriasis Area and Severity Index (PASI)>10 and one of the following: at least two systemic psoriasis treatments, age at onset<40 years, disease duration>10 years. The clinical parameters were similar between the two groups except for Total Cholesterol (mg/dl) (Ctrl 193.3 ± 6.2;Pso 213.2 ± 6.9; P<0.05). Blood pressure measurement, wave reflection analysis and pulse wave velocity (PWV) were similar between groups, echocardiographic parameters were different for left ventricular (LV) mass index (g/m2) (Ctrl 84.2±5.2;Pso 102.5±4.7;P<0.05) and relative wall thickness (RWT) (Ctrl 0.4±0.0;Pso 0.48±0.0;P<0.01). RNA was extracted from plasma (Pso N=29; Ctrl N=29) and from non-lesional (NLS) and LS of 6 Pso and 6 healthy subject skin biopsies (HS). miR-200 levels were assayed by quantitative RT-PCR.
**Results.** All miR-200s increased in LS vs NLS. miR-200c was the most expressed and upregulated in LS vs HS. Circulating miR-200c and miR-200a were upregulated in Pso vs Ctrl. miR-200c positively correlated with: PASI (Rs=0.43;P<0.05), disease duration (Rs=0.40;P<0.05), LV mass (Rs=0.32;P<0.05), LV RWT (Rs=0.32;P<0.05) and E/e' a marker of diastolic dysfunction (Rs=0.34;P<0.05). Regression analysis revealed that RWT and LV mass were significantly affected by miR-200c (P<0.01; P<0.05 respectively). Circulating miR-200a correlated with LV mass (Rs=0.30;P=0.06) and arterial pressure augmentation index (Rs=0.26;P=0.06).
**Conclusion.** miR-200c is upregulated in LS and plasma of Pso, suggesting its role in inflammation and CV risk in psoriasis.

### A217: EFFETTI DELLE TERAPIE NON CONVENZIONALI DELLO SCOMPENSO CARDIACO SULLA FUNZIONE ENDOTELIALE

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**Obiettivo.** I soggetti con scompenso cardiaco cronico (SCC) presentano frequentemente disfunzione endoteliale. Abbiamo valutato la disfunzione endoteliale nei soggetti affetti da SCC sottoposti a trattamenti non convenzionali: Trapianti cardiaci (HTX), impianto di dispositivo di assistenza ventricolare sinistro (LVAD) ed infusioni periodiche di levosimendan (LEVO).
**Metodi.** Abbiamo confrontato 20 pazienti con HTX (tempo mediano da HTX 21 mesi), 20 pazienti sostenuti con LVAD (tempo mediano dall'impianto 39 mesi) e 20 pazienti trattati con infusioni mensili di Levosimendan (tempo mediano dall'inizio del trattamento 28 mesi) con 20 soggetti sani. La funzione endoteliale è stata valutata con analisi ad ultrasuoni del diametro, prima e dopo stress ischemico, a livello dell'arteria brachiale (Flow Mediated Dilation – FMD). Tutti i pazienti erano stabili al tempo della valutazione di FMD. I pazienti in terapia con levosimendan sono stati valutati prima dell'infusione.
**Risultati.** L'FMD è risultata significativamente più bassa nei gruppi HTX e LVAD rispetto ai controlli (9.8±7.4, 9.3±5.7, e 15.6±6.4% rispettivamente, p=0.01), ma non nel gruppo r-LEVO (12.5±6.9%).
Quando i pazienti venivano analizzati secondo il tempo mediano dal trattamento non si osservavano differenze nei gruppi HTX e LEVO, mentre nel gruppo LVAD il valore di FMD era più alto nei pazienti con un follow-up più lungo con una significatività borderline (8.4±6.4% vs 10.2±5.2%, p=0.05).
**Conclusioni.** basandosi su questi dati preliminari possiamo dedurre che: 1- FMD è ridotto nei riceventi HTX, nonostante, probabilmente a causa dei fattori non correlati all'SCC (ipertensione, insufficienza renale, denervazione cardiaca ed effetto dei farmaci); 2- i pazienti con LVAD mostrano disfunzione endoteliale; 3- valori FMD sovrapponibili al gruppo di controllo sono stati trovati nei pazienti in LEVO suggerendo che il trattamento periodico potrebbe ottenere effetti favorevoli a livello periferico, persistenti anche dopo la clearance del farmaco e dei suoi metaboliti.

### A218: EFFECTS OF SACUBITRIL/VALSARTAN ON EXERCISE CAPACITY, NATRIURETIC PEPTIDES AND VENTRICULAR REMODELING IN A PROSPECTIVE COHORT OF PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION

Massimo Mapelli (a, b), Elisabetta Salvioni (a), Irene Mattavelli (a), Valentina Sassi (a, b), Fabiana De Martino (a), Stefania Paolillo (c), Valentina Mantegazza (a), Valentina Volpato (a), Carlo Vignati (a, b), Alessandra Magini (a), Pietro Palermo (a), Anna Apostolo (a), Piergiuseppe Agostoni (a, b)
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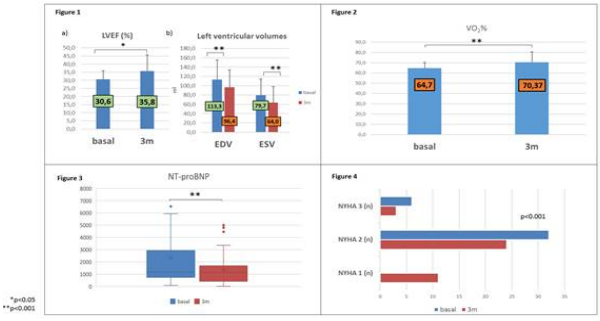
**Background.** Sacubitril/valsartan, a novel therapy in the treatment of heart failure with reduced ejection fraction (HFrEF), has recently proved efficacy in improving exercise tolerance and cardiac performance.
**Aim of the study and methods.** We prospectively enrolled a cohort of HFrEF outpatients eligible for sacubitril/valsartan and performed serial cardiopulmonary exercise tests (CPET), laboratory and echocardiographic assessments before and during the gradual titration of this treatment, in order to evaluate its effects on cardiopulmonary function and left ventricular remodeling.
**Results.** We examined 38 patients treated with sacubitril/valsartan for at least 3 months. At a mean follow-up of 145±68 days, 95% of patients reached the maximum dose, without important safety concerns. Ejection fraction increased (Fig. 1a), while left ventricular end-diastolic and end-systolic volumes decreased (Fig. 1b). Peak oxygen consumption % of predicted ($VO_2$%) improved (Figure 2), along with workload at maximal exercise (95.3±38.6 vs. 101.5±40.0 watt, p=0.0005). Minute ventilation/carbon dioxide production relationship ($VE/VCO_2$ slope) did not reach statistical significance in this sub-population. We also observed a significant reduction in NT-proBNP values (Figure 3) without significant worsening of renal function or hyperkaliemia. New York Heart Association functional class improved (Figure 4), together with a significant decrease of MECKI (Metabolic Exercise test data combined with Cardiac and Kidney Indexes) score from 4.4 (IQR 1.7-7.1) to 2.1 (1.1-4.9) %, with a positive impact on two-year HF prognosis (p=0.006).
**Conclusion.** Medium-term treatment with sacubitril/valsartan demonstrated beneficial effects on exercise tolerance, left ventricular remodeling and functional status, confirming the results from previous clinical trials in real-life. A longer follow-up and larger population will further contribute to the assessment of its positive effects on HFrEF patients.




### A219: EARLY CARDIAC REVERSE REMODELING IN A LARGE COHORT OF PATIENTS WITH HFREF TREATED WITH SACUBITRIL/VALSARTAN

Massimo Mapelli (a, b), Elisabetta Salvioni (a), Irene Mattavelli (a), Valentina Sassi (a, b), Valentina Mantegazza (a), Valentina Volpato (a), Carlo Vignati (a, b), Fabiana De Martino (a), Stefania Paolillo (c), Laura Fusini (a), Manuela Muratori (a), Mauro Pepi (a), Piergiuseppe Agostoni (a, b)
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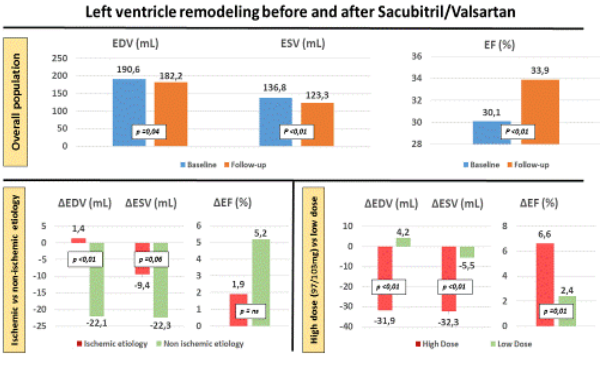
**Background.** Despite the widespread use of Sacubitril/valsartan (Sac/Val) in patients with reduced ejection fraction (HFrEF), definite data on cardiac remodeling under treatment are still lacking.
**Methods and aim of the study.** We conducted a retrospective analysis on a large cohort of 201 consecutive HFrEF ambulatory patients who started Sac/Val in our HF unit between Sept. 2016 and Dec. 2018 on top of optimal medical treatment. Patients with both basal and follow up (at least 3 months) echocardiographic assessment (TTE) were included.
**Results.** A follow up TTE was performed in 100 patients (male 76%; mean age 67.4±11.1 years; medium follow-up 309±182 days). Baseline characteristics are shown in Table 1. 34% of the patients reached the maximal dose (97/103 b.i.d.) while 18 interrupted the treatment. We observed an overall significant improvement in ejection fraction (EF), end-diastolic and end-systolic ventricular volumes (EDV/ESV), while just a trend in pulmonary pressures (PAPs) and mitral regurgitation (MR) reduction was noted (p=0.06 and 0.09 respectively). Non ischemic etiology and high dose of Sac/Val were predictors of better remodeling (Fig. 1).

| N=100 | Clinical characteristics |
|---|---|
| Systolic blood pressure (mmHg) | 116±11 |
| Diastolic blood pressure (mmHg) | 70±9 |
| Hemoglobin (g/dl) | 13±1.99 |
| MDRD (ml/min/1,73m2) | 63±21.4 |
| Potassium (mmol/L) | 4.26±0.50 |
| NYHA class II (n; %) | 59 (59%) |
| NYHA class III (n;%) | 41 (41%) |
| Ischemic etiology (n;%) | 58 (58%) |
| ICD (n;%) | 41 (41%) |
| CRT (n;%) | 32 (32%) |
| Beta-blockers (n;%) | 94 (94%) |
| ACEi or ARBs (n; %) | 92 (92%) |
| MRA (n;%) | 77 (77%) |



**Conclusion.** Sac/Val led to an early favorable ventricular remodeling assessed by echocardiography. The benefit was greater in patients on higher Sac/Val dose and non ischemic etiology.

### A220: SACUBITRIL/VALSARTAN USE IN A REAL WORLD EXPERIENCE: DATA FROM A LARGE SINGLE-CENTER POPULATION OF HEART FAILURE PATIENTS WITH REDUCED EJECTION FRACTION

Massimo Mapelli (a, b), Elisabetta Salvioni (a), Irene Mattavelli (a), Valentina Sassi (a, b), Paola Gugliandolo (a), Valentina Mantegazza (a), Valentina Volpato (a), Carlo Vignati (a, b), Fabiana De Martino (a), Stefania Paolillo (c), Mauro Contini (a), Anna Apostolo (a), Alessandra Magini (a), Pietro Palermo (a), Piergiuseppe Agostoni (a, b)
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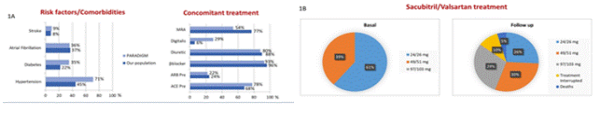
**Background.** Sacubitril/Valsartan has emerged as a novel therapy in the treatment of heart failure (HF) with reduced ejection fraction (HFrEF), showing a lower cardiovascular mortality and HF hospitalization rates compared to standard therapy. Although the recent widespread use of Sacubitril/Valsartan, real life data are still lacking.

**Aim of the study and methods.** We performed a retrospective analysis of 201 monocentric patients with HFrEF, who started Sacubitril/Valsartan between September 2016 and December 2018 and followed at our HF ambulatory (Centro Cardiologico Monzino, IRCCS, Italy). We collected demographic data, clinical history with ongoing medications, baseline clinical characteristics and blood sample (i.e. Haemoglobin, creatinine, potassium, sodium, NT-proBNP or BNP) and follow up (i.e. period of treatment until last contact with the hospital or by telephone call) about tolerated dose of Sacubitril/Valsartan, interruption of treatment, hospitalization for HF, deaths.

**Results.** Baseline characteristics of our population and of PARADIGM trial are presented in Table 1 and Fig.1A. One hundred and five patients also performed a cardiopulmonary exercise test before starting treatment, showing a mean peak VO2 of 14.9 ± 4.7 ml/min/kg (60 ± 17 % of predicted), with VE/VCO2 slope of 34.3±8.2, VO2/work of 9.4±1.5. During follow up (268 ±185 days) 36 patients had hospitalization for HF, while 20 patients interrupted treatment with Sacubitril/Valsartan (7 hypotension, 5 renal insufficiency, 1 angioedema, 7 not known/patient decision) and 9 deceased. Dose administered at baseline and at the end of follow-up is reported in Fig. 1B.

| | Mean *n(%)* | PARADIGM Mean *n (%)* |
|---|---|---|
| Age (years) | 67.2 ± 10.8 | 63.8 ± 11.5 |
| Female sex | 42 (21%) | 879 (21%) |
| White | 198 (99%) | 2781 (66%) |
| BMI (kg/m$^2$) | 26.1 ± 4.1 | 28.1 ± 5.5 |
| PAS (mmHg) | 116.8 ± 11.8 | 122± 15 |
| NYHA class II | 130 (65%) | 2998 (72%) |
| NYHA class III | 71 (35%) | 969 (23%) |
| Ischemic etiology | 109 (54%) | 2506 (60%) |
| ICD | 84 (42%) | 623 (15%) |
| CRT | 57 (28%) | 292 (7%) |




**Conclusions.** Compared to PARADIGM trial, our real-life population has similar characteristics and HF gravity. For clinical reasons during follow up only 31% reached the maximum dose. In future more studies are needed to analyze the prognostic impact of low vs. higher doses.

### A221: OXYGEN UPTAKE DURING DAILY LIFE DOMESTIC ACTIVITIES IN PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION

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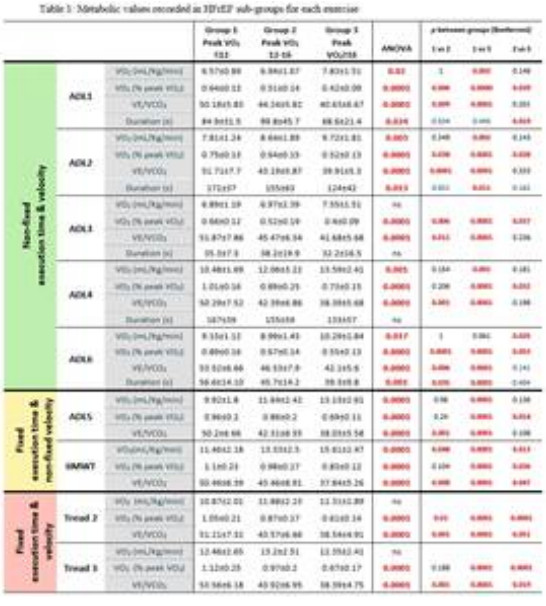
**Background.** Dyspnea is a pivotal symptom of chronic heart failure with reduced ejection fraction (HFrEF). It seriously compromises exercise performance, capability to perform standard activities of daily living (ADLs) and quality of life. Cardiopulmonary exercise test (CPET) is the gold standard in assessing functional capacity in HFrEF. However, exercise protocols don't fully represent patients' daily-life, with most of the symptoms arising with different activities like climbing the stairs or fastening the shoes (i.e. bendopnea). The aim of the present study is to assess the differences in task-related oxygen uptake (maxVO$_2$), both as absolute value and as % of the peakVO$_2$ obtained at CPET (%peakVO$_2$), ventilation (VE), and Borg symptom scores between pre-selected HFrEF sub-groups of patients (stratified according to their peakVO$_2$) and healthy subjects during a standardized protocol of ADLs.

**Materials and Methods.** Subjects underwent a basal CPET and the following exercises (Fig. 1) wearing a full wearable device (Cosmed® K5):ADL1: getting dressed; ADL2: folding 8 towels; ADL3: putting away 6 bottles; ADL4: making a bed; ADL5: sweeping the floor for 4-min; ADL6: climbing 1 flight of stair carrying a load; Six minutes walking test; 4-minutes 2Km/h treadmill; 4-minutes 3Km/h treadmill. The degree of dyspnea was recorded at the beginning and end of all exercises using a modified Borg symptom score.

**Results.** Sixty stable HFrEF patients with optimized medical treatment (age 65.2±12.1y; EF 30.4±6.7%), and 40 healthy volunteers (58.9±8.2y) were enrolled. As expected, at CPET, HFrEF patients showed significantly lower peak VO$_2$ (14.2±4.0 vs. 28.1±7.4ml/min/kg, respectively) and higher VE/VCO$_2$slope (36.8±9.1 vs. 27.2±4.0). For each exercise, patients showed higher VE/CO$_2$ and %peakVO$_2$ values compared to controls, while maxVO$_2$ was significantly higher in all the exercises except treadmill (the only ones in which both execution time and velocity are fixed). As expected, patients experienced more dyspnea (Borg scale), lower heart rate and higher exercises duration. Table 1 shows differences in the main metabolic values recorded in HFrEF sub-groups for each exercise performed: in exercises with non-fixed execution velocity, patients with more severe HFrEF have lower maxVO$_2$, higher %peakVO$_2$ and higher VE/VCO$_2$. In exercises with fixed execution time and velocity maxVO$_2$ did not changed among groups.




**Conclusions.** Oxygen consumption during ADLs worsens according to the severity of heart failure, with progressively increasing ventilatory inefficiency and erosion of the patients' VO$_2$ "reserve". Our data suggest that HFrEF patients limit themselves during the exercise, whenever possible, by decreasing velocity and/or intensity of the exercise.

### A222: IMPACT OF RENAL FUNCTION ON CARDIAC SYMPATHETIC INNERVATION

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**Introduction.** There is a strict correlation between heart and kidney in the clinical syndrome of heart failure (HF). Several studies evaluated the potential role of sympathetic over activity, that causes beta-adrenoceptor insensitivity in both renal failure and heart failure. So it can be hypothesized that renal failure is associated with impaired cardiac sympathetic innervation in HF.

**Purpose.** Aim of the present observational study was to assess the relationship between renal dysfunction and cardiac sympathetic innervation in HF patients with reduced ejection fraction (EF).

**Methods.** Two-hundred and sixty-three patients (84% males; 66 ± 10,8 years) with mild-to-severe HF (ejection fraction (EF) 31 ± 6,8 %) (HFmrEF and HFrEF patients) underwent iodine-123 meta-iodobenzylguanidine ($^{123}$I-MIBG) myocardial scintigraphy to assess sympathetic innervation, evaluating early and late heart to mediastinum (H/M) ratios and washout rate. All patients undewent to clinical evaluation for the assessment of NYHA class and to biohumoral evaluation for the assessment of serum creatinine and consequently the evaluation of glomerular filtration rate (eGFR), evaluated by EPI formula.

**Results.** A direct correlation was found between EPI-eGFR and late H/M (r = 0,215; p < 0.001) (figure 1), with an inverse correlation between NYHA class and late H/M (r = 0,152; p = 0.013), and a direct correlation between left ventricular EF and late H/M (r = 0,348; p < 0.001). These results were not confirmed for early H/M, nor washout rate. Dividing the population in reduced eGFR and normal eGFR (cut-off ≤ 60 ml/min/1,73m$^2$), a statistical significant reduction of late H/M value was found in patients with reduced eGFR (late H/M = 1,49 ± 0,21) compared with patients with preserved eGFR (late H/M = 1,56 ± 0,26) (p = 0.020). In a multivariate model, adjusting eGFR for NYHA class and left ventricular EF, reduced eGFR and left ventricular EF remained significant predictors of reduced late H/M again (p = 0.006 and p < 0.001, respectively).

**Conclusions.** Patients with impaired renal function and HF show lower cardiac sympathetic activity than HF patients with preserved renal function, and reduced eGFR evaluated by EPI formula is a predictor of reduced late H/M evaluated by $^{123}$I-MIBG.

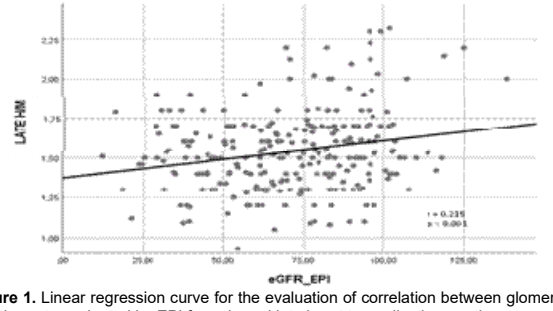


**Figure 1.** Linear regression curve for the evaluation of correlation between glomerular filtration rate evaluated by EPI formula and late heart to mediastinum ratio.

### A223: HEMODYNAMIC AND METABOLIC PHENOTYPING OF HYPERTENSIVE PATIENTS WITH AND WITHOUT HEART FAILURE WITH PRESERVED EJECTION FRACTION BY COMBINING CARDIOPULMONARY AND ECHOCARDIOGRAPHIC STRESS TEST

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**Background.** Arterial hypertension (HT) is one of the main risk factors for the development of heart failure with preserved ejection fraction (HFpEF). However, little is known about the hemodynamic and metabolic responses of patients with HT during the stress test. Cardiopulmonary exercise test (CPET) combined with exercise stress echocardiography (ESE) offers a feasible, non-invasive evaluation of different cardiac conditions, with the possibility of simultaneously exploring the peripheral and central components of oxygen consumption (VO2).

**Purpose.** We analysed the hemodynamic, respiratory and metabolic characteristics of HT subjects with and without HFpEF using CPET-ESE to improve the knowledge about the transition from HT to HF.

**Methods.** We studied 113 consecutive subjects, undergoing a symptom-limited graded ramp bicycle CPET-ESE: 50 stable (NYHA I-III) outpatients with HFpEF-HT (68±14 years; 42 males, 84%), 63 well-controlled HT subjects (63±11 years; 52 males, 82%) and 32 age and sex-matched healthy controls (59±15 years; 24 males, 75%). We assessed oxygen consumption ($VO_2$) and cardiac output (CO) during the exercise and estimated the arterial-venous oxygen content difference ($AVO_2$diff) using the Fick equation. Also, we measured left ventricular (LV) ejection fraction (EF), global longitudinal strain (GLS), E/e' and LV compliance (expressed as end-diastolic volume [EDV] / E/e' ratio).

**Results.** HT subjects had a peak VO2 (18.7±2 ml/min/kg) lower than controls (24.4±7.3 ml/min/kg, p<0.0001) but higher than HFpEF-HT (15.2±2 ml/min/kg, p<0.0001). The reduced peak VO2 in HT may be related to an early peripheral dysfunction, expressed by the decreased peak $AVO_2$diff. Indeed, $AVO_2$diff (the peripheral component of VO2) was significantly reduced in HT and HFpEF-HT in comparison to controls at peak exercise (13.5±1 and 13.3±1 vs 16.9±1 mL/dL, p<0.0001). Moreover, it is possible to identify a mild cardiovascular dysfunction associated with HT. The HT patients during effort reached E/e' values (9.1±2) higher than controls (6.2±1, p<0.0001) but lower than HT-HFpEF (12.7±3, p<0.0001). Conversely, LV compliance (13.4±2) resulted lower than controls (17.8±2, p<0.0001) but higher than HT-HFpEF (12.1±3, p=0.003), outlining an intermediate diastolic profile of HT patients between healthy subjects and HFpEF. Despite a preserved cardiac output and LVEF increase throughout the exercise, HT subjects had lower low-load (at 4 min of effort) GLS (18.2±3%) than controls (20.9±3%, p<0.0001), but higher than HFpEF-HT (16.8±5%, p=0.04).

**Conclusions.** HT subjects present a decreased $AVO_2$diff in comparison to healthy controls, but similar values to the HFpEF-HT group, suggesting an early HT-related peripheral dysfunction. Furthermore, HT subjects represent an intermediate step from healthy subjects to HFpEF, showing altered functional capacity and systo-diastolic profile.

### A224: RISK OF SUDDEN CARDIAC DEATH IN NEW YORK HEART ASSOCIATION CLASS 1 PATIENTS WITH DILATED CARDIOMYOPATHY: A COMPETING RISK ANALYSIS

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**Aims.** Primary prevention implantable cardioverter defibrillator (ICD) is not generally recommended in New York Heart Association (NYHA) 1 class patients with dilated cardiomyopathy (DCM). This study sought to assess the competing risk of sudden cardiac death (SCD) in DCM patients with left ventricular ejection fraction (EF) ≤35% and NYHA 1 class.

**Methods.** A total of 272 DCM patients with EF ≤35% and NYHA class I-III after ≥3 months of guideline-directed medical therapy were included. The risk of SCD and SCD/malignant ventricular arrhythmias (MVA) was assessed in NYHA 1 vs. NYHA 2 and NYHA 3 groups by competing risk analysis.

**Results.** NYHA 1 patients were younger, had higher EF and smaller left atrium, were less likely receiving mineralcorticoid receptor antagonists. The cumulative incidence of SCD (p=0.92) and SCD/MVA (p=0.42) did not differ between NYHA 1 vs higher NYHA classes. NYHA class did not influence the association between ICD and SCD risk (p for interaction = 0.125). ICD implantation was not associated with lower SCD risk in the overall population (HR=0.383, 95%CI 0.114-1.286, p=0.120).

**Conclusions.** In this cohort of DCMs, patients with EF ≤35% and NYHA 1 class were exposed to a risk of SCD and life-threatening arrhythmias not different from NYHA 2-3. Therefore, inclusion of asymptomatic patients with DCM and systolic dysfunction should be strongly considered in future randomized studies on primary prevention ICD.

### A225: CLINICAL AND ECHOCARDIOGRAPHIC PREDICTORS OF FUNCTIONAL CAPACITY IMPROVEMENT AFTER THE INDTRODUCTION OF SACUBITRIL/VALSARTAN IN PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION (HFREF)

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**Background.** A "milestone" in the complex therapy of HFrEF is represented by sacubitril/valsartan (S/V), the forefather of the ARNI (angiotensin receptor-neprilysin inhibitors). S/V strengthens the physiological mechanisms that compensate the deficit of the heart pump, slowing its deterioration. When compared with enalapril, the drug has been shown to offer a significant advantage in terms of reducing hospitalizations and improving prognosis quoad Vitam (PARADIGM-HF study). However, the effects of S/V on the exercise capacity of patients with HFrEF are still uncertain. In this study, we aimed to identify any predictors of improvement of functional capacity measured by cardiopulmonary test (CPET).

**Methods.** Through a retrospective analysis of the database of our outpatient clinic, we identified 40 subjects with HFrEF (age 63.05±1.58 years; 80% male) with all anthropometric, clinical, laboratory and instrumental (cardiac ultrasound and CPET) data collected at the time of the beginning of sacubitril/valsartan (B) and at follow up (F) (13.60±1.14 months).
**Results.** CPET showed an improvement in peak VO2 expressed as a percentage of the predicted (%VO2 predicted) in 65% of the evaluated patients. In particular, dividing patients according to the improvement (I) or no improvement (NI) of the predicted % VO2, the two groups obviously differed by delta %VO2 predicted between follow-up and baseline (I: +13.2 ± 2.49 vs NI: -10.20 ± 1.94; p <0.0001); interestingly, the two groups significantly differed by basal LVEF (I: 32.31 ± 1.52 vs NI: 37.00 ± 1.38%; p 0.049), E/E' ratio (I: 15.4 ± 1.76 vs NI: 9.4 ± 0.54; p 0.025), PAPs (I: 28.55 ± 2.12 vs NI: 22.50 ± 0.75 mmHg; p 0.049), and renal function (eGFR; I: 64.25 ± 4.06 vs NI: 79.43 ± 3.50 ml/min/1.73m²; p 0.013). Moreover, history of chronic ischemic heart disease (I: 46.2 vs. NI: 71.4 %; p 0.0005) and diagnosis of diabetes mellitus (I: 23.1 vs NI: 42.9%; p 0.0041) were prevalent in the NI group.
**Discussion and conclusion.** Our study highlights how S/V leads to improved functional capacity in those patients with worsening of functional parameters at the baseline. Furthermore, the improvement of the %VO2 predicted at CPET appears to be less likely in patients with a history of heart disease and diabetes mellitus.

### A226: PERSISTENCE OF LEFT SUPERIOR VENA CAVA IN KLEEFSTRA SYNDROME: A CHALLENGING HEART FAILURE CASE

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We present the case of a 43-years old woman with chromosome 9q sub-telomere deletion syndrome (9qSTDS), otherwise known as Kleefstra syndrome, who was admitted to our cardiology department for heart failure due to tachycardiomyopathy.
Kleefstra syndrome is characterized by intellectual disability, autistic-like features, childhood hypotonia and distinctive facial features; the patients often present with other sistemic manifestations and about half of them have cardiac congenital anomalies.
The patient suffered of persistent atrial fibrillation with high ventricular rate response. In the past she underwent right atrial flutter ablation in another cardiology centre. In the months before the admission the patient was treated with various anti-arrhythmic drugs, with unsatisfactory rate control and symptomatic hypotension; moreover, in a 24-hour EKG-monitoring done to ascertain the rate response during titration of medical therapy we found a pause of > 6 seconds and her parents reported frequent syncope episodes, so the implant of a pace maker was indicated. At the transthoracic echocardiogram at the admission we detected a dilated left ventricle with a depressed ejection fraction (EF 35-40%), moderate secondary mitral insufficiency, pulmonary hypertension and a dilated coronary sinus. We thought that an implantation of cardiac resynchronization device (CRT-P) coupled with the ablation of atrioventricular node (AVN) was the best choice for this patient, in order to treat both the heart failure and the atrial fibrillation with high ventricular rate response.
We planned to implant the CRT-P device with the support of the anesthetist in order to avoid any miscomfort of the patient. After the isolation of the left cephalic vein, having trouble with the progress of the guide wire, we decided to do a venography and we uncovered the persistence of the left superior vena cava, directly communicating with the coronary sinus. We then evaluated if the coronary sinus could have some collateral veins suitable for the implantation of the catheter for the left ventricle but unfortunately we found none. We therefore had to downgrade the implant and positioned a bicameral pacemaker with an atrial and ventricular catheter. The patient was discharged with a bisoprolol 1.25 mg sid and the indication to up titrate the dosage with her general practitioner; however, the medical therapy was not correctly taken due to symptomatic hypotension. At the ambulatory evaluation two weeks after the discharge the patient was congested, reporting asthenia and persistent atrial fibrillation with high ventricular rate response (mean heart rate 180 bpm) so we decided to admit the patient to our cardiology ward. We performed a modulation of the AVN with mild sedation; at the end of the procedure the EKG showed a residual junctional rhythm at 60 bpm. After a 2-days hospitalization the patient was discharged with bisoprolol 1.25 mg sid. We recently re-evaluated the patient: she feels well, without congestion or hypotension, with good functional capacity; at the pacemaker interrogation the mean heart rate is 75 bpm, without episodes of tachycardia and a pacing-burden < 40%, so that an up-grade to CRT-P is not deemed necessary.
We present this clinical case to outline the cardiac manifestations of the Kleefstra syndrome we have found in this patient. We also stress the importance of the anatomy of coronary sinus for a successful implant of CRT. To our knowledge, this is the first described case of persistence of the left superior vena cava in patients affected by Kleefstra syndrome.

## SCOMPENSO CARDIACO – 6
## Sessione Poster

### A227: GLOBAL CARDIAC REVERSE REMODELING INDUCED BY SACUBITRIL/VALSARTAN IN PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION (HFREF)

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**Objectives.** Sacubitril/valsartan reduces mortality and hospitalizations in patients with heart failure and reduced ejection fraction (HFrEF). However, little is known about its impact on cardiac reverse remodeling. We aimed to evaluate the left ventricle and left atrium reverse remodeling (LVRR; LARR) in a cohort of HFrEF patients treated with sacubitril/valsartan.
**Methods.** We prospectively evaluated symptomatic outpatients with HFrEF in optimal medical therapy (OMT) who started sacubitril/valsartan in our center. Clinical and echocardiographic data were collected at baseline and at last follow up. Aim of the study was to evaluate the incidence of LVRR and LARR. LVRR was defined as an increase in the left ventricular ejection fraction (LVEF) ≥10% or a LVEF >50% and a decrease ≥10% in indexed left ventricular end-diastolic diameter (LVEDDi) or a LVEDDi ≤33 mm/m2, while, LARR was determined as a decrease >15% in the left atrium end-systolic volume (LAESV).
**Results.** Our population was composed of 77 patients (65±11 years old, 78 % males, 40% ischemic etiology, 28 ±6% LVEF, 110 ± 100 months since HF diagnosis). Over a median (IQR) follow up of 9 (6-14) months after the beginning of sacubitril/valsartan LVRR occurred in 20 patients (26%) and LARR in 33 patients (43%). LVEF increased from 28 ±6% to 35±10 % (p<0.001), LVEDDi decreased from 34±5 mm/m2 to 32±7 mm/m2 (p=0.006) and LAESV dropped from 110±50ml to 92±40 (p<0.001). Moreover left ventricular global longitudinal strain (LVGLS) improved from -8.3± 4% to -12±4.7% (p<0.001), total left atrium emptying fraction (TLAEF) increased from 28.2 ±14.4% to 32.6 ±13.7% (p=0.01) and peak atrial longitudinal strain (PALS) from 10.3±6.9% to 13.7±7.6% (p<0.001), while the indexed right atrium end-systolic volume (RAESVi) declined from 29 ±14ml/m2 to 26±10ml/m2 (p=0.01). At the univariate analysis only duration of illness was associated with LVRR (p=0.01).
**Conclusions.** In stable patients in OMT shifting to sacubitril/valsartan seems to provide a significant global cardiac reverse remodeling.

### A228: ASSOCIATION BETWEEN MODIFICATIONS OF MEDICAL TREATMENT AND OUTCOME AFTER PERCUTANEOUS CORRECTION OF SECONDARY MITRAL REGURGITATION

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**Objectives.** To evaluate the adherence to guideline-directed medical therapy (GDMT) for reduced ejection fraction heart failure (HFrEF) in patients undergoing percutaneous transcatheter mitral valve repair (pMVR) and to explore the association between changes in GDMT and prognosis.
**Background.** Optimization of GDMT in HFrEF is associated with improved survival and can reduce the severity of secondary mitral regurgitation (SMR). Highest tolerated doses should be achieved before pMVR and drugs titration further perceived after procedure. However, the degree of GDMT titration in patients with HFrEF and severe SMR treated with pMVR remains unexplored.
**Methods.** We included all the patients with HFrEF and SMR≥3+ treated with pMVR between April 2012 and April 2019 and with available follow-up. GDMT, comprehensive of dosages, was systematically recorded. The study endpoint was a composite of death and heart transplantation.
**Results.** Among 133 patients successfully treated, 121 were included (67±12 years old, 77% males). Treatment rates of ACE-inhibitors/angiotensin receptor blockers/angiotensin receptor neprilysin inhibitor (ACEI/ARB/ARNI), beta-blockers and mineralcorticoid receptor antagonist at baseline and follow-up were 73 and 78%, 85 and 84%, 69 and 70%, respectively. At baseline 33% and 32% of patients were using >50% of the target dose of ACEI/ARB/ARNI and beta-blockers. At follow-up (median time 4 months, interquartile range 2-6), 34% of patients unchanged, 31% uptitrated and 33% of patients downtitrated GDMT. Downtitration of GDMT was independently associated with higher risk of death/heart transplantation (HR 2.542, 95%CI 1.377-4.694, p=0.003).
**Conclusions.** GDMT is frequently underdosed in HFrEF patients with SMR undergoing pMVR. Downtitration of medications after procedure is associated with poor prognosis.

### A229: MAPPAGGIO ELETTROANATOMICO DEL SENO CORONARICO: UN'ALTERNATIVA PER L'OTTIMIZZAZIONE DELLA CRT

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La terapia di resincronizzazione cardiaca è il caposaldo nel trattamento della cardiopatia dilatativa post ischemica associata a dissincronia ventricolare. La crescente esperienza degli operatori nel laboratorio di elettrofisiologia e le innovazioni tecnologiche nel campo dell'elettrostimolazione si propongono di adottare sempre più frequentemente tecniche di intervento che permettano di ridurre i tempi di fluoroscopia e di massimizzare i benefici per i pazienti sottoposti ad impianto di dispositivi elettronici.
Abbiamo utilizzato il sistema EnSite™ Velocity™ St. Jude Medical per il mappaggio elettroanatomico del seno coronarico (CS) durante l'upgrading ad ICD biventricolare in un paziente di 71 anni cardiopatico ischemico cronico, affetto da fibrillazione atriale parossistica, con blocco di branca sinistra incompleto, già sottoposto nel 2006 a sostituzione dell'aorta toracica ascendente e della valvola aortica con reimpianto delle coronarie secondo Bentall-De Bono (protesi valvolata Carbon ArtSorin™ 25/28 mm) e doppio bypass aorto-coronarico.
A gennaio 2019 per NSTEMI complicato da edema polmonare acuto veniva sottoposto a rivascolarizzazione coronarica percutanea e dopo riscontro di funzione sistolica globale severamente depressa (FE Simpson biplano 18%, volume telesistolico 201 mL) ad ecocardiogrammi seriati secondo protocollo Madit II. A febbraio 2019 si procedeva ad impianto di ICD monocamerale Boston™ in prevenzione primaria. A marzo 2019, per il peggioramento della classe NYHA e riacutizzazione dello scompenso cardiaco, il paziente veniva ricoverato nuovamente presso il reparto di cardiologia. All'elettrocardiogramma veniva rilevato blocco di branca sinistra completo. Si decideva pertanto di procedere ad upgrading a CRT-D.
L'intervento di upgrading veniva eseguito in sedazione locale, utilizzando il mappaggio elettroanatomico tramite guida unipolare del seno coronarico con il rilevamento dei ritardi di attivazione di tutto l'albero venoso; si procedeva a posizionamento dell'elettrocatetere ventricolare sinistro a livello del ramo laterale dove veniva evidenziato il maggior ritardo di attivazione ed i migliori parametri elettrici di pacing. Il paziente veniva dimesso due giorni dopo, in assenza di complicanze peri e post procedurali. Ad aprile 2019 veniva eseguito controllo ambulatoriale con riscontro di miglioramento clinico e sintomatologico; all'ecocardiogramma c/D si assisteva ad un miglioramento della funzione sistolica globale (FE Simpson biplano 35%; volume telesistolico 184 mL).
I sistemi di mappaggio elettroanatomici generano modelli cardiaci tridimensionali, permettendo di visualizzare la struttura anatomica ed i ritardi di attivazione per la ricerca del miglior sito di stimolazione, anche in base alle soglie testate direttamente con la guida durante il mappaggio; ciò consente il posizionamento dell'elettrocatetere e permette di valutare la presenza di aree di stimolazione efficaci in pazienti con vaste aree ischemiche, minimizzando il tempo di fluoroscopia e l'esposizione radiologica.

### A230: INCREASED CAPACITY TO UTILIZE KETONE BODIES IN PATIENTS WITH HEART FAILURE: TRANSMYOCARDIAL GRADIENT STUDY AFTER ORAL ADMINISTRATION OF 3-HYDROXYBUTYRATE ESTER

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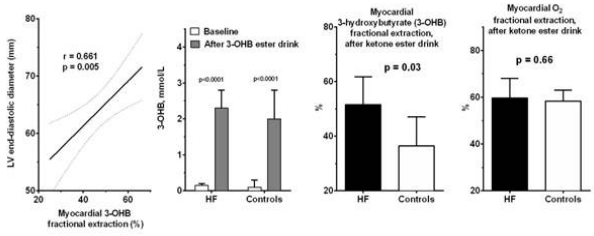
**Background.** Heart failure (HF) is characterised by diminished oxidation of FFA and enhanced utilisation of alternative substrates, including ketone bodies (mainly 3-hydroxybutyrate, 3-OHB). Advanced HF is ketosis-prone state. Upregulation of 3-OHB catabolism was documented in end-stage human hearts, but is unclear if this is due to intrinsic cardiac metabolic remodelling or secondary due to HF-related ketosis.
**Hypothesis.** To identify determinants and to test maximal 3-OHB utilisation capacity in mild/moderate HFrEF or in controls during exogenous hyperketonemia.
**Methods.** 16 HFrEF patients and 11 controls (group I) scheduled for pacemaker implantation underwent echo exam and sampling from artery (A) and coronary sinus (CS) to measure transmyocardial extraction of 3-OHB, blood gases and other substrates. The protocol was repeated in 11 HFrEF patients and 6 controls (group II) 60-min after oral administration of 25g of D-3-OHB ester (HVMN, USA).
**Results.** In group I, A and CS metabolites were similar between HF and controls, but myocardial FFA extraction was lower in HF vs controls (p=0.03), inversely proportional to neurohormonal activation. In group II, ketone ester raised 3-OHB both in HF and Con to levels seen after protracted fasting. Despite of low 3-OHB level baseline, myocardial 3-OHB fractional extraction during hyperketonemia was increased in HF (52% vs 36%, p=0.03), with similar oxygen extraction. 3-OHB fractional uptake directly correlated to LV end-diastolic diameter (p=0.005) and mass (p=0.02) and inversely with LV EF (p=0.034).




**Conclusions.** Acute nutritional ketosis unmasked enhancement of 3-OHB extraction that is present already in mild/moderate HF patients compared to controls and it correlates with cardiac dilatation. Therefore, subclinical metabolic remodelling occurs early in the evolution of HF. Further studies are needed to clarify cardiac metabolic plasticity and potential role of 3-OHB ester as oxygen-efficient cardiac fuel.

### A231: DETERMINANTS OF RIGHT VENTRICULAR DYSSYNCRONY IN PATIENTS WITH HEART FAILURE: COMBINED GATED BLOOD-POOL SPECT AND INVASIVE HEMODYNAMIC STUDY

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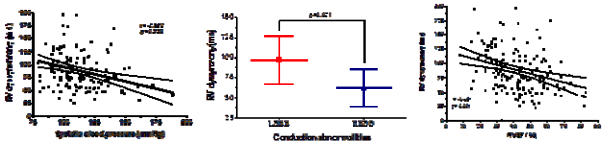
**Introduction.** Ventricular dyssynchrony compromises myocardial mechanical efficiency. While mechanisms of left ventricular (LV) dyssynchrony are well understood, little is known about the right heart dyssynchrony patterns.
**Methods.** We examined 214 patients with compensated HF (age 56.8±10.5 years, LVEF 29.5±18.0%, 80% males). Patients underwent right heart catheterisation with thermodilution, followed by a nuclear study. 30 minutes after injection of stannous pyrophosphate, erythrocytes were in-vivo labelled by intravenous injection of 740 MBq 99mTc isotope. The heart chambers were imaged using D-SPECT camera (Spectrum Dynamics, Israel) by time-averaged ECG-gated acquisitions and 3D reconstructed by semiautomatic plug-in software (QBS Cedars-Sinai, USA). Standard deviation of peak regional displacements over averaged cardiac cycle (PSD) was used to calculate dyssynchrony.
**Results.** In the overall population RV end-diastolic volume (EDV) was 260±89 ml and RV ejection fraction (EF) was 41±14%. Peak mechanical contraction occurred at 325±80ms in the LV and at 329±69 ms in the RV (p=0.44). On average, RV and LV had similar degrees of global dyssynchrony (p=0.90), but RV differed from LV in the determinants of dyssynchrony. RV dyssynchrony (RV-PSD) increased with the severity of RV dilatation (p=0.05) and dysfunction (p=0.001). QRS widening had larger effect on LV than on RV dyssynchrony. Left bundle branch block (LBBB) induced more dyssynchrony than right bundle branch block (RBBB) in the RV (LBBB 97.4±29.7 ms vs RBBB 62.0±23.2 ms, p=0.001). RV-PSD inversely correlated with age and BMI, and directly with LV-EDV and LVEF. No correlation was found between RV-PSD and LV-PSD (p=0.382). Regional LV dyssynchrony did not correlate with RV free wall dyssynchrony, with the only exception of the LV inferior wall (p=0.015). RV afterload was not related to RV dyssynchrony. Opposite, transeptal pressure difference (SBP-PAPsystolic) strongly correlated with RV but not with LV dyssynchrony, and this relation was driven by a strong negative correlation between RV-PSD (and RVEF) and systemic blood pressure (r= -0.563; p=0.003).



**Conclusions.** QRS duration has no significant influence on RV dyssynchrony, that was more pronounced in dilated and dysfunctional RVs. Systemic blood pressure strongly correlates with RV dyssynchrony, indicating the effect of RV-LV systolic interdependence on RV synchrony. Further studies are needed to understand the role of RV synchrony restoration in HF.

### A232: ADHERENCE TO THE ESC HEART FAILURE TREATMENT GUIDELINES IN A DEDICATED LARGE VOLUME OUTPATIENT CLINIC

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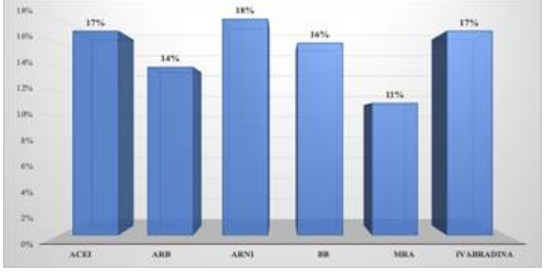
**Background.** Several studies showed that in patients with chronic heart failure (CHF) treatment guidelines are adopted slowly or are applied inconsistently, often failing to lead to further improvements in patient care quality and outcomes. The aim of our study was to evaluate how recommendations of European guidelines regarding pharmacological and non-pharmacological treatments for CHF are adopted in clinical practice in a dedicated large volume outpatient clinic.

**Material and Methods.** We retrospectively reviewed records of CHF patients treated at heart failure outpatient clinic of our centre in the last 12 months.

**Results.** From July 2018 to July 2019, we performed 1.764 visits to 1.079 patient (age 75.1 ± 10.9 years; 70% males; left ventricular ejection fraction 40.3 ± 10.0%; NYHA I-II 98%), of which 44% with HF with reduced ejection fraction (HFrEF), 30% with mid-range ejection fraction (HFmrEF) and 24% with preserved ejection fraction (HFpEF). Ischaemic cardiomyopathy was reported in about half of the patients, diabetes in one third and dyslipidaemia in more than 60%. In total, 75% of ambulatory patients with HFrEF received angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor blockers (ARB) or angiotensin receptor-neprilysin inhibitor (ARNi), 91% beta-blockers (BB), and 60% mineralocorticoid receptor antagonists (MRA). Ivabradine was prescribed in 19% of patients. Triple guideline-recommended therapy (ACEi/ARB/ARNi and MRA and BB) was used in 46% of HFrEF. In this group, target doses were reached in 16% of patients receiving ACEi, 14% of those with ARB, 18% of those with ARNi, 16% of those prescribed BB, and 11% of those with MRA. Among patients who could benefit from ivabradine, 17% were at target dose (Figure). A cardiac implantable device (ICD/CRT) was used in roughly 60% of HFrEF patients. ARB and MRA were used respectively in 22% and 60% of HFmrEF and in 21% and 61% of HFpEF patients.




**Conclusion.** Adherence to guidelines has improved over years but is still suboptimal, particularly with regards to medication dosage. Lower class of indication, such as for ARB and MRA in EF>40%, mirrored in lower prescription rate. However, exclusive use of the percentage of treated patients is a poor indicator of the quality of healthcare in HF. Our single centre analysis showed, despite the large volume of health services offered, rate of adherence to guidelines-directed therapies in line with the latest CHF European registries, but also room for improvement due to the undertreatment rate.

### A233: EFFICACIA IMPIANTO SUPPORTO TEMPORANEO DESTRO IN PAZIENTI CON LVAD AD ELEVATO ALMA SCORE

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**Introduzione.** La failure del ventricolo destro in pazienti supportati con assistenza ventricolare sinistra (LVAD) rappresenta una frequente complicanza. Obiettivo del nostro studio è stato valutare l'efficacia dell'impianto elettivo di assistenza temporanea destra(tRVAD) in pazienti ad alto rischio di failure post LVAD.

**Metodologia.** Sono stati valutati retrospettivamente 22 pazienti,14 impiantati con HeartMateII e 8 con HeartMate3, che hanno richiesto un supporto temporaneo destro. In questi pazienti veniva identificato il profilo di rischio di failure desttra calcolando l'ALMA score, uno score di rischio che valuta: l'indice di pulsatilità polmonare; il rapporto tra il diametro telediastolico del ventricolo destro e sinistro; l'indice di lavoro del ventricolo destro; il MELD-XI score epatico e l'intenzione di trattamento.

**Risultati.** Nei 22pazienti l'ALMA score calcolato risultava pari a4,2±0,63. In 10 pazienti il supporto destro veniva istituito mediante cannulazione Adx-AP. In 12 una configurazione VF-AP con intrposizione di graft veniva impiegata. In 14 pazienti una concomitante plastica della valvola tricuspide veniva effettuata. Il weaning dal supporto destro veniva condotto con successo in 19 pazienti(86%) dopo un periodo medio di supporto pari a 9±4 giorni. In un paziente l'impossibilità allo svezzamento richiedeva il trapianto in emergenza. In 2 pazienti (9%) veniva constatato l'exitus per altra causa. Al follow-up (70±24mesi) 1 paziente(4,5%)richiedeva ricovero per scompenso destro tale da richiedere inotropi endovena.

**Conclusioni.** In base ai risultati derivanti dalla nostra esperienza l'impianto in elezione di un tRVAD in pazienti con ALMA score superiore a 3 è una procedura valida nel trattamento di pazienti con disfunzione biventricolare.

### A234: SACUBITRIL/VALSARTAN EFFICACY ON FUNCTIONAL, LABORATORY, ECHOCARDIOGRAPHIC PARAMETERS: A REAL-WORLD STUDY

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**Background.** Sacubitril/Valsartan is a novel therapy in the treatment of heart failure with reduced ejection fraction (HFrEF) showing lower cardiovascular mortality and hospitalization for heart failure compared to standard therapy. However, informations about its use or impact in real-world practice are still limited.

**Methods.** We performed a retrospective study including consecutive patients (pts) with HFrEF and optimized therapy who initiated therapy with sacubitril/valsartan between November 2016 and July 2018, followed at out HF Center. Starting dose of sacubitril/valsartan was 24/26 mg bid except for pts who took the maximum dose of angiotensin converting enzyme inhibitor or angiotensin receptor antagonist, who directly started the intermediate dose (49/51 mg bid). We evaluated demographic, clinical, echocardiographic, laboratory and functional parameters at baseline, 6-months and 12-months.

**Results.** We included 138 pts, mean age 63±13 years, 118 male (85%). Among these, 76 (55%) had history of coronary artery disease, 61 (44%) hypertension, 40 (29%) atrial fibrillation, 39 (28%) chronic kidney disease, 39 (29%) diabetes and 15 (11%) chronic obstructive pulmonary disease. Forty-eight patients (35%) had previous cardiac resynchronization therapy. After one year, 49% of pts reached the dose of 49/51 mg bid and 18% achieved the target dose of 97/103 bid. There was a significant improvement in New York Heart Association functional class (p for trend = 0.02), left ventricular EF (LVEF) (p<0.0001) and NT-terminal pro-B type natriuretic peptide (p=0.001); glomerular filtration rate worsened (p=0.005) and systolic blood pressure decreased (p=0.03). A non-significant trend towards a reduction in diuretic dose has been demonstrated (table 1). Primary reasons for discontinuation of therapy (observed in 12 pts, 0.08%) were worsening renal function (58%) and hypotension (32%).

**Conclusions.** These real-world data demonstrated the efficacy of sacubitril/valsartan in improving symptoms, LVEF and NTproBNP values. Sacubitril/valsartan was associated with a decrease in blood pressures value and renal function but with very low rate of drug discontinuation.

**Table 1.** Clinical, functional and echocardiographic parameters at baseline, 6 and 12 months.

| | Baseline | 6 months after ARNI | 1 year after ARNI | p value |
|---|---|---|---|---|
| SBP (mmHg), mean ± SD | 119,82 ± 15,90 | 115,86 ± 15,42 | 113 ± 13,96 | 0.03 |
| DBP (mmHg), mean ± SD | 72,7 ± 9 | 70 ± 8 | 71 ± 8 | n.s. |
| eGFR (ml/min/1,73 $m^2$), mean ± SD | 67,70 ± 20,92 | 64,85 ± 22,46 | 61,84 ± 24,64 | 0.0055 |
| NYHA class I n, % | 0 (0) | 29 (21) | 33 (24) | 0.02 |
| NYHA class II n, % | 89 (64) | 92 (67) | 92 (67) | |
| NYHA class III n, % | 45 (33) | 17 (12) | 13 (9) | |
| NYHA class IV n, % | 4 (3) | 0 (0) | 0 (0) | |
| LVEF (%), mean ± SD | 29,85 ± 5,40 | 33,77 ± 7,22 | 35,20 ± 8,70 | <0.0001 |
| NT-proBNP (ng/L), mean ± | 1943 ± 1020 | 909 ± 618 | 750 ± 410 | 0.001 |
| Furosemide dose (mg/die), mean ± SD | 83 ± 99 | 78 ± 117 | 67 ± 109 | 0.06 |

SBP: systolic blood pressure; DBP: diastolic blood pressure; eGFR: estimated glomerular filtration rate; NYHA: New York Heart Association class; LVEF: left ventricle ejection fraction; N-TproBNP: NT-terminal pro-B type natriuretic peptide: SD: standard deviation.

### A235: EARLY EFFECTS OF SACUBITRIL/VALSARTAN ON EXERCISE TOLERANCE IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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**Background.** Sacubitril/valsartan in heart failure (HF) with reduced ejection fraction (HFrEF) was shown to be superior to enalapril in reducing the risk of death and hospitalization for HF. Our aim was to evaluate the cardiopulmonary effects of sacubitril/valsartan in patients with HFrEF.

**Methods.** We conducted an observational study. Ninety-nine ambulatory patients with HFrEF underwent serial cardiopulmonary exercise tests (CPET) after initiation of sacubitril/valsartan in addition to recommended therapy.

**Results.** At baseline, 37% of patients had New York Heart Association (NYHA) class III. After a median follow-up of 6.2 months (range 3–14.9 months) systolic blood pressure decreased from 117 ± 14 to 101 ± 12 mmHg ($p < 0.0001$), left ventricular ejection fraction (LVEF) increased from 27 ± 6 to 29.7 ± 7% ($p < 0.0001$), peak oxygen consumption ($VO_2$) improved from 14.6 ± 3.3 (% of predicted = 53.8 ± 14.1) to 17.2 ± 4.7 mL/kg/min (% of predicted = 64.7 ± 17.8) ($p < 0.0001$), minute ventilation/carbon dioxide production relationship ($VE/VCO_2$ Slope) decreased from 34.1 ± 6.3 to 31.7 ± 6.1 ($p = 0.006$), $VO_2$ at anaerobic threshold increased from 11.3 ± 2.6 to 12.6 ± 3.5 mL/kg/min ($p = 0.007$), oxygen pulse increased from 11.5 ± 3.0 to 13.4 ± 4.3 mL/kg/min ($p <0.0001$), and $\Delta VO_2/\Delta Work$ increased from 9.2 ± 1.5 to 10.1 ± 1.8 mL/min/watt ($p = 0.0002$).

**Conclusion.** Sacubitril/valsartan improved exercise tolerance, LVEF, peak $VO_2$, and ventilatory efficiency at 6.2 months follow-up. Further studies are necessary to better clarify underlying mechanisms of this functional improvement.

### A236: CONGESTION OCCURENCE AND EVALUATION IN ACUTE HEART FAILURE SCENARIO: TIME TO RECONSIDER DIFFERENT PATHWAYS OF VOLUME OVERLOAD

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(a) CARDIOVASCULAR DISEASES UNIT, DEPARTMENT OF INTERNAL MEDICINE, UNIVERSITY OF SIENA, SIENA, ITALY

Although congestion is considered to be the main reason for hospital admission in patients with acute heart failure, a simplistic view considering idro saline retention and total body volume accumulation did not provide convincing data. Clinical congestion occurrence is often the tip of the iceberg of several different mechanisms ranging from increased filling pressure to extravascular fluid accumulation and blood flow redistribution. Therefore, the clinical evaluation is often restricted to a simple physical examination including few and inaccurate signs and symptoms. This superficial approach has led to contradictory data and patients have not been evaluated according to a more realistic clinical scenario. The integration with new diagnostic ultrasonographic and laboratory tools would substantially improve these weaknesses. Indeed, congestion could be assessed by following the most recognized HF subtypes including primitive cardiac defect, presence of right ventricular dysfunction and organ perfusion. Moreover, there is a tremendous gap regarding the interchangeable concept of fluid retention and redistribution used with a univocal meaning. Overall, congestion assessment should be revised, considering it as either central, peripheral or both. In this review, we aim to provide different evidence regarding the concept of congestion starting from the most recognized pathophysiological mechanisms of AHF decompensation. We highlight the fact that a better knowledge of congestion is a challenge for future investigation and it could lead to significant advances in HF treatment.

### A237: LOOP DIURETICS ADMINISTRATION IN PATIENTS WITH ACUTE HEART FAILURE AND REDUCED SYSTOLIC FUNCTION: EFFECTS OF DIFFERENT INTRAVENOUS DIURETIC DOSE AND DIURETIC RESPONSE MEASUREMENT

Gaetano Ruocco (a, b), Mauro Feola (b), Isabella Evangelista (a), Lorenzo Luschi (a), Ranuccio Nuti (a), Alberto Palazzuoli (a)
(a) CARDIOVASCULAR DISEASES UNIT, DEPARTMENT OF INTERNAL MEDICINE, UNIVERSITY OF SIENA, SIENA, ITALY; (b) CARDIOLOGY DIVISION, OSPEDALE REGINA MONTIS REGALIS, MONDOVI' (CN), ITALY

**Background.** Despite loop diuretics are a landmark in Acute Heart failure (AHF) treatment, few RCT exist evaluating whether temporal administration and drug amount affect outcome. In this study we sought to evaluate: 1-different loop diuretic dose administration in relation to outcome; 2-the significance of temporal Diuretic Response (DR) measured over the whole intravenous timing administration.

**Methods.** Patients were screened in relation to loop diuretic dose comparing Low (LD) vs High (HD) dose of drug infusion during hospitalization. DR formula was defined as weight loss/40 mg daily of furosemide and it was examined at day 1, day 3 and during the whole infusion period.

**Results.** 121 AHF patients with reduced ejection fraction (EF) were evaluated. Adverse events rate was significantly higher in HD compared to LD group (75% vs 22%;$p<0.001$). Both DR measured during entire infusion period(HR 3.25 [CI: 1.92-5.50];$p<0.001$) and intravenous diuretic HD (HR 5.43 [CI: 2.82-10.45]; $p<0.001$) were related to adverse events occurrence.Multivariable analysis showed that DR(HR 3.01 [1.36-6.65];$p=0.006$), intravenous diuretic HD(HR 2.83 [1.24-6.42];$p=0.01$) and WRF (HR 2.21 [1.14-4.28];$p=0.01$) were related to poor prognosis.

**Conclusions.** HD intravenous loop diuretic administration is associated with worsen outcome and less DR.Low DR measured during the whole intravenous administration better predicts adverse events compared to DR measured in early phases.

## SCOMPENSO CARDIACO – 7
## Sessione Poster

### A238: THE ROLE OF THE KIDNEY IN ACUTE AND CHRONIC HEART FAILURE

Gaetano Ruocco (a), Alberto Palazzuoli (a)
(a) CARDIOVASCULAR DISEASES UNIT, DEPARTMENT OF INTERNAL MEDICINE, UNIVERSITY OF SIENA, SIENA, ITALY

Renal dysfunction affects approximately 30% to 50% of heart failure (HF) patients. This unfavourable relationship between heart and kidney dysfunction contributes to worse outcomes through several mechanisms such as inflammation, oxidative stress, impaired hydro-saline homeostasis and diuretic resistance. Renal dysfunction not only carries important prognostic value both in acute and in chronic HF, additionally a better understanding in terms of definition, incidence, and pathophysiology carries important additional information. Despite old and novel available biomarkers for the detection of renal dysfunction, there is no general consensus regarding terminology and definition of renal dysfunction in HF. Due to some specific pathophysiological mechanisms, renal impairment seems to be different on an individual patient level and, recognizing it in acute and chronic setting, could be useful to optimize decongestive treatment. For these reasons, in this review, we aim to describe and evaluate different phenotypes of renal dysfunction in acute and chronic HF and the possible therapeutic strategies in these settings.

### A239: A PARADOXICAL EXERCISE RESPONSE FOLLOWING MYECTOMY IN HYPERTROPHIC CARDIOMYOPATHY

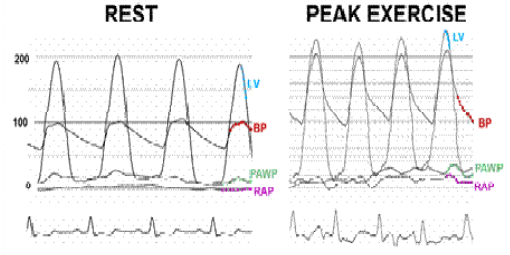
Claudia Baratto (a, b), Sergio Caravita (a, b), Valeria Rella (a, b), Giovanna Branzi (a), Lia Crotti (a, b), Giovanni Battista Perego (a), Franco Cecchi (a), Gianfranco Parati (a, b)
(a) ISTITUTO AUXOLOGICO ITALIANO, IRCCS, OSPEDALE SAN LUCA, MILANO; (b) DIPARTIMENTO DI MEDICINA E CHIRURGIA, UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA, MILANO

**Case report.** A 66-y.o. man with hypertrophic cardiomyopathy presented with recurrence of dyspnea NYHA II-III after surgical myectomy, mitral valve repair and ICD implantation, while on chronic treatment with beta-blocker and dysopyramide. Echocardiography suggested residual left ventricular outflow tract obstruction (LVOTO), but evidence so obtained was inconclusive: there was large day-by-day variability in LVOTO, and exercise stress echo was limited by a poor Doppler signal quality, so that it was difficult to precisely define the mechanism(s) underlying symptoms development. He was then referred to our attention for a comprehensive functional assessment, in order to evaluate the possible indication to a therapy escalation, including redo of septal myectomy.

A right and left cardiac catheterization was planned and performed, both at rest and during exercise. At rest, we found significant LVOTO, with maximum pressure gradient at baseline of 90-100 mmHg and typical “spike-and-dome” configuration of the aortic pulse contour (figure). Despite this, baseline resting hemodynamics demonstrated normal values

of mean PAP (16 mmHg), pulmonary artery wedge pressure (PAWP, 11 mmHg). LV end-diastolic pressure was at the upper limit of normal (LVEDP 15 mmHg), with a cardiac index at lower limits of normal (2.2 L/min/m2). During exercise, a "paradoxical" reduction of LVOTO was observed, with a minimum pressure gradient measured at a peak of exercise of 30-40 mmHg (figure). Despite this, exercise-induced pulmonary hypertension developed, entirely explained backward transmission of high LV filling pressure. Functional capacity was mildly reduced (peak VO2=20 mL/Kg/min, 75% of predicted) due to mildly reduced cardiac output (CO) reserve, mainly related to chronotropic incompetence (58% of the theoretical maximum heart rate). Since the patient already had an ICD, we made an attempt to optimize cardiac stimulation under echocardiographic monitoring. Under DDD sequential pacing, we observed an acute reduction of LVOT gradient from 50-70 mmHg to 20-30 mmHg. After 1 year the patient is clinically stable, without worsening of symptoms.

**Conclusions.** This case suggests that in well-selected cases, a patient' s management based on pathophysiological reasoning in the frame of current recommendations, may help to define the etiopathogenetic mechanisms underlying the patients' symptoms. Cardiac catheterization allowed us to highlight a paradoxical response of LVOT obstruction to exercise, with symptoms mainly attributable to diastolic dysfunction and chronotropic incompetence. This approach had clinical implications, helping us to drive treatment decision in a tailored and patient-centered way.




### A240: EFFETTI DELLA TERAPIA MARZIALE ENDOVENOSA SULLA CHEMOSENSIBILITÀ E SUI DISTURBI RESPIRATORI NEL SONNO IN PAZIENTI AFFETTI DA INSUFFICIENZA CARDIACA

Sergio Caravita (a), Andrea Faini (a), Carlo Vignati (c), Sara Pelucchi (b), Caterina Bonino (a), Elena Viganò (a), Claudia Baratto (a, b), Dario Pellegrini (a, b), Antonio Sorropago (a, b), Elisabetta Salvioni (c), Gaia Cattadori (d), Camilla Torlasco (a, b), Gabriella Malfatto (a), Alessandra Villani (a), Carolina Lombardi (a, b), Alberto Piperno (b), Piergiuseppe Agostoni (c), Gianfranco Parati (a, b)
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**Introduzione.** La terapia marziale endovenosa è in grado di migliorare la qualità di vita in pazienti anemici e sideropenici affetti da insufficienza cardiaca (HF). I meccanismi alla base di tale miglioramento sono potenzialmente molteplici e non completamente chiariti. Una alterata chemosensibilità e i disturbi respiratori nel sonno caratterizzano la fisiopatologia di HF, possono essere reciprocamente interrelati e potrebbero essere peggiorati dall'anemia e dalla sideropenia. Viceversa, la terapia marziale endovenosa potrebbe avere effetti benefici sia sulla chemosensibilità sia sui disturbi respiratori nel sonno ripristinando il metabolismo del ferro e la concentrazione emoglobinica.

**Obiettivi.** In pazienti con HF, anemici e sideropenici, abbiamo voluto valutare gli effetti della terapia marziale endovenosa su plurimi parametri, inclusi: chemosensibilità, apnee nel sonno (indice di apnea-ipopnea, AHI), capacità di esercizio.

**Metodi.** Abbiamo condotto uno studio randomizzato (ferro:placebo=2:1) controllato in doppio cieco in pazienti con HF, frazione di eiezione del ventricolo sinistro <= 45%, anemia (Hb<13 g% negli uomini e < 12g% nelle donne), sideropenia (ferritina<100 mcg/L o ferritina <300 mcg/L con saturazione transferrina < 20%). La chemosensibilità centrale è stata valutata come pendenza della relazione tra ventilazione minuto e pressione parziale di fine espirazione per la CO2 (VE/PetCO2 slope) durante un test di rebreathing di una miscela CO2 7% - O2 93%. La chemosensibilità periferica è stata valutata come pendenza della relazione tra ventilazione e saturazione ossiemoglobinica (VE/SpO2) durante un test di ipossia transitoria con miscela di N2.

**Risultati.** Su 70 pazienti arruolati, 58 hanno completato lo studio (71±10 anni, 21% donne, Hb 11.3±1.0 g/dL). Le caratteristiche cliniche ed ecocardiografiche, la chemosensibilità, il numero di apnee per ora di sonno e la capacità di esercizio non differivano tra i 2 gruppi pre-terapia. La terapia non apportava significative modifiche dei principali parametri clinico-strumentali nel braccio placebo. Viceversa, nel braccio in trattamento attivo, dopo terapia, risultavano migliorati: l'emoglobina (11.4±1.1g% al basale vs 12.5±1.4 in terapia, p<0.001), la classe funzionale NYHA (NYHA > 2 in 61% al basale vs 26% dopo terapia, p<0.05), il consumo di ossigeno al picco dell'esercizio (delta VO2 + 1 mL/Kg/min, p<0.01), la chemosensibilità centrale (VE/PetCO2 slope: 4.6±6.5 L/min/mmHg al basale vs 2.9±2.9 in terapia, p<0.05) e le apnee nel sonno totali (centrali+ostruttive) in pazienti che presentavano un AHI > 5/h allo studio basale (AHI 21±16 /h al basale vs 12±11 in terapia, p<0.05). Non vi erano significative differenze negli altri principali parametri clinico-strumentali.

**Conclusioni.** La terapia marziale endovenosa è in grado di migliorare plurimi parametri clinico-strumentali, inclusi la chemosensibilità centrale e le apnee nel sonno in pazienti affetti da HF, anemia e sideropenia. Tali effetti possono contribuire a spiegare l'impatto favorevole della terapia marziale endovenosa sulla qualità di vita in pazienti con HF, sommandosi agli effetti positivi sulla capacità di esercizio.

### A241: THE INFLUENCE OF BARIATRIC SURGERY ON EARLY PHASE OF OBESITY CARDIOMIOPATHY

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(a) UNVIVERSITY OF L'AQUILA; (b) CASA DI CURA DI LORENZO AVEZZANO (AQ)

**Background.** Obesity is considered one of the major risk factor for hypertension and coronary artery disease, both related to the development of heart failure and can lead to modification of cardiac structure and accelerate cardiac remodeling to an obesity cardiomyopathy that is associated primarily to the metabolic disease characterizing severe obesity. We aim to evaluate the influence of post-surgery weight loss on cardiac structure and diastolic function and estimate the association with cardiovascular risk factors.

**Materials and methods.** We enrolled 65 consecutive patients referred to Obesity center for morbid obesity (BMI ≥ 35 kg/m2 with comorbidities or ≥ 40 kg/m2). Studied patients were submitted to a good quality echocardiographic evaluation at baseline and after 18 months of follow-up.

**Results.** Echocardiographic parameters significantly changed during follow-up; LVEDD (59± 5,8 vs 46±4,7; p=0,002) LVmass (191,5±53,1 vs 162±35; p<0,001) and LV mass indexed (52,1±15,8 vs 44,2±11,2; p<0,001), E/A ratio (1,17±0,5 vs 1,37±0,4; p<0,003) and E/Ea ratio (9,2± 3,3 vs 6,4±2,3; p<0,001). Diastolic functions significantly changed with a significant reduction of grade I (56,9 vs 23,1; p<0,001) and grade II of diastolic dysfunction (12,3 vs 3; p=0,002). We obtained also a significant normalization of LV geometry (35,4% vs 20% before surgery; p=0,04). Univariate analysis revealed that weight loss, EBMIL and variation of BMI after surgery are related to a significant reduction of LV mass indexed, E/A ratio and RWT

**Conclusions.** Bariatric surgery leads to a modifications of clinical and echocardiographic parameters in severe obese patients, due to the stable, long-term weight reduction that these kind of intervention allow.

### A242: COMPARISON BETWEEN CLASSICAL AND NOVEL PARAMETERS OF RESPONSE TO CARDIAC RESYNCHRONIZATION THERAPY IN PATIENTS AFFECTED BY HEART FAILURE WITH REDUCED EJECTION FRACTION

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**Background.** Cardiac resynchronization therapy (CRT) reduces morbidity and mortality in selected patients with heart failure with reduced ejection fraction (HFrEF) who remain symptomatic despite optimal medical therapy. However, one third of patients treated do not respond. The aim of our study was to evaluate in a real world population both well validated and novel parameters able to predict response to CRT. We assessed clinical and echocardiographic data and HF risk scores. Newer and promising imaging features coming for Cardiac Magnetic Resonance (CMR) have also been tested, including the myocardial scarring and the LV lead (LVL) position, that have increasingly been recognized as important determinants of response.

**Methods and results.** Twenty-six consecutive patients with HFrEF (age 67.9±11.7 years) secondary to dilated cardiomyopathy or post-ischemic HFrEF were enrolled between March 2017 and May 2019. Clinical parameters, laboratory and echocardiographic data have been assessed at baseline and at 6 months follow-up. All patients underwent late gadolinium enhancement (LGE)-CMR at baseline prior to CRT. The implanter was blinded to CMR results. Fluoroscopy and LGE-CMR were retrospectively used to localize the LVL and myocardial scarring. The primary end-point, at the 6 months follow-up, was death or heart failure hospitalization. The other accepted definitions for CRT responder in the current literature were used as secondary end-points: improvement by ≥1 NYHA functional classes at 6 months, left ventricular end systolic volume (LVESV) reduction ≥15% at 6 months and left ventricular ejection fraction (LVEF) improvement ≥5% at 6 months. Clinical events were compared in the following subgroups: LGE + (evidence of LGE at CMR) versus LGE – (no evidence of LGE at CMR); LGE at LVL position (LGE at the pacing

stimulus) versus non-LGE at LVL position (no LGE at the pacing stimulus). Our study population was mostly composed by mildly symptomatic patients (57,7% NYHA class II) with a non-ischemic etiology of heart failure (65,4%). A significant majority of patients was treated with HF optimal medical therapy (65,4%). At univariate analysis for the primary end-point, better response to CRT was associated with female sex (p=0.009), QRS duration (p=0.048) and Seattle Heart Failure Model (SHFM) predicted life expectancy (1 year survival p=0.041; 5 year survival p=0.025). Focusing on CMR data, 16 patients had LGE at CMR and 2 patients had LGE at LV lead position. LGE within LV wall and LGE at LV lead position did not predict response to CRT (p>0.05). Differences in response between LGE + and LGE – and between LGE at LVL position and non-LGE at LVL position were not statistically significant (p= 0.547 and p=0.557 respectively). No parameter was significantly associated with the secondary end-points.
**Conclusion.** In our study, we corroborated the evidence that female sex and a wide QRS are associated with a better response to CRT. Cardiac Magnetic Resonance failed to predict response to CRT, probably due to the small number of patients with LGE. Remarkably, we found in the SHFM a useful tool for risk-stratification and early detection of non-responder patients who will benefit from a close monitoring and a far-sighted evaluation for surgical therapy of heart failure.

### A243: PROGNOSTIC ROLE OF TNM-LIKE CLASSIFICATION FOR HEART FAILURE AT 12 MONTHS FOLLOW UP: COMPARISON WITH OTHER NOSOLOGIES

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(a) SAPIENZA UNIVERSITÀ DI ROMA

**Introduction and purpose.** We proposed a new staging system for HF, named HLM (JACC 2014;20;63(19):1959-60), analogous to the TNM classification used in Oncology. HLM refers to heart damage (H), lung involvement (L), and malfunction of peripheral organs, such as kidney, liver, brain and hematopoiesis. Each parameter is allocated in four levels of severity (H1-4; L0-3; M0-3). The aim was a preliminary comparison between HLM and NYHA, ACC/AHA and ESC classification and MAGGIC score to assess the most accurate prognosis of HF patients in terms of rehospitalization and mortality.
**Methods.** We performed an observational registry of 1380 consecutive HF patients (68.5% female and 31.5% males) and examined all parameters for heart, lungs and peripheral organs function. Each patient has been classified according to HLM, NYHA, ACC/AHA, ESC and MAGGIC score. The MACCE (major adverse cardiovascular and cerebrovascular events) and cardiac death rates were calculated at 12 months follow up.
**Results.** Overall survival curves regarding rehospitalization for MACCE and cardiac death show that HLM classification is as valid as NYHA, ACC/AHA, ESC classifications and MAGGIC score in terms of prognosis of HF patients. In particular, ROC curves shows that HLM classification is more accurate than the others in terms of stratifiy risk of rehospitalization for MACCE and cardiac death at 12 months follow up, because the area under the ROC curve (AUC) is greater. At 1 year follow up, H3 (p=0.006), H4 (p=0.0001), L1 (p=0.002), L2 (p<0.0001), L3 (p<0.0001), M2 (p<0.0001) and M3 (p<0.0001) were significantly correlated with cardiac death, regarding the other classifications only NYHA III (p=0.0003), NYHA IV (p=0.0001), FE <35% (p<0.0001) and FE >50% (p= 0.006); about rehospitalization H3 (p=0.007), H4 (p= 0.0001), L1 (p=0.05), L2 (p<0.0001), L3 (p<0.0001), M2 (p<0.0001) and M3 (p<0.0001) were significantly correlated; regarding the other classifications only NYHA III (p=0.0006), NYHA IV (p<0.001) and FE>50% (p=0.003) showed significant results.
**Conclusions.** HLM nosology is comparing to other classifications as showed by overall survival curves. In particular, HLM seems to be more accurate than NYHA, ACC/AHA, ESC classifications and MAGGIC score to stratify risk of rehospitalization for MACCE and cardiac death in HF patients, since the area under the ROC curve is greater for HLM in terms of rehospitalization and cardiac mortality and this seems to be mainly due to the L and M parameters. In fact, HLM classification is able to better determine the prognosis at 1 year, because it evaluates both heart, lung, renal, hepatic, cerebral and hematopoietic involvement; heart damage (H2-H4), any lung involvement (L1-3) and two or more organs dysfunction (M2-3) present the most accurate prognostic power. A wider and systemic approach should be used in HF patients, changing the "cardiocentric" methodology of other classifications.

### A244: ROLE OF SACUBITRIL/VALSARTAN ON REVERSE CARDIAC REMODELING IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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(a) POLICLINICO PAOLO GIACCONE PALERMO

**Background.** The aim of our study was to evaluate, in a population of HFrEF patients, the additive value of sacubitril/valsartan versus standard medical therapy on symptoms, clinical data, cardiac function and reverse remodeling investigated through echocardiographic analysis.
**Methods.** 32 patients were enrolled according to ESC guidelines. The initial assessment included: physical examination, EKG, laboratory tests, six minutes walking test (6MWT), Kansas city questionnaire and echocardiogram. Subsequent checks were scheduled to 1 - 3 - 6 - 12 months. At each check-up we evaluated the efficacy of the therapy in terms of NYHA class, the symptomatology by Kansas city questionnaire score and the functional performance at 6MWT. At 6 and 12 months an echocardiographic evaluation, including global longitudinal strain (GLS) analysis, was performed.
**Results.** We registered a considerable clinical improvement that reached statistical significance both on the functional and echocardiographic side. We observed an improvement of the NYHA class (patients in NYHA class III were 37,5% at the enrollment and 3,1% after one year, p=0,049), increase of the distances covered to the 6MWT (283,28 meters vs 361,40 meters, p=0,0001), increase of the Kansas city questionnaire score (67,81% vs 75,96%, p=0,0001), reduction of both the daily dose of furosemide (60,94 mg/die vs 39,84 mg/die, p=0,021) and NT-proBNP value (p=0,0031). The ejection fraction had a statistically significant variation trend (29,6% at the enrollment, 33,2% after one year, p < 0.01). Indexed left ventricular end-diastolic and end systolic volumes (iLVEDV - iLVESV) had also a statistically significant decrease (iLVEDV was 97,8 ml/m$^2$ at the enrollment and 83,1 ml/m$^2$ after one year, p = 0.0124; iLVESV 64,8 ml/m$^2$ vs 57,5 ml/m$^2$ , p = 0.002). Even the variations of GLS reflected the improvement in the systolic performance of the left ventricle: GLS improved by about 2 points (-8,2 % vs -9-9%, p <0.0001). The volumetric reduction of the left ventricle was associated with a significant reduction in the left atrial volume in the follow-up (55,7 ml/m$^2$ vs 48,8 ml/m$^2$, p <0.0001).
**Conclusion.** In our study, in a population with HFrEF, sacubitril/valsartan therapy to replace ACE-I/ARB resulted in a statistically significant increase in the ejection fraction and a significant reduction of left ventricular end-systolic/end-diastolic volumes and atrial volumes. Global longitudinal strain had also a significant improvement. We registered also an improvement in biohumoral and clinical parameters (NYHA class, NT-proBNP, 6MWT and Kansas city questionnaire). All these data suggested that sacubitril/valsartan had an important impact on cardiac performance and reverse cardiac remodeling.

### A245: ROLE OF SACUBITRIL/VALSARTAN ON VENTRICULAR ARRHYTHMIC BURDEN REDUCTION IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

Federico Spanò (a), Egle Corrado (a), Giuseppe Coppola (a), Antonino Saladino (a), Giusy Morgante (a), Nilla Manzullo (a), Fabio Balasus (a), Riccardo Bentivegna (a), Antonino Mignano (a), Angelo Quagliana (a), Mirko Luparelli (a), Girolamo Manno (a), Giovanni Principato (a), Angelo Ferlisi (a), Enrico Bonnì (a), Federica D'Angelo (a), Francesco Sabatino (a), Gianluca Spica (a), Violetta Mineo (a), Simona Caputo (a), Mario Spanò (a), Daniele Adorno (a), Giuseppina Novo (a), Alfredo Galassi (a)
(a) POLICLINICO PAOLO GIACCONE PALERMO

**Background.** The available literature does not definitively clarify the impact of sacubitril / valsartan therapy on the ventricular and supra-ventricular arrhythmic burden in HFrEF patients. The primary aim of our study was to evaluate, in a population of HFrEF patients already underwent to ICD implantation in primary prevention, the additive value of sacubitril / valsartan versus standard medical therapy on ventricular and supra-ventricular arrhythmic burden and on cardiac mechanics investigated through echocardiographic global longitudinal strain analysis.
**Methods.** 32 patients were enrolled according to ESC recommendations. The initial assessment, once confirmed at the screening the presence of all the necessary conditions for enrollment, included: cardiological examination, EKG, laboratory tests, echocardiogram with global longitudinal strain calculation and ICD check. At 6 and 12 months ICD check and echocardiogram with strain analysis were performed.
**Results.** We observed, after one year follow up, a significant reduction of the arrhythmic burden, as premature ventricular contractions (PVC/h p=0,0116) and non-sustained ventricular tachycardia (NSVT, 56,2% of patients had NSVT at the enrollment and 37,5% after one year, relative risk reduction RRR=33,4%, p=0,0118We registered also a sustained

ventricular arrhythmias reduction, as the significant reduction of appropriate defibrillator interventions demonstrated (9,4% vs 3,1%, RRR=67%). Echocardiographic evaluations showed an improvement of left ventricular mechanical performance, witnessed by global longitudinal strain (GLS), that was linearly related to the reduction of ventricular arrhythmic activity according to a direct proportionality. The link between mechanical stress and arrhythmic burden is highlighted in our data by the direct correlation between the improvement of GLS (-8,22 VS -9,92, p=0,0004) and the reduction of the PVC/h (p=0,0027), to support the assumption that sacubitril/valsartan reduces the arrhythmic burden by reducing myocardial parietal stress levels and acting on reverse remodeling.

**Conclusion.** In our study, in a population of patients with HFrEF and ICD/CRT-D carriers, sacubitril/valsartan reduced both the ventricular arrhythmic burden and the appropriate ICD-shocks. The benefit was early and global with a positive impact both on cardiac performance (in terms of systolic function and chambers volumes) and reverse cardiac remodeling.

### A246: SURVIVAL IN ACUTE HEART FAILURE IN INTENSIVE CARDIAC CARE UNIT: FROM CLINICAL PARAMETERS TO SPECKLE TRACKING ECHOCARDIOGRAPHY, A PROSPECTIVE STUDY

Matteo Cameli (a), Carlotta Sciaccaluga (a), Giulia Elena Mandoli (a), Cosimo Rizzo (a), Chiara Nannelli (a), Francesca Falciani (a), Maria Luisa Parisella (a), Antonio D'Errico (b), Serafina Valente (a), Sergio Mondillo (a)
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**Introduction.** Acute Heart Failure (AHF) is defined as rapid onset or rapid worsening of typical signs and symptoms of heart failure (HF), and it is a clinical condition characterized by a high mortality and morbidity. The aim of this study is to identify the best predictors of mortality and re-hospitalization among clinical, biochemical and advanced echocardiographic parameters in AHF patients admitted to coronary care unit (CCU).

**Materials and methods.** Patients (n=118) admitted to CCU due to AHF de novo or to an exacerbation of chronic heart failure were enrolled. For each patient, clinical and biochemical parameters were reported as well as the echocardiographic data, including speckle tracking echocardiography analysis. These indexes were then related to intra- and extra-hospital mortality and re-hospitalization. At the end of the follow-up period, the study population was divided into two groups, defined as 'survivors' and 'non-survivors'.

**Results.** From statistical analysis, C-reactive protein (CRP) (beta=0,2; p=0,01; AUC=0,75), hemoglobin (beta=-0,84; p=0,012; AUC=0,71), creatinine (beta=0,96; p=0,01; AUC=0,73), left atrial strain (beta=-0,32; p=0,007; AUC=0,73) (Fig.1) and free-wall right ventricle (RV) strain (p=0,05; AUC=0,68) (Fig.2) showed the strongest association with short-term mortality (Fig.3) and they represented the items of the proposed risk score, whose cut-off of 3 points is able to discriminate patients at higher risk of mortality. Regarding re-hospitalization, the best predictors were N-terminal pro-brain natriuretic peptide (NT-pro-BNP) (R= 0,32), Body mass index (BMI) (R=-0,23) and free-wall RV strain (R=-0,42).

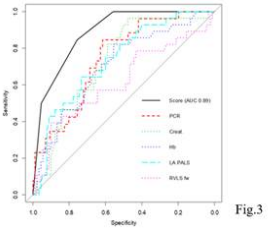

Fig.3

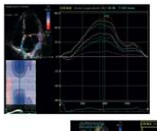
Fig.1

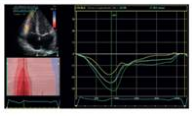
Fig. 2

**Conclusions.** AHF represents one of the major challenges in CCU. The use of a combined biochemical and echocardiographic score, assessed at admission, could help to better predict mortality risk, in addition to commonly used indexes.

### A247: SACUBITRIL/VALSARTAN REDUCES APNEIC BURDEN IN A REAL-LIFE HFREF POPULATION

Paolo Sciarrone (a), Alberto Giannoni (a, b), Giuseppe Vergaro (a, b), Francesca Bramanti (a), Giovanni Iudice (a), Michele Emdin (a, b), Claudio Passino (a, b)
(a) FONDAZIONE TOSCANA GABRIELE MONASTERIO; (b) SCUOLA SUPERIORE SANT'ANNA

**Background.** Sacubitril/valsartan (SV) is effective in patients with heart failure with reduced ejection fraction (HFrEF). However, its pathophysiological action and impact on unselected HFrEF populations are still largely unexplored.

**Purpose.** To explore the effects of sacubitril/valsartan (SV) on breathing pattern abnormalities in a real-life HFrEF population.

**Methods.** In this prospectic, longitudinal, monocentric study, a subanalysis of 30 patients with HFrEF (mean age 65±10 years, median left ventricular ejection fraction, LVEF 28%, interquartile range IQR 23-32%) and an apnea-hypopnea index (AHI) ≥5 events/hour, meeting current guidelines criteria for treatment with SV, were enrolled. At baseline and after 6 months, all patients underwent an extensive evaluation including biomarkers, cardiac ultrasound, and a 24-hour cardiorespiratory monitoring.

**Results.** 6-months treatment with SV led to a significant decrease in NT-proBNP (median 1534, IQR 646-3111 vs 670, IQR 318-2099 ng/L, p<0.001) and hs-TnT (median 17.84, IQR 10.93-29.47 vs 14.79, IQR 9.35-21.15 ng/L, p<0.001) levels, with a concomitant increase in LVEF (median 28%, IQR 23-32% vs 30%, IQR 27-37%, p=0.001). Plasma catecholamines, potassium and renal function were not significantly influenced by SV. At 6-months, the apneas-hypopnea index (AHI) were reduced both during the 24 hours (median 24-hours AHI 16, IQR 8-27 vs 9, IQR 7-13 ev/h, p=0.001) and during daytime (median daytime AHI 12, IQR 4-21 vs 3, IQR 1-7 ev/h, p=0.001), with a similar yet not significant trend in the nighttime AHI (median nighttime AHI 24, IQR 16-39 vs 21, IQR 12-24 ev/h, p=0.08).

**Conclusions.** Besides its known positive effects on natriuretic peptydes, myocardial damage and functional improvement, SV effectively reduces the apneic burden in HFrEF patients. Reduction of 24-hours and daytime AHI, but not nighttime AHI, can be explained through a higher impact on central than obstructive events, mostly occurring at night.

### A248: DIFFERENT RESPONSE TO SACUBITRIL/VALSARTAN IN A REAL-LIFE COHORT OF HFREF PATIENTS

Paolo Sciarrone (a), Alberto Giannoni (a, b), Giuseppe Vergaro (a, b), Silvia Masotti (a, b), Eleonora Benelli (a), Assunta Agazio (a), Aldo Clerico (a, b), Michele Emdin (a, b), Claudio Passino (a, b)
(a) FONDAZIONE TOSCANA GABRIELE MONASTERIO; (b) SCUOLA SUPERIORE SANT'ANNA

**Background.** Sacubitril/valsartan (SV) has been demonstrated to produce a significant clinical and prognostic benefit in patients with heart failure with reduced ejection fraction (HFrEF). However, the underlying mechanisms of this benefit are not completely understood.

**Purpose.** To explore the effects of SV on neurohormonal modulation in a real-life HFrEF population.

**Methods.** In this prospective, longitudinal, monocentric study, a preliminary series of 69 patients with HFrEF (mean age 65±10 years, median left ventricular ejection fraction 28%, interquartile range IQR 25-33%) meeting current guidelines criteria for treatment with SV were enrolled. At baseline and after 6 months, patients underwent an extensive evaluation including biomarkers of neurohormonal activation (renin, aldosterone, plasma catecholamines, BNP, NT-proBNP), myocardial injury (high sensitivity-TnT), renal function and a cardiac ultrasound.

**Results.** Treatment with SV led to an increase in plasma renin (median 47.4, IQR 6.9-160.2 vs 121.6, IQR 38.4-330.8 mU/L, p=0.001) and to a decrease in NT-proBNP (median 1534, IQR 646-3111 vs 670, IQR 318-2099 ng/L, p<0.001) and hs-TnT (median 17.84, IQR 10.93-29.47 vs 14.79, IQR 9.35-21.15 ng/L, p<0.001), with a concomitant improvement in systolic function (median LVEF 28%, IQR 25-33% vs 30%, IQR 26-35%, p=0.001). Clinical response to SV, defined as a ≥30% fall in NT-proBNP levels after 6 months of treatment, was observed only in 37 patients (55%). Responders and non-responders showed similar pre-treatment characteristics as regards history, comorbidities and drug treatment, but responders had lower levels of aldosterone (median 79, IQR 53-112 vs 122, IQR 69-172, p=0.044) and better renal function (mean eGFR 73±16 vs 60±17 mL/min, p=0.002) when compared to non-responders. At six months, SV responders had a progressive increase in plasma renin (median 30.4, IQR 4.8-92.3 vs 154.3, IQR 12.0-294.7 mU/L, p=0.001) with a concomitant reduction of hs-TnT (median 16.45, IQR 11.03-29.02 vs 11.36, IQR 8.00-18.69 ng/L, p<0.001) and BNP (median 229.0, IQR 130.3-488.0 vs 137.0, IQR 87.0-303.0 ng/L, p=0.014), a small yet significant decrease in renal function (mean eGFR 73±16 vs 69±17 mL/min, p=0.020) and an increase of LVEF (median 28%, IQR 24-31% vs 31%, IQR 27-36%, p=0.001). No such changes were observed among non-responders, who just showed an increase in BNP levels (median 239.0, IQR 166.0-576.0 vs 400.0, IQR 164.0-1175.0 ng/L, p<0.001). At univariate logistic regression, baseline renin (odds ratio, OR 0.97, 95%CI 0.994-1.000, p=0.025), aldosterone (OR 0.991, 95%CI 0.982-0.999, p=0.036) and eGFR (OR 1.047, 95%CI 1.014-1.081, p=0.005) resulted as univariate predictors of clinical response to SV as previously defined. At multivariate logistic regression, eGFR was the only predictor of clinical response to treatment with SV (OR 1.042, 95%CI 1.004-1.081, p=0.029).

**Conclusions.** In patients with positive response to the drug, SV effectively reduces ongoing myocardial damage and improves systolic function. Neurohormonal asset and, particularly, a better renal function may predict positive response to treatment with SV.

## SCOMPENSO CARDIACO – 8
## Sessione Poster

### A249: CHEMORECEPTOR HYPERACTIVITY IN HEART FAILURE: IS LACTATE THE CULPRIT?

Andrea Segreti (a), Francesco Grigioni (a), Jeness Campodonico (b), Alessandra Magini (b), Denise Zaffalon (c), Gianfranco Sinagra (c), Germano Di Sciascio (a), Piergiuseppe Agostoni (b, d)
(a) UNIT OF CARDIOVASCULAR SCIENCE, CAMPUS BIO-MEDICO UNIVERSITY OF ROME, ROME, ITALY; (b) CENTRO CARDIOLOGICO MONZINO, IRCCS, MILAN, ITALY; (c) CARDIOVASCULAR DEPARTMENT, OSPEDALE RIUNITI AND UNIVERSITY OF TRIESTE, TRIESTE, ITALY; (d) DEPARTMENT OF CLINICAL SCIENCES AND COMMUNITY HEALTH, UNIVERSITY OF MILAN, MILAN, ITALY

**Background.** Patients with heart failure are characterized by an augmented ventilatory response, identified during exercise by an increased slope of ventilation (VE) to carbon dioxide production (VCO2) relationship. Evidence for a major putative role of lactic acidosis in the augmented ventilatory response is debated. We hypothesized that the increase in plasma lactate may play a causative role in exercise hyperventilation.
**Methods.** We evaluated 22 patients with heart failure and reduced ejection fraction due to ischemic heart disease or dilated cardiomyopathy. The aim of this study was to investigate the relation between VE/VCO2 slope and blood lactate levels during cardiopulmonary exercise test.
**Results.** Mean blood lactate value was 1.0 mmol/L at rest and 4.5 mmol/L at peak exercise and mean VE/VCO2 slope was 35 ± 10. During exercise VE/VCO2 slope significantly correlated with arterial lactate increase (r=0.620; p=0.002), arterial to end-tidal partial pressure gradient of CO2 [P(a-ET)CO2] (r=0.556, p=0.007) and pH (r=0.545, p=0.009) but not with changes in PaO2 (r=-0.016, p=0.942), alveolar (A) to arterial (a) pO2 gradient [Δ(A-a)pO2] (r=0.288, p=0.194) and Δ(A-a)pO2/VO2 ratio (r=0.421, p=0.051) and was inversely correlated with PaCO2 (r=-0.698, p=0.0001) and PETCO2 (r=-0.862, p=0.0001) (in all peak values were excluded).
**Conclusion.** During cardiopulmonary exercise test, patients with heart failure present a linear correlation between VE/VCO2 slope and increase of blood lactates but not of PaO2, Δ(A-a)pO2 and Δ(A-a)pO2/VO2 ratio. These results suggest that chemoreflex hypersensitivity may be triggered by arterial lactate levels.

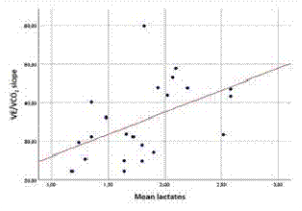


**Figure 1.** Linear regression between $VE/VCO_2$ slope and mean arterial lactate values (*r Spearman* = 0.620, *p* = 0.002).

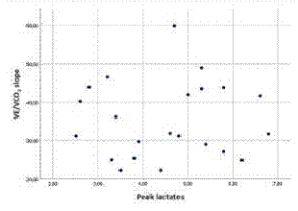


**Figure 2.** Linear regression between $VE/VCO_2$ slope and peak blood lactate (*r Spearman* = 0.016, *p* = 0.942).

### A250: SACUBITRIL/VALSARTAN IN ADVANCED HEART FAILURE: IS IT A JUST MATTER OF CONTRACTILITY OR ARE THERE EFFECTS ON PULMONARY CIRCULATION.MONOCENTRIC EXPERIENCE FROM REAL LIFE

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**Background.** Sacubitril/valsartan, the first-in-class angiotensin receptor neprilysin inhibitor (ARNI), is the first medication to demonstrate a mortality benefit in patients with chronic heart failure and reduced ejection fraction. In PARADIGM-HF trial, patients with HFrEF treated with sacubitril/valsartan had a 20% reduction in the primary composite endpoint of cardiovascular death or heart failure hospitalization, compared with subjects allocated to enalapril. However, the mechanisms are not clear. The aim of this prospective not randomized study was to assess the clinical and instrumental effects of this agent in patients with severe heart failure.
**Methods.** To investigate the effects of S/V in congestive heart failure we selected 40 consecutive patients (31 males, 9 females, mean age 64±19 years in the mean NYHA class 2,73 because they had left ventricular ejection fraction (LVEF) ≤35% by echocardiography. Etiology: 22 CHD, 3 Myocarditis, 15CMPD
**Results.** 2 patients took the maximum dose of 97/103 mg, 2 patients stopped the therapy for creatinine increase, all the others took the dose of 49 / 52mg. During a mean follow-up of 24±6 months, no patients died. An AICD was implanted in 20 patients. PAPs decrease from 44.10 mm/Hg ± ES 2.2 DS 12.1 to 38.6 mm/Hg ± ES 1.87 DS 10.6 p<0.05. 6MWT improve from 389.83 meter ± ES 22.5 DS 108.1 to 6MWT 438 meter ± ES 22.5 DS 108.1 p<0.05. LVEF improve from 29.7% + ES 0.9 DS 4.5 to 33.4% ± ES 1.1 DS 5.3 p< 0.05. NYHA improve from 2.5 ± SE 0.1 DS 0.5 to 2.0 ± ES 0.1 DS 0.6 p< 0.005. T-test for paired data: there are no correlations between the parameters (Pearson).
**Conclusion.** These preliminary data suggest that in patients with advanced congestive heart failure, sacubitril-valsartan is able to improve 6MWT and PAPS even in the absence of significant improvement of ventricular contractility. It hasn't been associated to morbid events or increased risk of death.Although the precise mechanisms responsible for benefit in heart failure remain unclear, sacubitril/valsartan may reduce the fluid retention and pulmonary vasoconstriction that contribute to heart failure symptoms.

### A251: LA RIORGANIZZAZIONE DELLE PRESTAZIONI SANITARIE IN UN'OTTICA DI APPROPRIATEZZA: IL DRG 127 (INSUFFICIENZA CARDIACA E SHOCK)

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**Introduzione.** Il presente studio nasce con lo scopo di uniformare e migliorare gli standard dell'offerta specialistica nell'ambito dello scompenso cardiaco (DRG 127: insufficienza cardiaca e shock), rispettando i criteri di efficacia, efficienza ed equità nella prestazione dei servizi di assistenza. A soffrire di scompenso cardiaco in Italia sono circa 1.000.000 di persone in Italia (prevalenza 1.7%) e si stima che la sua frequenza raddoppi a ogni decade di età (10% dopo i 65 anni). Il DRG 127 è, numericamente, al secondo posto, dopo il parto non complicato e nella Regione Campania nel 2017 vi sono stati 21.320 ricoveri con un riscompenso a 30 e 90 giorni del 17% e una spesa di 136 milioni di euro.
**Materiali e metodi.** Il nostro studio partendo da indicatori rilevati dall'ufficio SDO aziendale che riguardano il DRG 127 insufficienza cardiaca e shock della Cardiologia intensiva del 2017 ha rilevato uno scostamento della degenza media di 4 giorni circa dalla degenza media nazionale (13gg vs 9.1gg) e di una percentuale di ricoveri oltresoglia (>21gg) del 13% (vs 5.4 % dei dati nazionali) con un peso medio di 1,027. Dallo studio delle cartelle cliniche e delle dimissioni abbiamo riscontrato le comorbidità dei nostri pazienti (multiple fino a 5): i pazienti con una degenza oltresoglia erano prevalentemente affetti da BPCO e IRC. In merito alla criticità degenza lunga la tecnica del BPI (Business Process Improvement) ci ha permesso di: 1) mappare l'intero percorso assistenziale (*As Is*) dal ricovero alla dimissione e alla codifica della SDO 2)analizzare le criticità 3) formulare possibili soluzioni; 4) mappare il nuovo processo (*To Be*). Sono stati quindi identificati alcuni indicatori per monitorare l'efficacia e l'efficienza del ripensamento organizzativo.
**Discussione.** La mappatura del processo attuale dall'accesso al Pronto Soccorso fino alla dimissione e codifica della SDO prevede che il paziente con insufficienza cardiaca in conformità alle linee guida se presenta solo congestione ed è nota l'eziologia ed è a basso rischio viene ricoverato in Medicina (scenario A), se è da inquadrare l'eziologia (scompenso de novo) o refrattario si ricovera in Cardiologia (scenario B). Nel caso presenti ipotensione e congestione viene ricoverato in terapia intensiva (scenario C) e trasferito in Cardiologia raggiunta la stabilità clinica. Da qui viene dimesso e inviato a seconda della stratificazione prognostica al medico di medicina generale, in un ambulatorio dedicato o in una struttura riabilitativa. Insieme alla lettera di dimissione viene compilata la SDO. Di fronte alla problematica 'degenza lunga' analizzando le criticità per il primo scenario abbiamo proposto la consulenza cardiologica nell'ambito di un PDTA condiviso e l'attivazione precoce della consulenza broncologica e nefrologica per le comorbidità a maggiore impatto sulla degenza lunga; per il secondo e terzo scenario abbiamo proposto l'inserimento di una cartella clinica elettronica al fine di ridurre gli svantaggi della frammentazione e degli handoff. Per l'integrazione col territorio è stato curato l'inserimento precoce nella lista d'attesa per le strutture riabilitative e la condivisione di informazioni in rete con i medici generali e gli specialisti ambulatoriali.
**Conclusioni.** Tecnologia, Asset management, Percorsi, Formazione e Monitoraggio sono le leve proposte nel nostro lavoro. Il prossimo passo sarà la verifica empirica con analisi dei costi delle soluzioni utilizzate.

### A252: SACUBITRIL-VALSARTAN: A 2-YEAR SINGLE-CENTRE EXPERIENCE

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**Background.** Heart failure (HF) has an extimated prevalence of approximately 1-2%. Renin-angiotensin-aldosteron system (RAAS) inhibitors are the corner stone of medical therapy in HF, with well-known efficacy in reducing mortality and hospitalization. The PARADIGM-HF trial showed that the association of Sacubitril-Valsartan is superior to Enalapril in reducing risk of death and hospitalization for HF in heart failure with reduced ejection fraction (HFrEF) patients. Current Guidelines recommend the use of Sacubitril-Valsartan in patients with symptomatic

HFrEF despite optimal medical therapy (OMT). We present here a 2 years single-center experience with Sacubitril-Valsartan.
**Methods.** Since september 2017 Sacubitril-Valsartan was initiated in 29 consecutive patients referred to our Clinic who met the following criteria: symptomatic HFrEF (functional class NYHA ≥ II) despite OMT, reduced EF (≤ 35%), preserved renal function (eGFR ≥ 30 ml/min/1.73m2), systolic blood pressure (SBP) ≥ 100 mmHg and potassium serum levels ≤ 5.4 mEq/l. After 2 to 4 weeks, if tolerated, Sacubitril-Valsartan was titrated up to highest tolerated dose with a maximum target dose of 97/103 mg b.i.d. 6 to 12 months follow-up clinical evaluation, TTE and lab test were performed.
**Results.** Sacubitril-Valsartan was initiated in 29 patients, 22 (76%) of which completed the follow-up at the time of the analysis. In this population mean age was 67±12 years and 20 (69%) patients were male. Median serum BNP level was 390 pg/mL (IQR 158-692; normal value < 60 pg/mL). There was no significant variation neither in blood pressure (SBP 125±19 vs 117±18 mmHg) nor in heart rate (73±14 vs 66±10) during follow up. There was a slightly significant increase in serum creatinin levels (0.9±0.3 vs 1.1±0.3 mg/dl, p=0.05) with no significant change in renal function (77±26 vs 67±15 mL/min calculated with CKD-EPI). We recorded a significant improvement in left ventricular EF (28±6 vs 35±6 %, p=0.002) with significant reduction of end-diastolic volume (ESV, 125±45 vs 97±32 mL, p=0.027) and systolic pulmonary artery pressure (sPAP, 37±11 vs 30±8, p=0.035). We observed also a significant reduction of hospitalizations for HF (16, 55%, vs 2, 10%, p=0.002).
**Discussion and conclusion.** In our population Sacubitril-Valsartan was confirmed significantly superior to RAAS inhibitors in improving LVEF, reducing ESV, sPAP and hospitalization for HF, without significant detrimental impact on blood pressure and renal function. Sacubitril-Valsartan should be always considered in patients with HFrEF still symptomatic despite OMT.
Sacubitril-Valsartan was confirmed significantly superior to ACE-I/ARBs in improving LVEF, reducing ESV and hospitalization for HF. Sacubitril-Valsartan should be always considered in patients with HFrEF still symptomatic despite OMT.

### A253: NT-PROBNP IS A VALUABLE DIAGNOSTIC TOOL OF HEART FAILURE EVEN DURING POST PARTUM PERIOD

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**Background.** Post-partum period is characterized by complex haemodynamic changes that may lead to heart failure (HF) in a minority of patients. B-type natriuretic peptides inactive amino terminal fragment (NT-proBNP) is an established biomarker in the management of HF. Patients presenting with dyspnea are considered at high risk of HF if NT-proBNP is above 125 pg/ml. Higher levels of NT-proBNP in the post natal period were reported to be associated with increased risk of cardiovascular events, but there is no defined cut-off value established for prediction of HF in this setting.
**Purpose.** We conducted this study to identify an adequate cut-off value which would predict haemodynamic overload among post-partum women.
**Methods.** All women who gave informed consent during an obstetric clinical evaluation at our tertiary centre between 01/01/2018 and 30/11/2018 were included in the study. NT-proBNP was measured within 24 hours from delivery. The primary endpoint of the study was the development of signs and symptoms of heart failure (with the need of intravenous diuretics or a cardiological evaluation) within 15 days after delivery. We therefore analyzed the ability of different cut-off of NT-proBNP values in predicting the primary outcome. Confidence intervals (CI) for sensitivity and specificity were calculated with the Wilson score method.
**Results.** 262 women were included in the study. Eleven of them developed in the study timeframe signs and symptoms of HF (4.3 %); all of them were treated with diuretics. Nine patients were evaluated with echocardiography and 3 of them required cardiological counselling. The cut-off value of 600 pg/mL was found to have the best sensitivity (73%, CI 95% 0.43-0.9), specificity (98%, CI 95% 0.95-0.98), positive likelihood ratio (29, CI 95% 12-69) and negative likelihood ratio (0.28, IC 95% 0.10-0.70). The diagnostic odds ratio was 104 (CI 95% 22-494, p <0.001). Mean NT-proBNP was 169 ± 121 pg/mL (cutoff < 600 pg/mL) versus 852 ± 245 pg/mL.

**Table 1.** Different cut-off evaluated

| NT-proBNP value (pg/mL) | Specificity | Sensitivity | Diagnostic Odds ratio |
|---|---|---|---|
| 125 | 42 | 81 | 3.4 (CI 95% 0.7 - 16, p 0.1) |
| 300 | 85 | 72 | 14 (CI 95% 4 - 62, p <0.01) |
| 600 | 98 | 73 | 104 (CI 95% 22 - 494, p <0.01) |
| 700 | 98 | 66 | 65 (CI 95% 12 - 341, p <0.01) |

**Conclusion.** Our study suggests that NT-proBNP higher than 600 pg/mL is a high risk marker for developing HF in the post partum period. This value is slightly higher compared to the one adopted among the general population for diagnosis of HF and may reflect the peculiar haemodynamic changes of this setting.

### A254: PREDICTORS OF RIGHT VENTRICULAR FAILURE AFTER LEFT VENTRICULAR ASSIST DEVICE IMPLANT

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**Introduction.** Right ventricular failure (RVF) after left ventricular assist device (LVAD) implant remains a feared complication, associated with increasing morbidity and mortality. However, the identification of parameters that could hint the development of RVF is still particularly challenging. Therefore, the aim of this study is to identify the best predictors, among invasive and non-invasive parameters, of RVF post LVAD-implant, based on the experience of our centre.
**Methods.** From July 2009 to July 2019, 38 patients who underwent LVAD implantation were retrospectively enrolled. For each patient, clinical, laboratory and echocardiographic data were reported. Furthermore, invasive haemodynamic parameters, derived from right heart catheterization, were collected. Univariate and multivariate analysis was performed to identify the best independent determinants of RVF.
**Results.** Overall, eight patients (21%) developed RVF over time, which revealed to be strongly related to overall mortality as shown by the Kaplan-Meier curves (p=0.003) and by Cox proportional hazard model (HR 3.42 [95%CI 1.41-8.16] p=0.01). RVF patients had significantly higher central venous pressure (PVC) (17,23±4,06 vs 8,07±4,24 mmHg) (p < 0.0001) and PVC/pulmonary capillary wedge pressure (PCWP) ratio (3,05±1,70 vs 3,31±1,2) (p= 0.03) vs. no-RVF patients. By transthoracic echocardiography RVF was associated with larger mid-RV diameter (38,75±7,32 vs 34,69±4,54 mm) (p=0.05) and remarkably reduced RV free wall longitudinal strain (fw-RVLS) (-7,90±1,29 vs -16,14±5,83) (p<0.0001), lower tricuspid annular plane systolic excursion (TAPSE) (11,88±2,9 vs 16,52±4,27 mm) (p=0.02) and lower RV fractional area change (RVFAC) (34,63±9,9 vs 40,59±5,16 %) (p=0.02) vs. non-RVF. RV fw-RVLS was superior to other echocardiographic determinants of RVF and remained independently associated with RVF in a multivariable model including echocardiographic and invasive parameters (p=0.003) or NT proBNP (p=0.009).
**Conclusion.** In this study, fw-RVLS resulted to be a strong determinant of RVF after LVAD implant, superior to the other conventional echocardiographic measurements and to be independent from invasive and laboratory parameters. PVC was the most informative RVF predictor among the invasive parameters.

### A255: TACHYCARDIOMYOPATHY IN PATIENTS WITH NO UNDERLYING STRUCTURAL HEART DISEASE: RISK FACTORS AND PROGNOSIS

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**Introduction.** Tachycardiomyopathy (TCM) is an underestimated cause of reversible left ventricle dysfunction due to rapid and/or asynchronous, irregular myocardial contraction during atrial or ventricular arrhythmias. The diagnosis of TCM is retrospective and based on evidence of recovery after appropriate treatment. In fact, although, an arrhythmia is present with a concomitant left ventricular ejection fraction (LVEF) impairment, a cause-effect relationship is not always ascertainable.Very little data regarding recurrences and adverse events in patients with TCM are currently available in literature.
**Aim.** Aim of our study was to identify clinical predictors of recurrence and incidence of major cardiovascular events in TCM patients without underlying structural heart disease.
**Methods.** Prospective, observational study enrolling all consecutive patients with a diagnosis of TCM and no evidence of underlying structural heart disease. The TCM diagnosis was suspected in all patients admitted for heart failure (HF) with a left ventricular ejection fraction <50% and concomitant persistent atrial or ventricular arrhythmia, and confirmed after clinical and echocardiographic recovery during outpatient follow-up.
**Results.** Out of 107 pure TCM patients (9% of all HF admissions), 17 experienced at least one recurrence, 51 were hospitalized for cardiovascular reasons, two suffered from thromboembolic events and one died. Obstructive sleep apnoea syndrome (OSAS, HR 5.44), brain natriuretic peptide on admission (HR 1.01 for each pg/ml) and heart rate at discharge (HR 1.05 for each bpm) were all independent predictors of TCM recurrence. Left ventricular ejection fraction (HR 0.96 for each %) at discharge and heart rate at discharge (HR 1.02 for each bpm) resulted as independent predictors of cardiovascular-related hospitalization.
**Conclusions.** In conclusion, TCM is an under-diagnosed entity, affecting

nearly one out of ten patients admitted for HF. Pure TCM is associated with a good long-term survival. Nonetheless, recurrences are frequent and can occur after many years. Treatment aimed at reversing OSAS and lowering the HR after the acute event could prevent these recurrences and their related hospitalizations.

### A256: FEATURES OF HEART FAILURE WITH MID-RANGE VS. REDUCED OR PRESERVED LEFT VENTRICULAR EJECTION FRACTION

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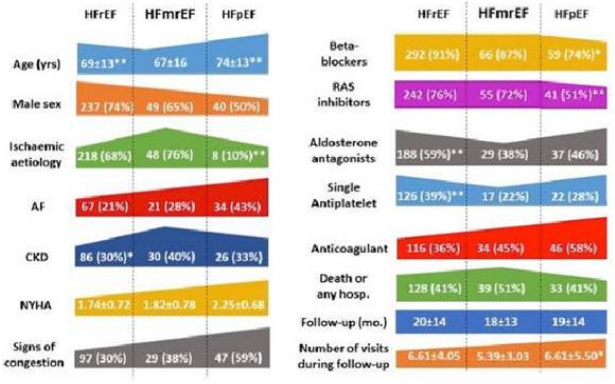
**Background.** While heart failure (HF) with reduced left ventricular ejection fraction (LVEF) (HFrEF) and HF with preserved LVEF (HFpEF) are clear-cut different conditions, the category of HF with mid-range LVEF (HFmrEF), as identified by the current European guidelines, is less defined.

**Methods.** We reviewed the records of 476 consecutive HF outpatients, who were referred to our clinic and underwent ≥2 visits between October 2014 and May 2019. The baseline characteristics of the subjects with HFmrEF were compared with the ones of those with HFrEF and HFpEF. Next, the changes in LVEF between the first and last evaluation were assessed in the HFmrEF group.

**Results.** At baseline, 320 (67%) patients had HFrEF, 80 (17%) HFpEF and 76 (16%) HFmrEF. As depicted in the Figure below, subjects with HFmrEF were younger than those with both HFrEF and HFpEF. However, their clinical phenotype and medical therapy were overall intermediate between those of HFrEF and HFpEF. Over a mean follow-up of 18.7 ± 13.3 months, HFmrEF patients received less visits than HFrEF and HFpEF ones. The frequency of all-cause mortality or any first hospitalization was similar in HFmrEF, HFrEF and HFpEF. Of 64 subjects with HFmrEF whose LVEF was recorded at the last evaluation, 33 (51.6%) had a value ≥50%, 23 (35.9%) remained between 40 and 49%, and 8 (12.5%) showed a decrease to <40%

**Conclusions.** HFmrEF shares features with both HFrEF and HFpEF, in fact LVEF progressed out of the HFmrFE range in a substantial proportion of patients in our cohort.




* and ** indicate P <0.05 and P <0.01 vs. HFmrEF, respectively.

### A257: CARDIAC PACEMAKER IMPLANTATION AFTER HEART TRANSPLANTATION

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**Background.** Permanent pacemaker implantation is not uncommon after orthotopic heart transplantation (OHT) and has been reported to occur 7%-24%. The objectives of this study were to investigate the frequency and the predictors of PM implantation following OHT and to evaluate its prognostic impact.

**Methods.** A retrospective, monocentric and observational study was conducted, enrolling all the patients who underwent OHT between May 1990 and May 2019, admitted at the Transplantation Centre of Città della Salute e della Scienza of Turin. For each patient clinical information were collected by special registers. For the statistical analysis, the population was divided into two groups: patients who required PM implantation and patients who did not required PM implantation. Pearson's Chi-square test and Fisher's test were used for categorical variables. For the continuous variables the Mann-Whitney test was used instead. Uni- and multivariate logistic regression models were used to identify factors associated with PM implantation.

**Results.** In total, 461 patients were enrolled; the median follow-up time of the study was 9 years [IQR 2,5-14]. During this frame time, 16% (n 76) of patients underwent PM implantation (median time from cardiac transplantation 92 days). During follow-up, 178 deaths occurred, of which 32 were among PM carriers. The comparison between the two populations did not show statistically significant differences in prognosis (p 0.335). At multivariable analysis, an elevated BMI, impaired renal function (i.e. low eGFR) and the occurrence of severe heart transplant rejection were factors associated with PM implantation following OHT.

**Conclusions.** Among patients undergoing OHT, PM implantation is not a rare event (16% in our study population). However, this complication, does not seem to exert a significant impact on patients' prognosis. High BMI, impaired renal function and severe heart transplant rejection, seem to increase the risk of PM implantation in OHT recipients.

### A258: LA FIBRILLAZIONE ATRIALE PUÒ ESSERE CAUSA DI MANCATA DIAGNOSI DELLO SCOMPENSO CARDIACO A FRAZIONE DI EIEZIONE CONSERVATA?

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(a) OSPEDALE SANTA MARIA DELLA MISERICORDIA - SORRENTO - NAPOLI

**Introduzione.** La diagnosi di insufficienza cardiaca con frazione di eiezione conservata (HfpEF) è più difficoltosa nei pazienti con fibrillazione atriale (FA) concomitante a causa dei problemi nel differenziare i sintomi dovuti a insufficienza cardiaca da quelli dovuti alla FA, e anche perchè valutazioni ecocardiografiche di parametri strutturali o funzionali (disfunzione diastolica, media è della parete settale e laterale, E / e ', indice del volume atriale sinistro-LAVI, indice di massa ventricolare sinistro-LVMI) risultano essere più complicate e frequentemente omesse. Anche i livelli di peptide natriuretico BPN o NT-PRO-BNP possono essere elevati nella FA.

**Metodi.** Abbiamo valutato retrospettivamente tutti i pazienti affetti da FA ricoverati nel nostro dipartimento nell'ultimo anno in ambito di emergenza. Abbiamo riportato parametri clinici / demografici ed ecocardiografici e, se disponibili, il valore di NT-Pro-BNP e la diagnosi di dimissione.

**Risultati.** Nell'ultimo anno sono stati ammessi nel nostro dipartimento 225 pazienti affetti da FA (età media 77 aa, 46% maschi, 54% femmine). Cento pazienti (44%) presentavano FA parossistica, 38 (17%) persistente e 87 (38%) avevano FA permanente. Di tutti i pazienti, 134 (59%) sono stati dimessi con una diagnosi di scompenso cardiaco, circa un terzo dei quali (49) è stato diagnosticato HfpEF, ma 43 pazienti (19% dei pazienti totali) che non erano stati diagnosticati con HF, presentavano invece i criteri per HfpEF (F.E.≥50% con NT-PRO-BNP elevato e cardiopatia strutturale rilevante - ipertrofia ventricolare sinistra e / o allargamento atriale sinistro o disfunzione diastolica). Pertanto di tutti i pazienti che hanno presentato i criteri di HfpEF, quasi la metà non era stata diagnosticata.

**Conclusioni.** Nei nostri pazienti ammessi in setting di emergenza con AF, una diagnosi di HfpEF è stata spesso trascurata. Forse, potrebbero essere necessari più strumenti diagnostici per rilevare un HfpEF precoce nei pazienti con fibrillazione atriale.

### A259: SUBCLINICAL CONGESTION: ACCURACY OF PHYSICAL EXAMINATION IN CHRONIC HEART FAILURE OUTPATIENTS

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**Background.** Congestion is the leading cause of clinical signs and symptoms in acute decompensated heart failure (HF) and its presence in chronic HF patients is an independent predictor of adverse outcome. Elevated central venous pressure (CVP) and pulmonary hypertension (PH) are the main pathological determinants of pulmonary and peripheral congestion. Nevertheless, it's often difficult to identify these signs in outpatients setting, where accuracy of physical examination (PE) is not actually known. Transthoracic echocardiography (TTE) can easily identify subclinical congestion (SubC) and potentially guide therapeutic choices, concerning diuretic dose and antiremodelling drugs. The aim of the study is to analyze the prevalence of SubC despite the absence of signs of elevated CVP and/or PH, defining the PE accuracy in outpatients setting. Second endpoint is to evaluate how TTE could modify therapeutic approach.

**Methods.** In this observational, prospective, multicentric pilot study, 67 consecutive stable HF patients underwent PE to evaluate jugular vein distention (JVD), hepatojugular reflux (HJR) and peripheral oedema (OED). Immediately after, a questionnaire was given to physician concerning the presence of signs of elevated CVP and PH, diuretic dose and titration of antiremodelling drugs. Then, TTE was performed to define pulmonary artery systolic pressure (PAPs), extimated right atrial pressure (RAP) and right ventricle dysfunction (RVD). In the end physician had to

answer about how echocardiographic data affected therapeutic strategies. Three patients had been excluded because of poor acoustic window or history of dialysis.
**Results.** Results are summarized in figure 1.

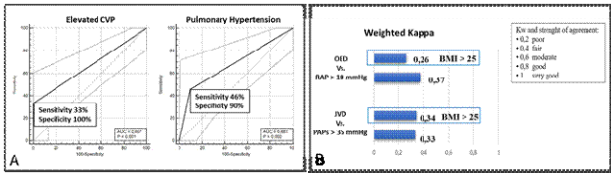


**Figure 1.** (A) ROC curve accuracy of PE determining elevated CVP e PH. (B) Weighted Kappa values of PE according to Body Mass Index.

**Conclusions.** PE has low sensibility to identify elevated CVP and PH, potentially driving physician to wrong prognosis evaluation of stable HF outpatients. Despite PE sensitivity, PE specificity is high. Obesity significantly worsen PE accuracy. Rarely TTE data induce physician to modify diuretic dose or antiremodelling therapy. However, a focused TEE is a simple and low-cost tool able to identify SubC, adding precise extimation of PH and elevated CVP often underdiagnosed by the PE alone. How these data could affect outcome in outpatient setting has to be investigated in future studies.

### A260: EFFECTS OF CARDIAC RESYNCHRONIZATION THERAPY IN HEART FAILURE PATIENTS

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**Objectives and background.** Cardiac resynchronization therapy (CRT) is an established treatment for heart failure (HF) according to the most recent international guidelines. CRT was conceived by the observation that an enlargement of QRS is frequent in HF patients, it is often the expression of mechanical dyssynchrony of cardiac contraction and it is associated with poor prognosis. The effects of CRT are immediately evident in the acute setting as a reduction of QRS and left ventricular (LV) volumes and as an improvement of LV function. In the chronic setting, CRT is associated with NYHA class reduction, LV inverse remodelling, LV ejection fraction (EF) and peak oxygen uptake ($VO_2$) increase, leading to mortality and morbidity improvement. However, the precise haemodynamic mechanism by which CRT improves HF patients' condition, both at rest and during exercise, is still undefined, but measuring them at rest and during exercise could be crucial to clarify the effects of CRT and to optimize CRT patient selection and post-CRT treatment.
**Methods.** In 93 HF patients, before and 8±3 months after CRT, we assessed clinical conditions, ECG, and standard echocardiography and we performed maximal cardiopulmonary-exercise-test with non-invasive measurement of cardiac output (CO) by inert-gas-rebreathing method.
**Results.** At rest, CRT significantly shortened QRS, and it improved NYHA class and left ventricular ejection fraction (LVEF) but not CO and stroke volume (SV). At peak exercise, a significant improvement of peak oxygen uptake ($VO_2$) (from 13.8±3.8 ml/min/kg to 14.9±4.6, p<0.0025), CO (from 6.19±1.82 L/min to 6.97±2.21, p<0.0001), and SV (from 62±18 mL to 71±19, p<0.0001) was detected. While all patients showed a similar peakCO increase, a significant post-CRT peak$VO_2$ increase was observed only in patients with the lowest pre-CRT peak$VO_2$ (5.9-11.3 ml/kg/min) and peakCO (24-43% predicted).
**Conclusions.** Our data showed that CRT improves exercise performance in HF patients by changing peak exercise CO and SV. The exercise performance improvement after CRT is significant only in patients with low peak $VO_2$ and peak CO before implant, suggesting the use of CPET with haemodynamic evaluation in CRT selection and follow-up. Finally, blood flow distribution toward the muscles is probably crucial for post-CRT functional change, since peak CO increase is similar in all patients regardless of pre-CRT exercise performance while significant peak $VO_2$ change is only evident in patients with a more severe exercise dysfunction. These data suggest the usefulness of pre-CRT peak$VO_2$ and CO measurements for CRT patient selection and post-CRT follow-up and treatment.

## ASSISTENZA CARDIACA IN ACUTO – GENETICA E BIOLOGIA MOLECOLARE
## Sessione Poster

### A261: IL RUOLO DELLO PSICOLOGO NEI CONTENZIOSI MEDICO-LEGALI IN UNA TERAPIA INTENSIVA POST OPERATORIA CARDIOCHIRURGICA

Andrea Ballotta (a), Edward Callus (a), Enrico Bertoldo (a), Hassan Kandil (a), Fabrizio Bettini (a), Dario Fina (a), Angela Satriano (a), Giuseppe Isgrò (a), Mohamed Lamti (a), Marco Ranucci (a)
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**Introduzione.** È noto che, analogamente a quanto accaduto nei paesi anglosassoni, anche nella nostra realtà si sia registrato un incremento esponenziale dei contenziosi medico-legali. In questo contesto il deficit di comunicazione medico-paziente può giocare un ruolo fondamentale nell'accrescere sentimenti di ostilità da parte del paziente piuttosto che dei familiari dello stesso nei confronti di figure sanitarie, troppo spesso vissute come sfuggenti o perlomeno non sufficientemente esaustive nella quotidiana trasmissione dei dati relativi alla propria salute o a quella del congiunto. Scopo del nostro studio è stato quello di verificare se la collaborazione sistematica con il servizio di psicologia clinica del nostro istituto abbia o meno avuto un impatto sul numero di contenziosi medico-legali intervenuti dal 2014 – anno di inizio di questo lavoro di affiancamento - ad ora.
**Metodi.** La nostra realtà è quella di una Terapia Intensiva Postoperatoria dotata di 25 letti, a cui afferiscono nella larga maggioranza pazienti cardio-operati 2/3 dei quali adulti ed per il terzo rimanente congeniti pediatrici e adulti. L'attività è pari a circa 1500 pazienti cardio-operati l'anno. Dal punto di vista pratico, specie nel caso di pazienti cardio-operati cronicizzati e ad alto rischio di mortalità, viene attivata la chiamata dello psicologo che incontra il paziente, compatibilmente con le condizioni generali oppure, più comunemente, i famigliari in ambienti mirati e non prima di aver riportato verbalmente il bollettino clinico aggiornato sulle condizioni del congiunto.
**Risultati.** Come si evince dalla tabella sotto riportata, il numero di contenziosi è andato progressivamente riducendosi negli ultimi tre anni, confermandoci nel nostro approccio alle criticità comunicative del paziente ricoverato in terapia intensiva.
**Conclusioni.** Si ritiene la nostra esperienza sia positiva, trasferibile ad altre realtà e migliorabile sia nella tempistica, anticipando il contatto, sia nelle modalità, aumentando gli spazi ed il tempo dedicabile all'opportuna informazione di pazienti e famigliari già in epoca preoperatoria.

| UUOO | 1999 | 2010 | 2011 | 2013 | 2014 | 2016 | 2017 | Totale complessivo |
|---|---|---|---|---|---|---|---|---|
| Cardiochirurgia | 1 | 1 | 1 | 1 | 3 | | 1 | 8 |
| Cardiochirurgia pediatrica | | | | 4 | 2 | 1 | | 7 |
| Totale complessivo | 1 | 1 | 1 | 5 | 5 | 1 | 1 | 15 |

### A262: CARDIAC TAMPONADE AS UNCOMMON PRESENTATION OF AGGRESSIVE MEDIASTINAL LYMPHOMA IN A 32-YEARS OLD WOMAN

Vincenzo De Marzo (a, b), Paola Minetto (c), Matteo Toma (a, b), Luca Giunta (a), Francesco Chiarella (a), Paolo Spallarossa (a, b), Emanuele Angelucci (c), Italo Porto (a, b)
(a) CARDIOVASCULAR UNIT, IRCCS OSPEDALE POLICLINICO SAN MARTINO, GENOA; (b) CARDIOVASCULAR UNIT, DEPARTMENT OF INTERNAL MEDICINE AND SPECIALTIES (DIMI), UNIVERSITY OF GENOA; (c) DIVISION OF HEMATOLOGY AND BONE MARROW TRANSPLANTATION, IRCCS OSPEDALE POLICLINICO SAN MARTINO, GENOA

A 32-year-old woman, without medical history other than a previous eating disorder, was admitted to emergency room of our hospital because of fever and a syncopal episode. She also complained about recent fatigue, sweating, and night pruritus. She was taking amoxicillin/clavulanic acid for a misdiagnosed dental infection related to oral surgery performed two weeks before. At admission she was hemodinamically stable and physical examination was normal.
Laboratory tests showed a mild anaemia (haemoglobin 11.5 g/dl), a neutrophilic leukocytosis (white blood cells 14.5 $x10^9$/L; neutrophils 12.2 $x10^9$/L), and increased biomarkers of inflammation (C-reactive protein 128 mg/L). Chest radiography revealed a severe enlargement of the heart silhouette. The following transthoracic echocardiogram showed a 4 cm circumferential pericardial effusion with partial right atrium collapse. Chest CT scan with contrast demonstrated multiple mediastinal enlarged lymph nodes confluent in an 8 x 10 cm hypodense and irregular mass which includes the supra-aortic trunks, the aortic arch, the large vessels emergence, the main branches of the pulmonary artery, and the pulmonary hili. CT scan also revealed several retrosternal, pectoral, axillar, subclavian, cervical, and supra-diaphragmatic enlarged lymph nodes bilaterally, other than a thrombosis at confluence of the innominate veins and scattered pseudo-nodular pulmonary thickenings.
Pericardiocentesis was initially postponed for patient's refusal but it

became mandatory two days after because of sudden evolution to shock related to cardiac tamponade. The procedure yields the removal of 500 ml of exudate (total protein 56 g/L, fluid to serum protein ratio 1.25, LDH 550 U/L, fluid-to-serum LDH ratio 0.7) in which was found a population of clonal B mature lymphocytes with irregular CD19/CD20/CD38/CD45 phenotype. Histology from a right supra-clavicular lymph node was consistent with the diagnosis of Diffuse Large B-cell non-Hodgkin lymphoma (DLBCL), immunohistochemically defined as germinal centre phenotype. Complete staging showed no under-the-diaphragm lymph-nodes involvement and absence of neoplastic bone marrow infiltrate. Fluorescence in situ hybridization on lymph-nodes tissue excluded c-MYC rearrangements. Immuno-histological and clinical findings were therefore consistent with the diagnosis of Primary Mediastinal B Cell Lymphoma. Low-molecular-weight heparin (LWMH) and conventional chemo-immunotherapy with rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone were administered determining a prompt resolution of innominate veins thrombosis and a dimensional regression of thorax lymph nodes.
In brief, the aggressive primary mediastinal B-cell lymphoma accounts for up to 10% of DLBCL, epidemiologically and clinically distinct from other DLBCL subtypes. It typically presents in adolescents and young adults (2/3 female) with an anterior mediastinal mass which may invade local structures. Massive pericardial effusion is rarely observed. Despite cardiac tamponade secondary to neoplastic aetiology is uncommon, lymphoma is reported as an underlying cause in 8%-21% of malignant pericardial effusions. An accurate diagnosis and a successful urgent intervention play a central role since pericardial involvement is related to worst clinical outcome.

### A263: IL RICORSO AL PRONTO SOCCORSO PER PATOLOGIA CARDIOVASCOLARE IN UN DEA DI 2° LIVELLO. ANALISI DESCRITTIVA

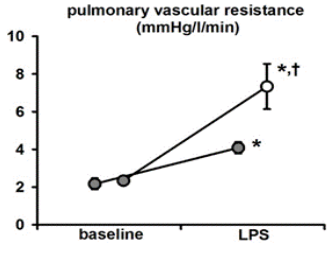
Valerio Di Nardo (a), Mauro Scimmi (a), Gianluca Capobianco (a), Andrea Del Grande (a)
(a) AZIENDA OSPEDALIERA "SANTA MARIA" DI TERNI

**Introduzione.** Le malattie cardiovascolari comprendono le patologie a carico del cuore e dei vasi sanguigni. Queste rappresentano la principale causa di morte a livello mondiale, ovvero circa il 31% di tutte le cause di decesso (OMS, 2016). Il Ministero della Salute (2017), sottolinea che le malattie cardiovascolari costituiscono uno dei più importanti problemi di salute pubblica. Il molteplice numero di sintomi descritti nelle problematiche cardiologiche sollecita il personale sanitario ad una diagnosi differenziale che può essere difficile e deve prevedere un management rapido per un'eventuale stabilizzazione dovuta a insufficienza respiratoria e/o cardiologica (Hunter et al., 2017). I dati sopra riportati evidenziano la dimensione del problema.
**Obiettivo.** Descrivere il fenomeno del ricorso al Pronto Soccorso per patologie cardiovascolari, ad eccezione di quelle di natura cerebrovascolare.
**Materiali e metodi.** Studio descrittivo. La raccolta dati è avvenuta dal 1° gennaio al 31 dicembre del 2018. Sono stati selezionati tutti gli accessi effettuati in un Pronto soccorso (PS) di un DEA di 2° livello per patologia cardiovascolare. I dati sono stati stratificati secondo le seguenti variabili: sesso, fasce di età, codice colore, diagnosi medica presente nella scheda di dimissione. L'elaborazione dei dati è avvenuta tramite l'utilizzo di un foglio di calcolo Excel.
**Risultati.** Gli accessi al PS per patologie cardiovascolari, escluse le patologie cerebrovascolari, sono stati 4.674 su un totale di 44.317 (10,54 %); con una lieve prevalenza del sesso maschile (53,77%) e della fascia di età compresa tra i 71 e gli 80 anni (21,84%). La distribuzione per codice colore è: Bianchi 131; Verdi 1995; Gialli 2272; Rossi 268.Relativamente alla distribuzione per fascia d'età l'accesso al PS per patologie cardiache risulta distribuito come di seguito: 4,68% (n 219) nella fascia di età inferiore ai 18 anni; 48,39% (n 2262) nella fascia di età 18-64; e 46,91% nella fascia di età superiore ai 65 anni. Le principali diagnosi mediche registrate, rappresentanti il 61,25% del campione, sono state le seguenti: angina e dolore n.1297, insufficienza cardiaca 567, fibrillazione 516; seguite poi dall'ipertensione 483.
**Conclusioni.** Interessante il dato relativo alla diagnosi "Angina e dolore" che rappresenta il 27,78% del campione; la cui distribuzione per codice colore è: Bianco 39; Verde 656; Giallo 582; Rosso 20. È probabile che la comparsa del dolore toracico possa essere quindi considerata come grave pericolo oppure come sintomatologia riferita da quei cittadini, che raggiungono l'unità operativa per ottenere prestazioni sanitarie né di urgenza né, tantomeno, di emergenza e che dovrebbero usufruire dei servizi presenti sul territorio, intendendo sia la medicina generale sia la specialistica ambulatoriale. Potrebbe essere utile ampliare il campione in esame facendo diventare lo studio Multicentrico così da poter indirizzare con più accuratezza le politiche di prevenzione e di medicina d'iniziativa, atte a migliorare i livelli di salute è a contrastare il fenomeno dell'overcrowding. Difatti l'alto numero di accesso impropri al PS è dovuto in particolar modo a utenti affetti da malattie croniche non gestite correttamente (Lupo et al., 2018). Conoscere la distribuzione degli accessi al PS per patologia può suggerire inoltre quali percorsi formativi specifici intraprendere e quali percorsi, della tipologia fast track, elaborare.

### A264: MILD HYPOTHERMIA POTENTIATES PULMONARY VASOCONSTRICTION DURING EXPERIMENTAL ENDOTOXEMIA

Alessandro Faragli (a), Dawud Abawi (a), Heiner Post (a), Alessio Alogna (a)
(a) CHARITE UNIVERSITÄTSMEDIZIN IN BERLIN - KARDIOLOGIE

**Background.** Mild hypothermia (MH) increases systemic vascular resistance (SVR) and reduces the need for vasopressors in resuscitated patients. Less is known about the effects of temperature on pulmonary vascular resistance (PVR).
**Methods.** We retrospectively analysed data from experimental studies on MH. 38 anaesthetized, closed-chest pigs were acutely instrumented with a Swan-Ganz and a left ventricular (LV) pressure-volume catheter, and temperature was controlled by an intravascular device. A control group of healthy pigs (n=9) was cooled from hyperthermia (HT, 40.5°), to normothermia (38 °C, NT) and further down to MH (33 °C), before and during dobutamine infusion. Two further groups of pigs were cooled from NT to MH for 6 h after LV myocardial infarction (MI) (n=16) or for 8 h during endotoxemia induced by lipopolysaccharide (LPS) infusion (n=13). Total pulmonary vascular resistance (TPVR) was calculated as mean pulmonary pressure (mPAP) divided by cardiac output (CO).
**Results.** Hyperthermia did not change TPVR compared to normothermia, while hypothermia increased significantly TPVR. After myocardial infarction and LV failure, TPVR increased both during normothermia and hypothermia. LPS infusion increased TPVR during normothermia, which was markedly potentiated during hypothermia.
**Conclusion.** MH per se increases TPVR. With a hemodynamic load after LV MI, MH does not further impact on pulmonary vascular tone. However, MH potentiated pulmonary vasoconstriction during pulmonary endothelial activation by LPS. Caution may be advised when MH is induced in patients with pre-existing severe pulmonary hypertension (i.e. pulmonary embolism, or septic shock).




### A265: ROLE OF ECHOCARDIOGRAPHY FOR THE EARLY DIAGNOSIS OF INFECTIVE ENDOCARDITIS IN THE EMERGENCY DEPARTMENT

Maria Chiara Gatto (a, b), Alessandra Oliva (c), Sara Cimino (b), Enrico Baldini (a), Elisa Fante (a), Lorena Cipollone (a), Maria Alessandroni (a), Gioacchino Galardo (a), Luciano Agati (b), Giuliano Bertazzoni (a), Francesco Fedele (b)
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Infective endocarditis (IE) is a rare but potentially life-threatening condition. IE early diagnosis at the emergency department (ED) is desirable in order to start targeted antibiotic therapy, to reduce morbidity and intra-hospital mortality (15-30%). In the most recent guidelines, the diagnosis of IE is based on modified Duke's Criteria; this classification has shown an overall sensitivity of around 80%. In the clinical practice, however, Duke's modified criteria have less accuracy for the early diagnosis, especially in cases of endocarditis on prosthetic valve (prosthetic valve endocarditis, PVE). In the case series herein reported, it is emphasized the role of transthoracic echocardiography (TTE) at the ED as an saving-time tool for the early diagnosis of IE. From November 2018 to February 2019, a total of 5 IE was diagnosed at the ED of our hospital throughout the use of TTE. Patients' mean age was 47±21 years old and 60% were male. The mean time from symptom's onset (fever and dyspnea) to hospital admission was 26±11days and in 40% of cases an antibiotic therapy was empirically started before hospitalization from general practitioner. In 3/5 (60%) subjects, IE was on native valves; among them, 2/3 (66%) had a structural valcular abnormality (prolapse) whereas in the remaining 2 subjects (40%), IE was on prosthetic valves. Cases were distributed as follows: 1) IE on prosthetic pulmonary valve in a young patient with treated Fallot's tetralogy; 2) IE on native tricuspid valve in a young woman with Ebstein's disease; 3) IE on prosthetic biological aortic valve implanted 4 months earlier; 4) IE on native tricuspid valve; 5) IE on prolapsing native mitral valve. Among patients 60% had immunological impairment and 20% was linked to iv drug use. According to the modified Duke's criteria, the diagnosis of IE at the ED was considered definite in 60% of patients while in 40% was possible. In particular, in 4/5 (80%) patients there were evidence of vegetation at TTE performed at ED and hemodynamic valvular changes such as a rapidly

increase of transvalvular gradient, or change in valvular insufficiency; often the valvular impairment is demonstrable with unconventional echo projections (out of axis and multiplane). In 40% of patients there were valvular complications such as abscess and perforation, especially in the case of PVE; in 60% of patients there were signs of embolization. Overall, the mean time of diagnosis was 20±17hours; however, when TTE was part of a rapid diagnostic assessment targeted at an early diagnosis of IE, the diagnosis was shortened (7±6 hours vs 34±19, with a Δtime of 26h, p=0.2). Specific antibiotic therapy (AT) was started approximately 2 hours from the diagnosis of IE. The mean duration of AT was 40±12 days. As part of IE therapy, 40% of patients underwent a cardiosurgical intervention. At 6 months follow up all patients were alive and free from infective diseases. The diagnosis of IE is a real challenge for any cardiologist working in the ED. The anamnesis and the clinical features are crucial in recognizing IE, which should be suspected whenever fever and at least one predisposing factor are present. Therefore, rapidly performing a "bedside" TTE represent a critical add-on for an early diagnosis and treatment of IE. Cooperation among different specialists (cardiologists, infectious diseases specialists and ED physicians) appears to be fundamental for dealing with such complex patients in order to reduce IE-related morbidity and mortality.

### A266: FAST MYOCARDIAL RECOVERY ENSURED BY THE COMBINED USE OF A-V ECMO AND IMPELLA CP IN CARDIOGENIC SHOCK RELATED TO A PHEOCHROMOCYTOMA CRISIS

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**Background.** Pheochromocytoma is a rare neuroendocrine functioning tumour, composed of chromaffin cells which overproduce catecholamines. A pheochromocytoma 'crisis' results in excessive catecholamine-induced stimulation of cardiac myocytes leading to myocardial damage which can manifest in different clinical forms ranging from Takotsubo to dilated cardiomyopathy and cardiogenic shock. The diagnosis of pheochromocytoma related cardiomyopathy is often delayed when the patient initially demonstrates severe biventricular dysfunction presenting as a cardiogenic shock that requires a rescue procedure. Recognizing this situation promptly could be challenging in determining the right option of treatment in these patients.
**Methods.** A 28-year-old female was admitted to our Hospital with ventricular arrhythmia, myocardial ischaemia, hypotension and respiratory failure, secondary to pulmonary oedema, that required orotracheal intubation and mechanical ventilation. Blood test documented elevated troponin levels and a normal C-reactive protein. Despite the fact that inotropic therapy was started, the echocardiogram revealed a poor right and left ventricular functions. Since the patient deteriorated rapidly, we decided to implant the extracorporeal membrane oxygenation (ECMO) device by right femoral artery and venous cannulation. The unloading of the left ventricle was obtained by inserting the IMPELLA CP percutaneously through the left femoral artery. A subsequently coronary angiography detected patent coronary arteries, so an endomyocardial biopsy was performed and showed diffuse contraction band necrosis and absence of signs of cytotoxic necrosis. Furthermore, the plasma catecholamine levels were four times higher than normal, so a CT-scan was performed and a nodular lesion of 5 cm, highly suggestive for pheochromocytoma, on the left adrenal gland was detected. Pharmacological therapy comprehensive of alpha- and beta-blockade was then started.
**Results.** The patient was successfully weaned from ECMO after two days of support. The IMPELLA was removed after 72 hours. Transthoracic echocardiography showed a completely recovery of the systolic function of both ventricles, following ECMO removal. Fourteen days later, the patient underwent surgical removal of the adrenal lesion, and the histologic exam confirmed the diagnosis of pheochromocytoma. One week later, the patient was discharged.
**Conclusions.** This case highlight that the combined support of ECMO ed IMPELLA in case of cardiogenic shock associated with a biventricular neurocardiogenic myocardial stunning, is highly compelling to obtain a fast myocardial recovery.

### A267: THERMODYNAMIC DESTABILIZATION GUIDES THE PATHOGENICITY ASSESSMENT OF A VARIANT OF UNCERTAIN SIGNIFICANCE IN CARDIAC MYOSIN BINDING PROTEIN C

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In the era of Next Generation Sequencing (NGS), genetic testing for inherited disorders identifies an ever-increasing number of variants, whose pathogenicity remains unclear. These variants of uncertain significant (VUS) limit the reach of genetic testing in clinical practice. The VUS for Hypertrophic Cardiomyopathy (HCM), the most common familial heart disease, constitute over 60% of entries for missense variants shown in ClinVar database. We proposed a workflow to determine pathogenicity of VUS, which integrates bioinformatics evaluation and functional studies of RNA splicing and protein thermodynamic stability. This workflow was applied to a novel VUS in *MYBPC3* gene, coding for cardiac myosin-binding protein C (cMyBP-C), which is the most mutated gene in HCM. The c.1809T>G-p.I603M variant was identified during genetic screening of a family clinically affected by HCM. It was classified as VUS applying the American College of Medical Genetics criteria. *In silico* prediction and mRNA analysis of c.1809T>G variant indicated no alteration of RNA splicing. The p.I603M mutation maps to the C4 domain of cMyBP-C protein. The homology modelling of C4 domain shows that p.I603 is buried in the protein structure, suggesting a potential destabilising role of this mutant. The Circular Dichroism (CD) revealed that the p.I603M variant does not perturb the structure of domain. However, thermal denaturation experiments by CD and Differential Scanning Calorimetry (DSC) shows the thermodynamic stability of C4 domain is severely compromised. Furthermore, the ΔΔG of C4-I603M is comparable to ΔΔG of other pathogenetic variants in different MYBPC3 domains. Therefore, we propose reclassification of variant p.I603M as likely pathogenic.
In conclusion, our strategy is useful to refine the assignment of pathogenicity in the absence of enough genetic support, improving the clinical management of HCM patients and their families.

### A268: ROLE OF GENETICS ANALYSIS IN PEDIATRIC CARDIOMYOPATHIES.

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**Background.** Pediatric cardiomyopathies (CMPs), often with a genetic nature, represent an important cause of childhood heart failure. Despite of the analysis of large gene panels by Next Generation Sequencing (NGS) technologies, the genetic background of these diseases is relatively understudied because of their rarity and heterogeneity. The assessment of aetiology is of paramount importance in order to define prognosis and therapeutic choices. Moreover, the recognition of genetic origins is the basis for familiar screening.We report the clinical features and the genetic screening results in a cohort of children with CMPs.
**Methods.** NGS was performed in a cohort of 35 unrelated pediatric patients (20 with Hypertrophic Cardiomyopathy, 11 with Dilated Cardiomyopathy, 2 with Left Ventricular Noncompaction, 1 with a Restrictive Cardiomyopathy and 1 with Arrhythmogenic Cardiomyopathy) after genetic counseling offered to parents.
**Results.** We identified a pathogenic or likely pathogenic variant in 16/35 ~45% patients: we found one patient with a de novo variant and a family with an autosomal recessive disease. Most of characterized patients had a sarcomeric aetiology and MYH7 resulted the most mutated gene (12/35 ~34%). 7/35 ~20% patients had a double mutation. In particular, we identified five cases with a syndromic CMPs with variants in SOS1, PTPN11, LAMP2, ALMS1 and PRKAG2 genes, respectively associated with Noonan, Danon, Alström and Cardiac Glycogenosis disease. These genetic diagnosis have immediate implications on clinical management. Moreover, genetic testing was performed in unaffected family members to define clinical follow-up and establish the recurrent risk. In our cohort, hypertrophic cardiomyopathy was the most common cause of pediatric-onset cardiomyopathy, followed by dilated cardiomyopathy.
**Conclusions.** Genetic testing was a powerfull tool to clarify the diagnosis, to suggest intervention strategies and to predict prognosis. In addition genetic analysis enables the study of proband's family by a personalized medicine approach.

### A269: PRIMARY CILIUM-AUTOPHAGY-CELL CYCLE AXIS DEFECTS DURING CARDIAC PROGENITOR SPECIFICATION CAUSE HYPOPLASTIC LEFT HEART SYNDROME

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**Background.** Complex molecular programs in specific cell lineages govern human heart development. Hypoplastic left heart syndrome (HLHS) is characterized by underdevelopment of the left ventricle–aorta complex in association with outflow-tract obstruction. Patient-derived induced pluripotent stem cells (iPSCs) offer the unique possibility to investigate early human cardiogenesis in vitro. Many signalling pathways

important for early cardiac specification are bundled in primary cilia, whose expression at the cell surface is closely connected to cell cycle patterning. The regulation of signalling at the base of the primary cilium, in response to cellular fate changes or stress, is thought to be closely linked to the activation of autophagy, that is an active process during embryonic development in multiple organs.
**Purpose.** To decipher the early developmental steps resulting in the cardiac phenotype of HLHS patients, we investigated in iPSC-derived cardiovascular progenitors (CVPCs), generated from three HLHS patient-derived samples, the role of the primary cilium-autophagy-cell cycle axis during cardiovascular specification.
**Methods.** During the course of CVPCs differentiation we measured from healthy and HLHS-derived CVPCs: expression levels of key cardiac developmental genes, proliferation and apoptosis rates, cell cycle phase distribution, primary cilium expression and autophagy activation.
**Results.** Expression levels of key cardiac developmental markers were altered during the course of CVPCs differentiation. HLHS-derived CVPCs showed a unique pattern of proliferation and cell-cycle-phases distribution at the time of early specification, without a significant difference in terms of apoptosis rates. All HLHS-derived CVPCs showed abnormalities in primary cilium and autophagy. Remarkably, inhibition of autophagy in healthy control lines recapitulated the defects observed in the HLHS-derived CVPCs.
**Conclusion.** Collectively, these findings indicate a key role of the primary cilium-autophagy-cell cycle axis in CVPC specification and HLHS pathology. Our study suggests potential novel nodes for therapy besides surgical intervention.

### A270: CARDIOMYOCYTE-DERIVED EXOSOMAL MICRORNAS REGULATE INFLAMMATION AND FIBROBLAST PHENOCONVERSION IN MYOCARDIAL INFARCTION

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The inclusion of microRNAs (miRNAs, miRs) in extracellular microvesicles/exosomes (named cardiosomes when deriving from cardiomyocytes) allows their active transportation and ensures cell-cell communication. We hypothesize that cardiosomal miRNAs play a pivotal role in the activation of myofibroblasts following ischemic injury.
Using bioinformatic approaches and an established murine model of myocardial infarction (MI, achieved via ligation of the left anterior descending coronary artery), we tested our hypothesis by measuring in isolated fibroblasts and cardiosomes the expression levels of a set of miRNAs, upregulated in cardiomyocytes post-MI and involved in myofibroblast phenoconversion.
We found that miR-92a and miR-195 were significantly upregulated (absolute values) in cardiosomes as well as in fibroblasts isolated at different time points after MI compared with SHAM conditions. These miRs were demonstrated to be both predicted (bioinformatics) and biologically validated (luciferase assays) targets of SMAD7. Moreover, primary isolated cardiac fibroblasts were activated both when incubated with cardiosomes isolated from ischemic cardiomyocytes and when cultured in conditioned medium of post-MI cardiomyocytes, whereas no significant effects were observed following incubation with cardiosomes or medium from sham cardiomyocytes. Myofibroblast activation was assessed measuring the expression of aSMA, periostin, collagen I/III, FAP, fibronectin ED-A. Both miRs also regulated the inflammatory response (evaluated in terms of IL-6 and CXCL1). The addition of an inhibitor of exosome release (GW4869 10 μM for 12 h) significantly attenuated all these responses. The mechanistic contribution of miR-92a and miR-195 was further confirmed using specific miR mimics and inhibitors.
Taken together, our findings indicate for the first time that two cardiomyocyte-specific miRNAs (namely miR-92a and miR-195), transferred to fibroblasts in form of exosomal cargo, are crucial for the activation of myofibroblasts in MI.

### A271: CAN EPIGENETICS OF ENDOTHELIAL DYSFUNCTION REPRESENT THE KEY TO PRECISION MEDICINE IN TYPE 2 DIABETES MELLITUS?

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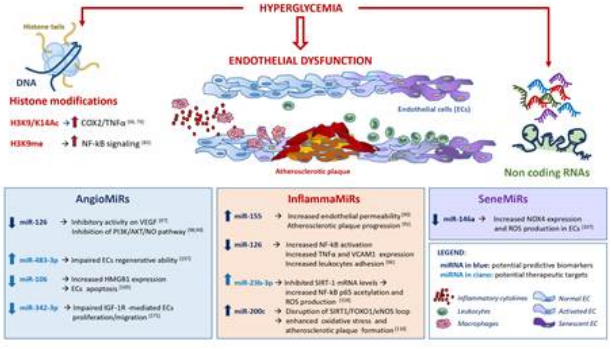
It is well known that type 2 diabetes (T2D) along with its complications is increasing across the globe and is considered as one of the most important metabolic disease in both developing and industrialized countries. The close relationship between genetic and environmental factors, such as eating habits and lifestyles, may induce specific changes in nutrition or fluctuations in metabolism which lead to dynamic modifications of chromatin-associated proteins and homeostatic transcriptional responses, often involved in the progression of the disease. Epigenetic mechanisms represent an adaptation to the environment and may be implicated in the pathway linking environmental factors to genetic predisposition of metabolic disturbances.
Endothelial dysfunction plays an essential role in the development of diabetes. Dysregulation of the endothelium functions due to an imbalanced level of vasomotor regulators is often implicated in metabolic diseases such as the early stages of insulin resistance and obesity and could be cause and/or resulting complications which may precede the clinical diagnosis of diabetes. Today it is increasingly necessary to investigate the genetic and epigenetic markers that can allow the most effective monitoring of diabetic disease from diagnosis to drug therapy.
Advances in genetics have identified novel pathways and targets involved in numerous diseases, paving the way for "precision medicine". This term, used so far in oncology, is based on the knowledge of the molecular characteristics of cancer cells, allowing to select for each patient the pharmacological treatment able to improve the survival outcome with the least toxicity. The application of epigenetics - acquired modifications to the genoma subjected to influence by environment - represent a field in growth that adds new knowledge for the understanding and treatment of several diseases, allowing the development of tailored therapy.
My oral presentation aims to summarize the most current knowledge regarding the involvement of epigenetic changes associated with endothelial dysfunction in T2D in order to identify potential targets that should contribute to the realization of "precision medicine" in the context of diabetic illness.




## ATEROTROMBOSI - DIABETE E MALATTIE DEL METABOLISMO
## Sessione Poster

### A272: P2Y12 VERSUS ASPIRIN FOR SECONDARY PREVENTION IN PATIENTS WITH ESTABLISHED ATHEROSCLEROSIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Mauro Chiarito (a), Jorge Sanz-Sanchez (a), Francesco Cannata (a), Davide Cao (a), Matteo Sturla (a), Cristina Panico (a), Cosmo Godino (b), Damiano Regazzoli (a), Bernhard Reimers (a), Raffaele De Caterina (c), Gianluigi Condorelli (a), Giuseppe Ferrante (a), Giulio Stefanini (a)
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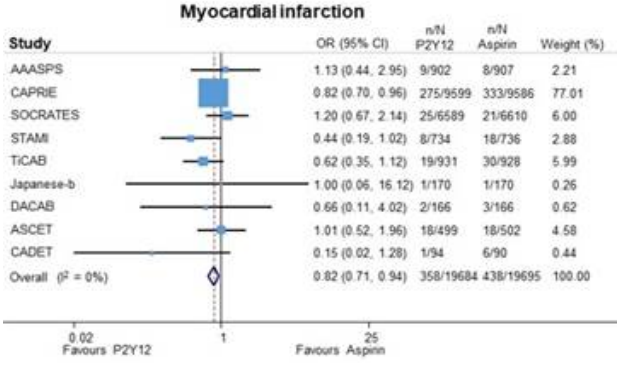
**Background.** Antiplatelet therapy is recommended among patients with established atherosclerosis. However, whether inhibition of $P2Y_{12}$ or cyclooxygenase should be preferred is still a matter of debate.
**Aim and Methods.** To compare monotherapy with a $P2Y_{12}$ inhibitor versus aspirin for secondary prevention in patients with established atherosclerosis. PubMed, Embase, BioMedCentral, Google Scholar, the Cochrane Central Register of Controlled Trials, and international meeting abstracts were searched to include trials comparing a $P2Y_{12}$ inhibitor versus aspirin for secondary prevention in patients with established cerebrovascular, coronary, or peripheral artery disease.
**Results.** Overall, 2089 studies were screened, and 10 randomized trials involving 42,448 patients were included. Prespecified co-primary outcomes were myocardial infarction and ischemic stroke, prespecified secondary outcomes were all cause-death, vascular death, and any bleeding event. The risk of myocardial infarction was significantly lower in patients treated with a $P2Y_{12}$ inhibitor than in those treated with aspirin (OR 0.82, 95% CI 0.71 to 0.94, p=0.005, $I^2$=0%). Conversely, the risks of stroke (OR 0.93, 95% CI 0.81 to 1.06, p=0.254, $I^2$=34.5%), all-cause death (OR 0.98, 95% CI 0.89 to 1.08, p=0.733, $I^2$=0%), vascular death (OR 0.96, 95% CI 0.86 to 1.08, p=0.536, $I^2$=0%), and any bleeding (OR: 1.08, 95% CI: 0.91 to 1.29, p=0.370, $I^2$=51.3%) were comparable between the two groups. Findings were consistent regardless the type of $P2Y_{12}$ inhibitor used. Meta-regression analysis showed that the positive effect of $P2Y_{12}$ inhibitors compared to aspirin was mainly driven by patients with coronary or peripheral artery disease.

Removing the AASPS trial a significantly lower risk of stroke emerged in patients treated with a $P2Y_{12}$ inhibitor as compared to aspirin, with no longer evidence of heterogeneity (OR 0.89, 95% CI 0.81 to 0.97, p=0.011, $I^2$=3%).

**Conclusions.** Among patients with established atherosclerosis, monotherapy with a $P2Y_{12}$ inhibitor significantly reduces the risk of myocardial infarction as compared to aspirin. The risks of stroke, death, and bleeding are similar with a $P2Y_{12}$ inhibitor and aspirin monotherapy. Our findings indicate that $P2Y_{12}$ inhibitors might be more effective than aspirin for secondary prevention in patients with established atherosclerosis, but further specifically designed large randomized trials are necessary to confirm our findings.




## A273: EFFICACY AND SAFETY OF DIRECT ORAL ANTICOAGULANTS VERSUS VITAMIN K ANTAGONISTS IN SUBGROUPS OF PATIENTS WITH ATRIAL FIBRILLATION UNDERGOING PERCUTANEOUS CORONARY INTERVENTION

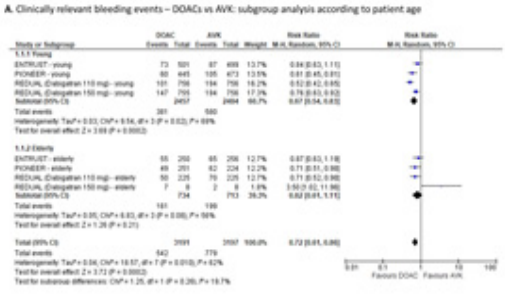
Matteo Casula (a, b), Francesca Fabris (a, b), Sergio Leonardi (c, d), Marco Ferlini (b), Sara Moscatelli (e, f), Italo Porto (e, f), Massimiliano Gnecchi (c, d), Federico Fortuni (a, d)
(a) UNIVERSITY OF PAVIA, SCUOLA DI SPECIALIZZAZIONE IN MALATTIE DELL'APPARATO CARDIOVASCOLARE, PAVIA, ITALY; (b) DIVISION OF CARDIOLOGY, FONDAZIONE IRCCS POLICLINICO SAN MATTEO, PAVIA, ITALY; (c) DEPARTMENT OF MOLECULAR MEDICINE, UNIVERSITY OF PAVIA, PAVIA, ITALY; (d) CORONARY CARE UNIT AND LABORATORY OF CLINICAL AND EXPERIMENTAL CARDIOLOGY, FONDAZIONE IRCCS POLICLINICO SAN MATTEO, PAVIA, ITALY; (e) UNIVERSITY OF GENOA, SCUOLA DI SPECIALIZZAZIONE IN MALATTIE DELL'APPARATO CARDIOVASCOLARE, GENOA, ITALY; (f) IRCCS OSPEDALE SAN MARTINO, GENOA, ITALY

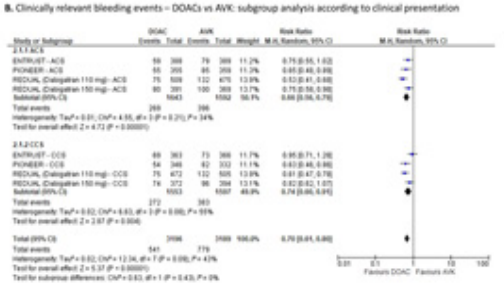
**Background and aim.** Approximately 5-10% of patients requiring long-term oral anticoagulants (OACs) for atrial fibrillation (AF) are also treated with percutaneous coronary intervention (PCI) and consequent need of antiplatelet therapy (APT). There are several antithrombotic regimens available in this setting and the European Society of Cardiology guidelines reccomend the use of direct oral anticoagulants (DOACs) over vitamin K antagonists (VKA). The aim of the present study-level meta-analysis was to explore the comparative efficacy and safety of DOACs and VKA in this clinical setting across different patient subgroups according to clinical presentation, age and type of stent implanted.

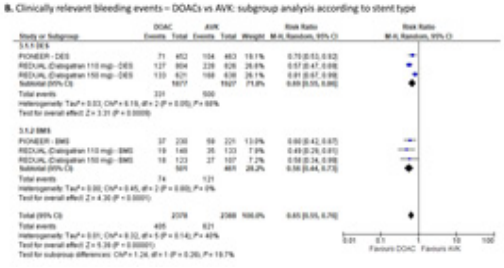
**Methods.** We searched electronic databases for randomized controlled trials (RCTs) published in peer-reviewed journals, investigating the comparative efficacy and safety of DOACs vs. VKA in patents with AF treated with APT for recent PCI. The efficacy outcomes were Major Adverse Cardiovascular Events (MACE) as defined in the included trials. The safety outcome was the incidence of any clinically relevant bleeding. The analyses were stratified for: patient age (young vs. elderly [> 75 years]), clinical presentation (acute coronary syndrome [ACS] vs. chronic coronary syndrome [CCS]) and stent type (bare metal stent vs. drug eluting stent).

**Results.** 4 RCTs with a total of 5646 patients were included (3204 on DOACs and 2442 on VKA). Mean follow-up was 12.6±1.2 months. Mean age was 70.4±1.3 years. Mean time in therapeutic range for patients on VKA was 65%. DOACs significantly reduced the incidence of clinically relevant bleeding (RR: 0.72; 95% CI 0.61-0.86; P=0.0002) regardless of patient age, clinical presentation and stent type (Fig. 1 A-C). Dabigatran 150 mg BID was the only DOAC to increase bleeding events in elderly patients compared with AVK (Fig. 1A). Regarding efficacy outcomes there was no difference between AVK and DOACs in the incidence of MACE (RR 1.05; 95% CI 0.90-1.23; P=0.54) and these results were consistent across age groups, different stent type and clinical presentation.

**Conclusions.** our meta-analysis confirms that in patients with AF undergoing PCI DOACs reduce bleeding events with no significant differences in the incidence of MACE compared with VKA. Moreover, it highlights that Dabigatran 150 mg BID should not be used in elderly patients in this clinical setting as it increases the risk of bleeding compared to the other DOACs and VKA.




## A274: THE ROLE OF ENDOTHELIAL DYSFUNCTION AND OXIDATIVE STRESS IN CEREBROVASCULAR DISEASES

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(a) CARDIOLOGY DEPARTMENT, UNIVERSITY OF BARI; (b) CARDIAC SURGERY UNIT, MATER DEI HOSPITAL, BARI; (c) CARDIOLOGY DEPARTMENT, HOSPITAL "F PERINEI" ALTAMURA (BA)

Cerebrovascular diseases (CBD) are one of the most dangerous complications of atherosclerosis. The clinical consequences of CBD deeply impact quality of life and the prognosis of patients. Atherosclerosis is the main cause of CBD development. Hypertension, dyslipidemia, diabetes, smoking, obesity, and other risk factors explain the higher CBD incidence in the general population, as they are able to anticipate the clinical expression of atherosclerosis. These risk factors are effectively able to promote endothelial dysfunction which is the premise for the early, clinical expression of atherosclerosis. The mechanisms by which risk factors can influence the occurrence of CBD are different and not fully understood. The inflammatory background of atherosclerosis can explain a great part of it. In particular, the oxidative stress may promote the development of vascular lesions by negatively influencing biochemical cellular processes of the endothelium, thus predisposing the vascular tree to morphological and functional damages. The aim of this narrative review is to evaluate the role of endothelial dysfunction and oxidative stress in CBD development.

## A275: SINDROME CORONARICA ACUTA O TROPONINOSI IN GRAVIDA?

Gabriella Ricci (a), Ezio Dioguardi (a), Michele Gesualdo (a), Claudia Resta (a), Stella Maria Ricco (a), Francesco Silvestri (a), Cristina Fontana (a), Antonietta Loforese (a), Anna Maria Faniglulo (a), Giovanni Luzzi (a)
(a) OSPEDALE SAN PIO DA PIETRELCINA DI CASTELLANETA

Donna di 40 anni, senza fattori di rischio CV, giunta per comparsa di dolore toracico tipico (preceduto da brevi episodi nei giorni precedenti) associato a rialzo della TNI (negativa all'ingresso, picco: 5.220 ng/ml; normalizzazione in 7ª giornata). L'ECG in 1ª giornata era nella norma con negativizzazione delle onde T in sede inferiore in 2ª giornata. Ai controlli ecocardiografici, non alterazioni della cinetica. All'ingresso, riscontro di beta-HCG positiva per stato gravidico in fase iniziale (non noto alla paziente). Pertanto, si decideva di soprassedere a esame coronarografico

e di somministrare, in accordo con i Ginecologi, acido acetilsalicilico ed enoxaparina. Il test ergometrico massimale, eseguito in pre-dimissione, non evidenziava segni clinici, ECG ed aritmici suggestivi di ischemia miocardica. Il Doppler coronarico era negativo per stenosi critiche. Le indagini deponevano per un' ischemia miocardica causata, verosimilmente, da una trombosi coronarica. Lo screening trombofilico risultava negativo eccetto che per una mutazione in eterozigosi del gene MTHFR. La paziente in follow- up ha mostrato un quadro clinico-emodinamico stabile; il decorso della gravidanza e l'espletamento del parto sono risultati nella norma. La presenza contestuale di dolore toracico, aumento delle TNI e modifiche ECG pone diagnosi di infarto miocardico (4° definizione universale). La troponinosi pertanto è improbabile; in letteratura questa è descritta solo in corso di gestosi ed embolia polmonare. Le principali cause di sindromi coronariche acute in gravidanza sono le dissezioni coronariche spontanee[1], le alterazioni dell'assetto emocoagulativo[2] e le anomalie di origine e decorso delle coronarie[3]. Una predisposizione genetica in un subset protrombotico quale quello gravidico può aver influito nella patogenesi di questa SCA.

### A276: THE FIRST POST-INFARCTUAL LEFT VENTRICULAR APICAL THROMBOSIS SUCCESSFULLY TREATED WITH LOW-DOSE APIXABAN: A CASE REPORT

Antonio Gianluca Robles (a), Luca Amato (a), Paolo Pollice (a), Domenico Zanna (a), Stefano Favale (a)
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Ventricular thrombosis is a high-risk embolic condition and is potentially fatal. The recommended treatment is based on the use of vitamin K antagonists (VKAs), whose use is burdened by numerous adverse effects. An alternative to these may be direct oral anticoagulants (DOACs) but till now there are not completed trials allowing their use for this specific complication. However, in literature there are several case reports showing the possibility of effectively treating ventricular thrombosis with DOACs.

We report the case of a 78-year-old male patient admitted for an anterior ST-segment elevation myocardial infarction. After percutaneous coronary angioplasty and drug eluting stent implantation on the culprit lesion, the patient received a dual anti-platelet therapy (DAPT) based on acetylsalicyl acid (ASA) 100 mg/day and clopidogrel 75 mg/day, once a loading dose of ASA 250 mg i.v. and clopidogrel 600 mg had been administered. The following day, a 10 x 8 mm sized, ovoidal, hyperechoic, sessile formation into apex suggestive of left ventricular apical thrombosis was detected by transthoracic ecocardiography and then low-dose apixaban 2.5 mg twice daily was associated with DAPT (patient refused standard therapy with vitamin K antagonists). Apixaban was stopped 30 days later given a complete resolution of ventricular thrombosis confirmed by transthoracic echocardiography. Neither hemorrhagic nor thrombotic complications were detected during that period. Ventricular thrombotic recurrences were not noticed at 2-years follow up.

Low dose regimen apixaban was prescribed taking into account the greater general augmented bleeding risk related to the triple antithrombotic therapy and a presumptive increased one due to a large pseudoaneurysm of the right radial artery complicating the catheterization. The patient had not recommended apixaban dose reduction criteria (patient's weight was 75 Kg and he had the following renal function parameters: serum creatinine 1.1 mg/dl and a CKD-EPI-estimated glomerular filtration rate of 63 ml/min).

In summary, to the best of our knowledge, this case dated in October 2016 is the first one of a successful and not complicated management of post-myocardial infarction ventricular thrombosis using off-label low-dose apixaban in a patient without DOACs dose-reduction recommended criteria. The case encourages further evidences and studies to evaluate the possibility of using this approach in the management of this kind of issues.

### A277: CHOLESTEROL-LOWERING AND STROKE: NO ROOM FOR PLEIOTROPIC EFFECTS OF STATINS-CONFIRMATION FROM PCSK9 INHIBITOR STUDIES

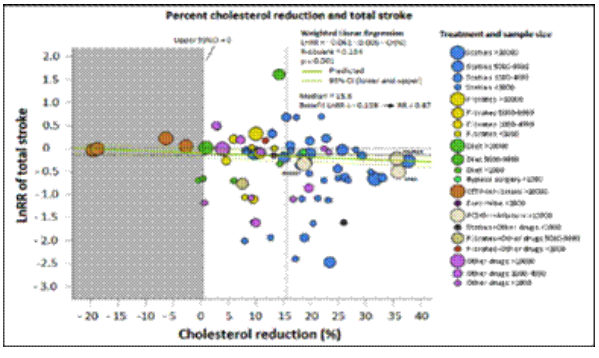
Tanya Salvatore (a), Riccardo Morganti (b), Roberto Marchioli (c), Raffaele De Caterina (b, d)
(a) INSTITUTE OF CARDIOLOGY, "G. D'ANNUNZIO" UNIVERSITY, CHIETI, ITALY; (b) AZIENDA OSPEDALIERO-UNIVERSITARIA PISANA, PISA UNIVERSITY HOSPITAL, PISA, ITALY; (c) HEMATOLOGY AND ONCOLOGY, THERAPEUTIC SCIENCE AND STRATEGY UNIT, QUINTILES, MILAN; (d) CHAIR OF CARDIOLOGY, UNIVERSITY OF PISA, PISA, ITALY

**Background and Purpose.** The relationship between cholesterol levels and stroke has been much less clear than between cholesterol levels and coronary heart disease. Because a reduction in stroke has been clearly observed in trials with statins, for long "pleiotropic" effects of such drugs, unrelated to cholesterol lowering, have been invoked. In a previous analysis of all randomized trials of cholesterol-lowering treatments reporting on stroke we had, however, reached the conclusion that any cholesterol lowering is related to a significant reduction of stroke, in a relationship that appeared to exist for both statin and non-statin cholesterol- lowering interventions. Outcome results of the FOURIER trial with evolocumab, SPIRE-1 and -2 with bococizumab, and ODISSEY OUTCOMES trial with alirocumab now offer the opportunity of clearly confirming or confuting this concept.

**Methods.** We report on an updated meta-regression of the relationship of total cholesterol changes occurred with various drugs or treatments and changes in the risk of stroke compared with control.

**Results.** A new meta-regression is presented in Figure 1. The new equation to predict the saving of strokes as a function of total cholesterol lowering is now: LnRR = - 0.061 – 0.005*(% cholesterol reduction). According to this equation, one should expect a relative risk (RR) of 0.851, 0.810 and 0.770 for a 20%, 30% and 40% reduction in total cholesterol, respectively. Figures of the RR found in FOURIER, SPIRE-1/2 and ODISSEY OUTCOMES (0.79, 0.60 and 0.79) are extremely close to the RR of 0.79, 0.79 and 0.84 predicted by our new meta-regression, respectively.

**Conclusions.** These findings offer a definitive proof that the pure total (and low-density lipoprotein) cholesterol lowering, with any available lipid-lowering intervention, reduce stroke risk proportional to the extent of cholesterol reduction, without the need of invoking "pleiotropic" effects of any such treatment.




### A278: EFFICACY AND SAFETY OF NON-VITAMIN K ORAL ANTICOAGULANTS IN PATIENTS WITH ATRIAL FIBRILLATION AND CANCER: A STUDY LEVEL META-ANALYSIS

Giuseppe Verolino (a), Ilaria Cavallari (a), Giuseppe Patti (b)
(a) UNIVERSITÀ CAMPUS BIO-MEDICO DI ROMA; (b) UNIVERSITÀ DEGLI STUDI DELL'AQUILA

**Objectives.** In this study-level meta-analysis we evaluated the clinical outcome with non-vitamin K antagonist oral anticoagulants (NOACs) vs vitamin K antagonists (VKAs) in atrial fibrillation (AF) patients with cancer.

**Background.** Anticoagulation in AF patients with cancer is challenging given the coexistence of elevated thrombotic and bleeding risk. The efficacy and safety of NOACs in this setting remain unclear.

**Methods.** We included three randomized trials in our primary analysis (N=2,661 patients) and three observational studies in our secondary, confirmatory analysis (N=28,727 patients). Outcome measures were the composite of any stroke or systemic embolism; ischemic stroke; venous thromboembolism; major bleeding; intracranial bleeding; all-cause death. Mean follow-up duration was 2.2 years.

**Results.** In the primary analysis, the use of NOACs was associated with similar incidence of stroke/systemic embolism (OR 0.70, 95% CI 0.45-1.09; P=0.11), ischemic stroke (OR 0.71, 0.31-1.64; P=0.42), venous thromboembolism (OR 0.91, 0.33-2.53; P=0.86), all-cause death (OR 1.02, 0.72-1.42; P=0.93) and major bleeding (OR 0.81, 0.61-1.06; P=0.13) compared to VKAs. The occurrence of intracranial bleeding was significantly lower in the NOACs vs VKAs group (OR 0.11, 0.02-0.63; P=0.01). These results were overall confirmed in the secondary analysis, where there was additionally a significant reduction of stroke/systemic embolism, ischemic stroke and venous thromboembolism with NOACs.

**Conclusion.** In AF patients with malignancy, NOACs appear at least as effective as VKAs in preventing thrombotic events and reduce intracranial bleeding. NOACs may represent a valid and more practical alternative to VKAs in this setting of high-risk patients.

### A279: RISK OF CARDIAC ARRHYTHMIAS DURING HYPOGLYCEMIA IN NORMOTOLERANT SUBJECTS

Maria Chiara Pelle (a), Marco Ricchio (a), Mariafrancesca Ruffo (a), Bruno Tassone (a), Paola Scarpino (a), Isabella Zaffina (a), Eliezer Tassone (a), Cosima Cloro (b), Francesco Perticone (a), Franco Arturi (a)
(a) DIPARTIMENTO DI SCIENZE MEDICHE E CHIRURGICHE - UNIVERSITÀ DEGLI STUDI "MAGNA GRAECIA" DI CATANZARO; (b) U.O.C DI CARDIOLOGIA - OSPEDALE "SS ANNUNZIATA" DI COSENZA

Hypoglycemia is a common finding in patients with both type 1 and type 2 diabetes and several evidences suggest a possible link between hypoglycemia and cardiovascular mortality in patients with diabetes mellitus. In these patients, hypoglycemia might cause arrhythmias through effects on cardiac repolarization and changes in cardiac autonomic activity. The most common electrocardiographic abnormalities observed during hypoglycemia are P-R interval shortening, ST-segment depression, T-wave flattening and QTc-interval prolongation. Especially the last one represents the most characteristic ECG variation during acute hypoglycemia and may promote the onset of potentially fatal arrhythmias. However, hypoglycaemia is a common finding in daily clinical also in obese or non-obese non-diabetic adult subjects and, to the best of our knowledge, there are no data on the role of hypoglycemia on cardiac function in these subjects.

The aim of this study was to evaluate the effects of experimental hypoglycemia induced by oral glucose tolerance test (OGTT) on the cardiac arrhythmias, heart rate variability (HRV) and cardiac repolarization in normotolerant subjects (NGT), at baseline and during OGTT.

Hundred twenty-six NGT subjects without known history of cardiovascular disease were enrolled. Participants taking □-blocking and QT interval-prolonging agents were excluded. Baseline 12-lead electrocardiogram (ECG) was performed prior to further testing and participants with atrial fibrillation or bundle branch block were excluded. Similarly, participants with thyroid diseases and/or estimated glomerular filtration rate (eGFR) <30ml/min/1.73m$^2$ were excluded. On the first day, after 12-h fasting, subjects underwent anthropometrical evaluation and a venous blood sample was drawn for biochemical and hormonal determinations including fasting plasma glucose, fasting plasma insulin, Hba1c and thyroid function. On the second day, after a 12-h fasting, a 75 g OGTT to 5 hours was performed with sampling for plasma glucose, plasma insulin and C-peptide. During OGTT, the subjects underwent a simultaneous 12-lead Holter ECG. In case of signs and/or symptoms typical of hypoglycemia and/or capillary blood glucose level ≤ 50 mg / dL, the OGTT was stopped. The insulin resistance was evaluated by HOMA-IR.

Twenty-two out 126 patients enrolled showed during OGTT impaired glucose tolerance (IGT) or diabetes and then were excluded. Seventy eight out 104 NGT subjects (21M/57F) showed hypoglycemia during OGTT. In these subjects, during hypoglycemic episode, the ECG analysis showed a significant QTc-interval prolongation (410 ± 24 msec vs 452 ± 23 msec, *P* <0.0001). Furthermore, ST-segment alterations, T wave modifications, presence of supraventricular tachycardia and atrial ectopic beats were also observed. The HRV analysis showed no significant changes in the low frequency component (LF) during hypoglycemia compared to baseline (63.3 ± 15.8 vs 66.6 ± 12.7, *P* = 0.1), but a significant increase in the high frequency component (HF) was demonstrated (23.9 ± 9 vs 35.1 ± 13, *P* <0.0001), with a significant modification of the LF/HF ratio (2.64 ± 0.9 vs 1.95 ± 1, *P* <0.0001). In the 26 NGT subjects who did not showed hypoglycemia during OGTT, no changes in QTc or HRV were observed.

### A280: MYOCARDIAL INFARCTION IN THYROTOXICOSIS:CASE REPORT

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A 70-year-old man presented to the emergency department with a 10-day history of intermittent chest pain at rest, lasting from 10 to 30 min, with spontaneous resolution. He also reported having lost 7-8 kg in the last month. His cardiovascular history was unremarkable, with no known cardiovascular risk factors. His vital signs were normal. There was no murmur detected on auscultation of the chest, and his lung sounds were clear and without rales. No significant findings were obtained from the examination of other systems, except fine widespread tremors located especially in the limbs. Routine laboratory tests were without peculiarity. The admission electrocardiogram (ECG) revealed sinus tachycardia and slight ST segment elevation in inferior leads with T waves inversion. The first Troponin I sample was slightly elevated (0,40 ng/L V.N 0,00-0,05) and the patient was admitted in the coronary care unit and was put on intravenous (IV) nitrates and bisoprolol therapy. After a few hours he experienced new episodes of chest pain with ECG evidence of transient ST segment elevation in the inferior and lateral leads, including pseudo-normalization of the T waves, subsequently undergoing urgent coronary angiography. Coronary angiography revealed 90% distal stenosis of the right coronary artery (RCA). During the procedure, intracoronary nitrates had been administered without stenosis resolution. Therefore, the lesion was successfully stented (2 zotarolimus eluting stents) with final TIMI III flow. The left coronary artery was angiographically normal. In the cath lab, after successful PCI, ECG monitoring showed transient ST elevation in the inferior leads with no evidence of coronary stenosis or spasm at the angiographic control. Echocardiography demonstrated globally normal systolic function with hypokinesis of infero-lateral and inferior wall. Despite the optimal angiographic result, in the first two days after the procedure the patient had two episodes of spontaneous angina with transient ST segment elevation and we observed, during the ECG monitoring and ECG, numerous episodes of transient ST segment elevation and pseudo-normalization of the T waves in the inferior and lateral leads, with spontaneous resolution and without symptoms. We assumed that it was a coronary microvascular vasospasm mechanism and we stopped administering bisoprolol introducing 30 mg of Diltiazem three times a day and continuing with the nitrates. Thyroid function tests showed an undetectable thyroid-stimulating hormone (TSH) and huge elevation of free thyroxine (normal range 0,550-4,780 uUl/ml, F-T3 12,81 pg/ml, normal range 2,30-4,20 pg/ml, F-T4 4,02 ng/dl, normal range 0,89-1,76 ng/dl). Thyroglobulin antibodies were > 500 U/ml (normal range 0- 60 Ul/ml) and Thyroperoxidase antibodies were 271,8 U/ml (normal range 0-60 UI/ml), TRAB were 1,96 U/L (normal values < 1,0 U/L). Graves' Disease was diagnosed. A 30 mg dose of Methimazole once daily (od) was initiated for the first two weeks. After modifying the drug therapy we did not observe any more episodes of angina and transient ST segment elevation. The patient was discharged at day 8, completely asymptomatic, due to the attenuation of his adrenergic drive, with normal systolic function and absence of left ventricle wall motion abnormalities at the echocardiography study. The thyroid profile was reassessed one week later, showing a marked reduction of free thyroxine levels (F-T3 5,41 pg/ml, normal range 2,30-4,20 pg/ml, FT4 3 ng/dl, normal range 0,89-1,76 ng/dl).

**Conclusion.** Clinicians should be aware that anginal chest pain caused by coronary vasospasm or coronary microvascular spasm is one of the manifestations of thyrotoxicosis, especially in patients with unstable angina or myocardial infarction who have a low risk of CAD events. A thorough medical history and a careful physical examination of the thyroid are important for patients that could possibly have ACS. Additionally, performing thyroid function tests before a coronary angiography procedure, when possible, may be prudent. Restoration of normal thyroid function in patients presenting with ACS and underlying thyrotoxicosis usually results in resolution of cardiac dysfunction and symptoms.

### A281: SEVERITÀ DI ATEROSCLEROSI CORONARICA E RISCHIO DI INSORGENZA DI DIABETE MELLITO

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**Background.** Il danno d'organo cardiovascolare predice l'insorgenza di diabete mellito (DM) nei pazienti ipertesi. Ad oggi non è noto se un'aumentata incidenza di DM possa essere legata alla severità di malattia aterosclerotica coronarica..

**Obiettivi.** Abbiamo valutato l'insorgenza di DM in relazione all'estensione e alla severità di aterosclerosi coronarica, utilizzando il SYNTAX score (SS), in pazienti con angina stabile o sindrome coronarica acuta e sottoposti ad angiografia coronarica.

**Metodi.** Sono stati inclusi nello studio pazienti non diabetici e sottoposti ad angiografia coronarica per la prima volta e in questi è stato calcolato il SS. Sono stati inoltre analizzati i predittori di insorgenza di diabete nei pazienti con SS basso, medio e alto.

**Risultati.** Cinquecentosettanta pazienti sono stati inclusi e il SS medio è stato di 6.3±7.6. Durante un follow-up mediano di 79 mesi (IQR: 67–94), 74 pazienti (13%) hanno sviluppato DM. Il rischio di insorgenza di DM era significativamente più alto nei pazienti con SS medio o alto (HR [95% C.I.]: 16 [4-61], p<0.0001; e 30 [9-105], p<0.0001, vs. basso SS, rispettivamente), anche dopo aggiustamento per obesità, storia di ipertensione, alterata glicemia a digiuno e terapia cardiovascolare.

**Conclusioni.** La severità e l'estensione di malattia aterosclerotica coronarica, valutata mediante SS, è un forte predittore indipendente di insorgenza di DM in pazienti sottoposti ad angiografia coronarica.

## IMAGING – 1
## Sessione Orale

### A282: CMR-DERIVED CARDIAC MECHANICS IN PIGS - STRAIN AND CARDIAC WORK UNDER VARIOUS INOTROPIC STATES

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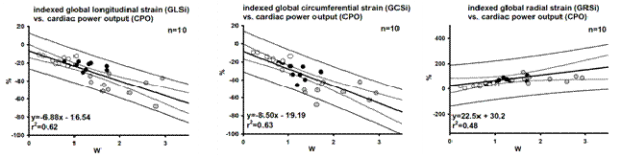
**Background.** CMR strain imaging has emerged as a new technique to better quantify global and regional myocardial function in various patient populations. However, to what extent LV systolic strain reflects conventional hemodynamic parameters is still not completely clear. Aim of this study was therefore to investigate the correlation of CMR systolic LV strain parameters with cardiac index and with an estimate of LV stroke work (cardiac power output, CPO) in a porcine model of LV hyper- and hypocontractility.

**Methods.** Ten anaesthetized, healthy Landrace pigs were acutely instrumented closed-chest and transported to the MRI facility for measurements. After baseline measurements (BL), two steps were performed: I) dobutamine-induced hypercontractility (Dob) and II) verapamil-induced hypocontractility (Ver). At each protocol, MRI images were acquired at short axis (SAX), 2Ch, 3Ch and 4Ch views. The software MEDIS was utilized to analyze the global longitudinal (GLS), the circumferential (GCS) and the radial strain (GRS).

**Results.** Baseline heart rate (106±1 $min^{-1}$) and cardiac output (6.2±1 l/min) substantially increased during Dob (146±1 $min^{-1}$ and 9.2±2 l/min respectively), while decreased during Ver (98±2 $min^{-1}$ and 4.1±1 l/min). Linear regression analysis showed a moderate correlation between GLS, GCS and CPO, and a poor one between GRS and CPO ($p<0.05$, $r^2$=58%, 52%, 28%, respectively). However, indexing LV strain parameters for mean aortic pressure (mAOP) improved the correlation with CPO for all the strain parameters ($p<0.05$, $r^2$=62%, 63%, 48%, respectively).

**Conclusion.** CMR LV systolic strain parameters correlate accordingly with LV stroke work in a porcine model of hyper-and hypo-contractility. Indexing strain for pressure substantially improved the correlation. Strain imaging may help better characterize LV function.




### A283: STRAIN ATRIALE COME MARKER PROGNOSTICO PREOPERATORIO NEI PAZIENTI CON INSUFFICIENZA MITRALICA SEVERA

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**Background e obiettivi.** Nei pazienti con insufficienza mitralica (IM) severa, la chirurgia resta l'unica opzione terapeutica valida per migliorare la sopravvivenza e la qualità di vita. Attualmente i criteri per la selezione dei pazienti da destinare a chirurgia mitralica restano dibattuti. L'obiettivo di questo studio prospettico è stato valutare il ruolo prognostico, post-chirurgia mitralica, dell'ecocardiografia Speckle Tracking, e la sua associazione con il grado di fibrosi atriale.

**Metodi.** Sono stati arruolati 71 pazienti sottoposti a valutazione ecocardiografica preoperatoria per IM severa. Pazienti con altre valvulopatie di grado maggiore di moderato, storia di cardiopatia ischemica, scompenso cardiaco, cardiopatia ipertrofica, blocco di branca sinistro, impianto di pacemaker o trapianto cardiaco, o scarsa finestra acustica, sono stati esclusi. L'endpoint primario era costituito dall'evento scompenso cardiaco e/o mortalità cardiovascolare e per tutte le cause; come endpoint secondario abbiamo considerato la stima della capacità funzionale, mediante classe NYHA o score di Borg CR10, nel follow-up a lungo termine. La fibrosi atriale è stata saggiata su pezzi bioptici atriali intraoperatori.

**Risultati.** I 62 pazienti eleggibili sono stati divisi in 2 gruppi in base allo sviluppo (32 pazienti) o meno (30 pazienti) di eventi cardiovascolari, con follow-up medio di 3.3±2.5 anni e 7.6±1 anni rispettivamente. Nel gruppo con eventi sono stati riscontrati: ridotta funzione longitudinale ventricolare sinistra e strain atriale longitudinale globale (global PALS; peak atrial longitudinal strain); aumento di area e volume atriale e di E/e' ($p<0.0001$). Tramite l'analisi di Kaplan Meier, il global PALS mostrava una buona stratificazione del rischio (sopravvivenza libera da eventi a 5 anni: 90±5% se PALS≥21% vs 30±9% e PALS<21%, $p<0.0001$). Il global PALS si è rivelato un predittore indipendente ed incrementale di outcome in 4 modelli di Cox aggiustati per altri indici prognostici. L'analisi della varianza ha stimato un'importante associazione tra il global PALS e l'endpoint secondario (per classe NYHA: r2=0.11, p=0.04; per lo score di Borg CR10 r2 = 0.10, p=0.02). Inoltre, è stata trovata una forte correlazione inversa tra il decremento del PALS e il grado di fibrosi atriale (r2 0.80, con percentuale di fibrosi: 76.6±20.7% se PALS<21% vs 31.9±20.8% se PALS≥21%; $p<0.0001$).

**Conclusioni.** il global PALS è emerso come affidabile predittore dell'outcome clinico e della capacità funzionale in pazienti con IM severa nonché come marker di fibrosi atriale. Potrebbe pertanto rappresentare uno strumento potenzialmente utile per ottimizzare il timing chirurgico prima dello sviluppo di una disfunzione miocardica irreversibile.

### A284: ADDITIVE VALUE OF GLOBAL LONGITUDINAL STRAIN MEASUREMENT IN PATIENTS WITH KNOWN OR SUSPECTED ISCHAEMIC HEART DISEASE UNDERGOING STRESS ECHO

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**Background.** Speckle-tracking echocardiography (STE) can be applied in a large variety of clinical conditions. Global longitudinal strain (GLS) shows high diagnostic accuracy for the detection of myocardial ischemia as it reflects changes in subendocardial fibers deformation that are more exposed to ischemic damage, even before alterations in segmental kinetics are revealed.

**Purpose.** Aim of our study was to assess whether the measurement of global longitudinal strain during stress-echo can provide additional information compared to the assessment of conventional parameters such as left ventricular ejection fraction (LVEF) and wall motion abnormalities. We also evaluated the added value of strain in patients with complete (CRP) and incomplete revascularization(IRP).

**Methods.** We enrolled 69 patients, 39 with known (IHD) and 30 with suspected ischaemic heart disease (SIHD) with indication to perform a stress echocardiogram. Inclusion criteria were: known or suspected CAD, age <85 and >18, adeguate acoustic window. Cardiological evaluation and stress echo were performed in all patients. Primary end point was evaluating whether in patients with negative stress test the presence of reduced GLS identifies patients with an adverse prognosis at follow up and to assess if in IRP and negative stress test there is evidence of left subclinical ventricular dysfunction identifiable by GLS analysis compared to CRP.

**Results.** LVEF was significantly reduced in IHD patients compared to SIHD patients (54±7vs 60±4 at rest; 55±8vs62±3 at peak; $p<0.0001$). We also observed a significant reduction of GLS in IHD patients compared to SIHD patients (-16.7±4,3vs-19±2.2 - p=0.07 at rest, -18±4.6vs22±3.4- p=0.004 at peak). In CRP patients GLS did not change significantly with a tendency to improve (-17.6±4 at rest vs -19±4.5 at peak - p=0.4). Instead in IRP patients, significant reduction of GLS was observed at peak (17.5±0.7 at rest vs 14.2±0.3 at peak, p value 0,03). LVEF did not significantly differ in CRP (54 ± 5 at baseline vs 55 ± 7 at peak, p = 0.5) and IRP (52 ± 9 at baseline vs. 52 ± 9 at peak, p = 0.9).

**Conclusions.** Our study shows that strain analysis during stress echocardiography can provide additional information in identifying a subclinical reduction of myocardial function at baseline and a reduction in contractile reserve under stress, secondary to coronary flow reduction. Being GLS a powerful prognostic marker probably patients with negative stress test and incomplete revascularization, reduced baseline GLS and reduction of GLS at peak exercise represent a population athigher risk of coronary artery disease progression and development of left ventricular dysfunction who need a closer follow up. To verify our hypothesis we plan to increase our sample size and to prospectively follow up our patients.

### A285: STRAIN AS EARLY MARKER TO DETECT RV FUNCTION AFTER MITRACLIP IMPLANTATION

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**Objective.** Recently the functional evaluation of the right ventricle (RV) gained significant interest in cardiac imaging playing an extremely important role for prognostic stratification of patient with structural heart disease. Accordingly, RV analysis is crucial to accurately stratify the high-risk patients with significant MR.

**Materials an methods.** From February 2015 to July 2017, clinical and

echocardiographic data of 35 patients with mitral regurgitation who underwent Mitraclip implantation in our division were evaluated for LV and RV function by strain analysis. RV_GLS (global longitudinal strain, including interventricular septum) and RV_FWLS (free wall longitudinal strain) at baseline, at 1 month, at 6 months and 1 year of follow up were assessed. The variation of continuous variables was evaluated using a student T test for paired data or the Wilcoxon matched-pair signed rank test when appropriate. The categorical variables between two groups were evaluated using the chi-square test (¬χ2). P values <0.05 were considered significant.
**Results.** The etiology of the mitral regurgitation was primary in 36,4% and secondary in 63,4% of the included patients. The MR degree was 3+ in 21,2 % of patients and 4+ in 78,8%. After Mitraclip implantation the MR degree before discharge was ≤ 2+ in 97 % of patients and at 1 year 75 %. When compared to baseline at 6 months a statistically significant improvement was observed for both RV_FWLS (*p* 0.005) and RV_GLS (*p* 0.017). When compared at 1 year the RV deformation improvement, reached at 6 month, was observed for RV_FWLS (*p* 0.05). We did not find significant differences in tricuspid annulus plane systolic excursion (TAPSE). Finally, the GLS of the LV was assessed, and no statistically significant variations were observed.
**Conclusions.** Transcatheter mitral valve repair by MitraClip implantation improves the RV systolic function. These data generate the hypothesis that the longitudinal strain, compared to conventional echocardiographic parameters, represents the most sensitive index to detect improvement of RV systolic function in Mitraclip implanted patients.

### A286: VALUTAZIONE ECOCARDIOGRAFICA DELL'AORTA NELLE MALATTIE DA ACCUMULO LISOSOMIALE IN MODELLI MURINI KNOCK OUT.DIVERSI MODELLI DI AORTOPATIE NELLE MALATTIA DI POMPE, FABRY E MUCOPOLISACCARIDOSI

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**Introduzione.** Le patologie da accumulo lisosomiale (LSD) sono un gruppo di malattie rare causate da mutazioni genetiche determinanti l'inattività di enzimi specifici. Lo scopo dello studio è stato quello di analizzare le dimensioni dell'aorta in modelli murini knock-out di 3 diverse tipologie di LSD: Malattia di Pompe (PD); Malattia di Anderson Fabry (FD); Mucopolisaccaridosi (MPS).
**Materiali e metodi.** Lo studio è stato approvato dal nostro Comitato etico istituzionale. Sono stati esaminati ecocardiograficamente (VisualSonics Vevo 2100 unit, Fujifilm) e dal punto di vista clinico trenta topi a 12 mesi: 15 topi maschi knock-out (KO) per diversi LSD (5 GLA -/-, 5 NAGLU -/-, 5 GAA -/-) e 15 topi wild-type (WT). I risultati sono stati analizzati statisticamente.
**Risultati.** Le misurazioni ecografiche effettuate sui topi KO sono state confrontante con quelle effettuate sui topi WT. In particolare, rispetto a questi ultimi: (a) i topi GAA-/- dimostravano un maggior diametro dell'aorta ascendente (1.61mm vs. 1.11mm, p 0.01) e dell'aorta discendente (1.17mm vs 1.02mm, p 0.04), mentre non presentavano differenze statisticamente significative a livello dei restanti segmenti aortici esplorati; (b) i topi GLA -/- dimostravano un maggior diametro a livello dell'anulus (1.35mm vs. 1.22mm, p 0.01), dei seni di Valsalva (1.6mm vs. 1.38mm, p<0.01), dell'aorta ascendente (1.57mm vs. 1.34mm, p<0.01), dell'arco aortico (1.36mm vs. 1.22mm, p 0.03) e dell'aorta discendente (1.29mm vs. 1.11mm, p<0.01), mentre non presentavano differenze statisticamente significative a livello della giunzione seno-tubulare; (c) i topi IDU -/- dimostravano un maggior diametro a livello dei seni di Valsalva (1.46mm vs. 1.31mm, p 0.05), dell'aorta ascendente (1.42mm vs. 1.29mm, p<0.01), dell'arco aortico (1.34mm vs. 1.28mm, p<0.01) e dell'aorta discendente (1.18mm vs. 1.1mm, p 0.01), mentre non presentavano differenze statisticamente significative a livello dell'anulus aortico e della giunzione seno-tubulare. Confrontando i diametri analizzati nei diversi topi KO, è possibile osservare che i topi GAA-/- mostravano valori maggiori rispetto ai topi GLA -/- e IDU -/- a livello dei seni di Valsalva (1.88mm, 1.6mm e 1.46mm rispettivamente, p<0.01), della giunzione seno-tubulare (1.49mm, 1.26mm e 1.16mm, p<0.01) e dell'aorta ascendente (1.61mm, 1.57mm e 1,42mm, p 0.04); i topi GLA -/- mostravano valori maggiori rispetto ai topi GAA -/- e IDU -/- a livello dell'aorta discendente (1.29mm, 1.17mm e 1.18mm rispettivamente, p 0.03); nessuna differenza è stata osservata a livello dell'anulus aortico e dell'aorco aortico.
**Conclusioni.** Nei modelli murini LSD è stata evidenziata una significativa compromissione dei diversi segmenti dell'aorta indagati, non presente nei topi WT.

### A287: NON-INVASIVE MYOCARDIAL WORK IS REDUCED DURING TRANSIENT ACUTE CORONARY OCCLUSION AND PREDICTS SIGNIFICANT CORONARY ARTERY DISEASE

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**Background.** Despite critical coronary artery stenosis (CCS) may cause persistent impaired longitudinal function at rest (2D-STE), its detection remains challenging. Strain parameters are load dependent, hence they might not reflect systolic function accurately. A novel non-invasive method to calculate Myocardial Work (MW) recently showed a strong correlation with invasive work measurements. Our aim was to investigate the ability of non-invasive MW indices: to identify the ischaemic risk area during acute coronary occlusion (ACO); to predict the ischaemic risk area underlying a CCS.
**Methods.** The study population comprises 80 individuals: 50 pts referred for coronary angiography and 30 controls (CTRL). Echocardiography recordings (GE-Healthcare) were obtained before coronary angiography, during ACO and after revascularization to measure longitudinal strain, Myocardial Work Index (MWI), Myocardial Constructive Work (MCW), Myocardial Wasted work (MWW), Myocardial work efficiency (MWE).
**Results.** Compared to baseline, we found a significant reduction of global longitudinal strain (GLS) (p=0.005), MWI, MCW and MWE (p<0.001) during ACO. After the procedure, we observed a significant improvement in GLS, MWI, MCW and MWE (p<0.001) compared to the findings obtained during CO. Baseline global MWI, MCW and MWE were significantly reduced in pts with CCS compared to controls (p<0.05). Regional MWE within the myocardial segments underlying the CCS, but not LS, was significantly reduced compared to non-target segments (p<0.001).
**Conclusions.** Our results demonstrate that non-invasive estimation of MW parameters are able to identify myocardial ischemia upon ACO. Moreover, MW work indices are able to predict the presence of CCS before invasive angiography.

## IMAGING – 2
## Sessione Orale

### A288: COMPARISON OF NEW MYOCARDIAL WORK INDEXES AND OTHERS LEFT VENTRICLE SISTOLIC FUNCTION PARAMETERS IN ISCHEMIC PATIENTS.

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**Introduction.** The aim of this study is the early identification of systolic ventricular function using advanced echocardiographic analysis of the Myocardial Work (MW) in a population of ischemic patients compared to a control group (Ctrl).
**Methods.** 154 patients were enrolled: 47 with acute myocardial infarction (AMI group: mean age 58 ± 13yrs; 4 NSTEMI and 43 STEMI), 52 with chronic ischemic cardiomiopathy (ICM group; mean age 62 ± 11yrs; 20 previous NSTEMI and 32 previous STEMI) and 54 healthy subjects (Ctrl; mean age 37 ± 13.5). Patients with suboptimal echocardiographic images, cardiac arrhythmias, more than mild valve disease and QRS duration> 130 msec were excluded. All underwent TTE and blood pressure (BP) measurement at the time of the examination. Standard 2D and speckle tracking (STE) TTE were performed at admission for patients with ACS and during standard follow-up, at least after one month after acute MI, for patients with chronic ICM. Pressure-strain loops (PSL) analysis allowed the calculation of the following indices: Global Work Index (GWI), Global Constructive Work (GCW), Global Work Waste (GWW) and Global Work Efficiency (GWE). Global longitudinal strain (GLS) was calculated using STE.
**Results.** All left ventricular function indices, including GLS and the parameters of MW (GWI, GWE, GCW and GWW) were worst in ischemic patients (GWI 1586 ± 545 mmHg/%; GWE 90,1 ± 8,6%; GCW 1773 ± 611 mmHg/%; GWW 118 ± 76 mmHg/%; P<0,001) compared to controls (2192,2 ± 365 mmHg/%; 97,4 ± 0,8%; 2433 ± 372 mmHg/%; 51,8 ± 20

mmHg/% P<0,001). These values were worst also in patients with AMI (1334 ± 533 mmHg/%; 86,8 ± 10,4%; 1509 ± 612 mmHg/%; 135,6 ± 87,8 mmHg/% P<0,001) compared to patients with chronic ICM (1815 ± 452 mmHg/%; 93,1 ± 5,2%; 2012 ± 508 mmHg/%; 102,6 ± 60,9 mmHg/% P<0,001) and in patients with STEMI (1858 ± 490 mmHg/%; 93,7 ± 3,6%; 2083 ± 535 mmHg/%; 91,2 ± 45,6 mmHg/% P<0,01) compared to those with NSTEMI (1495 ± 539 mmHg/%; 88,8 ± 9,5%; 1671 ± 607 mmHg/%; 127 ± 82,2 mmHg/% P<0,01). In the sub-analysis of the study, in the ischemic patients with preserved ejection fraction ("pEF"; EF>50%) we obtained that the traditional LV function indices such as FE, GLS and volumes did not differ significantly, while GWI, GWE and GWW were significantly worse in the group with AMI-pEF (1711 ± 477 mmHg/%; 90.8 ± 8,2%; 84.6 ± 17.6 mmHg/%) compared to patients with chronic ICM-pEF (1971 ± 347 mmHg/% P <0.05; 94.8 ± 3.2 % P = 0.001; 61.3 ± 9.8 mmHg/% P <0.01); in addition, GWW was worse in the STEMI-pEF group (121.4 ± 79.9 mmHg/%; P<0,05) compared to NSTEMI-pEF (80.8 ± 44.6 mmHg/%; P <0.05).

**Conclusions.** The new MW indices compared to more traditional parameters of systolic function, including GLS, are more sensitive to early identify cardiac alterations. Moreover, they are effective even in the group of patients with preserved FE. Clinical follow-up studies are needed to validate these interesting results.

### A289: ADDITIONAL ROLE OF CT-DERIVED FRACTIONAL FLOW RESERVE AND STRESS COMPUTED TOMOGRAPHY PERFUSION IN THE MANAGEMENT OF PATIENTS WITH STABLE CHEST PAIN COMPARED TO CORONARY COMPUTED TOMOGRAPHY ANGIOGRAPHY ALONE

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**Background.** Computed tomography-derived fractional flow reserve ($FFR_{CT}$) and stress computed tomography perfusion (stress-CTP) are functional techniques that could be added to coronary computed tomography angiography (cCTA) to improve the assessment of coronary artery disease (CAD).

**Objectives.** To determine the effect of adding $FFR_{CT}$ and stress-CTP to cCTA alone for assessment of lesion severity and patient management of patients referred for chest pain.

**Methods.** 291 patients scheduled for invasive coronary angiography (ICA) were evaluated with cCTA, $FFR_{CT}$, and stress-CTP. Management plan with optimal medical therapy (OMT) or revascularization for each non-invasive technique was recorded, and then compared to what effectively applied according to the reference standard, ICA plus invasive FFR. The main endpoints were the correct allocation of patients to OMT or revascularization using cCTA, cCTA+$FFR_{CT}$ and cCTA+stress-CTP and the selection of the correct pattern of treatment for all three vessels.

**Results.** The addition of $FFR_{CT}$ and stress-CTP to cCTA alone increased the agreement in allocating patients to OMT from 25% for cCTA to 35% and 47%, respectively, while the agreement in allocating patients to revascularization increased from 44% for cCTA to 48% and 53% with the addition of $FFR_{CT}$ and Stress-CTP, respectively. cCTA showed agreement for all three vessels in 57% of patients, while $FFR_{CT}$ and stress-CTP showed agreement in 65% and 75% of patients, respectively ($FFR_{CT}$ vs cCTA p 0.033; Stress-CTP vs cCTA p < 0.001).

**Conclusions.** The addition of CT functional assessment cCTA alone has a substantial, and comparable, effect on the evaluation of the relevance of coronary artery disease and therefore on the management of patients.

### A290: EFFECT OF NITRATES ADMINISTRATION BEFORE PCI IN STEMI PATIENTS ON CMR FEATURE-TRACKING LV STRAIN AT MID TERM FOLLOW UP

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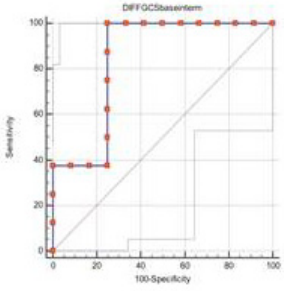
**Background.** CMR-derived myocardial strain has been reported as an useful tool to detect subclinical impairment before left ventricular (LV) systolic function deterioration. Furthermore, CMR derived strain has been increasingly used in STEMI patients to assess the efficacy of cardioprotection therapies on clinical end-points. Our aim was to retrospectively evaluate LV remodeling by CMR and the efficacy of nitrates administration before PCI on LV remodelling in STEMI patients at mid term FU.

**Methods.** One-hundred acute STEMI patients, treated by primary percutaneous coronary intervention (PCI) within 12 h after symptoms onset, undergoing CMR in the early post-infarction phase (within 8 days from symptoms onset) between January 2006 and April 2008, were enrolled. STEMI population was divided in two groups on the basis of nitrated administration before PCI.

**Results.** No significant differences were observed in demographic, clinical and angiographic findings between group treated with nitrates and group not treated with nitrates. Regarding CMR parameters, a significant reduction of LGE extent as well as an improvement of GRS, GCS and GLS between baseline CMR and CMR at 4-6 months was noted in patients who received nitrates before PCI (p<0.001). In STEMI patients who received nitrates before PCI, a receiver-operator-characteristics curve analysis identified an area under the curve of 0.844 for GCS difference between acute and intermediate CMR (95% CI, 0.684–1.00; p = 0.016) (Fig. 2), determining LV GCS ≥ -21,6% to predict LV remodelling with a sensitivity (100%) and specificity (91%).




**Conclusions.** In STEMI patients, administration of intravenous nitrates before primary PCI was associated with a greater improvement of LGE extent and of global LV strain at 4-6 months after PCI. In particular, difference of GCS between baseline and 4 months CMR seemed to predict LV remodelling at mid term FU.

### A291: EFFECTS OF CONTACT-TO-BALLOON TIME ON VARIATIONS OF THE LEFT VENTRICULAR GLOBAL AND REGIONAL FUNCTION DURING HOSPITALIZATION OF STEMI PATIENTS: AN ECHOCARDIOGRAPHIC STUDY

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**Background.** Ischemic time duration is one of the most important determinants of infarct size in patients with ST-segment elevation myocardial infarction (STEMI). An early reperfusion with percutaneous coronary intervention (PCI) therapy reduces the adverse events and mortality. It also influences the wall motion abnormalities and left ventricular ejection fraction (LVEF), which can be easily detected by a standard transthoracic echocardiogram (TTE).

**Purpose.** Aim of our study was to assess the immediate effects of an early percutaneous revascularization in STEMI patients on variations of the left ventricle (LV) global and regional function.

**Methods.** The study population consists of 141 consecutive patients with STEMI undergoing PCI from January to June 2018. The population was divided into two groups basing on first medical contact-to-balloon time (C2B), respectively ≤90 minutes and >90 minutes. Cardiac biomarkers were obtained uniformly. A standard TTE was performed in all patients, at moment of in-hospital admission and at the time of discharge, recording the LV wall motion abnormalities and LVEF, using the wall motion score index (WMSI) and modified Simpson's rule, respectively. Finally, we performed a sub-analysis in the group of patients who showed an improvement of the LVEF ≥10% at discharge.

**Results.** In both groups at baseline, patients suffered from a moderately reduced LVEF (41±8.3% in ≤90 min group vs 40.97±8.91% in >90 min group, p=ns). A WMSI >1 was recorded uniformly: 1.78±0.39 in patients with C2B ≤90 min and 1.81±0.40 in patients with C2B >90 min, without significant differences between the two groups. At the time of discharge, a significant improvement of LVEF (from 41±8% to 44±9%, p=0.013) and WMSI (from 1.78±0.39 to 1.64±0.38, p=0.036) exclusively emerged in the ≤90 min group. Furthermore, we identified 37 patients who experienced, at the time of discharge, an improvement of the LVEF ≥10% compared to baseline values. In these patients the C2B time resulted significantly shorter, when compared with patients with LVEF improvement <10%: 42 min (IQR 18.5-77.5) vs. 104 (IQR 48-176), p < 0.0001. Additionally, these patients had lower significant levels of cardiac biomarkers. A significant improvement in WMSI was also observed in the ≥10% group (1,69±0,41 vs 1,49±0,41, p= 0.039).

**Conclusions.** Our study shows the immediate effects of an early revascularization. In particular, the duration of C2B time influences the

recovery of ventricular function, in terms of ejection fraction and parietal kinetics. A standard TTE is a low cost and easily available examination, which may provide immediate results without impacting significantly on health costs.

### A292: AN UNEXPECTED DIAGNOSIS BEHIND ATYPICAL CHEST PAIN

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**Background.** Free ventricular wall rupture is one of the most serious complications following transmural infarction. Advancements in reperfusion techniques and medical therapy of myocardial infarction (MI) have reduced the incidence. Its presentation may range from sudden cardiac death to an insidious pericardial effusion, which requires cardiocirculatory support and urgent cardiac surgery. Uncommonly, the rupture is contained by adherent pericardium resulting in the formation of a false aneurysm. Differential diagnosis is crucial since pseudoaneurysms are prone to rupture, although is always a challenge with any imaging modality.
**Case presentation.** We present a case of a 62-year-old woman, smoker and with hyperlipidemia, who presented in the emergency room with chest pain. She described 6-months of intermittent chest discomfort. The EKG showed abnormal Q waves in the inferior and lateral leads, but laboratory findings demonstrated cardiac enzymes within the normal range. Transthoracic echocardiography (panel A,B) revealed a left ventricular (LV) inferolateral aneurysm and mild-to-moderate inhomogeneous pericardial effusion. Coronary angiography was performed and a thrombotic occlusion of the mean left circumflex artery was assessed. For better assessment of left ventricle anatomy and pericardial effusion definition, a contrast computed tomography (CT) was requested. CT (panel C) showed an extensive aneurysm formation in the inferior medio-basal LV wall (42x31x20mm) without clear evidence of active contrast media extravasation in the pericardial space. However, the pericardial effusion showed an intermediate density (32 HU), compatible with blood. The case was presented to the Heart Team and the patient was referred to urgent surgery with the suspicion of contained cardiac rupture. Surgery (panel D) confirmed the presence of haematic pericardial effusion along with a large aneurysmal formation in the LV inferior wall, slightly attached to the pericardium, consistent with pseudoaneurysm. The LV rupture correction was performed successfully.


**Conclusion.** Mechanical complications in acute myocardial infarction are often seen in the acute phase of non reperfused patients; however subacute presentacion, weeks or months after the acute event may be seen as well. Differential no invasive diagnosis between aneurysm and pseudoaneurysm/contained rupture is a challenge which has important clinical implications. The presence of pericardial effusion suggestive of haematic content on echocardiography is essential to establish the diagnosis. Alternative imagine techniques, as CT, able to better characterize pericardial fluid content (blood) are very useful, especially in stable patients were the differential diagnosis cannot be made with echocardiography.

### A293: THE ADDITIVE PROGNOSTIC VALUE OF END SYSTOLIC PRESSURE-VOLUME RELATION BY CMR IN PATIENT WITH KNOWN OR SUSPECTED CORONARY ARTERY DISEASE

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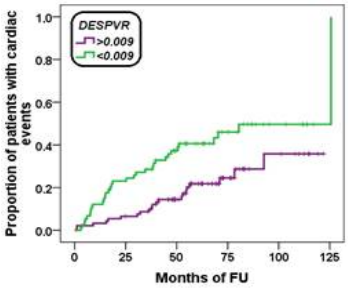
**Background.** The variation between rest and peak stress end-systolic pressure-volume relation is an afterload-independent index of left ventricular contractility. This index is easily obtained during routine stress echocardiography but can be derived also during a stress cardiovascular magnetic resonance (CMR) exam, that is the gold standard for the quantification of biventricular volumes.
**Purpose.** The aim of this study was to assess for the first time the prognostic value of delta rest-stress ESPVR (DESPVR) by dipyridamole stress-CMR in patients with known or suspected coronary artery disease (CAD).
**Methods.** One hundred and sixty-six consecutive patients (37 females, main age 61.96±10.05 years) who underwent dipyridamole stress-CMR in a high volume CMR Laboratory were considered. Abnormal wall motion and perfusion at rest and after dipyridamole were analysed. Macroscopic myocardial fibrosis was detected by the late gadolinium enhancement (LGE) technique. The ESPVR was evaluated at rest and peak stress from raw measurement of systolic arterial pressure by cuff sphygmomanometer and end-systolic volume by biplane Simpson method.
**Results.** An abnormal stress CMR was found in 39 (23.5%) patients; 24 patients had a reversible stress perfusion defect in at least one myocardial segment and 15 a reversible stress perfusion defect plus worsening of stress wall motion in comparison with rest. Myocardial fibrosis was detected in 69 patients (41.6%). A DESPVR<0.009 was detected in 74 patients (44.6%). During a median follow up of 55.51 months (IQ range 33.20 months), 54 patients (32.5%) experienced major cardiac events: 5 deaths, 2 ventricular arrhythmias, 18 coronary syndromes, and 29 heart failure hospitalization. Reversible perfusion deficit, DESPVR<0.009, diabetes and family history were significant univariate prognosticators. In the multivariate analysisthe independent predictive factors were reversible perfusion deficit (hazard ratio-HR=2.17, P=0.010), DESPVR<0.009 (HR=1.92, P=0.028) and diabetes (HR=2.42, P=0.004). The Kaplan–Meier curve for DESPVR is shown in Figure 1. The log-rank test revealed a significant difference (P=0.003).




**Conclusions.** DESPRV assessed by CMR provides a prognostic stratification in patients with known or suspected coronary artery disease, in addition to that supplied by reversible perfusion deficit and diabetes.

## INTERVENTISTICA VALVOLA AORTICA – 2
## Sessione Orale

### A294: TRANSCATHETER AORTIC VALVE IMPLANTATION IN PATIENT WITH SEVERE AORTIC STENOSIS AND PAPILLARY FIBROELASTOMA

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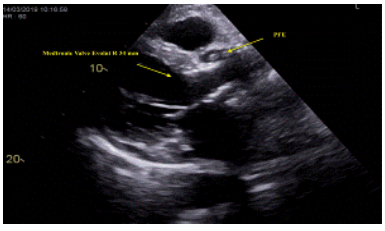
A 86-year-old male patient was admitted to our division for worsening dyspnea. Transthoracic echocardiography (TTE) revealed dilated cardiomyopathy with reduced ejection fraction, moderate mitral and aortic regurgitation and severe low-flow low-gradient aortic valve stenosis. A large mobile echodensity was noted near the aortic valve, with a stalk at the base of the right coronary cusp. Transesophageal echocardiography (TEE) confirmed a hyperechogenic mobile and pedunculate mass (6x7 mm), protruding on the aortic side, the appearance most consistent with a papillary fibroelastoma (PFE). Dobutamine stress echocardiography confirmed a severe low-flow low-gradient aortic stenosis with reduced contractile reserve. The Heart Team opted for transcatheter aortic valve implantation (TAVI), using echocardiographic support to avoid excessive manipulation of the aortic root and of the PFE. A complete atrium-ventricular block and hemodynamic instability occurred, therefore Evolut R 34 mm (Figure) was implanted without echo support, through transfemoral access. TTE after TAVI showed normal prosthetic function indices, without significant trans or para-valvular leaks. Moreover, the PFE was trapped between the new device and the aortic wall. Postoperative period was free of further complications and the patient was discharged after 7 days. PFE is one of the rarest primary cardiac tumors

(1% of all cardiac neoplasms). The diagnosis of PFE is suspected with echocardiographic assessments and should be confirmed with histological examination. It is often localized on the aortic valve, followed by mitral. PFE is usually small size (<10 mm), fragile and mobile, with a high risk of systemic embolization. Surgical excision remains the gold standard of treatment; option precluded in this case, because of the high surgical risk. Therefore, in this clinical scenario, TAVI by transfemoral access, could be an option in high risk patient with papillary fibroelastoma and severe aortic stenosis.




**A295: SUPRA-ANNULAR SELF-EXPANDING BIOPROSTHESIS IMPLANTATION IN SMALL FAILED MITROFLOW AORTIC PROSTHESIS: EVALUATION OF BNP LEVELS BEFORE THE PROCEDURE AND AFTER A MEDIUM FOLLOW UP OF TWO YEARS**

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**Background.** Early structural valve deterioration (SVD) frequently occurs in Mitroflow (Sorin) aortic bioprosthesis, especially for small sizes,19-mm and 21-mm, and it is associated with reduced overall survival. With respect to the large use of Mitroflow bioprosthesis (>100000 implantations worldwide), a growing number of patients with SVD requiring reoperation is expected. Percutaneous valve-in-valve (ViV) transcatheter aortic valve implantation (TAVI) for the treatment of failed small Mitroflow bioprosthesis is considered a very challenging procedure. This is mainly due to a significantly elevated risk of coronary ostia obstruction and high post-procedural mean gradients, especially when severe pre-existing patient-prosthesis mismatch (PPM) is present.
**Purpose.** The aim of our study was to assess the feasibility of transfemoral ViV implantation in small Mitroflow aortic valves using supra-annular self-expanding valve systems, named CoreValve and Evolut R (Medtronic) and Acurate Neo (Boston Scientific), and to report the midterm clinical results by comparing serum BNP before the procedure and at a mean follow-up (FU) of 2 years.
**Methods and Results.** Between July 2012 and March 2018, 11 consecutive patients with SVD of small Mitroflow valves considered at high/prohibitive risk for surgical reoperation underwent ViV implantation at our Institution. Mean age was 79,2 years. The Mitroflow valve size was 19-mm in 4 patients and 21-mm in 7 patients. Pre-existing severe PPM was present in 4 patients and moderate PPM in the remaining 7 patients. The etiology of degeneration was stenosis in all cases. CoreValve 26 was implanted in 2 patients, Evolut R 23 in 5 patients and Acurate neo S in 4 patients. We reported no coronary ostia obstruction events. No deaths or other major events occurred during the hospitalization. The all-cause mortality rate was 9% at the 1-year FU (1 patient died for intracranial hemorrhage). The mean gradient (mΔP) was significantly reduced from 56,0±19 mmHg at baseline to 16,6±8 mmHg (p<0,001) after the procedure and 29,6±16 mmHg (p=0,008) at a 2-year mean FU. A post-procedural mΔP ≥20 mmHg was observed in 3 patients (27%). There were no cases of moderate/severe stenosis (post-procedural mΔP >40 mmHg). Pre-procedural BNP ratio (the ratio between measured serum BNP/NT-pro-BNP level and maximal normal level) was 14,6±12 with all but one of the patients with a BNP ratio >3. The BNP ratio measured after a 2-year mean FU in 7 patients was significantly lowered to 1,5±1,08 (p=0,01) with only one patient with a BNP ratio >3. For the sub-group of patients with a higher mΔP (≥20 mmHg) we did not observe any difference in terms of mortality and reduction of serum BNP levels.
**Conclusions.** We report our experience with a small but very specific cohort of patients with degenerated stenotic small (19-mm and 21-mm) Mitroflow bioprosthesis and pre-existing PPM treated by ViV-TAVI. Although this procedure is considered at a particularly elevated risk of complications, the implantation of supra-annular self-expanding valves (in our study CoreValve/Evolut R and the less investigated Acurate Neo) appears to be technically feasible and reasonably safe. It also showed to provide good midterm clinical results with a significant reduction in serum BNP levels. Even though a post-procedural mΔP ≥ 20 mmHg is considered indicative of suboptimal aortic valve hemodynamics (according to VARC-2 criteria), its correlation with worse outcomes remains unclear and deserves further investigations.

**A296: IMPIANTO TRANS-CATETERE PERCUTANEO DI PROTESI VALVOLARE AORTICA PER VIA TRANS-SUCCLAVIA IN PAZIENTE CON INSUFFICIENZA AORTICA SEVERA E PREGRESSA SOSTITUZIONE CHIRURGICA DELL'AORTA ASCENDENTE CON RESIDUA DISSEZIONE AORTICA DI TIPO B**

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Donna di 70 anni, affetta da ipertensione arteriosa in terapia medica. In anamnesi sostituzione dell'aorta ascendente per dissezione aortica estesa fino all'aorta addominale soprarenale mediante protesi Intervascular n°34 nel 2007 ed in seguito sottoposta a follow-up TC periodico. All'ultimo controllo, mediante Angio-TC nel giugno 2017 non si riscontravano significative modificazioni della nota dissezione aortica rispetto al precedente controllo; sovrapponibili il calibro dell'aorta toracica, l'andamento del lembo di dissezione intimale, caudalmente estesa ad un piano situato 9 cm cranialmente al carrefour aorto-bisiliaco, e la morfologia del vero e del falso lume. Invariata anche l'estensione craniale del lembo di dissezione all'arteria anonima.
Riscontro ecocardiografico nel Luglio 2018 di insufficienza aortica moderato-severa con dilatazione della radice aortica (42 mm) e compromissione della funzione sistolica ventricolare sinistra globale (EF 44%). Nel Gennaio 2019 ricovero per scompenso cardiaco acuto; sottoposta ad Angio-TC dell'aorta toraco-addominale che evidenziava gli esiti di correzione chirurgica di dissezione aortica di tipo A con sostituzione protesica dell'aorta ascendente e dissezione B residua a partire dall'anastomosi distale della protesi. Per la presenza di severa insufficienza aortica, la paziente veniva discussa in Heart-Team dipartimentale e veniva posta indicazione ad impianto percutaneo di protesi valvolare aortica.
Dopo valutazione delle immagini TC, in considerazione della residua dissezione aortica di tipo B, veniva escluso l'approccio percutaneo trans-femorale e si optava per approccio chirurgico trans-succlavio sinistro, con posizionamento efficace di protesi valvolare aortica (Corevalve Evolut R n. 34, Medtronic), all'interno della protesi vascolare dell'aorta ascendente; al termine della procedura minimo leak paravalvolare residuo.

**A297: EARLY INFECTIONS AFTER TAVR: PREDICTORS AND PROGNOSTIC VALUE**

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**Aims.** Transcatheter aortic valve replacement (TAVR), as compared to surgery, leads to similar or better clinical outcomes, mainly due to less invasiveness. Lower post-procedural infection rate has also been reported as a benefit of TAVR. We reviewed frequency, microbiological pattern, predictors and outcome of infections following TAVR, describing the impact of multidrug-resistant (MDR) and extensively drug-resistant (XDR) germs on mortality.
**Methods and results.** The study cohort comprised 462 patients who underwent successful TAVR between January 2014 and April 2019, and had at least one microbiological isolate. MDR was defined as acquired non-susceptibility to at least one agent in 3 or more antimicrobial categories. XDR was defined as non-susceptibility to at least one agent in all but 2 or fewer categories. Mean age was 82.7±7.7 years, 196 (42.4%) patients were men. At admission, 436 (47.6%) were in NYHA class I-II, the remaining in NYHA III-IV. TAVR was transfemoral in 440 (95.2%), with 19 (4.1%) valve-in-valve replacements. Self-expandable valves were deployed in 191 (41.3%) patients. Mean procedural time was 116.3±45.9 min. Mean follow-up was 17.1±13.5 months. Six-month and 1-year mortality rates were 1.9% and 3.5%, respectively. We observed 46 (9.9%) infections within 30 days from the procedure, 42 (9.1%) in-hospital. Time-to-infection was 7.2±6.9 days. There were 10 primary bloodstream, 8 urinary tract (1 with sepsis), and 22 pulmonary infections (1 with sepsis). Isolated bacteria were Gram+ in 12/29 (41.4%) (4 S. aureus, 1 S. hominis, 1 S. capitis, 1 S. haemolyticus, 2 S. epidermidis, 1 S. agalactiae, 2 E. faecalis), and Gram- in 17/29 (58.6%) (4 P. aeruginosa, 1 E. cloacae, 1 K. pneumoniae, 2 H. influenzae, 4 E. coli, 1 K. oxytoca, 1 P. mirabilis, 2

S. marcescens, 1 S. maltophilia); five patients had multiple isolates. Four (16.7%) MDR and no XDR germs were isolated. Twenty-two (4.8%) patients had signs and symptoms of infection in the absence of isolates. At multivariate analysis, significant predictors of developing an infection within 30 days were post-TAVR acute kidney injury (OR: 3.06, 95%CI: 1.32-7.07), VARC-2 vascular complications (OR: 2.95, 95%CI: 1.09-7.96), COPD (OR: 2.54, 95%CI: 1.01-6.35), and procedural time (OR: 1.01 per minute, 95%CI: 1.01-1.02), p<0.04 for all). Thirty-day infections were more prevalent in patients who died within 6 months (10.9% vs. 1.0%) and 1 year (13.0% vs. 2.4%, all p<0.001). After accounting for other significant predictors of 6-month (neurological disorders, AKI) and 1-year mortality (COPD), 30-day infections remained independently associated with 6-month (OR: 7.36, 95%CI: 1.69-31.97, p=0.008) and 1-year mortality (OR: 4.34, 95%CI: 1.32-14.28, p=0.016). Of note, the association between 30-day infections and mortality was not greater in MDR/XDR (p for interaction=0.54).
**Conclusions.** Thirty-day infections occurred in 1/10$^{th}$ of our TAVR cohort, particularly in those with more comorbidities, significantly affecting short-term mortality regardless of antimicrobial susceptibility. Careful microbiological surveillance and appropriate antibiotic treatment are essential to further improve the results of TAVR.

### A298: CHIUSURA DI LEAK PARAPROTESICO AORTICO IN PAZIENTE PORTATORE DI DOPPIA PROTESI MECCANICA VALVOLARE. IL RUOLO AGGIUNTO DELL'IVUS

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**Background.** I leak paraprotesici conseguenti ad impianto di protesi o anelli valvolari in sede aortica o mitralica talora possono portare a conseguenze emodinamiche e cliniche importanti, come l'insufficienza valvolare grave, lo scompenso cardiaco e l'emolisi e rappresentano una complicanza relativamente comune (5–10% in caso di sostituzione chirurgica e 40–70% in caso di impianto transcatetere). L'approccio tradizionale è il reintervento chirurgico, tuttavia nei pazienti sintomatici ad elevato rischio, una valida alternativa è rappresentata dalla chiusura percutanea, guidata dalle immagini ottenute mediante ecocardiografia transtoracica e transesofagea prima e durante la procedura di chiusura.
**Case report.** Uomo di 66 aa iperteso con FAP in TAO, talassemia minor ed OSAS, storia di RAA in giovane età. Nel 1971 intervento di sostituzione valvolare aortica con protesi meccanica per cardiopatia valvolare reumatica. Nel 2013, per distacco emolizzante della protesi aortica, redo per sostituzione valvolare aortica con protesi meccanica e aortoplastica riduttiva dell'aorta ascendente; in tale occasione per riscontro di insufficienza mitralica e tricuspidalica di grado severo, veniva sottoposto contestualmente a sostituzione della valvola mitralica con protesi meccanica ed impianto di anello tricuspidalico. Da febbraio 2019 comparsa di dispnea da sforzo ingravescente (NYHA IIIb), nonostante adeguamento della terapia medica, per cui eseguiva ecocardiogramma documentante lieve dilatazione del Vsn, distacco della protesi aortica in sede posteriore condizionante insufficienza paraprotesica moderata (Gmed 13 mmHg). Protesi mitralica normofunzionante (Gmed 6mmHg). FE 50%. Gli esami ematochimici evidenziavano la presenta di anemia emolitica. Dopo valutazione con TEE e successiva discussione in Heart Team, si poneva indicazione a chiusura del leak paravalvolare per via percutanea. La procedura è stata eseguita in sedazione profonda attraverso accesso femorale destro 7Fr, con approccio retrogrado. All'aortografia conferma di insufficienza valvolare aortica di grado severo. Mediante catetere guida (GC) MultiPurpose 7Fr e guida coronarica polimerica 0.014", si sondava il leak e si procedeva a misura endovascolare dell'orifizio mediante analisi IVUS, documentante una forma a D della parte centrale con diametro massimo, nella zona più stretta del tramite, di 6 mm. Sondato il leak con guida idrofilica 0.035'', si avanzava il GC in VSn. Si posizionava, senza rilasciarlo, Plug Vascolare di 8 mm, lasciando la guida 0.014" di protezione attreverso il leak. Al controllo angiografico ed ecocardiografico residuava rigurgito moderato-severo con modesta riduzione delle dimensioni del leak ed accelerazione della velocità di flusso. Si decideva, pertanto, di posizionare un secondo Plug di 6 mm. Esternalizzato il delivery del primo plug attraverso l'introduttore, si sondava il leak con guida stiff J preformata 0.035" e si attraversava efficacemente con GC JR 5Fr. Dopo aver rimosso entrambe le guide, si posizionava con successo il secondo Plug Vascolare di 6 mm, attiguo al precedente. Dopo aver verificato la corretta posizione dei due plug nel leak, l'assenza di interazione col movimento degli emidischi della protesi aortica, l'assenza di interferenza con la protesi mitralica, la stabilità dei due dispositivi, la parziale riduzione dell'entità del rigurgito aortico che, al TEE, rimaneva comunque significativo, si rilisciavano contemporaneamente i due plug. Emostasi efficace con sistema di chiusura. Il paziente veniva dimesso dopo 5 giorni di degenza, asintomatico ed in buon compenso emodinamico.
**Conclusioni.** L'uso dell'IVUS in procedure complesse come i casi di correzione di leak paraprotesici in cui le immagini fornite dal TEE possono essere inficiate dalla presenza di artefatti legati alla protesi meccanica, può rivelarsi la scelta più idonea nella definizione sia del rigurgito sia nella selezione del device o dei device più adatti.

### A299: PROTOCOLLO INTERAZIENDALE PER L'ESECUZIONE DELLE PROCEDURE DI TAVI IN UN CENTRO SPOVVISTO DI CARDIOCHIRURGIA: RISULTATI DOPO IL PRIMO ANNO DI ATTIVITÀ

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**Premessa.** Nell'ottica di fornire ai pazienti con stenosi aortica severa a rischio chirurgico elevato intermedio il miglior trattamento mediante procedura di TAVI, da poco più di 1 anno è attivo un protocollo di convenzione interaziendale tra la Cardiologia UTIC ed Emodinamica dell'AORN A. Cardarelli, centro sprovvisto di cardiochirurgia, ed il Laboratorio di Emodinamica dell'UOS di Angiologia del DAI Emergenze Cardiovascolari, Medicina Clinica e dell'Invecchiamento dell'AOU Federico II. Tale convenzione prevede l'effettuazione di procedure di TAVI per i pazienti dell'AORN Cardarelli mediante trasferimento in ambulanza rianimatoria presso l'emodinamica della Federico II con successivo rientro presso la struttura di provenienza dopo l'esecuzione della procedura interventistica sotto stretta sorveglianza medico infermieristica dell'equipe dell'AORN Cardarelli.
**Risultati.** Dall'avvio della convenzione a fine aprile del 2018 ad oggi sono strati trattati con tale protocollo 30 pazienti con una età media di 81,37 (età minima 73 anni età massima 94). Tutte le procedure si sono svolte mediante accesso femorale destro o sinistro senza significative complicanze procedurali e postprocedurali significative. Nei primi 7 mesi della convenzione nell'anno 2018 sono stati trattati con TAVI 11 pazienti dell' AORN Cardarelli presso la Federico II. Il rodaggio del protocollo dopo i primi casi ha portato ad un rapido incremento del numero di procedure con già 19 pazienti trattati nei soli primi 7 mesi del 2019. I risultati di tale protocollo sono estremamente incoraggianti con totale assenza di complicanze dovute al trasporto dei pazienti per l'effettuazione della procedura ed il successivo ritorno presso l'UTIC di provenienza. Non vi sono state complicanze vascolari significative, in due soli casi è stata necessaria emotrasfusione in due pazienti già con valori di emoglobina ridotti prima dell'impianto. In 4 pazienti è stato necessario impianto di PM definitivo effettuato presso l'AORN Cardarelli per l'insorgenza di BAV completo in due pazienti e blocco trifascicolare negli altri due (due pazienti presentavano tuttavia già turbe della conduzione pre-impianto). Tutti i pazienti sono stati dimessi al domicilio con una media di ricovero di circa 6 giorni. È stato quindi iniziato un protocollo di controlli ambulatoriali presso la Cardiologia UTIC dell'AORN Cardarelli per il follow up dei pazienti. Abbiamo riscontrato un decesso per un episodio di morte improvvisa ad 11 mesi dall'impianto in una paziente di 88 anni fino a quel momento in buon compenso emodinamico e con netto miglioramento clinico. Ai controlli clinici e strumentali al follow up tutti i pazienti sono asintomatici ed in buon compenso di circolo con miglioramento clinico significativo e buon funzionamento della protesi valvolare all'ecocardiogramma.
**Conclusioni.** I risultati in questo primo anno e mezzo di esperienza evidenziano la fattibilità e la sicurezza di questa strategia atta ad estendere tale procedura anche nei centri non dotati di cardiochirurgia in considerazione della sempre maggiore estensione all'indicazione della TAVI.

## ISCHEMIA MIOCARDICA IN ASSENZA DI STENOSI CORONARICA: UN DILEMMA DIAGNOSTICO
## Sessione Orale

### A300: REVERSE TAKOTSUBO EPINEPHRINE-INDUCED AFTER ANAPHYLAXIS

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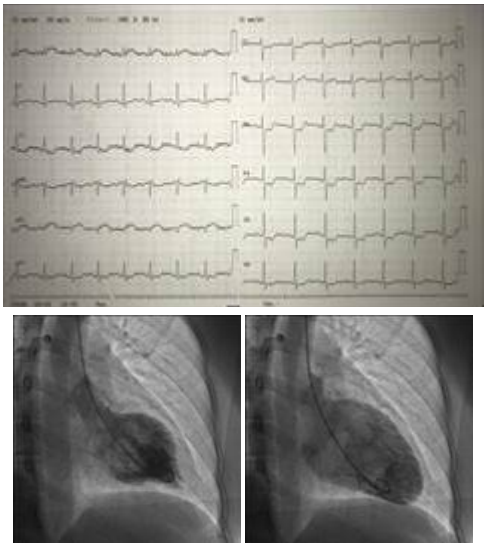
**Background.** Takotsubo cardiomyopathy (TTC) is a transient acute left ventricular (LV) systolic dysfunction mainly triggered by emotional or physical stress. Tipically it is characterized by a transient hypokinesis of the left ventricular (LV) apex. A rare form of TCC is "reverse-TCC" characterized by basal akinesis/hypokinesis associated with apical hyperkinesis. This form represents 1-23% of all TTC and it is usually rapidly reversible with a good prognosis.

**Case description.** A 30-year-old woman, smoker and with familiarity for cardiovascular deseases, had an allergic reaction after penicillin's assumption, characterized by acute oropharyngeal angioedema and rash. In Emergency Room doctors administered epinephrine 0,5 mg iv and hydrocortisone 200 mg iv to her but, after that, the patient felt chest pain and dyspnea. New electrocardiogram (EKG) abnormalities appeared (ST elevation in D1-aVL and diffuse ST segment depression) and basal akinesis/hypokinesis associated with apical hyperkinesis were found at the transtoracic echocardiogram (TTE), so the patient was admitted to Cardiology Care Unit (CCU). Main lab tests were normal, except troponin value which was 1346 ng/L (cut off < 11,6 ng/L). In the suspicion of an acute coronary syndrome (atheromasic plaque, dissection, spasm, embolism, etc) a coronary angiogram and a cardiac ventriculography were performed: the first didn't reveal evidence of obstructive coronary disease, the second showed a "chestnut morphology", tipical of a reverse Takotsubo. Therapy based on beta-blocker and ACE-inhibitor was started and it was continued patient's observation. During the hospitalization she was asymptomatic. EKG abnormalities were transient and frequent ETT showed gradual and complete recovery of the left ventricular systolic function. The troponin peak was 1847 ng/L. There weren't arrhythmias.
**Discussion.** The pathophysiology of Takotsubo cardiomyopathy has been attributed to catecholamine-induced myocardial toxicity and coronary vasospasm. In this case the fast intravenous administration of high dose of epinephrine has provoked a "reverse" Takotsubo cardiomyopathy (rTTC) characterized by basal akinesis/hypokinesis associated with apical hyperkinesis.



**Conclusions.** Anaphylaxis is a life-threating condition and it must be promptly treated with intramuscular administration of epinephrine. The intravenous administration of epinephrine should be avoided or, otherwise, administred with caution, because it may cause, in exceptional cases, iatrogenic rTTC.

### A301: PHARMACOLOGICAL THERAPY FOR MINOCA: INSIGHTS FROM A MULTICENTRE NATIONAL REGISTRY

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**Background.** Myocardial infarction and non-obstructed coronary arteries (MINOCA) represent an emerging condition among patients with acute coronary syndromes. However, the optimal therapeutic management and the prognostic predictors for these patients are still largely unclear.
**Objectives.** To assess the effect of pharmacological therapy on long-term prognosis of patients with MINOCA.
**Methods.** MINOCA was defined as acute myocardial infarction (AMI) with angiographic coronary stenosis <50%, in agreement to the Fourth Universal Definition of Myocardial Infarction. The primary endpoint (PE) was considered as a composite of the following adverse events: all cause death, acute myocardial infarction or acute coronary syndrome, heart failure leading to hospitalization and stroke.
**Results.** In our institutional multicentre registry n=637 consecutive patients were diagnosed as having MINOCA and follow-up was available for n=575 (90.3%). At a median follow-up of 95 [IQR:45.6-136.5] months the composite end-point occurred in 93 patients (16.2%). Among them death occurred in 22 patients (23.7%). Patients experiencing an event were more often males (p=0.04), aged ≥75 years (p=0.05), diabetic (p=0.007) and with a history of atrial fibrillation (p=0.01), hypertension (p=0.01), more extended coronary atherosclerosis (p=0.007), reduced ejection fraction (p=0.04) and with ST-segment elevation presentation (p<0.001). According to the Cox- regression analysis, we observed a significant association between aspirin therapy at discharge and an increased risk of PE (HR=3.22, 95% CI 1.18-8.78, p=0.02), while a significant benefit was observed with beta-blockers (HR=0.60, 95% CI 0.39-0.92, p=0.02). These results were confirmed at multivariate analysis for both ASA (HR=3.63, 95% CI 1.31-10.1, p=0.01) and beta-blockers (HR=0.48, 95% CI 0.30-0.77, p=0.003). A significant interaction was observed between the negative prognostic effect of ASA among patients with reduced ejection fraction (n=143; p for interaction =0.03) and the use of DAPT in CMR-confirmed MINOCA (n=128; p for interaction =0.04) and diabetic patients (n=89, p for interaction=0.04).
**Conclusions.** In this large multicentre registry, the use of beta-blockers significantly reduced the risk of mortality and major cardiovascular events among patients with MINOCA, whereas antiplatelet drugs, in single or dual therapy did not demonstrate any benefit, displaying even a potential harmful impact on the outcomes, especially in certain subsets of patients. Patients with MINOCA represent a heterogeneous category, where an adequate diagnostic assessment and risk stratification can condition the treatment and the outcome. Future largest studies will certainly provide a better comprehension of the pathophysiological mechanisms and a definition of the prognostic tools for optimizing the management of these patients.

### A302: CLINICAL FEATURES AND OUTCOMES OF PATIENTS WITH STABLE OR UNSTABLE CHEST PAIN AND NO-OBSTRUCTIVE CORONARY ARTERY DISEASE

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**Background and purpose.** Previous studies showed different clinical presentations of coronary microvascular dysfunction (CMD). However, very few studies previously compared the clinical features and outcome of patients with different presentation of CMD (i.e. chronic/stable vs. acute/unstable). The aim of this study was to compare clinical features and outcomes of patients with stable clinical presentation with those of patients with an acute presentation.
**Methods.** We enrolled 47 patients who underwent coronary angiography for typical angina pectoris, showing normal coronary arteries (NCA) or no-obstructive coronary arteries disease (NOCAD). Patients with a diagnosis of myocarditis, takotsubo syndrome, variant angina or other significant cardiac or systemic disease were excluded. Patients were divided in two groups: 1) patients admitted to undergo elective coronary angiography because of stable, effort-related angina symptoms; 2) patients admitted to the emergency department (ED) of our hospital with a clinical presentation of acute chest pain suggestive for a no-ST elevation acute coronary syndrome (ACS). Clinical outcome was assessed at 1 and 6 months after discharge through a diary in which patients reported angina episodes and the Seattle Angina Questionnaire (SAQ). At 1-month follow-up, patients also underwent an exercise stress test (EST).
**Results.** No significant differences were found in clinical characteristics and angiographic findings between the stable and unstable patients. 21 stable patients and 26 unstable patients underwent an intracoronary acetylcholine (Ach) test during angiography, showing induction of epicardial or microvascular spasm in 5 and 8 patients of the 2 groups, respectively (p=0.94). At 1-month follow-up, stable patients reported a higher recurrence of angina compared to unstable patients (71% vs 38%, p=0.04), confirmed by lower scores in the items frequency of symptoms (p=0.04) and treatment satisfaction (p=0.03) at SAQ evaluation. EST, however, showed similar results in the two groups. However, these differences were no longer present at 6 months after discharge. Patients with positive Ach-test reported a higher recurrence of angina compared with patients with negative Ach-test (69% vs. 46%, p=0.02) at 1-month follow-up, whereas the difference did not achieve statistical significance at 6 months (86% vs. 50%, p=0.07).
**Conclusion.** Our data showed no differences in clinical features, angiographic findings and response to Ach test in patients with angina pectoris and no-obstructive coronary artery disease with stable or unstable clinical presentation. Further studies should better clarify the impact of Ach-test on long term symptomatic outcome.

### A303: GENDER-RELATED DIFFERENCES IN CLINICAL PRESENTATION AND ANGIOGRAPHIC FINDINGS IN PATIENTS WITH ISCHAEMIA AND NO OBSTRUCTIVE CORONARY ARTERY DISEASE (INOCA): A SINGLE-CENTER OBSERVATIONAL REGISTRY

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**Background.** Ischaemia and no obstructive coronary artery disease (INOCA) is a common clinical presentation, with a variety of causes that are often not fully investigated in routine clinical practice.
**Methods.** The study population consisted of 435 patients who underwent diagnostic coronary angiography for anginal symptoms and/or evidence of myocardial ischaemia at non-invasive imaging. In all patients angiography demonstrated non-obstructive coronary artery disease (CAD, less than 30% luminal diameter stenosis or FFR>0.8 and/or iFR >0.9).
**Results.** Fifty-four percent of the patients were women. Atypical clinical presentation was more common in women (59.5%, p=0.037). Women were more likely to have normal coronary arteries than men (41.8% vs. 16.2%, p<0.001), and less likely than men to have haemodynamically non-significant CAD (32.1% vs. 55.1%, p<0.001). No significant correlation between typicality of symptoms and evidence of ischaemia was found in those patients (244/435, 56.1%) who had either dobutamine stress echocardiography or ECG stress test.
**Conclusions.** INOCA is a common clinical condition highly prevalent in women often presenting with atypical symptoms.

### A304: CORONARY SLOW FLOW IS ASSOCIATED WITH A WORSE CLINICAL OUTCOME IN PATIENTS WITH TAKOTSUBO SYNDROME

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**Background.** Patients with Takotsubo syndrome (TTS) present an acute microvascular dysfunction with vasoconstriction that leads to an impaired myocardial perfusion and in more severe forms to an impaired epicardial flow. Of importance, the prognostic value of a delayed coronary flow, the so-called coronary slow flow (CSF), in TTS patients have never been investigated.
**Methods.** We prospectively enrolled patients discharged with a diagnosis of TTS. CSF was defined as angiographically non-obstructive coronary arteries with Thrombolysis In Myocardial Infarction (TIMI) 2 flow. The incidence death from any cause and major adverse cardiovascular events (MACE), defined as the composite of TTS recurrence, cardiac rehospitalization, cerebrovascular events and death from any causes, was assessed at follow-up.
**Results.** We enrolled 101 TTS patients [mean age 71.0±11.1 years, 86 (85.1%) female]. CSF occurred in 18 (17.8%) patients. At admission, patients with CSF presented more frequently with Killip class III/IV, with moderate-to-severe left ventricle systolic dysfunction and right ventricle dysfunction compared with patients with normal coronary flow (NCF). During index admission CSF patients had a higher rate of intra-hospital complications [p=0.01]. After a median follow-up of 22.6±17.5 months, CSF patients had a significantly higher occurrence of death from any causes [9 (50%) vs. 19 (22.9%), p=0.011] and a numerically higher rate of MACE [10 (55.5%) vs. 27 (32.5%), p=0.06] compared with NCF. Of interest, the cause of death was non-cardiac in the large part of patients (89.3%). At multivariable Cox regression, CSF and a pre-existing neurologic disorder were independently associated with death from any causes.
**Conclusion.** TTS patients presenting CSF have a worse clinical presentation with a higher rate of intrahospital complications and a poor long-term clinical outcome.

### A305: BASELINE CLINICAL PREDICTORS OF MYOCARDIAL INFARCTION WITH NON-OBSTRUCTIVE CORONARY ARTERIES (MINOCA): A CHALLENGING DIAGNOSIS

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**Background.** Myocardial Infarction with Non-Obstructive Coronary Arteries (MINOCA) is a clinical scenario characterized by myocardial infarction (MI) occurring in the absence of obstructive coronary disease. This is a heterogeneous entity and clinical characteristics potentially able to address diagnosis are still poorly understood. Therefore, there are very few clinical score to predict the diagnosis of MINOCA at admission.
**Purpose.** To evaluate different clinical characteristics at admission between MINOCA and obstructive related MI (ob-MI) and propose predictors of MINOCA.
**Methods.** We included all consecutive patients with MI undergoing coronary angiogram between 2016 and 2018 at Policlinico Sant'Orsola-Malpighi. According to 2016 ESC Position Paper criteria, we considered as MINOCA all patients with acute MI and with the angiographic conventional cut-off of <50% coronary stenosis without clinically apparent alternative diagnosis such as pulmonary embolism and coronary dissection. Finally, we analyzed baseline clinical characteristics of MINOCA patients comparing these findings with those of acute ob-MI (coronary stenosis ≥50%) patients. Variables with a statistical significance lower than p<0.05 in univariable analysis were included in a logistic regression analysis to determinate independent predictors of MINOCA.
**Results.** Among 1093 MI, 112 patients fulfilled the 2016 ESC criteria for MINOCA. Overall, 62.3% were males and the mean age was 68.6 ± 13.2 years. There were no differences in terms of age between MINOCA and ob-MI. Regarding the traditional cardiovascular risk factors, MINOCA more frequently were females (63.4% vs 28.1%; p<0.001) and non-smokers (50% vs 64.2%; p=0.009) whereas patients with ob-MI had higher prevalence of diabetes (28.4% vs 13.6%; P=0.002). There were no statistically significant differences in the prevalence of hypertension, dyslipidemia and family history. At admission, patients with MINOCA less frequently had typical angina (77.5% vs 87.1%, p=0.017) but they complained palpitations more often (22.3% vs 5.1%, p<0.001). Analyzing ECG at admission, MINOCA patients had higher heart rate (96.6±30.5 vs 83.4±26.2, p=0.006) but significantly less primary ischemic ST-T alterations (45% vs 71.6%, p<0.001); indeed, patients with MINOCA were more frequently diagnosed with NSTEMI compared to ob-MI (57.1% vs 46.5%, p<0.001). Multivariate analysis showed that the independent predictors of MINOCA were female sex (HR 4.1; 95% CI 2.4-7.1; p<0.001), no history of diabetes (HR 0.3; 95% CI 0.14-0.6; p<0.001), higher heart rate at admission (HR 1.02; 95% CI 1.01-1.03; p=0.001) and absence of ECG ischemic alterations (HR 0.30; 95% CI 0.18-0.5; p<0.001).
**Conclusions.** The diagnosis of MINOCA is still an intriguing challenge. This heterogeneous group revealed a different clinical profile than ob-MI. Identifying baseline clinical predictors specific of MINOCA could address the diagnostic process and suggest the distinctive pathophysiological mechanisms underlying this complex and underrecognized condition.

## CARDIONCOLOGIA – 1
## Sessione Orale

### A306: VASCULAR AND CARDIAC TOXICITY RELATED TO CHEMOTHERAPY REGIMENS IN PATIENTS WITH GYNECOLOGICAL MALIGNANCIES

Marco Matteo Ciccone (a), Rossella Nitti (a), Annagrazia Cecere (a), Maria Consiglia Bellino (a), Aldo Agea (a), Roberta Ruggieri (a), Gabriella Ricci (a), Michele Gesualdo (a), Francesca Cortese (a), Francesco Massari (c), Micaela De Palo (b), Pietro Scicchitano (a, c)
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**Purpose.** Chemotherapy can impact cardiovascular system by promoting cardiac and vascular damages. Few data are about the cardio- and vascular toxic effect of chemotherapyin gynaecologic cancers. The aim was to assess the cardiac and endothelial toxicity as result of standard combination including carboplatin-paclitaxel regimen in female affected by gynaecological cancers as uterine corpus, cervix and ovary.
**Methods.** This was an observational, prospective, non-randomized, non-controlled study. Forty-seven consecutive patients (mean age 58±13 years) were enrolled after cancerstaging. They were groupedin: Group A(patients receivingchemotherapy, n=32), and Group B (chemotherapy-naïve patients, n=15). All of the patients underwent vascular function/morphology evaluation (common carotid intima-media thickness; flow-mediated dilation (FMD) of the brachial artery; antero-posterior diameter of the infrarenal abdominal aorta), and echocardiographic assessment.Fourteen patients underwent 6-months follow-up.
**Results.** Carboplatin+Paclitaxel+Bevacizumab impaired left ventricular ejection fraction (LVEF) (r=-0.34, p=0.017), as well as previous history of cancer (r= -0.38, p= 0.008). Group 2 showed better LVEF (r=0.42, p=0.003). Surgical intervention improved LVEF and tricuspid annular plane systolic excursion(r=0.437, p = 0.002 and r= 0.34, p= 0.019, respectively). Further, doxorubicin reduced left ventricle E/A ratio (r= -0.4, p= 0.006). Patients who underwent chemotherapy showed reduced FMD than chemotherapy-naive patients (6.47±2.99% vs 8.77±3.32%, p=0.028), which was persistent at 6-months follow-up (baseline: 7.87 ± 3.73% vs 6-months follow-up: 3.61 ± 3.79%).
**Conclusions.** A "*cardio/vascular*", preclinical toxicity can be early detected in gynaecological cancer treated with chemotherapy. Such alteration can increase the overall cardiovascular risk profile of patients.

### A307: THE ELECTROCARDIOGRAPHIC CHANGES ASSOCIATED WITH CARDIAC METASTASIS

Francesca Cortese (a), Pietro Scicchitano (b), Giacinto Calculli (d), Serena Di Marino (e), Marco Matteo Ciccone (c)
(a) OSPEDALE GIOVANNI PAOLO II, POLICORO; (b) OSPEDALE F. PERINEI, ALTAMURA; (c) POLICLINICO DI BARI; (d) OSPEDALE MADONNA DELLE GRAZIE, MATERA; (e) OSPEDALE VALLE D'ITRIA, MARTINA FRANCA

An 83-year-old woman came to our observation for intense asthenia. She had a history of cancer mammary, endocrine-responsive (HER2) for which she had been subjected to left radical mastectomy and ipsilateral axillary lymphadenectomy. Total body computerized axial tomography, performed about 2 months earlier, had shown a progression of neoplastic disease in the liver and lymph node with pulmonary micronodules. At the first medical contact, she was asthenic, arterial pressure was 100/60 mmHg and the heart rate of 99 b / min. The clinical examination showed a diffusely reduced pulmonary murmure and no other relevant clinical finding.

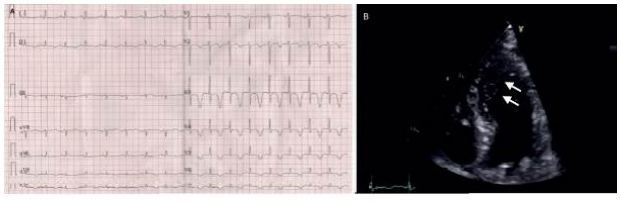
The ECG showed sinus tachycardia at the frequency of 101 b / min, low voltages of the QRS complex in the derivations

peripherals and diffuse negative T waves with giants negative T waves (amplitude of T waves ≥10 mm) in V3 (Figure 1A).

The echocardiographic evaluation showed the presence of two rounded, sessile formations, adherent to the endocardium of the middle and apical segments of the interventricular septum, with hyperechogenic margin and anechoic content, in the absence of other prominent cardiac anomalies (Figure 1B, white arrows).

Considering the clinical-anamnestic context and echocardiographic characteristics of the two elements (content predominantly anechogenic and movement synchronous with the cardiac walls in the absence of any anomaly of global and segmental contractility), these findings have been interpreted as metastatic localizations at cardiac level from breast cancer.

Unfortunately, the patient died before she could perform additional imaging tests.



### A308: METABOLOMIC FINGERPRINT OF PATIENTS WITH CHRONIC MYELOID LEUKEMIA IS ASSOCIATED WITH CARDIOVASCULAR EVENTS DURING TYROSINE KINASE INHIBITORS TREATMENT

Daniele Cocco (a), Martino Deidda (a), Christian Cadeddu Dessalvi (a), Giovanni Caocci (b), Antonio Noto (a), Claudia Fattuoni (c), Marianna Greco (b), Maria Pina Simula (b), Olga Mulas (b), Giorgio La Nasa (b), Giuseppe Mercuro (a)
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**Background.** Cardiovascular adverse events (CV-AE) represent emerging complications in chronic myeloid leukemia (CML) patients treated with second and third generation tyrosine kinase inhibitors (TKIs). Further understanding of the molecular pathways underlying CV-AE may facilitate novel strategies to prevent its initiation prior to clinical disease. In this setting, the use of a novel tool such as metabolomics could allow the identification of new metabolic pathways related to CV-AE.

**Methods.** We enrolled 39 adult CML patients (mean age 49, range 24-70), without comorbidity at baseline, consecutively diagnosed and treated with imatinib, dasatinib nilotinib and ponatinib, at the Haematology Unit of "Businco Hospital", Cagliari, Italy. All patients underwent a metabolomic analysis and were stratified in 2 groups on the basis of the presence or absence of CV-AE during follow-up. Plasma samples were collected and related spectra were analysed by means of the software AMDIS (Automated Mass Spectral Deconvolution and Identification System; http://chemdata.nist.gov/mass-spc/amdis).mData were investigated by applying the supervised multivariate statistical Orthogonal partial least square discriminant analysis (OPLS-DA).

**Results.** The mean follow-up since CML diagnosis was 3.7 years (range 0.9-5); 22 (56.4%) patients were treated frontline, while 17 (43.6%) underwent second or subsequent TKI lines of treatments. The reason for switching was inefficacy in 15.3% and intolerance in 28.2%. At CV-AE or last follow-up 16 (41%) patients were treated with imatinib, 8 (20.5%) with dasatinib, 14 (35.8%) with nilotinib and 1 patient with ponatinib. The 60-month cumulative CV-AE incidence was 54.4±9.1%. The mean time between the start of the treatment and the occurrence of a CV-AE was 44.4 months (range 19-60). Overall, 17 CV-AE were recorded, of whom 7 CV-AE were graded as 3 according to the common toxicity criteria and one patient died. OPLS-DA showed a clear clustering of the patient's samples into the 2 "a priori" groups achieving good quality parameters (R2Y = 0.76 and Q2 = 0.44) and an ANOVA statistical significant (p=0.002). The main discriminant metabolites were tyrosine, lysine, ornithine, glutamic acid, 2-piperdincarboxylic acid, proline, citric acid, phenylalanine, mannitol, threonine, leucine, creatine, serine, 4-hydroxyproline, and alanine (more represented in CV-AE group); while unknown 204, myristic acid, arabitol, oxalic acid, 4-deoxyrithronic acid, elaidic acid and ribose resulted less abundant in CV-AE group.

**Conclusions.** This exploratory study showed different metabolomic profile of CML patients suffering from CV-AE due to TKI treatment, suggesting possible mechanisms of endothelial damage mediated by the accumulation of metabolites. Metabolomics research has considerable potential for translating the metabolic fingerprint into personalized therapeutic strategies. These preliminary data should be confirmed in prospective clinical trials.

### A309: PATHOPHYSIOLOGICAL EVIDENCES OF DAPAGLIFLOZIN-RELATED CARDIOPROTECTIVE EFFECTS AGAINST DOXORUBICIN AND TRASTUZUMAB-INDUCED CARDIOTOXICITY

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**Background.** The clinical trial "DECLARE-TIMI 58" (Dapagliflozin Effect on Cardiovascular Events-Thrombolysis in Myocardial Infarction 58), demonstrated that Dapagliflozin, a Sodium glucose cotransporter 2 inhibitor (SGLT2i), reduces the composite end point of cardiovascular death/hospitalization for heart failure in a broad population of patients with type 2 diabetes mellitus.

**Purpose.** We aimed to study if Dapagliflozin could exerts cardioprotective and anti-inflammatory effects in Doxorubicin and Trastuzumab-induced cardiotoxicity.

**Methods.** HL-1 adult cardiomyocytes were exposed to subclinical concentration of Doxorubicin and Trastuzumab (100 nM) alone or in combination with Dapagliflozin at 50 nM. After the incubation period, were performed the following tests: determination of cell viability, through analysis of mitochondrial dehydrogenase activity, study of lipid peroxidation (quantifying cellular Malondialdehyde and 4-hydroxynonenal), and of intracellular $Ca^{2+}$ homeostasis. Moreover, studies on the inflammation state of cardiomyocytes were also performed (activation of NLRP3 inflammasome; transcriptional activation of p65/NF-κB and; secretion of cytokines involved in cardiotoxicity (Interleukins 1β, 8 and 6).

**Results.** Dapagliflozin increases significantly the cardiomyocytes viability during exposure to Doxorubicin and Trastuzumab. Its cardioprotective properties are explainable by the reduction of intracellular $Ca^{2+}$ overload (-47,6% vs cells treated only to anticancer drugs; p<0,001), of the lipid peroxidation phenomena (mean reduction of 35-43 % compared to cells exposed only to anticancer drugs; p<0,001). Moreover, cardiomyocytes exposed to Dapagliflozin during anticancer drugs have a reduced expression of pro-inflammatory cytokines involved in cardiotoxicity (- 37,3 % for Interleukin-1β; -39,5 for Interleukin 8; -41,3 % for Interleukin 6; p<0,001 for all). Notably, Dapagliflozin reduces p65-NF-κB activation (-36,5% vs cells treated only to anticancer drugs) and inhibits of 27,8 % the expression of NLRP3 inflammasome that consequently improves the mitochondrial homeostasis of cardiomyocytes.

**Conclusion.** Dapagliflozin demonstrated cardioprotective properties during Doxorubicin and Trastuzumab exposure. Dapagliflozin improves the $Ca^{2+}$ homeostasis and inhibits the pro-inflammatory "NLRP3- NF-κB – cytokines" pathways in cardiac cells. The overall picture obtained provides the proof of concept for translational studies designed to investigate the cardioprotective use of Dapagliflozin during anticancer therapies.

### A310: THE NOVEL BUTYRATE DERIVATIVE PHENYLANALINE-BUTYRAMIDE PROTECTS FROM DOXORUBICIN INDUCED CARDIOTOXICITY

Michele Russo (a, b), Fiorentina Guida (a), Lorella Paparo (a), Giovanna Trinchese (c), Rosita Aitoro (a), Carmen Avagliano (d), Antonella Fiordelisi (e), Fabiana Napolitano (f), Valentina Mercurio (a), Valentina Sala (b), Mingchuan Li (b), Alessandra Ghigo (b), Emilio Hirsch (b), Daniela Sorriento (e), Michele Ciccarelli (g), Roberto Bianco (f, h), Guido Iaccarino (e), Pasquale Abete (a), Domenico Bonaduce (a, k), Antonio Calignano (d), Roberto Berni Canani (a, i, j, k), Carlo Gabriele Tocchetti (a, h, k)
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DEPARTMENT OF CLINICAL MEDICINE AND SURGERY, FEDERICO II UNIVERSITY, NAPLES, ITALY; (g) DEPARTMENT OF MEDICINE, SURGERY AND DENTISTRY, UNIVERSITY OF SALERNO, SALERNO, ITALY; (h) INTERDEPARTMENTAL CENTER FOR CLINICAL AND TRANSLATIONAL RESEARCH (CIRCET), FEDERICO II UNIVERSITY, NAPLES, ITALY; (i) CEINGE ADVANCED BIOTECHNOLOGIES, FEDERICO II UNIVERSITY, NAPLES, ITALY; (j) EUROPEAN LABORATORY FOR THE INVESTIGATION OF FOOD INDUCED DISEASES (ELFID), FEDERICO II UNIVERSITY, NAPLES, ITALY; (k) TASK FORCE FOR THE STUDY OF MICROBIOME, FEDERICO II UNIVERSITY, NAPLES, ITALY

**Background.** Butyric acid (BUT), a short chain fatty acid produced daily in nanomole concentrations by the gut microbiota, has proven beneficial in models of cardiovascular diseases. With advancements in cancer survival, an increasing number of patients are at risk of anticancer drug-cardiotoxicity. Here we assess whether the novel BUT-derivative Phenylalanine-butyramide (FBA) protects from doxorubicin (DOXO) cardiotoxicity, by decreasing oxidative stress and improving mitochondrial function.

**Methods.** C57/BL6 mice were randomly divided in four groups. At day 0, mice in the FBA and FBA + DOXO groups were pre-treated with FBA daily for 21 days by oral gavage, while SHAM and DOXO mice received vehicle as control. At day 15, DOXO and FBA+DOXO mice were injected with Doxorubicin 1h after daily pre-treatment with vehicle or FBA for the next 7 days, while SHAM and FBA mice were treated with saline solution. At day 21, mice were sacrificed for ex-vivo analysis. Heart function was monitored by echocardiography analysis at days -1, 14, 17 and 21.

**Results.** in C57BL6 mice, DOXO produced LV dilation assessed by echocardiography. FBA prevented LV dilation, fibrosis and cardiomyocytes apoptosis when co-administered with DOXO. DOXO increased atrial natriuretic peptide, brain natriuretic peptide, connective tissue growth factor, and matrix metalloproteinase 2 mRNAs, which were not elevated on co-treatment with FBA. DOXO, but not FBA+DOXO mice, also showed higher nitrotyrosine levels, and increased Inos expression. Accordingly, DOXO hearts showed lower levels of intracellular catalase vs SHAM, while pretreatment with FBA prevented this decrease. We then assessed for ROS emission: DOXO induced increased activity of mitochondrial SOD and higher production of H2O2, which were blunted by FBA pretreatment. FBA also ameliorated mitochondrial state 3 and state 4 respiration rates that were compromised by DOXO. Furthermore, in DOXO animals the mitochondrial degree of coupling was significantly increased vs SHAM, while FBA was able to prevent such increase, contributing to limit ROS production, Finally, FBA reduced DOXO damage in human cellular models, and increased the tumor-killing action of DOXO.

**Conclusions.** FBA protects against experimental doxorubicin cardiotoxicity. Such protection is accompanied by reduction in oxidative stress and amelioration of mitochondrial function.

### A311: CARDIOVASCULAR PROFILE OF ONCOLOGIC PATIENTS SCHEDULED TO RECEIVE ANTI VEGF THERAPY AND IMPLICATIONS FOR THE RISK OF CARDIOTOXICITY

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**Background.** Anti VEGF agents are targeted antineoplastic therapies that have resulted in significant prognostic improvements for many cancers. However, this class of anticancer drugs is also related to cardiotoxic adverse effects, in particular new-onset hypertension, but also thrombotic and hemorrhagic events. Notably, these may lead to dose reduction of the treatment or even to its premature discontinuation, with significant oncological prognostic implications. Cardiotoxicities occur more commonly in subjects with already known cardiovascular (CV) risk factors or coronary artery disease (CAD) or heart failure (HF). Nevertheless, such patients are frequently excluded from oncological clinical trials. Aim of the present study was to define prevalence of CV factors increasing risk of cardiotoxicity in a real-world cohort of oncologic patients scheduled to receive anti VEGF therapy.

**Methods.** All patients systematically evaluated at our Cardio-Oncology outpatient clinic before starting anti VEGF chemotherapy, from December 2015 to December 2018, were retrospectively enrolled. Those evaluated for (suspected) cardiac symptoms or already on anti VEGF therapy were excluded.

**Results.** Ninety-one patients were included. Mean age was 66 ± 12 years; most patients (n=70, 77%) had metastatic cancers. Most frequent malignancies were colon-rectal (n=28, 31%) and kidney cancer (n=22, 24%). The anti VEGF agent most commonly scheduled to be used was bevacizumab (n=56, 62%). Arterial hypertension was highly prevalent in our cohort (n=49, 54%), whereas patients with prior CAD or known HF were less common (n=5, 6% and n=2, 2%, respectively). Nine subjects (10%) were taking anticoagulant therapy. All patients (and referring Oncologists) received detailed education in particular regarding the risk of increasing blood pressure values and advice on how, when and with which drugs manage the eventuality of new-onset hypertension. Moreover, our baseline evaluation found that 12 hypertensive patients (13%) needed adjustment of their anti-hypertensive therapy due to poorly controlled blood pressure values, and in one case a new diagnosis of hypertension was done.

**Conclusion.** In this sizeable real-world cohort of oncologic patients scheduled to receive anti VEGF therapy, we found that prevalence of CV factors increasing risk of cardiotoxicity was not trivial. In particular, more than a half of subjects had an history of hypertension, with a significant proportion of them showing insufficiently controlled blood pressure values. Our findings reinforce the importance of a Cardio-Oncologic evaluation before initiation of specific oncologic therapies. It may help identifying subjects with factors posing them at higher risk of cardiotoxicity, and thus worth of a closer follow up. Moreover, in the case of anti VEGF drugs, the Cardio-Oncologic evaluation represents an important chance to assess blood pressure, educate to control it, and, most importantly, define how to manage the eventuality of this adverse effect. Such an approach helps guiding the patient and the referring Oncologist without the need for multiple cardiologic re-evaluations or the risk of stopping chemotherapy.

## CARDIOPATIE CONGENITE – 1
## Sessione Orale

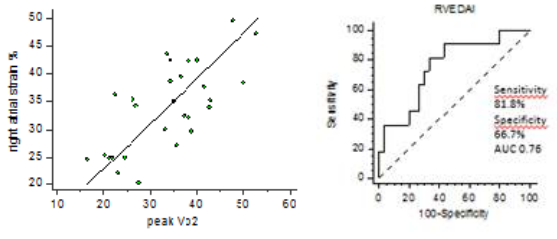
### A312: AN ECHO AND CMR STUDY IN CHILDREN WITH REPAIRED TETRALOGY OF FALLOT AND THEIR CORRELATION WITH PEAK VO2

Martina Avesani (a, b), Nunzia Borrelli (a), Elena Filippini (a), Grazia Delle Donne (a), Jolanda Sabatino (a), Sylvia Krupickova (a), Manjit Josen (a), Sabino Iliceto (b), Giovanni Di Salvo (a)
(a) ROYAL BROMPTON HOSPITAL, LONDON, UNITED KINGDOM; (b) UNIVERSITY OF PADUA, ITALY

**Background.** Severe pulmonary regurgitation (PR) and right ventricular (RV) disfunction are common in patients with repaired Tetralogy of Fallot (r-TOF), and CMR has become the gold standard for their assessment. However, in paediatric patients CMR use can have some limitations. The aim of our study was to correlate Echo and CMR parameters and to analyse which parameter was associated with peak oxygen consumption (VO2) in a paediatric population of r-TOF with at least moderate PR assessed by Echo.

**Methods.** r-TOF patients (<18 years) with at least moderate PR were included in the study. Echocardiographic parameters: PR was assessed by Color and Continuous-wave (CW) Doppler and derived parameters such as pressure half time (PHT), PR index, ratio of diastolic and systolic time-velocity integrals (DSTVI) of the main pulmonary artery; RV end-diastolic area (RVEDA), end-systolic area (RVESA), right ventricle outflow tract (RVOT) end-diastolic area, fractional area change (FAC) and TAPSE; by speckle tracking analysis we measured RV global longitudinal strain (RVGLS) and right atrial strain (RAS). CMR parameters: we evaluated PR as RF, end-diastolic and systolic volumes (RVEDV, RVESV) and right ventricle ejection fraction (RVEF). In addition, we collected values of peak Vo2 evaluated by cardiopulmonary exercise test (CPET).

**Results.** Fiftythree r-TOF patients (aged 13.8 ± 2.5 years, male 57%) were included. Free PR (RF >35%) was diagnosed in 38 out of 53 patients and nobody had > mild tricuspid regurgitation. We found a significant correlation between RVEDA and CMR RVEDV (p <0.0001, r =0.73), which slightly improved adding RVOT area (p<0.0001, r =0.75). RVEDAi (indexed)> 21.9 cm2/m2 was found to have a good sensitivity (81.8%) for RVEDVi (indexed) >150 ml/m2. No correlation was found neither between TAPSE, FAC, RVGLS measured by echo and RVEF calculated by CMR nor between echo Doppler parameters and PR RF. None of the CMR parameters correlated with peak VO2. Among the studied echo parameters only RAS demonstrated a significant correlation (p <0.0001, r =0.70) with peak VO2. At the multivariate analysis only RAS was the best independent predictor of peak VO2 (p <0.0001).




**Conclusion.** Echo Doppler parameters studied to assess PR were unsatisfactory and did not correlate with PR RF by CMR. RVEDA was well correlated with CMR volumes. RAS was the best predictor of peak VO2 and should be included in the follow up of children with r-TOF.

### A313: DIASTOLIC DYSFUNCTION IN POST-SURGICAL TETRALOGY OF FALLOT PATIENTS: COMPARISON BETWEEN CARDIAC MRI AND ECHOCARDIOGRAPHY

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**Introduction.** Right ventricular (RV) systolic dysfunction is associated with poor outcomes in Tetralogy of Fallot (ToF) patients. Conversely, the influence of diastolic dysfunction is poorly known. In addition, evaluation of diastolic function with cardiac MR imaging is rarely performed. We studied the possible association between traditional echocardiographic parameters of RV diastolic function and cardiac MRI evaluation of trans-tricuspidal flow.
**Methods.** Twenty-four surgically treated ToF patients were enrolled (54% males; mean age at study: 34±2.7 years; mean age at surgery: 2.2±0.7 years). They were studied by echocardiography to assess RV diastolic function in terms of traditional and TDI derived parameters (E/A, E/e', deceleration time, MPI). At cardiac MRI, RV diastolic function was assessed by using phase-contrast analysis of flow through the tricuspid valve in short axis view. Diastolic dysfunction was graded as impaired relaxation, pseudonormal, or restrictive physiology.
**Results.** Fifteen (62.5%) ToF subjects had echocardiographic evidence of diastolic dysfunction and eleven (45.8%) at cardiac MRI. A statistically significant correlation was not found between echocardiographic and cardiac MRI parameters of diastolic dysfunction. At cardiac MRI, higher degree of RV diastolic dysfunction (restrictive physiology) was weakly associated with larger indexed right atrial area ($p<0.04$). Greater number of interim palliative procedures was associated with higher E/e' (diastolic dysfunction) at echocardiography.
**Conclusions.** Diastolic dysfunction, as determined by echocardiography and cardiac MRI-derived measures, is prevalent in ToF. These measures are not associated with each other. This lack of correlation between cardiac MRI-based and traditional trans-thoracic parameters of diastolic function seems to highlight some limitations which need to be considered, at least in the ToF setting. As soon as cardiac MRI will have the ability to better characterize a range of diastolic impairments, it will likely become an important diagnostic test in the future, capable of comprehensive RV function evaluation in ToF.

### A314: BLOOD FLOW SPECKLE TRACKING AS NEW TECHNIQUE TO DISCRIMINATE OUTFLOW TRACT OBSTRUCTION: A TGA CASE REPORT

Nunzia Borrelli (a), Martina Avesani (a), Jolanda Sabatino (a), Aladino Ibrahim (a), Manjit Josen (a), Giovanni Di Salvo (a)
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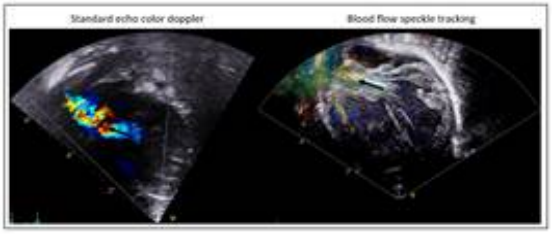
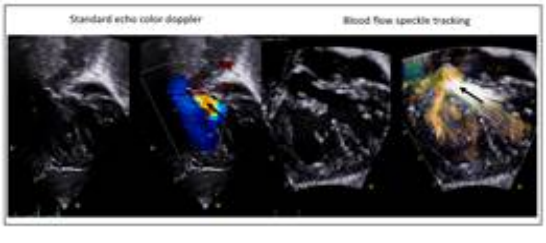
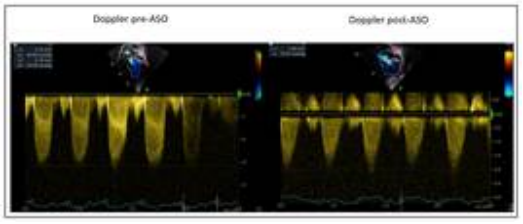
**Case report.** We present the case of a 3.5-month-old baby girl with an antenatal diagnosis of Transposition of Great Arteries (TGA). At first day of life, an urgent echocardiogram confirmed TGA diagnosis with a large perimembranous ventricular septal defect (VSD) shunting right to left. A tunnel like sub-pulmonary infundibulum was also detected. After the fall of pulmonary resistances, and in presence of blood hyperflow through the VSD, an increased gradient across the pulmonary valve was noticed at CW Doppler assessment. Since the presence of pulmonary stenosis can condition the surgical approach, we decided to perform another echocardiogram by using blood flow speckle tracking (BFST) technique to assess the flow at outflow tracts.This evaluation showed laminar flow at pulmonary valve level, without any turbulences. The patient underwent a successful arterial switch operation (ASO) and VSD closure. The post-operative echocardiogram confirmed the absence of neo-aortic and neo-pulmonary stenosis and the absence of outflow tracts obstruction.




**Discussion.** Left ventricle outflow tract (LVOT) obstruction complicates almost 10% of TGAs with associated VSD. To perform ASO it is generally required competent and unobstructed ventriculo-arterial connections. Frequently, an abnormal shunt like a VSD can be responsible of an hyperdynamic flow. However, this is a functional phenomenon rather than a true anatomic lesion. This kind of functional gradient does not need correction and generally solves repairing the abnormal shunts. However, true anatomic obstructions must be carefully assessed for the practicability of surgical relief and change completely the surgical approach. In presence of TGA with LVOT functional gradient, BFST may help to discriminate between a true obstruction and an increase in pressure gradient secondary to flow overload. Indeed, in this patient with d-TGA, VSD and no pulmonary stenosis, BFST demonstrated a central laminar flow across the unobstructed left outflow tract with no turbulences and no vortex appearing in main pulmonary artery arising from left ventricle, despite the presence of a significant gradient at traditional Doppler assessment.

### A315: EXPERIENCE OF THREE YEARS OF BALLOON PULMONARY ANGIOPLASTY IN A SINGLE CENTRE: SAFETY AND SHORT TERM RESULTS

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**Background.** Balloon pulmonary angioplasty (BPA) has recently been developed as an alternative and less-invasive treatment strategy for chronic thromboembolic pulmonary hypertension (CTEPH) but therapeutic efficacy and technical safety of the technique have to be established.
**Purpose.** To examine the effects of BPA on patients with inoperable disease or residual pulmonary hypertension (PH) after pulmonary endarterectomy (PEA).
**Methods.** From June 2015 to January 2019 we enrolled symptomatic (WHO-FC ≥II) inoperable CTEPH patients and patients with residual PH after PEA. At baseline and after 3 months after last BPA session all patients underwent clinical evaluation, six-minute walking distance (6MWD) and right heart catheterization. For comparisons Friedman test (with Bonferroni post-hoc pairwise analysis) was used. Results: forty-one patients [male 49%, median age 65 (52-75) years, 34 inoperable and 7 with residual PH after PEA] were treated for a total of 111 sessions (median number of sessions for each patient: 2); during each session we treated 2 (2.0-2.5) vessels.
**Results.** Results are shown in the Table. Forty patients were treated with medical therapy before BPA (16 with combination therapy). Four pulmonary artery dissection and 2 haemoptysis with clinical impairment were documented during the procedures; 27 patients had lung injury (radiographic opacity with/without hemoptysis and/or hypoxemia), none had renal dysfunction, 6 patients had access site complications. Five patients died during follow-up (none within 30 days from the procedure) because of sepsis (1), heart failure (1), cancer (1), arrhythmic storm (1) and sudden death in a patients with severe coronary atherosclerosis (1).
**Conclusions.** BPA is a safe and effective treatment able to improve symptoms and hemodynamic profile in inoperable CTEPH patients and in patients with residual PH after PEA.

| median (interquartile range) | Baseline (n= 41) | Baseline ÷ Pre-BPA 8 (3-49) months | Pre-BPA (n= 41) | Pre-BPA ÷ Post-BPA 10 (6-18) months | Post-BPA (n= 32) | Global p-value |
|---|---|---|---|---|---|---|
| WHO-FC III-IV (%) | 88 | N.S. | 83 | <0.05 | 42 | <0.001 |
| 6MWD (m) | 430 (346-560) | N.S. | 425 (357-500) | <0.05 | 450 (375-605) | <0.001 |
| RAP (mmHg) | 6 (5-8) | N.S. | 6 (5-8) | N.S. | 6 (4-8) | 0.023 |
| mPAP (mmHg) | 46 (40-52) | <0.05 | 43 (33-50) | <0.05 | 36 (28-41) | <0.001 |
| CI (l/min/m$^2$) | 2.6 (2.2-3.0) | N.S. | 2.7 (2.2-3.0) | <0.05 | 3.1 (2.6-3.5) | 0.004 |
| PVR (WU) | 7.5 (5.6-11.5) | <0.05 | 6.5 (4.7-10.3) | <0.05 | 4.1 (3.3-5.9) | <0.001 |
| $SvO_2$ Sat (%) | 69 (63-71) | N.S. | 69 (63-72) | N.S. | 69 (63-73) | 0.002 |

CI, Cardiac Index; mPAP, mean Pulmonary Arterial Pressure; PVR, Pulmonary Vascular Resistance; RAP, Right Atrial Pressure; 6MWD, 6 Minute Walking Distance; $SvO_2$ Sat, Mixed Venous Oxygen Saturation; WHO-FC, World Health Organization Functional Class.

### A316: FONTAN CON CONDOTTO EXTRA-CARDIACO NELLA PALLIAZIONE DELLA FISIOLOGIA UNIVENTRICOLARE NON ETEROTASSICA: IL FOLLOW-UP A LUNGO TERMINE MOSTRA UN'ARITMOGENICITÀ SIMILE A QUELLA DELLA FONTAN CLASSICA

Corrado Di Mambro (a), Marta Unolt (a), Nicoletta Cantarutti (a), Massimo Stefano Silvetti (a), Daniela Righi (a), Marie Laure Yammine (a), Camilla Calvieri (a), Giulia Cafiero (a), Salvatore Giannico (a), Sonia Albanese (a), Adriano Carotti (a), Fabrizio Drago (a)
(a) DMCCP - OSPEDALE PEDIATRICO BAMBINO GESÙ

**Introduzione e scopo dello studio.** Le aritmie rappresentano una severa comorbidità a lungo termine nei soggetti con cardiopatie congenite complesse di tipo univentricolare, sottoposti a palliazione secondo Fontan. Dal 1971, numerose varianti chirurgiche hanno portato ad oggi a preferire l'utilizzo del condotto extra-cardiaco (ECC). Molti studi hanno riportato come quest'ultima variante della procedura si sia dimostrata meno "aritmogena", anche se il follow-up (FU) in letteratura appare significativamente più breve rispetto a quello delle precedenti metodiche (connessione atrio-polmonare, tunnel intra-atriale). Pertanto, abbiamo voluto analizzare le possibili complicanze aritmiche e la loro epoca di insorgenza in una ampia coorte di pazienti sottoposti a intervento di Fontan con ECC, durante un periodo di FU medio di 15 anni (range 5-30 anni).
**Materiali e metodi.** Abbiamo retrospettivamente valutato una popolazione di 348 pazienti consecutivi sottoposti a palliazione secondo Fontan ECC presso la nostra Istituzione tra il 1987 ed il 2013. Di questi ne abbiamo esclusi 126 (36.2%): 51 (14.7%) eterotassie per la propensione intrinseca a sviluppare aritmie; 10 (2.9%) con precedenti interventi di Fontan non-ECC; 4 (1.1%) per "take-down" della Fontan ECC; 54 (15.5%) persi al FU; 7 (2%) deceduti nel corso del FU. Dei 222 rimanenti (134 maschi, 60.4%), 7 (3.2%) sono stati sottoposti a trapianto cardiaco (mediamente dopo 10 anni dalla chirurgia palliativa). Le cardiopatie native erano rappresentate da: 77 (34.7%) ipoplasie del ventricolo sinistro; 37 (16.7%) ipoplasie del ventricolo destro; 54 (24.3%) connessioni atrio-ventricolari a doppia entrata; 45 (20.3%) assenze di connessione atrio-ventricolare; 9 (4%) canali atrio-ventricolari completi sbilanciati. L'età media dei pazienti è risultata di 19.2 anni (7.8-45.7 anni; DS ± 7.3; mediana 17.6 anni), mentre l'età media all'intervento è stata di 4 anni (range 1-22 anni; DS ± 2.6; mediana 3 anni).
**Risultati.** Quattro pazienti hanno manifestato blocco atrio-ventricolare completo pre-chirurgia. Il FU aritmologico definitivo, quindi, è stato effettuato su 218 soggetti. In questi: 62 (28.5%) hanno presentato almeno una complicanza aritmica significativa testimoniata, di cui 10 (4.6% della popolazione totale) in fase precoce, ossia entro 30 giorni dall'intervento, e 52 (23.8% della popolazione totale) in fase tardiva con latenza media dalla procedura di Fontan (Δt) di 9 anni (DS ± 5.3 anni): 29 (13.5%) hanno avuto almeno una tachiaritmia, con Δt per le tachicardie sopraventricolari di 11.5 anni (DS ± 4 anni) e Δt per le tachiaritmie ventricolari di 13.5 anni (DS ± 6 anni), mentre 47 (21.5%) una bradiaritmia con Δt di 8 anni (DS ± 5.4 anni). Quattordici pazienti (6.4%), hanno avuto un'aritmia multipla. Infine, in 28 soggetti (12.8% della popolazione totale) è stato necessario impiantare un pace-maker (di cui 9 in fase precoce), mentre nessuno è portatore di defibrillatore.
**Conclusioni.** Questo studio, eseguito esclusivamente su soggetti non affetti da eterotassia, dimostra che anche i pazienti con Fontan ECC presentano un elevato rischio di sviluppare aritmie, ma che l'unico vero fattore di rischio per la genesi di una complicanza aritmica è la durata del tempo trascorso dall'intervento.

### A317: A CASE OF PLATYPNEA-ORTHODEOXIA SYNDROME: DIAGNOSIS BY EXCLUSION OR SOMETHING TO LOOK FOR?

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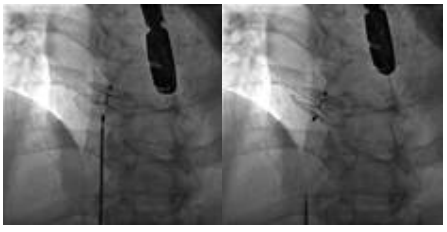
**Initial presentation.** A 60-year-old man was admitted to the hospital with worsening of chronic hypoxemia in a known obstructive and restrictive pulmonary disease, apparently not justified by the underlying pulmonary disease. His vital signs were normal except for arterial oxygen saturation ($SO_2$) of 75% on room air while seated. Transthoracic echocardiogram (TTE) didn't reveal intracardiac shunts and chest-CT scan showed no evidence of pulmonary thromboembolism nor aortic dissection.
**Diagnosis and Management.** Patient's arterial blood gas tests demonstrated a significant drop in arterial oxygen partial pressure (pO2) from clinosatism to orthostatism, confirming the suspicion of Platypnea-Orthodeoxia Syndrome (POS). In the absence of heart and lung failure, a right-to-left shunting was suspected as the cause of this clinical condition. Transesophageal echocardiography (TEE) revealed the presence of a Patent Foramen Ovale (PFO) with right-to-left shunt through two sites in the centre and in the lower part of the foramen ovale. This shunt, due to the change in the anatomic relationship between the atrial septum and inferior vena cava (IVC), occurred only while the patient was sitting or standing. In fact, in this position the dilated aortic root deformed the atrial septum and the right atrium, so that the blood coming from the IVC was directed to the PFO. Cardiac catheterization showed a reduced right cardiac output (pulmonary blood flow= 3.34 l/min; 1.62 l/min/mq; systemic blood flow= 3.69 l/min; 1.8 l/min/mq; Qp/Qs= 0.9) and the absence of pulmonary hypertension (mean right atrial pressure 5 mmHg and mean pulmonary pressure 12 mmHg). Oximetry during catheterization showed significant $SO_2$ decrease in the aorta (86%) compared to pulmonary veins (98.4%) and a temporary PFO closure by balloon inflation showed an immediate improvement of the $SO_2$ in the aorta. Thus, it was decided to close the PFO using a 35/25-mm Amplatzer PFO-occluder device (Figure 1a and 1b) with immediate cessation of the episodes of hypoxemia, and $SO_2$ in sitting position increased from 78% to 97% without any residual shunts. At the 6-month follow-up, the patient was free of symptoms with no cyanosis and normal $SO_2$ in every position.



**Conclusions.** This case showed a rare clinical entity known as POS. In our case, the aortic dilatation changed the anatomic relationship between the atrial septum and the inferior vena cava, facilitating desaturated blood flow redirection through the PFO. The gold standard for the diagnosis is right and left cardiac catheterization, which shows a mismatch in oxygen saturation between the pulmonary veins and the aorta. Additionally, less invasive exams, like contrast echocardiography or thoracic computer tomography, can be performed to reach the same diagnosis. In conclusion we recognize that POS is not a very common disease and for this reason it can be under-diagnosed. In the presence of position-dependent hypoxemia, it is mandatory to consider this diagnosis and to exclude other causes of hypoxemia.

## VALUTAZIONE DEL RISCHIO ARITMICO
## Sessione Orale

### A318: PROARRHYTHMIA IN CHF PATIENTS WITH ATRIAL FIBRILLATION UNDERGOING RHYTHM CONTROL STRATEGY: A RETROSPECTIVE STUDY CONCERNING PARADOXYCAL ARRHYTHMIAS IN DIFFERENT PHARMACOLOGICAL SUBSETS

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**Background.** Proarrhythmia is a frequent complication of the use of antiarrhythmic drugs, especially those belonging to Vaughan Williams class I and III. In this retrospective study centered around a population of patients with chronic heart failure (CHF)and history of atrial fibrillation (AF) undergoing a rhythm control strategy, the respective prevalences of proarrhythmic events in various therapeutic subsets have been investigated.
**Methods.** A series of inpatients and outpatients all characterized by the availability of the relevant electrocardiographic documentation, and by anamnestic data suitable for demonstrating the pathogenetic dependence of the arrhythmia on the prescribed antiarrhythmic drugs was the subject of the present retrospective investigation. Inclusion criterion was the presence of AF in the patient's clinical history, whose cardioversion had been followed by the adoption of rhythm control strategy. The prevalence of paradoxical arrhythmias in each of the various pharmacological groups was chosen as primary endpoint.
**Results.** 182 cases of proarrhythmia out of a total of 624 patients were detected during a median follow-up of 20 months (interquartile range: 18-24 months). The prevalences of proarrhythmic events were : IC antiarrhythmic drugs +betablockers, 111 cases out of a total of 251 patients (44.22%); amiodarone, 7 cases out of a total of 230 patients (3%); sotalol, 61 cases out of a total of 140 patients (43.57%); quinidine + digoxin, 3 cases concerning all 3 patients enrolled retrospectively (100%). The paradoxical arrhythmias were: torsade de pointes, second and third degree sino-atrial block, slow atrial flutter with 1: 1 AV conduction, second degree Mobitz II AV block, sustained monomorphic ventricular tachycardia. Five fatal cases of proarrhythmia were found.
**Conclusions.** In CHF patients with a history of AF converted to sinus rhythm by means of adequate therapy - with external transthoracic electrical shock, pharmacological cardioversion or transcatheter ablation - the rhythm control strategy appears as a choice burdened by a high risk of proarrhythmic events. Probably in this group of patients the wisest choice would be to avoid chronic use of IC drugs or sotalol for purposes of secondary prevention. In the case of frequent AF relapses, a simple rate control strategy combined with judicious anticoagulation might be the option with the best risk/benefit ratio.

### A319: SINDROME DI BRUGADA E STRAIN VENTRICOLARE: IL RITARDO ELETTROMECCANICO COME NUOVO INDICE PER LA DIAGNOSI DIFFERENZIALE

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**Introduzione.** La Sindrome di Brugada (SBr) è una patologia ereditaria caratterizzata da un aumentato rischio di morte cardiaca improvvisa a seguito di eventi aritmici ventricolari, in assenza di alterazioni strutturali. La diagnosi si basa essenzialmente sull'elettrocardiogramma, che talora presenta caratteristiche difficilmente distinguibili da altre anomalie comuni e benigne, quali il blocco di branca destra completo (BBDx), che, pur discostandosi dalla SBr per substrato anatomico e significato clinico, presenta talora caratteristiche ECG di difficile interpetazione. L'obiettivo di questo studio è stato valutare se l'ecocardiografia *speckle-tracking* (STE) fosse in grado di distinguere la SBr dal BBDx mediante un'analisi del ritardo di conduzione.
**Metodi.** È stato condotto uno studio trasversale multicentrico, realizzato in collaborazione tra il reparto di Cardiologia dell'Università di Siena e l'Institut Clínic Cardiovascular IDIBAPS dell'Università di Barcellona. I partecipanti allo studio sono stati arruolati nel periodo compreso tra Ottobre 2017 e Giugno 2019. Tutti i partecipanti sono stati sottoposti ad ECG a riposo a 12 derivazioni e ad ecocardiografia standard, TDI e *speckle-tracking*. I 66 partecipanti sono stati suddivisi in tre gruppi: BBDx (n=24, età media: 54,4 anni), SBr tipo 1 (n=22, età media: 48,8 anni) e controlli (n=20, età media: 47,0 anni).
**Risultati.** Le misurazioni dell'ecocardiogramma standard, sia per quanto riguarda le dimensioni biventricolari che la funzione biventricolare analizzata mediante frazione d'eiezione, il fractional area change e i parametri funzionali derivati dal TDI, non hanno mostrato differenze significative fra i 3 gruppi. L'analisi *strain* sul ventricolo destro ha dimostrato la normalità della deformazione miocardica in tutti e 3 i gruppi. Per quanto riguarda la deformazione ventricolare sinistra, l'analisi mediante STE non ha evidenziato differenze tra i tre gruppi per quanto riguarda lo *strain* longitudinale globale. È stata invece descritta una differenza statisticamente significativa tra le tre popolazioni per quanto riguarda i tempi di attivazione ventricolare sinistra: l'analisi *strain* ha mostrato che i soggetti con BBDx presentano un ritardo di attivazione elettromeccanica che non è osservabile nei pazienti con SBr e nei soggetti di controllo (p<0.001), evidente soprattutto a livello dei segmenti anteriori del ventricolo sinistro.
**Conclusioni.** Lo studio ha dimostrato che, mentre l'ecocardiografia di base non è in grado di fornire parametri utili alla diagnosi differenziale, l'analisi *strain* permette di identificare nei soggetti con BBDx completo un ritardo elettromeccanico nella conduzione dell'impulso nel ventricolo sinistro che non è visibile nei pazienti con SBr. Pertanto, nei casi in cui l'ECG risulta dubbio o non diagnostico, potrebbe esser utile ricorrere a metodiche di imaging avanzato (STE), che si sono dimostrate capaci di evidenziare le differenze nella conduzione dell'impulso elettrico nei pazienti con SBr ed in quelli con BBDx.

### A320: INDEPENDENT ASSOCIATION OF BODY MASS INDEX AND LEFT ATRIAL STRAIN IN PATIENTS WITH NON VALVULAR ATRIAL FIBRILLATION. THE NEAFIB-ECHO REGISTRY

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(a) AOU FEDERICO II, NAPOLI

**Background.** Overweight and obesity are related to the risk of new onset atrial fibrillation (AF). Peak atrial longitudinal strain (PALS) is an advanced echocardiographic parameter of left atrial (LA) function with a recognized diagnostic and prognostic role in both the general population and AF.
**Purpose.** To investigate the impact of body mass index (BMI) on LA function by utilizing standard and advanced echocardiography in patients with non-valvular AF.
**Methods.** In the NeAfib-Echo registry, 395 consecutive adult patients with non-valvular AF (F/M: 175/220; age 70.6±11 years, BMI: 27.8±5.6 kg/m$^2$) were enrolled. 215 patients (54.1%) had permanent/persistent AF (prAF) and 178 (45.9%) had paroxysmal AF (pxAF). Anthropometric parameters and blood pressure (BP) were recorded and CHA2DS2VASc score was calculated. Patients underwent a complete echo Doppler exam, including evaluation of PALS and left ventricular (LV) global longitudinal strain (GLS). The overall population was divided according to BMI tertiles: first tertile <25.3 (n=127); second tertile 25.3-29(n=137); third tertile >29.3 (n=130).
**Results.** No significant difference in sex prevalence, age, systolic BP and heart rate was found among the three BMI tertiles, whereas diastolic BP was higher in the third tertile (p<0.001). CHA2DS2VASc score did not significantly differ among tertiles. In the pooled population LV mass index (LVMi) progressively increased from the first to the third tertile (p=0.001), whereas LA volume index, LV ejection fraction (EF), GLS and E/e' ratio were not significantly different among the three groups. PALS was lower in the third tertile (14.3 ± 8.2%) versus both the first (19.0 ± 11.5%) and the second tertile (17.7 ± 10.6%) (p<0.002). In separate sub-analyses according to AF type, PALS was significantly lower in the first and the third tertile (p=0.01) in the PxAF group, but not in patients with PrAF (p=0.158). In the pooled population PALS was significantly related with BMI (r=-0.17, p<0.001) but also with age, heart rate, LVMi, LVEF, GLS, E/e' ratio and pulmonary artery systolic pressure (PAPs). By a multilayer regression analysis, after adjusting for CHA2DS2VASc score, LV mass index, LVEF, E/e' raito and PAPs, BMI remained independently associated with PALS (standardized β coefficient= -0.127, p<0.02) (cumulative $R^2$ =0.41, SEE= 8.5%, p<0.0001).
**Conclusions.** In patients with non valvular AF, overweight and obesity exert a detrimental effect on LA function as testified by the gradual PALS reduction with the increase of BMI tertiles. BMI is associated with PALS independently of several confounders including CHA2DS2VASc. Besides CHA2DS2VASc score, BMI could be considered as an additional factor for evaluating cardiovascular risk in non valvular AF.

### A321: L'ESECUZIONE ROUTINARIA DELL'ECOCARDIOGRAMMA TRANS-ESOFAGEO PRIMA DELLA CARDIOVERSIONE ELETTRICA RAPPRESENTA UNA VALIDA E PRUDENTE STRATEGIA CLINICA? STUDIO REAL WORLD

Giulia Ferrante (a), Francesca Bursi (a), Alice Pugno (a), Laura Massironi (a), Laura Bosotti (a), Chiara Bencini (a), Daniela Torta (a), Maria Silvia Negroni (a), Stefano Carugo (a)
(a) ASST SANTI PAOLO E CARLO

**Introduzione.** La strategia di controllo del ritmo mediante cardioversione elettrica esterna (CVE) è utile nel ridurre i sintomi dei pazienti con fibrillazione atriale (FA) ma è associata ad un aumentato rischio di eventi tromboembolici. Le attuali linee guida raccomandano almeno 3 settimane di terapia anticoagulante prima della CVE o in alternativa l'esecuzione di ecocardiogramma trans-esofageo (ETE) per escludere la presenza di trombi in atrio/auricola sinistra quando vi è necessità di CVE precoce. Attualmente molti centri non eseguono routinariamente un ETE a tutti i pazienti in nota per CVE elettiva. Tuttavia tale pratica è controversa poichè alcuni studi hanno dimostrato la possibilità che si formino apposizioni trombotiche in atrio nonostante la terapia anticoagulante in atto, evento la cui prevalenza rimane ad oggi non del tutto definita.
**Obiettivi.** Valutare la prevalenza di trombi in atrio sinistro nella pratica clinica quotidiana.
**Metodi.** Nel nostro ospedale tutti i pazienti in lista per CVE, indipendentemente dalla durata dell'aritmia e dal tipo di anticoagulante assunto, eseguono routinariamente l'ETE creando il setting epidemiologico ideale per uno studio della reale prevalenza di trombosi intra-atriale. Abbiamo esaminato il periodo compreso tra Gennaio 2014 e Dicembre 2017.
**Risultati.** 211 pazienti consecutivi con FA sono stati sottoposti a ETE (64.5% uomini, età media 71±10 anni, CHA2DS2-VASc 3.1±1.4), 151 presentavano FA persistente per almeno 4 settimane prima della CVE, tra questi 111 assumevano antagonisti della vitamina K (AVK) e 40 erano in terapia con anticoagulanti orali diretti (NAO) da almeno 4 settimane precedenti la CVE. È stato inoltre preso in considerazione un gruppo di 60 pazienti (28.4%) con FA parossistica in terapia con eparina a basso peso molecolare (EBPM). La mediana di durata della FA è risultata simile nei gruppi AVK e NAO, p=0.944. All'ETE è stata documentata trombosi intra-atriale in 14 pazienti (6.6%). Tale prevalenza è risultata simile nei pazienti in AVK (6.3%, n=7), in NAO (7.5%, n=3), e in EBPM (6.7%, n=4), p=0.97. Al momento dell'ETE la scoagulazione è risultata inefficace in 8 (7.3%) pazienti in AVK (INR non a target) e 2 (5%) pazienti in terapia con NAO hanno dichiarato erronea assunzione. Tra i 141 pazienti che stavano assumendo in maniera efficace la terapia anticoagulante, il trombo è stato riscontrato in 3 (2.9%) pazienti in AVK e 1 (2.6%) in NAO, p=0.929. I fattori associati ad elevato rischio trombotico sono risultati l'elevato CHA2DS2-VASc (p=0.023), la bassa frazione di eiezione (p<0.001), l'ecocontrasto spontaneo e la scoagulazione inefficace (p=0.004). In nessun caso vi sono state complicanze procedurali associate all'ETE. Stroke o TIA entro le 4 settimane dalla CVE si sono verificati in 2 pazienti, 1 era in EBPM e 1 in NAO, in entrambi l'ETE era risultato negativo per trombosi.
**Conclusioni.** In pazienti affetti da FA in nota per CVE elettiva ed in trattamento efficace con terapia anticoagulante, il riscontro di trombosi intra-atriale all'ETE non è raro e la prevalenza risulta simile tra quelli in terapia con AVK o NAO. L'esecuzione di un ETE, finalizzato all'esclusione di trombi in atrio in previsione della CVE, sembra essere una prudente pratica clinica specialmente nei pazienti in cui si sospetti o si accerti un'inefficace anticoagulazione.

### A322: RATE CONTROL STRATEGY BUT NOT TRANSCATHETER ABLATION IMPROVES MID-TERM CLINICAL OUTCOMES IN CHF PATIENTS WITH A HISTORY OF ATRIAL FIBRILLATION: A RETROSPECTIVE COHORT STUDY

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**Background.** Clinical management of patients with chronic heart failure(CHF) and a history of atrial fibrillation (AF) focuses on the goal of preventing AF recurrences, or, if this is impossible due to the fact that the arrhythmia is by now become permanent, it is aimed at the control of the ventricular response. In patients with AF, an important topic is the comparative evaluation in the mid-long term of clinical outcomes arising from the various therapeutic regimens, including pharmacological approaches as well as radiofrequency catheter ablation (abl).
**Methods.** In the present cohort retrospective study, 175 cases of paroxysmal, persistent or long-lasting persistent AF have been grouped depending on therapeutic approach: abl - isolated or followed by chronic use of antiarrhythmics- (74 cases), drug treatment for rate control strategy (60 cases), drug treatment for rhythm control strategy(41 cases). The effects respectively exerted by the three treatment modalities on the primary endpoint, namely a composite of death, disabling stroke, severe bleeding and cardiac arrest, have been compared through a median follow up of 20 months(interquartile range=18-24 months) using the Cox proportional-hazards regression analysis. Further exposure variables were hypertension, the A-P left atrial diameter, left ventricular ejection fraction and AF relapses.
**Results.** As documented by the Cox model, an increased risk of the primary composite endpoint was associated with the rhythm control strategy as well as with the AF recurrences during the follow-up (for the former, hazard ratio [HR]: 3.3159; 95% CI: 1.5415 to 7.1329; p = 0.0023; for the latter, HR: 1.0448; 95% CI: 1.0020 to 1.0895; p =0.0410). Even hypertension was associated with an increased risk (HR: 1.1040; 95% CI: 1.0112 to 1.9662; p = 0.0477). On the contrary, a rate control strategy predicted a decreased risk of experiencing the primary endpoint (HR: 0.0711; 95% CI: 0.0135 to 0.3738; p = 0.0019), while ablation did not exert a statistically significant effect on the same outcome.
**Conclusions.** AF ablation is able to decrease the arrhythmic episodes but does not provide a statistically significant protection against the composite of death, disabling stroke, severe bleeding and cardiac arrest in the mid-term follow-up.

### A323: ASSOCIATION OF ECHOCARDIOGRAFIC PROGRESSION AND GENETIC PROFILE IN ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY

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**Background.** Arrhythmogenic right ventricular cardiomyopathy (ARVC) is frequently associated with mutations in genes coding for desmosomal proteins. In this study, we investigated the association of genetic status with ARVC progression as defined by echocardiographic parameters.
**Methods.** We tested 62 ARVC patients for their genetic profile. Accordingly, they were grouped in mutation positive (48 (77%) patients; median age 48.5 years; 33 (69%) males), and mutation negative (14 (23%) patients; median age 45 years; 10 (71%) males). Prevalent mutations were Desmoglein-2 (DSG2) in 16 (26%), Desmoplakin (DSP) in 14 (23%), and Plakophilin-2 (PKP2) in 9 (15%) patients.
**Results.** At baseline, there were no significant differences in clinical characteristics between the two groups. Patients were followed-up for a median time period of 1420 days, and there was no significant difference in the duration of follow-up between the two groups (p = 0.05). In the mutation positive group, there was a significant increase in right ventricular end-diastolic area (p=0.002), right atrial short (p=0.008) and long (p=0.002) diameter, left atrial diameter (p=0.014), and a decrease in left ventricular ejection fraction (p=0.014) during follow up. Right ventricular functional parameters did not change significantly (tricuspid annular plane systolic excursion: p=0.24; fractional area change: p=0.088). In the mutation negative group, none of the aforementioned echocardiographic findings exhibited any significant difference during follow-up: right ventricular end-diastolic area (p=0.1); right atrial short (p=0.7) and long (p=0.9) diameter, left atrial diameter (p=0.6), and left ventricular ejection fraction (p=0.3). Similarly, right ventricular functional parameters did not change significantly (tricuspid annular plane systolic excursion: p=0.77; fractional area change: p=0.80. Results are summarized in the table.

Table. *Baseline and follow-up echocardiographic findings of study subjects.*

| Echocardiographic findings | Geno-positive group (n=48) | | | | | Geno-negative group (n=14) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | | Follow-up | | | Baseline | | Follow-up | | |
| | Mean | SD | Mean | SD | P value | Mean | SD | Mean | SD | P value |
| Tricuspid annular plane systolic excursion | 19.06 | 5.053 | 18.23 | 5.402 | 0.243 | 21.25 | 5.203 | 20.63 | 3.777 | 0.767 |
| Fractional area change | 32.82 | 10.886 | 29.97 | 9.925 | 0.088 | 34.56 | 12.300 | 35.33 | 8.675 | 0.798 |
| Left ventricular ejection fraction | 56.47 | 9.826 | 52.71 | 11.862 | 0.014 | 60.33 | 7.467 | 57.89 | 4.285 | 0.315 |
| Right ventricular end-diastolic area | 30.156 | 9.682 | 32.832 | 10.703 | 0.002 | 25.644 | 6.485 | 28.556 | 7.230 | 0.101 |
| Left atrium diameter | 3.475 | 0.5082 | 3.725 | 0.6174 | 0.014 | 4.178 | 0.8121 | 4.033 | 0.5958 | 0.608 |
| Right atrium short diameter | 4.125 | 0.7825 | 4.572 | 1.305 | 0.008 | 4.500 | 1.272 | 4.338 | 0.6323 | 0.722 |
| Right atrium long diameter | 4.941 | 0.7098 | 5.409 | 1.132 | 0.002 | 5.650 | 0.7464 | 5.625 | 0.8430 | 0.918 |

**Conclusions.** There is a strong association between echocardiographic progression of ARVC phenotype and the presence of a pathogenic mutation. Such mutations should be searched in all patients with an ARVC phenotype, and mutation positive individuals should be followed-up in shorter.

## IMAGING – 3
## Sessione Orale

### A324: ADDITIONAL PROGNOSTIC IMPACT OF FEATURE-TRACKING RIGHT VENTRICULARGLOBAL LONGITUDINAL STRAIN IN NON-ISCHEMIC CARDIOMYOPATHY

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**Background.** Left ventricular global longitudinal strain (GLS) by cardiac magnetic resonance feature tracking (CMR-FT) analysis, has shown an incremental prognostic value compared to classical parameters in non-ischemic cardiomyopathy (NICM). However, nothing is known about the role of Right Ventricular (RV) GLS.
**Objectives.** To evaluate the prognostic impact of RV-GLS by CMR-FT analysis, in a large population of NICM patients.
**Methods.** In this multicenter study, we examined NICM patients evaluated with a comprehensive CMR-FT study. Major cardiac events (MACEs) were considered as the study outcome measure and were defined as a composite of (a) cardiovascular death, (b) cardiac transplant, (c) destination therapy ventricular assist device, (d) implantable cardiac defibrillator appropriate intervention and (d) hospitalization for life-threatening ventricular arrhythmias. C-statistics and net reclassification index (NRI) were used to calculate the possible additional effect of RV-GLS to standard evaluation.
**Results.** We enrolled 273 patients (men 66%, median age 51 years; median left ventricular ejection fraction [LVEF] 34%). During a median follow-up of 39 months, 41 patients (15%) experienced MACEs. LV late gadolinium enhancement and RV-GLS emerged as the strongest prognostic CMR-FT variables: their association provided an estimated 5-year MACEs rate of 37%. The addition of RV-GLS to the CMR-FT evaluation significantly improved the prognostic accuracy in predicting MACEs at 5 years with respect to the clinical-echocardiographic model (NRI of 27%, p=0,02). By receiver operating characteristics (ROC) analysis, -19.1% emerged as the most accurate prognostic cut-off for RV-GLS. After adjustment for LVEF, RVEF and LV-GLS, RV-GLS >-19,1% remained associated to significant higher rates of MACEs.
**Conclusions.** RV-GLS showed an independent and incremental value with respect to classical prognostic parameters in reclassifying the risk of MACEs of NICM patients.

### A325: WHEN THE HEART MAKES BIZARRE JOKES

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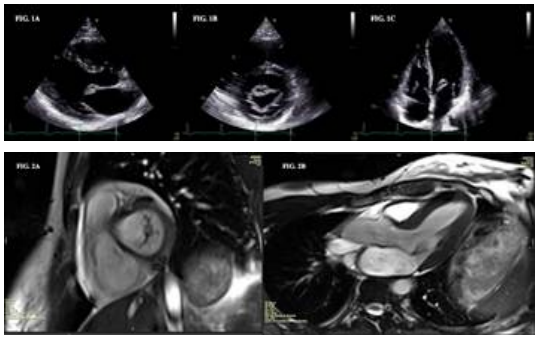
**Introduction.** Blood cysts are congenital and benign tumours of the heart endothelium, located more frequently on atrioventricular valves. They are mainly identified in the first month of life and in children because they tend

to spontaneously regress with age. Blood cysts are usually asymptomatic in adults and have often been discovered incidentally during routine echocardiographic evaluation. Although their benign histological nature, blood cysts could determine ventricular obstruction, valvular regurgitation, ventricular dysfunction and systemic embolism.
**Case description.** A 23-year-old girl was referred to emergency room for atypical chest pain. No cardiovascular risk factors, familiarity for cardiovascular diseases or drug use were reported. Physical-examination was unremarkable. Electrocardiogram and cardiac biomarkers (Troponin I) were normal. A transthoracic echocardiography revealed a small, non-echogenic, rounded mass (7 x 11 mm) with a thin wall attached to the anterior mitral valve leaflet (Fig. 1) and a cleft in the posterior mitral valve leaflet. Doppler imaging demonstrated a minimal mitral valve regurgitation without turbulence in the left ventricular outflow tract. Biventricular dimensions and systolic function were normal (left ventricular ejection fraction 60%). Cardiac magnetic resonance imaging confirmed the presence of mass and its location on the atrial surface of the anterior mitral valve leaflet (Fig. 2) without evidence of valve dysfunction. On steady-state free precession imaging the mass showed a homogeneous isointense signal in comparison with myocardium. After the contrast injection, the mitral lesion didn't present late gadolium enhancement, suggesting a cystic nature of mass. Due to the small dimensions of the mass and the poor clinical manifestation, a conservative approach was preferred and an echocardiographic follow-up was suggested.
**Conclusions.** The present case highlighted the crucial role of echocardiography in the evaluation of valvular mass, in order to its high temporal and spatial resolution. Cardiac MRI is fundamental to give additional information about size, anatomical relationship and tissue characterization of the valvular mass. Although there is not an acknowledged consensus for the treatment of cardiac blood cyst, it's Author opinion that conservative approach could be the better choice for small mass in patients with normal cardiac function. Surgical treatment should be considered only in case of symptoms, valve and ventricular dysfunction.



### A326: LEFT VENTRICULAR SYSTOLIC AND DIASTOLIC FUNCTION IN UNCOMPLICATED TWIN PREGNANCIES: A LONGITUDINAL SPECKLE-TRACKING ANALYSIS

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**Objectives.** During pregnancy profound hemodynamic changes occur. There is scarce information available about maternal left ventricular function during twin pregnancies. The aim of this study is to evaluate longitudinal changes in maternal left ventricular function in a series of women carrying uncomplicated twin pregnancies, compared to singleton ones, and whether they depend on multi-foetal pregnancy and/or weeks' gestation.
**Methods.** 30 women experiencing an uncomplicated twin pregnancy and 30 with an uncomplicated singleton pregnancy were prospectively enrolled and underwent echocardiography at first (T1), second (T2) and third trimester (T3). Left ventricular (LV) dimensions and volumes, ejection fraction (LVEF), mass (LVM) and diastolic parameters at transmitral pulsed wave Doppler and mitral annular plane tissue Doppler were calculated. In addition, speckle-tracking imaging was applied to evaluate LV global longitudinal (GLS), radial and circumferential 2D strains.
**Results.** LV dimensions, volumes and LVM tended to increase from T1 to T3 in both groups, while LVEF remained stable. LV remodeling/hypertrophy regarded 50% of women at T2 and T3. Diastolic function tended to worsen from T1 to T3 in both groups, with higher LV filling pressure (i.e., E/E') at T2 for twins vs singletons. No differences were found between the two groups at each trimester for the three 2D strains. Moreover, we did not find differences across the trimesters for each 2D strain, except for a linear trend to increase (i.e., worsen) for GLS in singletons. Radial and circumferential 2D strains were impaired in about half or more women at each trimester, while GLS was altered in one-fourth to one-third of them.
**Conclusions.** Left ventricular geometry, dimension and function are significant impaired during pregnancy, in particular in the second half, without significant differences among twins and singletons.

### A327: PROGNOSTIC VALUE OF FIBROSIS AMOUNT AND LOCALIZATION ASSESSED BY CARDIAC MAGNETIC RESONANCE IN PATIENTS WITH NON ISCHEMIC DILATED CARDIOMYOPATHY

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**Background.** Myocardial fibrosis detected with cardiac magnetic resonance (CMR) has emerged in recent years as an important prognostic value in patients (pts) with heart failure (HF).
**Purpose.** To evaluate the prognostic role of myocardial fibrosis amount and localization in pts with non ischemic dilated cardiomyopathy (DCM) and left ventricular systolic dysfunction.
**Methods.** We enrolled retrospectively pts suffering from DCM with left ventricular ejection fraction (LVEF) ≤45% underwent CMR with administration of paramagnetic contrast agent followed at our HF Department from January 2012 to December 2016. We evaluated demographic, laboratory, therapeutic and imaging parameters (left and right ventricular ejection fraction, myocardial mass, presence of late gadolinium enhancement (LGE), LGE localization, number of LGE segments). The composite endpoint was death from any cause and hospitalization for cardiovascular (CV) causes or HF.
**Results.** We enrolled 184 pts (69% male, mean age 56 ± 12 years). 90 pts (49%) showed left ventricular LGE. Table 1 shows the parameters that were predictive of events at univariate analysis. At multivariate analysis, only the presence of LGE confirmed its prognostic value (HR 8,009; IC 95% 2,504–25,621; p=0,0001). With the increase in the number of LGE segments there was a significant trend of worsening of the prognosis (p=0.03). In particular, the presence of more than 3 LGE segments was associated with a worse outcome (HR 1.3, IC 95% 1.16-2.02, p=0.008). The localization at basal septum was associated with an increased risk of events, especially arrhythmias, compared to the other localizations.
**Conclusions.** The amount and localization of myocardial fibrosis are independent predictors of death and CV and HF hospitalization in pts affected by DCM and may allow early detection of pts at high risk of poor prognosis, needing more aggressive treatment and closer follow-up visits.

**Table 1.** Univariate analysis for the composite endpoint.

| | Total (184) | Events (85, 46%) | No events (99, 54%) | p value |
|---|---|---|---|---|
| Age, years | 55±15 | 57±14 | 53±16 | 0.05 |
| Diabetes, n (%) | 41(23) | 28(33) | 14(14) | 0.03 |
| Chronic kideny disease, n (%) | 23(13) | 18(21) | 6(6) | 0.02 |
| Atrial fibrillation, n (%) | 48(27) | 30(36) | 19(19) | 0.05 |
| Left ventricular ejection fraction, % | 35±10 | 32±9 | 39±10 | 0.0008 |
| Right ventricular ejection fraction, % | 44±11 | 41±12 | 46±10 | 0.005 |
| Myocardial mass, g | 146±47 | 164±52 | 133±39 | 0.001 |
| LGE, n (%) | 87(49) | 49(58) | 40(40) | <0.0001 |

### A328: ULTRASOUND INDICES OF CONGESTION IN PATIENTS WITH ACUTE HEART FAILURE ACCORDING TO BODY MASS INDEX

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**Background.** The inverse relationship between body mass index (BMI) and natriuretic peptide levels complicates the diagnosis of heart failure in patients who are obese. Assessment of congestion with ultrasound could facilitate HF diagnosis but it is not known if any relationship between BMI, inferior vena cava (IVC) diameter and number of B-lines, exists.
**Aims and methods.** We studied the relationships among IVC diameter, B-lines, BMI and outcome in patients admitted with heart failure (AHF).
**Results.** Amongst 216 patients with AHF (median age 81 [77-86] years), the median number of B-lines was 31 (IQR: 26-38), median IVC diameter was 23 (22-25) mm and median BNP 991 (727-1601) pg/ml. BMI was inversevely correlated with B-lines (r= -0.50, p<0.001), but not with IVC diameter (r=-0.04, p-0.58). Compared to patients overweight (BMI 25-29.9 kg/m$^2$; n=100) or with a normal BMI (BMI<25 kg/m$^2$; n=59), obese patients (BMI≥30 kg/m$^2$; n=57) had lower B-lines (30 (26-35) vs 38 (32-42) vs 28 (24-33), respectively; p<0.001) but similar IVC diameter. During the first 60 days of follow up, there were 53 primary events; 29 patients died and

24 had a heart failure related hospitalisation. B-lines and IVC diameter were indipendently associated with an increased risk. However, B-lines were less likely to predict outcome in the subgroup of patients with a BMI≥30 kg/m$^2$.

**Conclusions.** Assessment of IVC diameter or B-lines in patients admitted with acute heart failure identifies those at greater risk of death or HF readmission. However, assessment of B-lines might be influenced by BMI.

### A329: DIAGNOSTIC ACCURACY OF CARDIAC COMPUTED TOMOGRAPHY AND F-FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAPHY IN THE IDENTIFICATION OF CARDIAC MASSES

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**Background.** Understanding the nature of cardiac masses represents a challenge for clinicians in order to select the appropriate therapeutic strategies. In the presence of a suspected cardiac mass, echocardiography is the first-line imaging modality and cardiac magnetic resonance may provide additional information. The diagnostic accuracy of cardiac computed tomography (CT) and $^{18}$F-fluorodeoxyglucose ($^{18}$F-FDG) with positron emission tomography/CT ($^{18}$F-FDG PET/CT) findings in identifying the nature of cardiac masses has not been evaluated in a large population before.

**Purpose.** To evaluate the diagnostic value of CT and $^{18}$F-FDG PET/CT in defining the nature of cardiac masses, integrating morphologic features and metabolic activity.

**Material and methods.** Out of 223 patients with an echocardiographic suspicion of cardiac mass, we selected a final cohort of 60 patients which underwent to CT scan and $^{18}$F-FDG PET/CT (completed within 3 months of CT examination). All masses had histological certain obtained either by endomiocardial biopsy or surgical removal, apart from thrombi, in which the diagnosis was defined as radiologic resolution of the lesion after adequate anticoagulant treatment. Based on the histopathologic diagnosis, 20 patients had benign cardiac masses (8 primary cardiac benign tumours and 12 pseudo-tumours) and 40 patients' malignant cardiac masses (18 primary malignant cardiac tumours and 22 cardiac metastases). For each mass, eight morphologic CT signs and standardized uptake value ($SUV_{max}$, $SUV_{mean}$), metabolic tumor volume (MTV) and total lesion glycolysis (TLG) in $^{18}$F-FDG PET, were evaluated.

**Results.** Seven specific cardiac CT signs - irregular tumour margins, pericardial effusion, invasions, solid nature of the mass, mass diameter, TC contrast up-take and pre-contrast characteristics were strongly associated with the malignant nature of cardiac masses ($p < 0.001$). Only the presence of calcification did not discriminate the nature of the cardiac masses ($p=0.2$). Additionally, the presence of at least four CT signs was able to discriminate malignancies, with sensitivity of 95% and specificity of 95% at this threshold (CI 0.969-1). The mean value of $SUV_{max}$, $SUV_{mean}$, MTV and TLG was significantly higher in malignant cardiac masses than in benign lesions ($p < 0.001$). Among patients with benign masses, patients with a primary cardiac tumour had lower $SUV_{max}$, $SUV_{mean}$, MTV and TLG as compared to the pseudo-tumor group although the difference was not statistically significant. Similarly, in patients with malignant cardiac masses the metabolic tumor indices measured by 18 F-FDG PET/CT scan did not differ between malignant cardiac tumors and cardiac metastasis. Concerning the diagnostic accuracy of SUV, MTV, and TLG in 18F-FDG PET/TC in detecting malignant lesions, ROC analysis indicated an excellent performance of SUV (AUC=0.948, 95% CI 0.891-1) and of the other two parameters (MTV AUC=0.928, 95% CI 0.841-1; TLG AUC=0.961, 95% CI 0.902-1). The optimal threshold for these parameters was ≥4.9 for SUV, ≥29 for TLG and ≥8.2 for MTV.

**Conclusions.** In patients with cardiac masses, cardiac computed tomography and $^{18}$F-FDG PET/CT findings provide independent and incremental prognostic information regarding their nature. A systematic use of CT and $^{18}$F-FDG PET/CT is therefore useful for diagnostic and therapeutic purposes.

## INTERVENTISTICA CORONARICA: VECCHI ALLEATI E NUOVE PROMESSE
## Sessione Orale

### A330: SPONTANEOUS CORONARY ARTERY DISSECTION AND INTRACRANIAL ANEURYSM: MERE COINCIDENCE OR UNUSUAL CASUAL RELATIONSHIP?

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Spontaneous coronary artery dissection (SCAD) is considered a cause of acute coronary syndrome (ACS), myocardial infarction and sudden cardiac death. SCAD is an intramural hematoma of the coronary artery that creates a false lumen and can obstruct coronary perfusion distal to the lesion. SCAD affects women in >90 % of cases and represents 2–4% of acute coronary syndromes. Recently, an association between spontaneous dissection of the coronary arteries and other extra-coronary vascular abnormalities (EVAs), such as dissections and aneurysms, irregularities, and/or tortuosity, has been described. We present the case of a 42-years-old man admitted to our emergency department with chest pain. He was a smoker without other cardiovascular risk factors. The laboratory tests showed an increase of high-sensitivity cardiac troponin (2403.7 ng/L). The coronary angiography didn't show significant coronary atheromasia. In suspicion of SCAD, he underwent to cardiac CT–scan which confirmed the presence of proximal left anterior descending (LAD) dissection. Considering the persistence of chest pain, patient underwent direct stenting of the proximal tract of LAD with self-expanding stent 3.0-3.5 x 27 mm, and direct stenting of the middle tract with conventional stent 3.0 x 12 mm. The final angiographic result was with TIMI 3 flow, in the absence of rhyme of dissection. Then, the patient was discharged with appropriate medical therapy (PPI, β-blockers, clopidogrel, aspirin, ACE-I, atorvastatin). Because of the risk of other EVAs and considering the age of the patient, we decided to perform a cerebral angio-MRI, which documented intracranial aneurysm at the level of the anterior communicant with diameter of 3 mm., confirmed at a subsequent angio-TC.

As in our case, recently, EVAs have been found in the screening of some SCAD patients. However, it is still not known if these associations are related to a systemic arterial disorder that underlie SCAD.

### A331: 5-YEAR OUTCOMES AND PREDICTORS OF EVENTS IN A SINGLE-CENTER COHORT OF PATIENTS TREATED WITH BIORESORBABLE CORONARY VASCULAR SCAFFOLDS

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**Aims.** To report 5-year outcome data of patients treated with coronary bioresorbable scaffolds.

To investigate predictors of adverse events between 4-5 years after implantation.

**Methods and Results.** 512 consecutive patients (62 (54-73) years, 79% males, 20% diabetics, 68% acute coronary syndromes) who were treated in a total of 598 lesions with at least one coronary bioresorbable scaffold (BRS, Abbott Vascular, Santa Clara, USA)) between May 2012 and May 2014 were enrolled. Clinical/procedural characteristics and outcome data at 1868(1641-2024) days were collected. A total of 30 scaffold thromboses (ScT), 42 scaffold restenoses (ScR) and 92 target lesion failures (TLF) were reported. The Kaplan-Meier rate of ScT was 3.6% in the first year, 1.7% and 0.5% in the second and third year, and 0% and 0.6% in the fourth and fifth year after implantation. The corresponding incidence of TLF was 8.8%, 6.1%, 2.0%, 1.7% and 2.1%. Procedural parameters (vessel size, scaffold footprint) and the technique used at implantation (including predilation, parameters of sizing, and postdilation) were predictors of ScT and TLF in the first three years after implantation. In contrast, in Multivariate Cox regression analysis, only diabetes was predictive of events between 4-5 years (HR 6.21[1.99-19.40], P=0.002).

| Max footprint | HR | p |
|---|---|---|
| 1 year | 1.06(1.04-1.08) | <0.0001 |
| 2-3 years | 1.09(1.06-1.11) | <0.0001 |
| 4-5 years | 1.03(0.96-1.11) | 0.40 |
| **Optimal implantation** | **HR** | **p** |
| 1year | 0.44 (0.22-0.88) | 0.02 |
| 2-3 years | 0.34(0.17-0.66) | <0.01 (0.007) |
| 4-5 years | 0.91 (0.30-2.74) | 0.86 |
| **RVD<2.5mm** | **HR** | **p** |
| 1 year | 1.99(1.03-3.86) | 0.04 |
| 2-3 years | 2.17 (1.05-4.50) | 0.04 |
| 4-5 years | 1.03(0.23-4.60) | 0.97 |
| **RVD>3.5mm** | **HR** | **p** |
| 1 year | 1.13(0.48-2.67) | 0.78 |
| 2-3 years | 2.33(1.06-5.12) | 0.04 |
| 4-5 years | 0.64(0.08-4.89) | 0.67 |

**Conclusions.** After resorption of the device, the incidence of very late adverse events in lesions/patients implanted with a BRS decreases to rates comparable to those observed in metallic stents. Procedural and device-related parameters are not anymore predictors of events.

### A332: ARE POLYMER-FREE DES SUPERIOR TO BIODEGRADABLE POLYMER DES?

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**Background.** The polymer of drug-eluting stents (DES) has been associated with inflammation, neoatherosclerosis and incomplete stent endothelialisation. The superiority of polymer-free (PF) DES over biodegradable-polymer (BP) DES has never been proven.
**Methods and Results.** PF biolimus-eluting stents (BES) and BP sirolimus-eluting stents (SES) were investigated in two recent multicenter registries including 2764 all-comer patients undergoing percutaneous coronary interventions (PCI) at 21 Italian centers. Using propensity score matching, safety and efficacy outcomes were compared among 1914 patients (957 matched pairs) treated with PF-BES or BP-SES. The primary endpoint was target-lesion failure (TLF) – a composite of cardiac death, target-vessel myocardial infarction (TV-MI) and target lesion revascularization (TLR). At 1 year, TLF occurred in 4.1% of PF-BES and 4.4% of BP-SES-treated patients (HR 1.11, 95%CI 0.72-1.72). Risks of cardiac death (2.3% vs. 1.8%, HR 0.79, 95%CI 0.42-1.50), TV-MI (1.0% vs. 1.5%, HR 1.43, 95%CI 0.63-3.21), TLR (1.6% vs. 2.7%, HR 1.79, 95%CI 0.95-3.37), and definite/probable stent thrombosis (1.8% vs. 2.0%, HR 1.13, 95% CI 0.59-2.18) were comparable in patients treated with PF-BES and BP-SES.
**Conclusions.** The present study shows that PF-BES and BP-SES have favorable and comparable safety and efficacy profiles in all-comer patients undergoing PCI. Further evaluation in large-scale, randomized trials are necessary to confirm our findings.

### A333: ATHEROSCLEROTIC DISEASE PROGRESSION PRECEDING THE OCCURRENCE OF ACUTE CORONARY SYNDROME IN PATIENTS WITH PLAQUE RUPTURE VS. PLAQUE EROSION: AN ANGIOGRAPHIC AND OPTICAL COHERENCE TOMOGRAPHY STUDY

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**Background.** Plaque rupture (PR) and plaque erosion (PE) are the two most frequent pathogenic mechanisms at the basis of acute coronary syndrome (ACS). The atherosclerotic disease progression preceding the occurrence of ACS in these two groups of patients remains unknown.
**Methods.** We retrospectively identified 34 patients with ACS who underwent coronary angiography and optical coherence tomography (OCT) imaging of the culprit lesion, and had received at least one prior coronary angiography before the acute event. Based on the OCT characteristics of the culprit plaque, patients were divided into two groups: PR (n=16) and PE (n=18). Atherosclerotic disease severity, as well as progression, were assessed using the Bogaty and Gensini angiographic scores and by quantitative coronary angiographic analyses.
**Results.** At baseline, patients with PR showed a greater atherosclerotic disease severity compared to patients with PE (Bogaty score: 0.47 ± 0.41 vs. 0.20 ± 0.27, p=0.030). In addition, atherosclerotic disease progression was significantly higher in patients with PR than in those with PE as assessed by both the Bogaty and Gensini scores (Δ Bogaty score: 0.63 ± 1.13 vs. 0.08 ± 0.08, p=0.049; Δ Gensini score: 14.3 ± 15.7 vs. 4.1 ± 5.3, p=0.014). At the culprit lesion analysis, PR occurred at sites previously characterized by a lower stenosis severity (diameter stenosis ≤30% in 75% of cases), as opposed with PE which predominantly occurred at sites with a previous greater stenosis severity (diameter stenosis >30% in 61% of cases, p=0.034).
**Conclusion.** The present study suggests that patients with PR and PE may have distinct atherosclerotic disease progression pathways before causing an ACS. The prognostic and potential therapeutic implications of these observations need to be investigated in future studies.

### A334: PERCUTANEOUS CORONARY INTERVENTION WITH AGENT PACLITAXEL-COATED BALLOON: A REAL-WORLD MULTI-CENTRE EXPERIENCE

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**Aims.** The AgentTM paclitaxel-coated balloon is a new drug-coated balloon (DCB), with limited real-world available data. Our study sought to assess the safety and efficacy of this new paclitaxel-coated balloon during percutaneous coronary intervention (PCI) in different coronary lesions types in a prospective, registry.
**Methods and Results.** All comers patients undergoing PCI with use of AgentTM DCB in 3 italian centres between September 2014 and March 2018 were included in this registry. Major adverse cardiac events (MACE) were defined as the composite of cardiac death, recurrent non-fatal myocardial infarction (MI) and target lesion revascularization (TLR). DCB procedural lesion success was also evaluated. Among 354 patients (with 450 lesions treated with 508 DCBs) included in the registry, AgentTM DCBs were used for the treatment of in-stent restenosis, small vessel disease, bifurcation lesions and "stent-like result" (SLR) lesions obtained after balloon pre-dilatation in 34%, 29%, 26% and 11%, respectively. The implant of Agent DCBs was safe and with a high DCB lesion success (92%). 1-year MACE occurrence estimate was 5.7% (TLR 4.0%, MI 3.8%, cardiac death 2.1 %).
**Conclusions.** The use of AgentTM DCB during PCI appears safe and effective in a large real-world registry.

### A335: IMPACT OF DRUG ELUTING STENT ON LEFT VENTRICULAR WALL MOTION AFTER SUCCESSFUL REPERFUSION OF FIRST ANTERIOR STEMI

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**Background.** Timely myocardial reperfusion, using primary percutaneous coronary intervention (pPCI) is considered the most efficacious option to prevent the development of left ventricular (LV) dysfunction after myocardial infarction (MI). It is still unclear whether the beneficial effects of drug-eluting stents (DES) over bare-metal stents (BMS) might also rely on an positive impact on LV function recovery after MI. The purpose of this study was to evaluate whether BMS and DES differently affect the recovery of LV function in patients with ST-elevation acute anterior MI (STEMI).
**Methods.** A total of 103 STEMI patients were retrospectively analyzed. All patients had single vessel disease with culprit lesion on the left anterior descending coronary artery. Patients were categorized in: DES group (n= 67) and BMS group (n=36). Changes in LV contractility were assessed by trans-thoracic echocardiogram by the percent increase in LV kinetic segments. Follow-up visits were performed between 6 and 12 months after hospital discharge.
**Results.** In patients treated with DES, LV segments with normokinesia, hypokinesia, dyskinesia, and aneurism increased by 108%, 3%, 100% and 180%, respectively. Akinetic segments decreased by 28%. In patients treated with BMS, LV segments with normokinesia, hypokinesia, dyskinesia and aneurism increased by 50%, 20%, 3% and 0%, respectively. Akinetic segments decreased by 14%. LVWMSI significantly improved in patients treated with DES (1.95±0.25 vs 1.78±0.38, p< 0.05), while it remained unchanged in those treated with BMS (2.09±0.21 vs 1.98±0.33, p=ns).
**Conclusions.** DES compared with BMS is associated with a favorable impact on LV regional contractility.

## CARDIOPATIA ISCHEMICA – 2
## Sessione Orale

### A336: RELATIONSHIP BETWEEN THE FIRST MEDICAL CONTACT AND REPERFUSION TIME IN THE STEMI PATIENTS

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The guidelines for the management of patients presenting with acute myocardial infarction with ST-segment elevation (STEMI) recommend the organisation of a STEMI network with the aim to reduce the time between the first medical contact and the time of reperfusion. Treatment delays are the most easily audit and index of quality of care in STEMI patients; they should be recorded in every system providing care to STEMI patients and be reviewed regularly, to ensure that simple quality of care indicators are met and maintained over time. The aim of our study was to verify in our center whether myocardial reperfusion therapy was performed within the times suggested by the latest STEMI ESC guidelines.

**Methods.** We evaluated 922 STEMI patients, consecutively admitted at our CCU from 1st January 2008 to 31th March 2019. For each patient we evaluated the time of symptoms onset, time of first medical contact and the time of reperfusion (identified as the moment of restoring flow in the culprit coronary): thus we calculated as performance indicators pain-to-ECG time (PTCEG), door-to-ballon time (DTB), first medical contact (FMCTB) and total ischemic time (TIT).

**Results.** The population was divided in 3 categories: patients arrived with the Emergency Medical System (EMS, 523 patients, 56,7%, group 1); patients admitted in the Emergency Room of our HUB centre (237 patients, 25,7%, group 2); patients transferred by other territorial hospitals/ SPOKEs centers (162 patients, 17,6%, group 3). In the Table we have reported the median time of performance indicators for each group. All the median of principal time interval are significantly reduced in EMS group. Considering a FMCTB time < 90 minutes as an important indicator of good adherence to guidelines, 49.4% of group 1 patients, 45,8% of group 2 and only 16,3% of group 3 patients have obtained this result.. However, we observed a significant increase in percentage of patients with FMCT<90 over the time in EMS group patients. (from 20.8 in the 2008 to 71.4 in the 2019, p<0.0001). Patients with a FMCTB < 90 showed less intrahospital mortality (2.2% vs 4.4%,p=0.033). At multivariate analysis, the age under 75 years, the access with EMS and/or ER, and the arrival at the hospital during the regular hours were independent predictors of a FMCTB < 90 minutes.

| | EMS | ER HUB centre | Spokes Centers | Totale | p value |
|---|---|---|---|---|---|
| PTCEG | 71 (45-120) | 128,5 (75,3-196) | 114,5 (71-222) | 94 (53-164) | <0,0001 |
| DTB | 44,0 (32-59) | 90 (72,3-121,8) | 134,5 (95-183) | 62 (40-101) | <0,0001 |
| FMCTB | 90 (73-110) | 92 (74,3-127) | 136 (102-183,8) | 95 (76-128) | <0,0001 PTCEG) |
| TIT | 170 (135-235) | 234 (172-324) | 277,5 (210,3-411,8) | 202 (147-280) | <0,0001 |

**Conclusions.** Measurement of quality indicators of care in a large population of patients with STEMI allows to detect the most important critical issues in the treatment of reperfusion therapy. In our study, the important role of a network for the management of STEMI is confirmed. The pre-hospital diagnosis by EMS enabled improved reperfusion times, thanks to the implementation of specific protocols that allow direct access into the cath-lab to perform an immediate reperfusion therapy with primary angioplasty.

### A337: ISCHEMIC HEART DISEASE AND GENETIC POLYMORPHISMS IN THE CROSS-TALK BETWEEN MYOCARDIAL METABOLISM AND CORONARY FLOW

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**Background.** Ischemic heart disease (IHD) is classically associated with coronary artery disease (CAD) and conventional cardiovascular risk factors. However, IHD may exhibit in absence of CAD too, underlying the importance to better understand the coronary blood flow regulation mechanisms and the pathophysiological basis of their dysfunction, such as the presence of genic variants. Among these, there are ion channels, which act mainly in the microcirculation. Recently, we reported the correlation between some single nucleotide polymorphisms (SNPs) of ion channels genes and the presence of IHD, independently from the presence of conventional cardiovascular risk factors. The goal of this study is to confirm the results of the previous study on a bigger population and discover new SNPs of ion channels genes which may be associated with IHD.

**Methods.** A prospective, observational, single-center study was conducted on patients who were candidates for coronary angiography. Genetic polymorphisms relative to KCNJ11 encoding for the Kir6.1 and Kir6.2 subunits of K-ATP channels and KCNE1 encoding for the MinK subunit of IKs channels were analyzed.

**Results.** 603 consecutive patients (G1: 409; G2:76; G3:118) were enrolled in this study. Genetic analysis showed for the three groups a statistically significant difference about the SNP S38G of KCNE1 (p=0.001) and rs5215, rs5218, rs5219 of KCNJ11 (p<0.0001), as well as comparing G1-G3 (S38G p=0.006; rs5215, rs5218 and rs5219 p<0.0001). Regarding G1-G2 we confirmed differences only for rs5215 (p<0.0001), rs5218 (p=0.005) and rs5219 (p=0.024), while regarding G2-G3 we found differences for S38G, rs5215 e rs5219 (p<0.0001). A multivariate analysis was performed and highlighted that the SNP rs5215_GG of KCNJ11 may represent an IHD independent protective factor (p<0.0001; OR: 0.036; 95.0% CI: 0.018-0.069).

**Conclusion.** These results confirm the importance of genetic susceptibility and the role of SNPs of ion channels genes in the determinism of IHD, independently from the conventional cardiovascular risk factors. Moreover, these results may represent a future perspective for a genic therapy for IHD.

### A338: RIGHT VENTRICULAR FUNCTION IN ANTERIOR MYOCARDIAL INFARCTION: A SPECKLE TRACKING ECHOCARDIOGRAPHY STUDY

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**Background.** right ventricular dysfunction in anterior acute myocardial infarction (AMI) is an independent predictor of major adverse events although there are only a few studies in literature. Echocardiography is routinely used to assess ventricular function. Speckle Tracking Echocardiography (STE) could be used to assess subclinical right ventricular dysfunction.

**Purpose.** The aim of this study was to assess right venticular dysfunction in anterior AMI comparing the traditional echocardiographic parameters with STE data; to determine the prognostic role of the right venticular dysfunction in patients with anterior AMI.

**Methods.** We enrolled 44 patients (mean age 55; M:F=4:1) admitted for Acute Coronary Syndrome (ACS) due to an isolate occlusion of Left Anterior Descendent artery (LAD). Echocardiographic and STE parameters were measured within 72 hours of anterior IMA diagnosis (T0) and 3 months after the coronary revascularisation (T1). The occurrence of adverse events was verified after 6 months (T2) (chest pain, acute heart failure and re-hospitalization). Patients were compared with a control group of 22 healthy subjects.

**Results.** No significant differences in right ventricular function indexes were found between patients with anterior AMI and control group patients at T0 (TAPSE 23±3 e 24±4; RVFAC% 42±9 e 43±8). Conversely, STE analysis assessed a significant reduction of the strain of the right ventricular free wall in patients with AMI diagnosis at T0 (−15.2± 4.6 e −22.5± 4.4 p-value= 0,001) with a greater reduction in mid (−15.7±6.6 e −22.1±5.7) and apical (−11.6±5.4 e −21.5±5.2) segments. To verify the "Ventricular Interdependence" we compared the EF with the right ventricular strain and a strongly positive correlation was observed between the right ventricular strain and EF of the left ventricle (Pearson's Coefficient R = 0.738; p <0.001). The patients with anterior AMI were divided into 2 groups based on the presence of right ventricular dysfunction detected by STE (strain cut off =-19%) to assess the prognostic role of the right ventricular strain. We found that 22% of patients with normal right ventricular strain results in adverse events at follow up, while the 56% of patients with reduced strain results in adverse events. The univariate analysis showed a statistically significant association between the presence of right ventricle involvement assessed by STE and the adverse events observed during follow-up (odds ratio, 15.8).

**Conclusions.** according to the results of our study, in spite of the apparent normality of the traditional right ventricular function parameters (FAC, TAPSe), in patients with anterior AMI, there is a subclinical dysfunction of the right ventricle that can be detected by using STE. Right ventricular dysfunction is likely to be secondary to left ventricular dysfunction, as a result of "ventricular interdependence." Right ventricular dysfunction correlates with a poorer prognosis. In patients with anterior AMI, right ventricular strain could be used to identify those with higher risk of mortality and re-hospitalization, therefore the routinely use of STE should be encouraged.

### A339: SERUM FREE LIGHT CHAINS PREDICT LEFT VENTRICULAR DYSFUNCTION IN PATIENTS WITH ST ELEVATION MYOCARDIAL INFARCTION

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**Background.** Recent studies have shown a possible role of serum free light chains (sFLC) as a marker of inflammation and a predictor of mortality in patients with chronic heart failure (HF). The potential causes of inflammation in heart failure patients are numerous, including the activation of innate immune responses following tissue injury, neurohormonal activation, oxidative stress, systemic hypoperfusion. However, patients with chronic heart failure often have comorbidities that could increase the concentration of sFLC, such as chronic kidney failure. Therefore, it is unclear whether the increase in sFLC is due to cardiac or kidney disease. The aim of our study is to evaluate the concentration of sFLC in patients with acute heart failure after ST elevation myocardial infarction (STEMI), in the absence of previous kidney failure.
**Materials and Methods.** We evaluated the sFLC in 113 patients with STEMI, who were treated with primary angioplasty in the Cardiology Department of the University Hospital Tor Vergata. Inclusion criteria: patient with acute heart failure after myocardial infarction in the absence of previous cardiovascular diseases. Exclusion criteria: diabetes, haematological diseases, kidney failure. For each patient during hospitalization we have determined blood concentration of sFLC and we also performed an echocardiogram to evaluate cardiac function. Left ventricular ejection fraction (LVEF) was measured by 2-dimensional echocardiography. Reduced systolic function was defined as LVEF <50%. The sFLC measurement was performed using N Latex FLC kit based on a mixture of monoclonal antibodies for use on the BN ProSpec® System analyzer (Siemens Healthcare Diagnostics).
**Results.** We observed that patients with LVEF> 50% had normal sFLC levels. Patients with LVEF <50% had an increase in sFLC. Therefore, depending on the ejection fraction greater or less than 50%, in almost all cases we have verified a correlation with the concentration of sFLC.
**Conclusions.** We have shown, for the first time, that sFLC correlates with left ventricular dysfunction in patients with STEMI and without kidney failure. It can be hypothesized that a reduction of LVEF increases the systemic inflammation and activates the neurohormonal system, such as to increase the FLC. More studies are needed to better understand the role of sFLC in cardiovascular disease.

### A340: PROGNOSTIC DIFFERENCES IN MYOCARDIAL INFARCTION WITH NON-OBSTRUCTIVE CORONARY ARTERIES (MINOCA) DUE TO CORONARY CAUSES VERSUS SUPPLY-DEMAND MISMATCH

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**Background.** Myocardial Infarction with Non-Obstructive Coronary Arteries (MINOCA) is a heterogeneous entity accounting for coronary and non-coronary conditions related to supply-demand mismatch. Clinical and prognostic implications of these two different etiopathological categories are still largely unknown.
**Purpose.** To evaluate the outcomes in patients with MINOCA due to coronary causes (MINOCA-Co) versus extra coronary discrepancy (MINOCA-NCo).
**Methods.** Between 2016 and 2018 we prospectively enrolled all consecutive patients admitted to our Center who fulfilled the diagnostic criteria for MINOCA as proposed by the 2016 ESC Position Paper. According to pre-specified criteria regarding blood pressure, heart rate, haemoglobin level, peripheral oxygen saturation and arterial blood gas, the study cohort was divided into MINOCA-NCo due to discrepancy and MINOCA-Co. We evaluated and compared all-cause and cardiovascular-related mortality as well as re-infarction over a 2-year follow-up period.
**Results.** Among 1093 acute myocardial infarction, we prospectively enrolled 97 patients with MINOCA. Overall, 66% were females and the mean age was 70.2 ± 13.1 years. The median follow-up time was 19.8 ± 4.6 months. MINOCA-Co was the more prevalent entity accounting for 63 (65%) patients while 34 (35%) were MINOCA-NCo. The two subgroups showed similar baseline characteristics and classic cardiovascular risk factors, including diabetes. Peripheral vasculopathy (14.6% vs. 3.9%; *p=0.04)* and chronic obstructive pulmonary disease (29.3% vs. 7,8%; *p=0.002)* were more prevalent in MINOCA-NCo patients compared to others. Analyzing ECG at admission, MINOCA-Co more frequently presented sinus rhythm (91.6% vs 73.5% *p=0.015*) but there was no significant difference regarding the presence of ST-segment elevation (14.3% vs 4.8%; *p=0.25*). Also, no differences were found in mean ejection fraction (*p=0.7*) and troponin values (*p=0.25*). At 2-year follow-up, a total of 11 (11,3%) deaths from all causes was recorded: 4 patients (6.3%) in MINOCA-Co group and 7 patients (20,6%) in MINOCA-NCo group (*p=0.04*). Cardiovascular-related deaths were also more frequent in MINOCA-NCo group (12.1% vs 1.8%; *p=0.04*). Moreover, considering a composite endpoint (all-cause deaths + re-infarction), MINOCA with non-coronary causes still showed a worse outcome at two years (27.3% vs 10.9%, *p=0.04*). Multivariate analysis adjusted for age and sex revealed that the presence of discrepancy was an independent predictor for all-cause deaths and re-infarction (HR 3.31; 95% CI 1.05-10.48; *p=0.04*). As far as therapeutic management is concerned, we found that MINOCA patients were not properly treated. In fact, excluding patients treated with an anticoagulant, 88% of them were treated with an antiplatelet drug and only 64% were in dual antiplatelet therapy (MINOCA-Co: 67% vs MINOCA-NCo: 55%). Similar data were found regarding the administration of statins (prescribed in 71.1% of all population), beta-blockers (75%) and ACE-inhibitors/Sartans (69.7%).
**Conclusions.** Our findings suggest that MINOCA is not a benign condition. MINOCA due to non-coronary causes as a consequence of supply-demand mismatch had the worst outcome (both for all-cause and cardiovascular mortality) compared to MINOCA due to coronary conditions. Patients with MINOCA-NCo had more comorbidities and were also not properly treated. We emphasize that MINOCA due to discrepancy requires even better management and attention during follow-up.

### A341: A PATIENT WITH TWO RARE SIDE EFFECTS TO STATIN THERAPY

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**Introduction.** Statins are a class of drugs whose main adverse effects are drug-induced liver injury (DILI) and myopathy. Some of these may be predictable, due to their pharmacokinetic and pharmacodynamic properties, while others, unfortunately, are idiosyncratic. Liver injury is generally of the mixed type but in this case the patient presented severe acute cholestatic hepatitis. Moreover he had two uncommon adverse drug reactions with two different statins.
**Materials and methods.** We reported a 64 years old caucasian man who was admitted with weight loss, icterus and itch for more than one months. In his medical history there was: primary hypertension, dyslipidemia and previous Acute Miocardial Infarction (percutaneous transluminal coronary angioplasty and stenting of Left Anterior Discedent). Three months before he presented unstable angina and was performed percutaneous transluminal coronary angioplasty and stenting of Right Coronary Artery. The patient was discharged with the following therapy: ticagrelor 90mg bid, omeprazole 20mg od, ramipril 5mg od, bisoprolol 5mg od, acetylsalicylic acid 100mg od, atorvastatin 80mg od. On initial physical examination he showed icterus, hepatomegaly and splenomegaly. Laboratory testing showed an high increase of creatinine 1.39mg/dl, total bilirubin 3.67 mg/dl, conjugated bilirubin 1.93 mg/dl and unconjugated bilirubin 1.74 mg/dl, GOT 153 UI/L, GPT 143 UI/L, Gamma-GT 265 UI/L, LDH 658 UI/L, ALP 542 UI/L; and a normochromic/normocytic anemia (Hb 13.2 g/dl). An initial abdominal Echography showed gallbladder sludge without biliary tract dilation. For a better diagnostic analysis we performed a Magnetic resonance cholangiopancreatography that showed normal morphovolumetrical liver with dysmorphic gallbladder with presence of sludge, without biliary tract dilation. Autoimmune hepatitis and liver infectious diseases are excluded.
**Results.** On the base of suspisious of an iatrogenic etiology, atorvastatin was stopped with a considerable and fast clinical and laboratory improvement. Therefore simvastatin/ezetimibe was introduced. After one week the patient presented muskle pain, fatigue and lab tests showed Acute Kidney Injury with increase of CPK 1347 UI/l, Myoglobin 746.5 ng/ml, and Aldolase 11.3 UI/l. After withdrawal the drug the patient's wellbeing slowly improves and biological features; after two weeks of washout, first introduced Ezetimibe 10mg o.d. and therapy was improved with PCSK9-i (alirocumab 150mg/2weeks). The patient was discharged with diagnosis of: Atorvasrtatin related cholestatic hepatitis and simvastatin induced rhabdomyolysis.
**Conclusions.** This case report provides further evidence that among statins, atorvastatin may be implicated in drug-induced liver injury and simvastatin may be implicated in drug-induced rhabdomyolysis with acute kidney injury.

# MECCANISMI E MARCATORI DELLE MALATTIE CARDIOVASCOLARI
## Sessione Orale

### A342: CLIMATE CHANGES AND STEMI TREATED WITH PRIMARY PCI

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Sebastiano Sciarretta (b), Massimiliano Scappaticci (a),
Ludovica Lanzi (a), Stefano De Angelis (a), Romina Casati (a),
Armando Del Prete (a), Francesco Romeo (c)
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**Background.** The incidence of acute myocardial infarction is influenced in a complex fashion by climate changes. The impact of seasonal changes on this association has been incompletely appraised, especially in the modern era of primary percutaneous coronary intervention (PPCI).

**Objectives.** We aimed to investigate the overall and season-specific impact of climate changes on the daily rate of PCCI.

**Methods.** Details on PPCI and climate changes were retrospectively collected in three high-volume Italian institutions with different geographical features. The association between rate of PPCI and temperature, atmospheric pressure (ATM), humidity and rainfall was appraised with Poisson mixed models, with overall analyses and according to season of the year.

**Results.** Details on 6880 days with a total of 4132 PPCI were collected. Overall adjusted analysis showed that higher minimum ATM 3 days before PPCI were associated with lower risk (regression coefficient=0.999 [95% C.I. 0.998-1.000], p=0.030). Focusing on season, in Winter PPCI rates were increased by lower same day mean temperature (0.973 [0.956-0.990], p=0.002) and lower rainfall (0.980 [0.960-1.000], p=0.049). Conversely, in Spring greater changes in atmospheric pressure 3 days before PPCI were associated with increased risk (1.023 [1.002-1.045], p=0.032), with similar effects in Summer for minimum temperature on the same day (1.022 [1.001-1.044], p=0.040).

**Conclusions.** Climate has a significant impact on the risk of PPCI in the current era, with a complex interplay according to season. Higher risk is expected with lower minimum ATM in the preceding days, lower rainfall in Winter, greater changes in ATM in Spring, and higher temperatures in Summer. These findings have important implications for prevention strategies.

### A343: IMBALANCE BETWEEN INTERLEUKIN-1BETA AND INTERLEUKIN-1 RECEPTOR ANTAGONIST IN EPICARDICAL ADIPOSE TISSUE IS ASSOCIATED WITH ACUTE CORONARY SYNDROMES

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Maddalena Conte (a), Fabrizio Grieco (a), Serena Cabaro (a),
Giusy Ferraro (a), Aurelio Caruso (b), Maria Gabriella Grimaldi (b),
Giuseppe Castaldo (a), Pietro Formisano (a), Valentina Parisi (a)
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**Introduction.** Interleukin-1beta (IL-1β) is involved into atherosclerosis and cardiovascular events and its inhibition has proven cardiovascular benefits. Epicardial adipose tissue (EAT) is a local source of inflammatory mediators directly acting on coronary arteries. In the present study we explored the relationship between systemic and EAT levels of IL-1β and IL-1 receptor antagonist (IL-1ra) and acute coronary syndromes (ACS) in coronary artery disease (CAD) patients.

**Methods.** In 70 patients undergoing coronary artery bypass grafting we obtained EAT biopsies. We measured serum and EAT levels of IL-1β and IL-1ra. On EAT biopsies an immunophenotypic study was carried and the antigen CD86 was studied as a marker of M1 macrophages.

**Results.** Of 70 patients, 31 patients underwent cardiac surgery within 1 week from ACS and was considered as the 'unstable CAD' group. Circulating levels of IL-1β were significantly higher in CAD patients with respect to a control group [7.64 pg/ml (6.86; 8.57) vs 1.89 pg/ml (1.81;2.29); p<0.001]. In contrast, no differences were observed for IL-1ra levels between CAD and controls. Comparable levels of IL-1β were found between 'stable' and 'unstable' CAD [7.6 pg/ml (6.9; 8.7) vs 7.9 pg/ml (7.2; 8.6); p=0.618]. In contrast, significanltly lower levels of IL-1ra were found in 'unstable' compared to 'stable' CAD group [603 pg/ml (334; 1022) vs 274 pg/ml (220; 577); p=0.035]. The 'unstable CAD' group had similar levels of EAT- secreted IL-1β compared to 'stable CAD' group [3.4 pg/ml (2.3; 8.4) vs 2.4 pg/ml (1.9; 8.0); p=0.176]. In contrast, significantly lower EAT levels of IL-1ra were found in unstable vs stable CAD [101 pg/ml (40; 577) vs 1344 (155; 5327); p=0.002].

**Conclusion.** The present study explored, for the first time, the levels of IL-1β and IL-1ra in the serum and EAT of CAD patients with and without recent myocardial infarction. The main finding of the study is that ACS seems to be associated to lower local and systemic leves of IL-1ra, resulting in an enhanced unfavorable activity of IL-1β.

### A344: PROTEOMIC PROFILING OF CORONARY THROMBUS IN ACUTE MYOCARDIAL INFARCTION

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Antonio D'Errico Ramirez (a), Fabio Fulgenzi (a), Carlo De Innocentiis (a),
Maurizio Ronci (b), Ilaria Cicalini (b), Giovanni Di Matteo (b),
Vincenzo De Laurenzi (b), Piero Del Boccio (b), Marco Zimarino (a),
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**Background.** ST-elevation myocardial infarction (STEMI) is primarly caused by the rupture or the erosion of a vulnerable atherosclerotic plaque, initiating with intraluminal thrombosis and resulting in total occlusion of the coronary artery. In the past five decades, the advances in revascularisation procedures and greater use of preventive measures have led to better clinical outcomes and improved survival rates, but morbidity and mortality remain high. In this regard, increasing attention is given to the cellular and molecular composition of coronary thrombus, which is a complex and dynamic process involving flow, blood cells and several plasma proteins, and it is still not completely understood.

**Purpose and Methods.** To define - by proteomic profiling - the composition of occluding thrombus and its changes from the onset of ischemia, we studied a consecutive series of 18 patients with ST-elevation myocardial infarction, in which manual thrombus aspiration was successfully performed during the primary percutaneous coronary intervention (PPCI). Thrombi were categorised by the elapsed time of onset-of-pain-to-PPCI in 2 groups: <3 hours (T1) and >3 hours (T2). We performed two different analysis. First, we examined 10 samples, obtained from 5 patients for each group, as two independent pools. Than we analyzed the remaining collected thrombi as individual samples. Proteomic characterizations were obtained by nano-Liquid Chromatrography Quadrupole Time-of-flight Tandem Mass Spectrometry (nanoLC-QTOF-MS/MS). The acquired data were processed through different statistical analysis to assess the time-related differential expression of the isolated proteins.

**Results.** In the pooled analysis, we identified a total of 717 proteins: 545 were equally represented at T1 and T2, 53 were selectively expressed only in T1, 94 only in T2, 25 were co-expressed but with different modulation in the two groups. On the pooled analysis, proteic patterns implicated in the coagulation cascade and platelet activation were more expressed in T1 than in T2. On the other hand, at T2, proteins involved in immunoregolatory functions and the antiapoptotic process were more represented. On individual samples analysis we identified 5 proteins of particular cardiovascular interest that showed differential expression between the two groups: trombospodin-1 (TSP-1) and its receptor CD47, implicated in immunoregulatory and endothelial functions, z-disk protein (CAPZ), involved in actin filaments stabilization, and profillin-1 (PNF-1), involved in vascular smooth muscle cells proliferation and extracellular matrix organization were expressed at T1. Conversely, fibronectin (FINC), an extracellular matrix protein responsible for cellular adhesion, was more shown at T2.

**Conclusions.** Both TSP1 and CD47 are overexpressed in the first hours after the ischemia. Their interaction impairs the nictric oxide signalling in the endothelial and vascular smooth muscle cells and influences the inflammatory response. Pharmacological modulation of their concentration and interaction may reduce the ischemia-reperfusion injury. CAPZ is more expressed in the younger thrombi and its diminishing concetration over time may point out the ischemic preconditioning of the myocardial tissue. Finally, the decrease in Profilin-1 (PNF-1) levels and the increasing amount of fibronectin (FINC) with time may explain the thrombus organisation and the initiation of the reparative process, respectively.

### A345: MICROBIAL SIGNATURE IN PLAQUE AND GUT IN ACUTE CORONARY SYNDROME: PATHOGENETIC IMPLICATIONS

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Ramona Vinci (a, b), Francesco Canonico (a, b), Alice Bonanni (a, b),
Giulio La Rosa (b), Alessia D'Aiello (b), Pellegrino Ciampi (b),
Giampaolo Niccoli (a, b), Francesco Burzotta (a, b),
Luigi Marzio Biasucci (a, b), Maurizio Sanguinetti (a, b),
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**Background.** Metabolome is the means through which microorganism communicate with different cell types of immune system creating a signaling network. An alteration of gut microbioma and a consequent change in the metabolome, could interfere with cellular homeostasis in adaptive and innate immune system leading to proinflammatory and proatherogenic pathways activation. The influence of gut microbiota on immune system is both bacterial metabolism mediated, as evidenced by the effect of TMAO on cardiovascular risk, and metabolism independent. The last consist of a direct bacterial translocation, from gut to other extra-intestinal sites, such as coronary lesions, promoting a systemic low grade inflammation and a local activation of innate and adaptive immunity.

**Purpose.** The aim of the current study is to explore the presence of bacterial DNA on coronary plaque material obtained from angioplasty balloons during percutaneous coronary intervention (PCI) procedure in patients with stable chronic angina (SA) and acute coronary syndromes (ACS), with or without elevation of the ST segment, STEMI and NSTEMI, respectively.
**Methods and Results.** Angioplasty balloons were obtained, during PCI of the culprit lesion after the first dilatation at high pressure, from ACS (n=30) and SA (n=11) patients. In each patient DNA was isolated from washed plaque material and feces. Samples were subjected to 16S rRNA gene V3–V4 region sequencing by an Illumina MiSeq platform. For sequence analyses, a combination of QIIME and VSEARCH software packages was used to generate a biological observation matrix, analysed using MicrobiomeAnalyst. Taxa analysis was performed using the linear discriminant analysis effect size (LEfSe) method. TMAO levels were measured on serum samples with a UPLC-MS/MS mass spectrometry method. β-diversity analysis in feces showed a different bacterial composition in SA and ACS patients ($p<0.05$). LEfSe analysis, at genus level, highlighted an enrichment of Bacteroides in SA patients ($p<0.05$) and of Prevotella in ACS ($p<0.05$). In contrast, β-diversity analysis in plaques showed a similar bacterial composition in SA and ACS patients, although LEfSe, at genus level, displayed an enrichment of Propionibacterium and Streptococcus among ACS ($p<0.05$) and Corynebacterium, Staphylococcus and Burkholderia in SA ($p<0.05$). β-diversity in all patients showed a different bacterial composition in feces and plaques ($p <0.001$). LEfSe analysis, at phylum level, highlighted an enrichment of Bacteroidetes and Firmicutes in feces and of Proteobacteria and Actinobacteria in plaques ($p<0.05$). Finally, TMAO levels were higher in STEMI as compared to SA and to NSTEMI ($p<0.05$).
**Conclusions.** Our preliminary results indicate, for the first time, feasibility of bacterial DNA amplification on the plaque material obtained from angioplasty balloons demonstrating the presence of bacteria metagenome in coronary plaques. In addition, the abundance of proinflammatory bacterial phyla in the three groups of patients is probably due to the local environment of the atherosclerotic plaques. Further studies will be necessary to understand the mechanism of bacterial translocation and their involvement in plaque instability.

### A346: CD31 MOLECULE: A NOVEL TARGET IN ACUTE CORONARY SYNDROME PATIENTS PRESENTING WITH DISRUPTED CORONARY LESIONS

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**Background.** Antiplatelet therapy is the first-line treatment for Acute Coronary Syndrome (ACS) patients, two-thirds of which are characterized by ruptured lesions (RFC), according to Optical Coherence Tomography (OCT) investigation. Although several progresses have been made in cardiovascular therapeutics, a relevant quote of patients is not adequately responsive to proven pharmacological treatments, especially on long-term period. CD31 is a recognized immunomodulator, but there is currently no information on its pathophysiological function on platelets.
**Purpose.** We investigated monocytes and platelets CD31 expression and its involvement in generation of monocyte-platelet complexes in general population of ACS patients and in patients with ruptured (RFC) and intact fibrous cap (IFC) culprit plaques, at OCT analysis.
**Methods.** We isolated platelets and peripheral blood mononuclear cells (PBMCs) from 70 ACS patients with Non ST-elevation Myocardial Infarction (NSTEMI, of which: 15 RFC and 15 IFC at OCT analysis), 30 SA patients and 20 CTRL individuals. We cultured PBMCs and platelets alone or in a monolayer monocyte-platelet co-culture after treatment with recognized damage and pathogen associated molecular patterns. We tested the differences of monocyte-platelet binding by acquiring the % of CD14+CD42+ cells. We evaluated the CD31 protein expression on basal and cultured cells. Finally, we clustered the obtained data depending on anti-platelet therapies.
**Results.** 1) CD31 protein surface expression on basal monocytes and platelets displays a cell-dependent behavior, being significantly lower on monocytes and, on the opposite, significantly higher on platelets from NSTEMI as compared to those from SA ($p = 0.034$ and $p= 0.005$ respectively) and CTRL ($p = 0.006$ and $p = 0.043$ respectively) (ANOVA for trend: $p = 0.0017$ and $p = 0.012$ respectively); 2) CD31 surface expression might reflect a specific plaque phenotype, with a decreased expression on monocytes from patients with RFC plaque type compared to those with IFC ($p =0.054$, trend). On the other side, CD42+ platelets from patients with RFC plaque displayed significant higher expression of CD31 compared to those with IFC ($p = 0.004$). 3) RFC patients showed a significant increased CD14+ CD42+ binding, particularly in the presence of low molecular weight hyaluronan (LMW-HA), used as dangerous signals, compared to those with an IFC ($p = 0.012$ for LMW-HA stimulation, ANOVA for trend: $p = 0.001$). Of note, CD14+ CD42+ binding decreased after treatment with mAb anti-CD31 ($p = 0.006$ for LMW-HA stimulation, ANOVA for trend: $p = 0.009$). CD31 expression on platelets from NSTEMI seems to be not affected from pharmacological treatments, being higher in patients undergoing dual antiplatelet therapy with ticagrelor ($p= 0.006$ vs SA patients, and $p = 0.029$. vs NSTEMI patients in DAPT with clopidogrel, ANOVA for trend: $p = 0.009$).
**Conclusions.** Our work investigates the role of CD31 in ACS patients, alongside the OCT analysis of the culprit plaque, and demonstrates its role in platelet-monocyte interaction in patients presenting with RFC plaques. Indeed, in RFC patients, this mechanism might contribute to thrombotic plaque burden, and might be not inhibited from common antiplatelet therapy. In the era of precision medicine, these considerations have profound clinical implications, since the distinction of ACS provoked by erosion versus rupture may direct more precision management.

### A347: DEATHS FROM ISCHEMIC HEART DISEASE AND DAYLIGHT SAVING TIME TRANSITIONS: A RETROSPECTIVE ANALYSIS IN THE VENETO REGION OF ITALY

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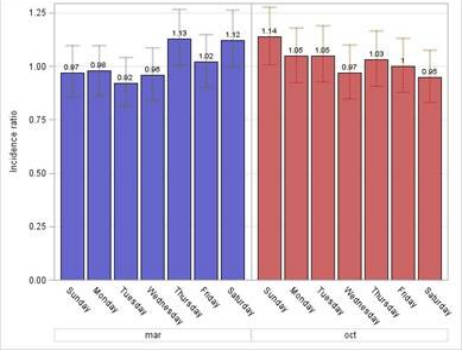
**Background.** An association between Daylight Saving Time transitions (DST) and an increased frequency of acute myocardial infarction (AMI) was first observed in Sweden (Janszky & Ljung N Engl J Med 2008). A meta-analysis of the literature (Manfredini et al, J Clin Med 2019), confirmed the presence of an increase in the risk of AMI after the Spring shift (+5%, $p<0.001$).
**Methods.** We performed a retrospective analysis on the regional archive of mortality records of the Veneto region of Italy (years 2000-2015). For death classification, we utilized the ICD-9 and ICD-10 categories used in standard reports of mortality statistics. The number of deaths observed in each of the seven days after the spring and the autumn shift (post-transitional weeks) was compared with the mean number of deaths registered in the corresponding week-day of the two weeks before and the two weeks after the post-transitional week (reference period).
**Results.** During the study period, a total of 3638 deaths for ischemic heart disease (IHD) were registered in the Spring and Autumn post-transitional weeks (n= 1869 and 1769, respectively) (Figure). No significant differences in the observed/expected (O/E) ratio of mortality were found in the post-transitional weeks with respect to the reference period in both Spring and Autumn (1.03 and 1.08, respectively, p=NS). Also analyses by age or gender were negative.




**Conclusions.** As for total deaths with ICDM-C9 codes referring to IHD, no significant differences following DST shifts were found. However, overall vascular deaths showed an increased frequency after the Spring shift, on Tuesday (Manfredini et al, Intern Emerg Med 2019). Possible negative mechanisms for cardiovascular health may include phase advance, sleep deprivation, and circadian rhythms disruption (Manfredini et al, Intern Emerg Med 2018). A few months ago, in agreement with some scientific suggestions (Meira e Cruz et al, Eur J Intern Med 2019), the European Parliament decided to discontinue seasonal changes of time starting from the year 2021.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 3
## Sessione Orale

### A348: UNEXPECTED CIRCUMSTANCES OF LIFE-THREATENING ARRHYTHMIAS IN PATIENTS WITH ARRHYTHMOGENIC CARDIOMYOPATHY

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**Background.** Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a leading cause of sudden cardiac death (SCD). Different studies demonstrate a link between physical exercise and ARVC, suggesting that the occurrence of SCD is associated with physical exertion.

**Objectives.** The present study investigates the circumstances of occurrence of life-threatening arrhythmic events (LAE) in our large single-center ARVC cohort.

**Methods.** We selected 60 patients experiencing an LAE with documented circumstances of LAE from our single-center ARVC cohort of 301 patients. We investigated the circumstances of LAE occurrence. Overall, 46 patients (77%) were males, with an average age of 39 years at first LAE occurrence. The patients were followed for a mean of 51 months.

**Results.** Amongst the aforementioned 60 patients, 34 patients (56%) experienced their first LAE at rest. Of the remaining, 23 patients (38%) experienced a first LAE during physical exercise, while only 3 patients (5%) did so during conditions of emotional stress. In patients who had multiple LAEs during their lives, 12 (66%) had experienced LAEs always in the same circumstances. Interestingly, 18 patients (30%) engaged in strenuous exercise prior to experiencing an LAE. All 18 aforementioned patients were males, compared to 31 males (74%) in the group who did not engage in strenuous exercise (n= 42). The two groups were comparable in terms of the average age at the time of the first LAE (37 ± 15 years for strenuous exercise vs. 40 ± 15 years, p value = 0.7). Importantly, out of 23 patients who experienced their first LAE during exercise and/or emotional stress, 12 patients (52%) have engaged in strenuous exercise compared to only 6 athletes (19%) who suffered a LAE at rest (p value = 0.004).

**Conclusions.** In the general population, ARVC patients tend to suffer life-threatening arrhythmic events more commonly at rest. However, athletes who participate in strenuous physical activities are far more likely to experience adverse events during physical exercise. Clinical implications of these findings clearly suggest that early recognition and diagnosis of ARVC and consequent interruption of the physical activity in professional athletes is lifesaving.

### A349: CONTEMPORARY SURVIVAL TRENDS IN DILATED CARDIOMYOPATHY

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**Introduction.** Dilated cardiomyopathy (DCM) is one of the first causes of heart transplantation (HTx) in the western world. However, contemporary (i.e. during the last decade) survival trends of DCM patients remain unknown.

**Aim.** The aims of this study are to investigate the contemporary clinical descriptors and survival trends in DCM patients in comparison with previous decades of enrollment.

**Methods.** Patients were divided in 4 groups according to the decade of enrolment: 1$^{st}$: 1978-1984 (52 patients); 2$^{nd}$: 1985-1994 (326 patients); 3$^{rd}$: 1995-2004 (379 patients); 4$^{th}$: 2005-2015 (527 patients). The considered outcome measures were 1) a composite of all-cause mortality, HTx, or destination therapy ventricular assist device (VAD) implantation; 2) a composite of cardiovascular death, HTx, VAD implantation, or 3) the occurrence of sudden cardiac death (SCD).

**Results.** A total of 1284 DCM patients were analyzed and followed for a mean of 12 years. Despite older age (52±15 years), the clinical characteristics of DCM patients were progressively improved in the last decade, indicating a less advanced stage of the disease at diagnosis. Similarly, at competitive risk analysis, the annual incidence of all the three considered outcome measures progressively decreased throughout the epochs of enrolment (global p<0.001). At multivariable analysis, the last decade of enrolment emerged as independently associated to lower all-cause death/HTx/VAD (1.46 events/100 patients/year); cardiovascular death/HTx/VAD (0.82 events/100 patients/year) and SCD (0.15 events/100 patients/year).

**Conclusions.** Contemporary survival trends of DCM patients are continuously improving over the last 40 years, especially when cardiovascular events and SCD are considered.

### A350: CARDIAC TRANSTHYRETIN WYLD TYPE AMYLOIDOSIS (ATTRWT): A PROSPECTIVE STUDY ON 300 PATIENTS FOLLOWED AT THE ITALIAN REFERRAL CENTER

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**Background.** Cardiac wild type transthyretin (ATTRwt) amyloidosis, formerly known as senile systemic amyloidosis, is an increasingly recognized, progressive, and fatal cardiomyopathy. However, the natural history of this disease remains unclear and only small retrospective studies reported the outcome of this patient population in Italy. This is relevant at a time when novel specific therapies are being evaluated and are about to enter the market.

**Methods.** Starting in 2007, we protocolized the collection of past medical history and data of organ dysfunction, in all the patients (n=300) diagnosed at the Pavia Amyloidosis Center.

**Results.** The diagnoses were performed in 5 cases (1%) between 2007-2009, in 15 (5%) in 2010-2012, in 66 (22%) in 2013-2015 and in 152 (72%) in 2016-2019. Median age was 76 years [interquartile range (IQR): 71-80 years] and 278 patients (92%) were males. One hundred and twenty-two (41%) had atrial fibrillation, 48 (16%) had a history of ischemic cardiomyopathy and 41 (14%) underwent pacemaker or ICD implantation. NYHA class was I in 55 subjects (18%), II in 173 (58%) and III in 72 (24%). Median NT-proBNP was 3024 ng/L (IQR: 1703-5616 ng/L), troponin I 0.093 ng/mL (IQR: 0.063-0.152 ng/mL), eGFR 62 mL/min (IQR: 50-78 mL/min). Median IVS was 18 mm (IQR: 16-19 mm), PW 17 mm (IQR: 15-18 mm) and EF 53% (IQR: 45-57%). One-hundred subjects (33%) had a concomitant monoclonal component in serum and/or an abnormal free light chain ratio. In these patients the diagnosis was confirmed by immunoelectron microscopy or mass spectrometry [positive fat pad aspirate in 9 patients (3%) and positive endomyocardial biopsy in 91 (30%) patients]. In 200 (67%) the diagnosis was based on bone scintigraphy with ($^{99m}$Tc-DPD) with Perugini score 2 in 22 (11%) and 3 in 178 (89%). DNA analysis for amyloidogenic mutations in transthyretin and apolipoprotein A-I genes was negative in all subjects. Median survival of the whole cohort was 59 months (95% confidence interval: 52-88 months). The Mayo Clinic staging based on NT-proBNP (cutoff: 3000 ng/L) and troponin I (cutoff: 0.1 ng/mL) discriminated 3 different groups [stage I: 79 (27%), stage II: 95 (32%) and stage III: 118 (40%)]. No significant difference in survival was seen between stage I and stage II (median survival not reached vs. 59 months, P= 0.11), while a significant difference was seen between stage II and stage III (median survival 59 vs. 40 months, P <0.001). According to the UK staging system (based on NT-proBNP 3000 ng/L and eGFR 45 mL/min), 126 (44%) patients were stage I and stage II respectively and 37 (12%) were stage III. A significant difference in survival was noted between stage I and stage II (median survival not reached vs. 49 months, P <0.001) while no differences were seen between stage II and stage III (median survival 49 vs. 33 months, P=0.217).

**Conclusions.** This is the largest Italian series of patients with cardiac ATTRwt. The diagnoses increased exponentially in recent years, mainly due to increased awareness and biopsy-free diagnosis approach. However, one third of patients has a concomitant monoclonal gammopathy and needs unequivocal tissue typing with adequate techniques. Current staging systems offered suboptimal discrimination and need to be improved. Knowledge of the natural history of the disease will be instrumental in implementing novel effective treatments.

### A351: PREVALENCE AND CLINICAL SIGNIFICANCE OF RED FLAGS IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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**Introduction.** We sought to determine prevalence and predictive accuracy of clinical markers (red flags, RF), known to be associated with specific systemic disease in a consecutive cohort of patients with hypertrophic cardiomyopathy (HCM).

**Methods.** We studied 129 consecutive patients (23.7±20.9 years, range 0-74 years; male/female 68%/32%). Pre-specified RF were categorized

into five domains: family history; signs/symptoms; electrocardiography; imaging; and laboratory. Sensitivity (Se), specificity (Sp), negative predictive value (NPV), positive predictive value (PPV), and predictive accuracy of RF were analyzed in the genotyped population.
**Results.** In the overall cohort of 129 patients, 169 RF were identified in 62 patients (48%). Prevalence of RF was higher in infants (78%) and in adults >55 years old (58%). Following targeted genetic and clinical evaluation, 94 patients (74%) had a definite diagnosis (sarcomeric HCM or specific causes of HCM). We observed 14 RF in 13 patients (21%) with sarcomeric gene disease, 129 RF in 34 patients (97%) with other specific causes of HCM, and 26 RF in 15 patients (45%) with idiopathic HCM (p<0.0001). Non-sarcomeric causes of HCM were the most prevalent in ages <1yo and >55yo. Se, Sp, PPV, NPV and PA of RF were 97%, 70%, 55%, 98% and 77%, respectively. Single and clinical combination of RF (clusters) had a high specificity, NPV and predictive accuracy for the specific etiologies (syndromes/metabolic/infiltrative disorders associated with HCM).
**Conclusions.** An extensive diagnostic work up, focused on analysis of specific diagnostic RF in patients with unexplained LVH facilitates a clinical diagnosis in 74% of patients with HCM.

### A352: TAKO-TSUBO SYNDROME: A 10 YEAR EXPERIENCE AT CORONARY CARE UNIT, UNIVERSITY HOSPITAL OF CAGLIARI

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The Tako-Tsubo (CTS) is a syndrome characterized by acute left ventricular regional systolic dysfunction, generally transient and reversible, often triggered by a significant physical or emotional stressor, which predominantly affects postmenopausal women. At presentation it mimics an acute myocardial infarction in the absence of atherosclerotic obstruction of epicardial coronary arteries on angiography. The aim of our study was to collect data from our Takotsubo population to help learn more about the characteristics, treatment strategies and natural history of this disease, with a particular focus on complications, recurrences and comorbidities associated to CTS.
**Materials and methods.** From January 2007 to June 2019, 70 patients with CTS were admitted to our CCU. All the patients enrolled in this study met the Mayo Clinic Criteria for the diagnosis of CTS. We analyzed the clinical features, risk factors, both electrocardiographic and echocardiographic tests on admission.
**Results.** Over the study period, the incidence of TC increased from 2.9% in the first semester of 2007 to 14.2% in the first semester of 2019. We observed that the mean age of our population was 69.5±11.5, range 44-96; women comprised 86% of our cohort (60/70; M:F=1:6.6), with postmenopausal women (>50 yrs) representing 82.8% of our population. A trigger event was identifiable in 67.2% of the cases and the incidence of CTS was found to be higher during summer and autumn. CV risk factors were found to be common in our study population: 82.8% (58/70) had at least one CV risk factor amongst hypertension, dyslipidemia, diabetes, current or past smoking and obesity, with hypertension representing the most common CV risk factor in the cohort. We found a nonnegligible prevalence of comorbidities, with 52.8% of our population (37/70) having at least one associated pathology to CTS amongst coronary arteriopathy (none of these significant in the context of the CTS), neurologic diseases, psychiatric disease, pneumologic disease, autoimmune disease, Hashimoto thyroiditis and past or current cancers. Mean EF at presentation was 42%±10% and mean WMSI was 1.93±0.32; we we have observed a significant improvement at discharge (EF 59.5±7.2% and WMSI 1.28±0,28 respectively p<0.0001 for both). 28.6% of the patients experienced at least one intrahospital complication (IHC); the most common were arrythmias (18.6%), but only one was life-threatening for the patient (FV), and pulmunary oedema (10%); we observed no cases of death. 34 patients (48.5%) were followed up over a median period of 5.5 years: we observed 3 cases of recurrence (4.2%) and 6 deaths (8.5%). The most common symptoms at FU were chest pain (11.4%) and dyspnea (7.1%). All the patient who experienced recurrence were discharged with both beta-blockers and ACEi/ARBs at the first episode and 67% of them were depressed. Notably, mean age of patients who experienced death at FU was higher when compared to patients who did not die (76.3±14 vs 65.8±8, p=0.032).
**Conclusions.** Our study confirms that Takotsubo cardiomyopathy is a complex syndrome with a complex course of the illness: originally believed to be a benign design, CTS have shown to be associated to a nonnegligible prevalence of both CV risk factors and IHCs; nevertheless none of our patients died during hospitalization. We confirm that a stressful trigger is often associated to the syndrome. Our study confirms that Takotsubo cardiomyopathy is more common during autumn and summer, as opposed to ACS. We did not observed any efficacy in the use of beta-blockers and ACEi/ARBs in preventing the syndrome. Long-term mortality risk did not appear to be affected by CTS.

### A353: ECOCARDIOGRAFIA SPECKLE TRACKING NELLA CARDIOMIOPATIA IPERTROFICA E NELLA CARDIOMIOPATIA DI FABRY

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**Introduzione.** La cardiomiopatia ipertrofica (HCM) è la più comune patologia cardiaca su base ereditaria, con elevato rischio di morte cardiaca improvvisa e progressione verso lo scompenso cardiaco. Entra in diagnosi differenziale con l'ipertrofia cardiaca da accumulo lisosomiale, tra cui la malattia di Fabry (AFD) dovuta a deficit di alfa-galattosidasi. I pazienti con HCM che sviluppano aritmie hanno aumentata dispersione elettrica e disomogeneità della conduzione intraventricolare per disarray, fibrosi, variazione del diametro dei miociti, Dati recenti in letteratura dimostrano che la dispersione meccanica (MD) del ventricolo sinistro (LV) ricavata da Speckle Tracking (STE), può essere un marker aggiuntivo di rischio aritmico anche in pazienti con frazione di eiezione (EF) preservata.
**Obiettivo.** Obiettivo dello studio è stato di valutare funzione diastolica, strain longitudinale (GLS) e MD mediante STE in pazienti con HCM o con AFD.
**Materiali e metodi.** Abbiamo valutato 31 pz con HCM (27M-4F, età 56±12a); 52 con AFD (13M-39F, età 44,5±10,8a), di cui 41 non ipertrofici (AFD-N, 11M-30F, età 38±13a) e 11 con ipertrofia VS (AFD-IVS, 2M-9F, età 54±20a); 21 soggetti sani (N, 13M-8F, età 26±4a). Le immagini sono state acquisite con ecocardiografi GE Vivid 7 ed E95, ed elaborate mediante sistema Echo PAC vers. 2.02. Abbiamo analizzato: spessori setto (SIVd) e parete laterale (PWd), massa indicizzata (LVMi), LV EF, volume atriale sinistro (LAVi), velocità del rigurgito tricuspidalico (TRV), velocità mitraliche (E, A) e loro rapporto, velocità TDI all'anulus mitralico (E', S' come media settale e laterale) e rapporto E/E', GLS e MD. I dati, espressi come media ± deviazione standard, sono stati analizzati mediante test T di Student, con livello di significatività per p<0.05.
**Risultati.** Tutti i pz hanno presentato volumi LV ed EF nella norma. I pz HCM avevano SIVd 15,5±2,5 e PWd 11,5±2,6 mm; 4/31 ostruzione LVOT (PGm 67,25±26,5mmHg); 3/31 ipertrofia apicale. LVMi è risultata maggiore in HCM vs N (p<0.001) e vs AFD-N; in AFD-IVS vs AFD-N e vs N (p<0,001). E/E' è risultato maggiore in AFD- IVS vs HCM, vs AFD-N e vs N (<0,003), in HCM vs N (<0,001) e vs AFD-N; in AFD-N vs N (<0,001).LAVi è risultato maggiore in HCM vs N (<0,001), vs AFD-N e vs AFD-IVS; in AFD-IVS vs AFD-N e vs N (<0,001); in AFD-N vs N (<0,04). TRV è risultato maggiore in HCM rispetto tutti i gruppi. GLS è risultato minore in HCM vs N e vs AFD-N, in AFD-IVS vs HCM, vs AFD-N e vs N (<0,04); in AFD-N vs N (<0,002). MD è risultata maggiore in HCM vs N (<0.001) e vs AFD-N; in AFD-IVS vs AFD-N, vs N (<0,01), vs HCM (<0,39); maggiore in AFD-N vs i N (<0,001).
**Conclusioni.** L'analisi dei dati ha dimostrato che i pz con HCM presentano disfunzione diastolica, ridotto GLS nonostante EF preservata e aumentata MD rispetto a N e AFD-N. I pazienti AFD-IVS presentano anomalie maggiori rispetto ai pz HCM, con GLS minore e maggiore MD. GLS e MD sono indici aggiuntivi nella valutazione dei pazienti con cardiomiopatia ipertrofica (sarcomerica o da accumulo), anche in presenza di EF apparentemente preservata e promettenti predittori per identificare pazienti a rischio elevato di progressione verso l'espressività aritmica o lo scompenso.

## INTERVENTISTICA STRUTTURALE
## Sessione Orale

### A354: FIBRILLAZIONE ATRIALE IN PAZIENTE EMOFILICO LA CHIUSURA PERCUTANEA DELL'AURICOLA SINISTRA COME ALTERNATIVA ALLA TAO

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**Introduzione.** L'aspettativa di vita dei pazienti con emofilia è drasticamente aumentata nelle ultime decadi. Con la disponibilità dei fattori ricombinanti della coagulazione, vi è stata una riduzione della mortalità dovuta ai sanguinamenti ed alle infezioni virali. Gli emofilici pertanto rappresentano un piccolo ma crescente gruppo di pazienti a rischio di malattie CV tipiche dell'età avanzata, tra cui la fibrillazione atriale (FA). Quest'aritmia è considerata una dei principali fattori di rischio per ictus ischemico. Il trattamento standard per la prevenzione di tale complicanza consiste nella terapia anticoagulante orale (TAO). Tuttavia, alcuni pazienti presentano una controindicazione alla TAO, tra i quali vi rientrano pazienti coagulopatici come gli emofilici. Tale malattia ha origine genetica ed è legata al cromosoma X. Esistono tre forme: l'emofilia A dovuta ad un deficit del fattore VIII, l'emofilia B del fattore IX e l'emofilia C del fattore XI. Tali pazienti hanno una predisposizione a sanguinamenti, anche spontanei, dei tessuti muscolari (ematomi) e delle articolazioni (emartri). La classificazione della severità della malattia è correlata con il livello di fattore della coagulazione disponibile.

**Caso clinico.** Presentiamo il caso di un paziente affetto da emofilia A, classificata di grado severo sulla base di un'attività del fattore VIII del 4,2%, condizionante un valore di aPTT di 61,7 sec (Ratio 2,02). Alla fine del 2017, all'età di 76 anni, gli venne riscontrata la FA, asintomatica. Il CHA2DS2-VASc risk score di 3 (ipertensione arteriosa ed età) poneva il paziente ad alto rischio cardioembolico, pertanto sussisteva l'indicazione alla TAO. Tuttavia, in considerazione dell'elevato rischio emorragico del paziente, in accordo con i Colleghi del Centro Emofilia locale si programmava intervento di chiusura percutanea dell'auricola sinistra (LAAC). Tale procedura ha dimostrato in diversi trial, come il PROTECT-AF ed il PREVAIL, la non inferiorità rispetto alla TAO nella prevenzione degli ictus cardioembolici e viene posta nelle linee guida ESC sulla FA in Classe di raccomandazione IIb, in caso di una controndicazione alla TAO. Nel Febbraio 2018 il nostro paziente fu sottoposto, sotto guida fluoroscopica ed ecocardiografica TE, all'intervento di LAAC con l'utilizzo del device Amplatzer Amulet 25. La gestione pre e periprocedurale dei pazienti emofilici prevede la somministrazione della dose personalizzata del fattore VIII ricombinante finalizzata a normalizzarli dal punto di vista coagulativo e permettere, quando necessario, la somministrazione di boli di Eparina intraprocedurale, come richiesto durante l'intervento di LAAC. Come terapia antitrombotica post-procedurale decidemmo per una singola antiaggregazione con il clopidogrel, dato l'elevato rischio emorragico del paziente. A tale merito, vi è ancora incertezza su quale sia la miglior strategia antitrombotica, sia in termini di singola o duplice antiaggregazione piastrinica, che nella sua durata. L'ultimo Consensus Statement dell'ESC del 2014 consiglia una DAPT per un periodo da 1 a 6 mesi, e successivo proseguimento con un solo farmaco antiaggregante. Tuttavia, studi più recenti tendono ad indicare una riduzione della durata complessiva della terapia antiaggregante, esplorando la possibilità di partire direttamente con una monoterapia con aspirina/clopidogrel. Nelle settimane successive l'intervento, il paziente del nostro caso clinico ha presentato episodi di emartro e di epistassi che lo inducevano ad aumentare spontaneamente la dose di fattore VIII; alla visita a 2 mesi, previo ecocardio TE che confermava un buon posizionamento del device in assenza di trombosi, si sospendeva il clopidogrel. A 18 mesi di distanza, il paziente non ha sviluppato complicanze ischemiche né recidive significative di sanguinamenti spontanei, tali da permettere un ripristino del dosaggio storico del fattore VIII ricombinante, ovvero di 2000 UI/ 2 volte alla settimana.
**Conclusioni.** L'intervento di LAAC rappresenta una valida alternativa alla TAO nei pazienti con FA ed elevato rischio emorragico, come nel caso degli emofilici, che potrebbero divenire una casistica in aumento per tale procedura. Riteniamo possano essere utili ulteriori studi che definiscano la miglior strategia antitrombotica postprocedurale, indirizzati soprattutto ad esplorare una riduzione di quest'ultima, considerato l'elevato rischio emorragico dei pazienti tipicamente selezionati per questa procedura. Riteniamo altresì che la scelta debba essere comunque sempre fatta su misura bilanciando il rischio ischemico ed emorragico di ogni singolo paziente.

### A355: PROTOCOLLO AZIENDALE PER L'ESECUZIONE DI PROCEDURE DI CHIUSURA PERCUTANEA DI PFO: RISULTATI DOPO 3 ANNI DI APPLICAZIONE

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La pervietà del forame ovale (PFO) è presente in circa il 25% della popolazione generale. Recenti evidenze scientifiche hanno dimostrato l'importanza di una attenta valutazione del profilo di rischio dei pazienti con stroke criptogenico e PFO da inviare all'intervento di chiusura percutanea di tale difetto: presenza di aneurisma del setto interatriale (SIA), l'entità dello RLS, le dimensioni del PFO e la persistenza di residui embrionali sono associati ad un più alto rischio di eventi cerebrovascolari. Abbiamo quindi valutato a distanza dall'intervento di chiusura di PFO per via percutanea la recidiva di TIA/stroke, il miglioramento dell'emicrania e/o la comparsa di eventi avversi ad un anno dalla procedura. Da febbraio 2016 a luglio 2019 sono stati screenati 154 pazienti con precedente ictus ischemico criptogenico con sospetto di PFO. In 58 pazienti il TCD è risultato negativo per RLS ed il TEE è risultato negativo per la presenza di PFO. Nei restanti 96 pazienti, invece, il TCD è risultato positivo per la presenza di RLS ed in 93 di questi pazienti il TEE è risultato positivo per la presenza di PFO. 51 di questi pazienti che presentavano un profilo di rischio elevato (47% era di sesso femminile ed età media 48.1 anni) sono stati avviati a chiusura percutanea mediante dispositivo Amplatzer e negli ultimi mesi mediante Noblestich (5 pazienti risultati allergici ad acido acetilsalicilico, nichel o che non potevano essere trattati con DAPT). Tali pazienti sono stati sottoposti a TCD per la ricerca e la quantizzazione di eventuale RLS residuo a 3-6-12 mesi dopo la procedura e ad ecocardiografia transtoracica alla dimissione, ad 1 e a 12 mesi dopo la procedura per escludere possibili complicanze legate alla presenza del dispositivo intracardiaco, con follow-up clinico eseguito a 3, 6, 12, 24 e 36 mesi dopo la procedura. Il follow-up clinico a 36 mesi è stato completato nel 25% dei pazienti (13/51). In un solo paziente con riscontro di Fibrillazione Atriale, si è verificata una recidiva di evento ischemico cerebrale. Nessun paziente ha avuto complicanze legate al dispositivo intracardiaco, ad eccezione di due pazienti che riferiscono la comparsa di modesta extrasistolia (sopraventricolare). Dei 16 pazienti affetti da emicrania, 14 hanno riscontrato un netto miglioramento della sintomatologia e 2 riferiscono totale assenza di crisi dopo la chiusura del PFO. I 6 casi trattati con Noblestich non hanno mostrato alcun evento e/o shunt residuo nel follow-up finora effettuato (90 giorni), effettuando solo 30 giorni di terapia con acido acetilsalicilico. Concludendo, nei pazienti con RLS associato a PFO e ictus criptogenico, è indispensabile una attenta valutazione preliminare del profilo di rischio per individuare i pazienti che realmente possano beneficiare dell'intervento di chiusura percutanea di tale difetto congenito.

### A356: PATIENTS AFFECTED BY SEVERE AORTIC STENOSIS AND CONCOMITANT MITRAL REGURGITATION: IMPACT OF TRANSCATHETER AORTIC VALVE IMPLANTATION

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**Background.** Severe aortic stenosis (AS) and functional mitral regurgitation (MR) frequently coexist. There is no consensus about the optimal therapeutic strategy for patients with combined valve disease. Evidence has shown that double valve surgery is associated with high complication rates and mortality, whereas MR severity may improve after transcatheter aortic valve implantation (TAVI).
**Purpose.** Aim of our study was to evaluate hemodynamic parameters and cardiac function in patients with severe AS and concomitant MR undergoing TAVI.
**Methods.** We prospectively enrolled consecutive TAVI patients with concomitant MR. Exclusion criteria were primary cardiomyopathies, prior valve surgery, permanent atrial fibrillation and inadequate echocardiographic imaging. Echo-Doppler assessment, including global longitudinal strain (GLS) and peak atrial longitudinal strain (PALS) (absolute value), was performed before TAVI and after 1-3 months. MR grading was assessed according to quantitative methods (vena contracta and/or PISA). Changes (Δ) of the main echo parameters before and after intervention were computed. On the basis of MR grading changes, the study population was divided in two groups: no improvement in MR grading (NIMR) and improvement in MR grading (IMR).
**Results.** Of 49 included patients (M/F=20/29, age 80.7±5.6 years), 23 had mild MR and 26 moderate to severe MR before TAVI. After the procedure, MR grading improved in 11 (IMR) and remained stable in 38 (NIMR) patients. The two groups were comparable for sex, age, body mass index, blood pressure and heart rate. After TAVI, both groups showed an improvement in GLS (17.8±4.7 vs. 20.1±4.4%, p<0.0001 and 16.8±3.8 vs. 19.0±3.1%, p<0.01, in NIMR and IMR respectively) and in PALS (20.4±7.4 vs. 24.2±7.3%, p<0.0001 in NIMR and 19.5±4.5 vs.26.7±6.1%, p<0.001, in NIMR and IMR respectively), without significant changes in ejection fraction (p=0.12). Only in IMR group, a significant decrease of systolic pulmonary arterial pressure (sPAP) (45.5±10.6 to 36.3±6.9 mmHg, p<0.001) and left atrial volume index (54.9±14.8 to 48.9±13.3 ml/$m^2$, p<0.01) was observed after TAVI. ΔsPAP (9.1±6.4 vs. -0.07±6.7, p<0.0001) was higher and ΔPALS (-7.2±5.1 vs. -3.8±4.3, p<0.03) lower in IMR compared with NIMR group (Figure). By a multiple linear regression analysis performed in the pooled population, after adjusting for ΔPALS, Δ aortic valve area and ΔGLS, the association between ΔsPAP and MR grading improvement remained significant (beta=0.53, p<0.001) (cumulative $R^2$=0.31, SEE=6.9 mmHg, p=0.007).
**Conclusion.** Afterload reduction following TAVI may induce hemodynamic changes determining also a reduction in MR severity. This mechanism implies a reduction in left atrial pressure, whose PALS is a reliable marker, and a consequent reduction of post-capillary pulmonary hypertension. The association between MR improvement and ΔsPAP reduction is independent on echocardiographic confounders.

### A357: TRANSCATHETER MITRAL VALVE IMPLANTATION IN A PATIENT WITH PRE-EXISTING AORTIC VALVE BIOPROSTHESIS: A CASE REPORT

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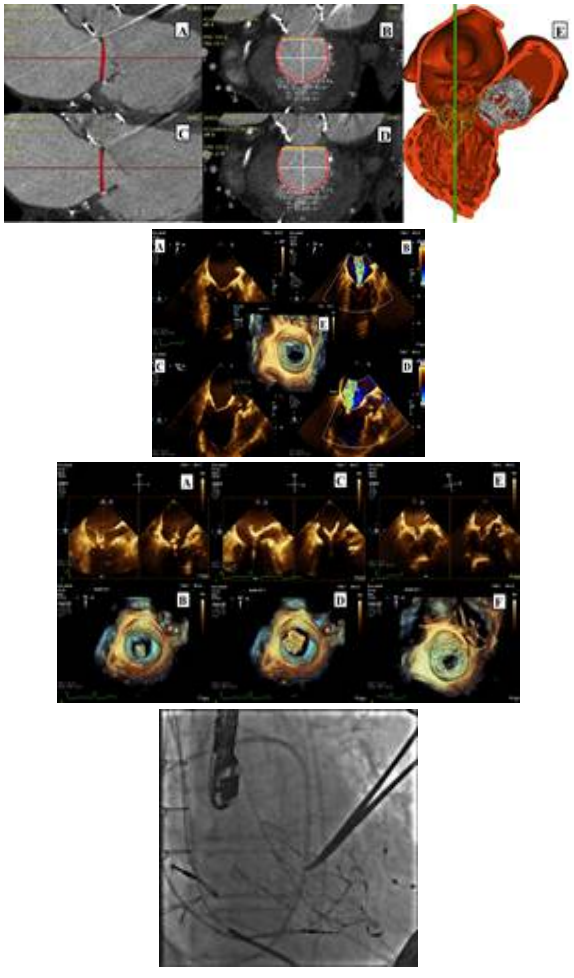
Transcatheter mitral valve replacement (TMVR) is increasingly developing as option for patients with severe mitral regurgitation (MR). Compared with transcatheter aortic valve replacement, TMVR seems to be more complex and more challenging. TMVR must address challenges such as the asymmetrical annulus, the irregular geometry of mitral leaflets, the large annulus dimensions, the high-pressure gradient across the mitral valve (closing pressure), the absence of a calcific structure for anchoring,

complex subvalvular anatomy, and the risk of left ventricular outflow tract (LVOT) that may be higher in patients with preexisting aortic valve prosthesis because patients with prior aortic stenosis often have left ventricular hypertrophy and small left ventricular cavity, and the frame of the aortic prosthesis can extend into the LVOT. In addition, the anchoring mechanism of TMVR may interfere with the proper functioning of an aortic prosthesis, especially a mechanical valve. MR patients with aortic valve prosthesis have been excluded from most TMVR trials. We describe for the first time to our knowledge a case of patient with severe MR and pre-existing aortic bioprosthesis successfully underwent to transapical TMVR with Tendyne prosthesis.



**A358: LONG-TERM CLINICAL AND ECHOCARDIOGRAPHIC RESULTS AFTER PFO CLOSURE WITH OCCLUTECH FIGULLA FLEX II DEVICE: A SINGLE CENTER PROSPECTIVE REGISTRY**

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**Background.** Patent foramen ovale closure has been demonstrated to be superior to medical therapy and recommended for the secondary prevention of stroke by current guidelines. However, long-term clinical and echo data are not commonly available.

**Purpose.** To describe long-term outcomes after percutaneous PFO closure under intracardiac echocardiography guidance.

**Methods.** Between January 2012 and December 2018, 688 consecutive patients undergoing PFO closure in a single high-volume center, were enrolled in a prospective, observational registry. Contrast transthoracic echo (TTE) or TTE and transcranial doppler were performed 6 months after closure and then TTE yearly. Primary endpoint was residual shunt and secondary endpoints were: any death, stroke or TIA and arrhythmias after the procedure.

**Results.** Of the 688 PFO closure procedures, a total of 546 (mean age 46.2± 12.6 years; 58.8 % female) were perfomed as a secondary prevention of stroke, TIA or arterial paradoxical embolism. An atrial septal aneurysm and a large shunt were present in 170 (24.7%) and in 468 (68%) pts, respectively. The procedure was perfomed under local anesthesia with intracardiac echo guidance (UltralCE plus, Boston Scientific Corp, MA, USA). Mean procedural time was 16±8 min with an X-ray time of 3.4±2.4 min (mean DAP 520±538 Gy/cmq). Procedural success was 98.8%. Pts were discharged on single, double antiplatelet therapy or anticoagulation in 87.2%, 11.6% and 1.2% of cases, respectively. In-hospital vascular access site complications occurred in 2 pts (0.3%) and supraventricular arrhytmias/paroxysmal atrial fibrillation were detected in 50 (7%) pts during/24 hours and 30 days after PFO Closure. Residual shunting was observed in 80 (11.3%) pts after the procedure and in 54 (7.8%: trivial in 5% and mild in 2.7%) at 6 months. Clinical and echocardiographic follow-up is currently available in 605 (88%) pts up to 7.5 years (mean 3.5 + 2.0 years). A total of 3 (0.4%) non cardiac deaths, and 3 (0.4%) TIAs due to severe carotid disease (n=2) or atrial fibrillation (n=1) occurred during follow-up

**Conclusions.** In our long-term, single center registry, PFO closure with the Figulla Device was achieved safely and effectively, with high acute procedural success and very low incidence of residual shunts.

**A359: TUTTO,...TRANNE LE CAROTIDI**

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Paziente D.C.P, donna di anni 79, (peso 50 kg, h 150 cm), ipertesa e dislipidemica, sottoposta in passato a CABG (AMI sinistra su IVA e venoso sequenziale su MO e PL), by-pass femoro-popliteo sinistro, PTA su AFS sinistra; in terapia con asa100, plavix 75, atorvastatina 10, gastroprotettore. Accede presso la nostra UO per evidenza eco-color-doppler di stenosi bilaterale 60% arterie carotidi interne associata a instabilità posturale, con indicazione a eseguire carotidografia. Parametri ematochimici nella norma (Hb 13.9 g/dl, creatinina 0.84 mg/dl, troponina nei limiti), ECG: ritmo sinusale a 74 b/m, ECO2D: FE 50%, IM e IA medie. Per approccio arterioso radiale dx, a causa di difficoltà nell'avanzamento in succlavia della guida teflonata, è stata eseguita angiografia che ha evidenziato stenosi angiograficamente critica ed emodinamicamente significativa della a.succlavia dx a monte della arteria vertebrale. L'iniezione ottenuta con pigtail in aorta ha mostrato invece a carico delle arterie carotidi interne solo lieve ateromasia non stenosante. Si è proceduto pertanto sempre per accesso radiale destro a PTA di arteria succlavia (predilatazione con palloni ClearPAC 6.0x40 mm e Admiral Xtreme 8.0x40mm, impianto di stent Bard LifeStent 10x30mm post-dilatato con pallone Invatec 10x40 mm). Dopo post-dilatazione si è osservta immagine di dissezione con localizzata perforazione di parete e stravaso di mdc. Per accesso arterioso femorale dx 7Fr, su guida extrasupport si è proceduto ad avanzamento di stent ricoperto LifeStream 9x38 mm; nel tentativo di attraversamento dello stent autoespandibile si sono verificati in sequenza accartocciamento dello stent autoespandibile (con migrazione prossimale rispetto alla sede di impianto) e disengagment dello stent ricoperto dal proprio pallone; dopo vari tentativi si è riusciti a posizionare lo stent ricoperto in sede di perforazione e a ricoprire lo stent accartocciato, crushandolo a parete, verificando con successiva angiografia l'assenza di perdita ematica extravasale. Per insorgenza durante la procedura di toracoalgie associata a diffuso sottoslivellamento del tratto ST, TNG sensibili, si è proceduto a controllo coronarografico e dei by-pass, con evidenza di stenosi critiche del graft sequenziale a monte di MO e PL. Al controllo angiografico in sede di puntura femorale (pre-posizionamento di angioseal) si è evidenziata stenosi critica a carico del tratto prossimale dell'iliaca esterna dx che è stata trattata mediante PTA con posizionamento diretto di stent LifeStream 8x58 mm. Considerata la stabilità emodinamica della paziente e l'assenza di angor si è ritenuto opportuno, anche alla luce della quantità di contrasto somministrato (400 cc), concludere la seduta. Nel successivo decorso si è osservato un lieve aumento della troponina (picco 551 pg/ml: v.n.<11.6) e della PCR (picco 51 mg/L: v.n.<10), stabilità dei parametri emodinamici e degli indici di funzione renale, riduzione dei valori di Hb (sino a 10.7 g/dl). Dopo tre giorni la paziente è stata sottoposta per accesso radiale sinistro a efficace procedura di PCI con stents medicati (Xience Alpine 3.5x12 mm e 3.0x33 mm) sulle lesioni critiche prossimale e distale del graft sequenziale, e quindi dimessa in terza giornata post-procedura con indicazione a proseguire DAPT per un anno.

**Conclusioni.** Entrata in Reparto con il sospetto di un problema di pertinenza carotidea, la paziente ha eseguito procedure interventistiche in tutt'altri distretti (succlavio, coronarico, iliaco), passando attraverso una complicanza vascolare e una SCA-NSTEMI. Per citare Oscar Wilde: "L'esperienza è il tipo di insegnante più difficile. Prima ti fa l'esame, poi ti spiega la lezione...".

## ATEROTROMBOSI
## Sessione Orale

### A360: SUBLINGUAL ASPIRIN FORMULATION LEADS TO BETTER ABSORPTION AND REDUCES BLEEDING RISK IN HEALTHY VOLUNTEERS: A DOUBLE BLIND, RANDOMIZED, PLACEBO-CONTROLLED STUDY

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Low-dose aspirin is used worldwide for preventing thromboembolic disorders. Its use, however, is often associated with gastrointestinal bleeding, mostly due to direct irritation of the gastric mucosa. Here we provide evidence for a novel sublingual formulation of aspirin micronized and co-grinded with collagen proven to be as effective as oral standard formulation in inhibiting platelet aggregation but with attenuated gastric irritation. In particular, sublingual administration of 50 and 100 mg (n= 30 for each dose) in healthy volunteers of aspirin micronized and co-grinded with collagen, produced a dose-related peak of serum concentration of acetyl-salicilic acid which occurred earlier compared to both sublingual and oral administration of standard crystalline formulation of aspirin (1h) with a decline of serum concentration occurring 4-5h after the administration (n= 30 for each dose). This effect was accompanied by early inhibition of TXB2 levels which was observed after 2h and lasted 10h after aspirin administration. Furthermore, the effect of aspirin formulation in TXB2 was confirmed by detection of its urinary metabolite11-dehydro-TXB2 after day 7 of the study, thus suggesting that sublingual administration of micronized co-grinded aspirin displays a non inferiority response on COX enzyme compared to crystalline standard formulation. Determination of serum TXB2 serum levels and of urinary 11-dehydro-TXB2 showed no changes before and after treatment in healthy volunteers receiving placebo. Moreover, acute oral administration of aspirin (400 mg/Kg) in rats both crystalline or micronized and co-grinded with collagen produced gastric lesion with an elevated ulcer score index. The severity of ulceration was however reduced by 73+6 % in the gastric tissues when aspirin was given micronized and co-grinded with collagen.
Taken together, these data show that sublingual administration of a novel formulation of aspirin may represent an option for patients undergoing aspirin treatment with a better safety profile.

### A361: THE MODULATION OF MIR-129-3P LEVELS IN CORONARY THROMBI AFTER PRIMARY PCI DISCLOSES A NOVEL POTENTIAL MECHANISM UNDERLYING THE NO REFLOW PHENOMENON

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**Background.** Angiographic no-reflow (NR) is described as an absent or reduced coronary flow despite removal of the mechanical obstruction. Platelets have a major impact on the development of NR. In fact, the use of glycoprotein IIb/IIIa receptor antagonists, as well as the novel P2Y12 antagonists, reduced the incidence of NR, ameliorating patients prognosis. Despite several studies have addressed this issue, the pathophysiology underlying NR it is still largely unknown. For this reason, we will evaluate the association between the miRNA expression profile in coronary thrombi collected from AMI patients during the revascularization of the infarct-related artery (IRA) to study their association with different flow patterns after mechanical reperfusion.
**Methods and results.** Intracoronary thrombi were collected from 100 AMI patients during the revascularization procedure by means of a thrombectomy catheter. After washing with a sterile 0.9% NaCl solution, thrombi were immerged in RTL buffer. Total RNA was extracted using the Norgen extraction kit. Patients were divided according to the post-procedural corrected TIMI Frame Count (cTFC) and a miRNA differential expression profile was obtained comparing 5 patients with optimal flow with 5 matched patients without optimal coronary flow after reperfusion, by means of the Affymetrix's GeneChip miRNA 3.0. Platelet miRNAs, showest the largest differential expression between the two groups. Validation by means of qRT-PCR confirmed, among the others, significant modulation of miR-223 (p=0.006) and miR-129–3p (p<0.001). In a subgroup of patients, we found a correlation between peripheral blood levels of miR-129-3p and its concentration in coronary thrombi (p=0.045). We focused mechanistical experiments on miR-129-3p as we found it was present in biologically relevant concentrations in platelets, endothelial cells and cardiomyocytes, but not in cardiac fibroblasts. In co-culture experiments, we found a significant reduction of miR-129-3p levels in HUVECs, upon activation of co-cultured platelet by means of thrombin (p=0.044) or ADP (p=0.035). An inverse modulation of osteopontin and RUNX2 was observed in association to the decrease in miR-129-3p levels. These effects were partially attenuated in HUVECs that had been co-cutured with ADP-activated platelets from patients on anti-P2Y12 treatment.
**Conclusions.** The differential expression levels of miR-129-3p in coronary thrombi from patients provides a novel biomarker that could be potentially useful for the early identification of patients at risk for no reflow. The modulation of miR-129-3p associated to no reflow provides new insights to disentangle the mechanisms underlying no reflow.

### A362: MULTIMODALITY APPROACH FOR HEMODYNAMIC INVOLVEMENT IN ACUTE PULMONARY EMBOLISM: B-TYPE NATRIURETIC PEPTIDE IN RELATION TO PULMONARY ARTERY SYSTOLIC PRESSURE

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**Background.** Right heart response in patients with acute pulmonary embolism (PE) is strictly related to prognosis. In particular, pulmonary artery systolic pressure (PASP) measurement is able to recognize patients with high mortality risk. However, B-type natriuretic peptide (BNP) is elevated in patients with acute PE and right ventricular dysfunction (RVD). The importance of identifying patients with RVD has been demonstrated, and echocardiography is the reference test for identification of RVD. Unfortunately echocardiography is not always available, for this reason it should be very important to recognize a biomarker which is able to add prognostic information.
**Aims.** In this study, we sought to evaluate: 1- the relationship existing between BNP and PASP; 2-echocardiographic measurements in acute PE patients and their changes according to the grade of arterial obstruction in PE.
**Methods.** All patients were admitted in our department within 24 hours from emergency department. Diagnosis of PE was performed with computed tomography or alternatively with pulmonary scintigraphy. At admission all patients underwent echocardiography and blood sample analysis to measure BNP, high sensitivity troponin, D-dimer and creatinine. Patients were treated according last PE guidelines.
**Results.** A total of 42 patients with acute PE were included in this study. Median age was 80[75-85] years and female gender was more prevalent (23/42). Median BNP was 210 [74-440] pg/ml, median PASP was 40 [35-50] mmHg, median basal end diastolic diameter of right ventricle (EDDRV) was 43 [34-49] median tricuspidal anular plane systolic excursion (TAPSE) was 20 [18-21] and median left ventricle ejection fraction (LVEF) was 55 [55-60]. In our sample, BNP was directly correlated with PASP (r=0.54; p=0.004) and inversely related to LVEF (r=-0.47; p=0.02). Moreover, PASP was directly correlated with high sensitivity troponin (r=0.39; p=0.02) and D-dimer (r=0.45; p=0.03). ROC curve analysis showed that BNP was a strong predictor for PASP≥40 mmHg (AUC 0.76 [0.54-0.98]; p=0.03); BNP serum levels greater than 184 pg/ml were related to PASP increase with good accuracy (77%; sensitivity 71% and specificity 90%). Dividing our population according PE severity, no differences statistically significant were found in terms of BNP, troponin, d-dimer and PASP.
**Conclusions.** In patients with acute PE, BNP was strictly related to PASP and was able to detect patients with increased pulmonary pressure. In our study the cut off level of 184 pg/ml BNP serum level was the most accurate to detect PAPs increase in patients with acute PE For clinicians BNP measurement should be useful to select high risk patients in acute PE. Similarly, both D-dimer and troponin were related to PASP, but were not significantly able to predict its increase.

### A363: BINDING OF GAMMA-GLUTAMYLTRANSFERASE TO TOLL-LIKE RECEPTOR-4 ALLOWS TISSUE FACTOR ACTIVATION IN MONOCYTES

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**Background.** Gamma-glutammiltransferase (GGT) provides intracellular cysteine derived from the hydrolysis of extracellular gluthatione (GSH) to restore the intracellular pool of that thiol. Along that well known antioxidant action, GGT, however, also exerts pro-oxidant effects by activating NFkB, a redox-sensitive transcription factor key in the induction of Tissue Factor (TF) gene expression, the principal initiator of the clotting cascade. Thus, GGT may potentially modulate TF expression, an assumption verified by previous studies carried out in human Peripheral Blood Mononuclear Cell (PBMCs). Quite importantly, TF expression in response to GGT stimulation was independent of its enzymatic properties since those experiments were conducted by using human recombinant (hr)GGT, a wheat germ-derived protein enzymatically inert because of missing post-translational glycosylation site (Scalise et al, Thromb J. 2016

Nov 4;14:45). Thus, GGT may act through a cytokine-like mechanism although the precise determinants of its action and the receptor involved were not defined by those experiments.
**Aims.** To assess whether GGT-induced TF stimulation is a consequence of binding to Toll-Like Receptor (TLR)-4 and activation of Myd88 and NFkB activation, as suggested by results recently obtained in different experimental contexts (Moriwaki et al, Sci Rep. 2016 Oct 24;6:35930).
**Methods.** PBMCs obtained from healthy donors through a discontinuous Ficoll/Hystopaque density gradient and THP-1 cells, a human monocytic cell line derived from an acute monocytic leukemia patient, were incubated with hrGGT (0.5ng/µl for PBMCs and 1ng/µl for THP-1). LPS-Rs (0.5 ng/µl for PBMCs and 1ng/µl for THP-1), CLI-095 ($3x10^{-6}$M) and BAY-11-7082 ($10^{-5}$ M) were used to block TLR-4 receptors, TLR4 signaling and NFkB respectively. TF pro-coagulant activity (PCA) was assessed through the use of Start Max coagulometer and results were expressed in ng/ml after calibration with a standard curve.
**Results.** hrGGT increased TF expression in both PBMCs (PCA from 0.11±0.07 to 0.51±0.43, n=7, p<0.01) and THP-1 cells (PCA from 0.19±0.14 to 0.46±0.36, n=15, p<0.001). In PBMCs GGT-induced TF stimulation was antagonized by LPS-Rs (PCA: -72±17% n=4, p<0.01) a TLR-4 antagonist, CLI-095 (PCA:-74±34%, n=7, p<0.001) a Myd88 antagonist and BAY-11-7082 (PCA:-71±32%, n=7, p<0.001), a NF-kB inhibitor. Similar results were obtained in THP-1 cells [LPS-Rs: -40±20%, n=2; CLI-095: -89±10 %, n=5, p<0.05; BAY-11-7082: -90±21%, n=7, p<0.01].
**Conclusions.** Besides confirming the cytokine-like activity of GGT and its procoagulant effect in PBMCs and THP-1 cells, these data identify for the first time the possible role of TLR-4 as the receptor of GGT and Myd88 and NFkB as the involved signal transduction pathway. The GGT-TLR-4 link may provide a mechanistic explanation to the consistent association between circulating GGT levels and increased risk of acute thrombotic events as well as to the involvement of GGT in the morbid evolution of the silent atherosclerotic plaque in which GGT colocalizes with monocytes and foam cells, the prime sources of TF within the plaque.

### A364: PCSK9 INDUCES A PROTHROMBOTIC RESPONSE BY BINDING TOLL-LIKE RECEPTOR 4 AND MYD-88/NFKB SIGNALING PATHWAY IN PBMCS

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**Background.** By enhancing the degradation of the low-density lipoprotein (LDL) receptor (R)in the liver, proprotein convertase subtilisin/kexin type 9 (PCSK9) reduces hepatic LDL-R clearance, increases circulating LDL-C and thereby, the susceptibility to cardiovascular diseases. In addition to that by now established evidence, mounting data suggest the direct involvement of PCSK9 in atherogenesis by induction of pro-inflammatory cytokine release through a NFκB-mediated mechanism as the final chain in the link of a mechanism initiated by Toll-like Receptor 4 (TLR)-4 activation (Tang et al, Atherosclerosis 2017; 262:113e122). Since NFκB is the transcription factor key in the regulation of TF gene expression from mononuclear cells, it is conceivable to hypothesize a relationship between inflammation-mediated PCSK9 expression and coagulation as a consequence of its binding to TLR4 and activation of the Myd88 and NFkB pathway.
**Aims.** To assess whether PCSK9 may stimulate TF expression in monocytic cells and whether binding the TLR4, Myd88 and NFkB pathway is involved in that mechanism.
**Methods.** PBMCs obtained from healthy donors and THP-1 cell line were stimulated with human (h) PCSK9 (1 µg/mL and 5 µg/mL respectively) either *per se* or pre-incubated with an anti-PCSK9 monoclonal antibody (2.5 µg/ml) as well as BAY-117082 (BAY, $10^{-5}$M) a NFκB inhibitor, CLI-095 ($3x10^{-6}$M), a highly Myd88/TLR-4 signaling specific inhibitor and LPS-RS (1µg/mL) a TLR-4 antagonist. TF procoagulant activity (PCA), was assessed by 1-stage clotting assay using a STart Max semi-automated coagulation analyzer.
**Results.** hPCSK9 stimulated TF activity in PBMCs (PCA: from 11±9 to 183±80 ρg/mL, n=10 paired experiments, p<0.001) an effect downregulated by anti-PCSK9 antibody (PCA: -60±23%, n=10, p<0.001). The antibody showed no effect when tested against LPS (0.1µg/mL), the prototype TLR4 agonist, indicating the specificity of PCSK9-induced TF expression in PBMCs. BAY, a NFkB inhibitor (PCA: -96±7%, n= 5, p<0.001), CLI-095, a Myd88/TLR-4 signaling inhibitor (PCA: -91±12%, n=5, p<0.01) and LPS-RS a TLR-4 antagonist (PCA:- 92±16%,n=5, p<0.01) abolished PCSK9-induced PCA. To verify the direct involvement of monocytes in this response, was used THP-1 cell line as an *in vitro* model and the results corroborate the PCSK9-induced effect on TF expression (PCA: from 50±20 to 120±20 ρg/mL, n=10, p<0.01). BAY, (PCA: -71±23%, n= 5, p<0.01) and CLI-095, (PCA: -86±26%, n= 3, p<0.05) down-regulated PCSK9-induced TF activity completely.
**Conclusions.** These data show the procoagulant effect of PCSK9 in both human PBMCs and THP-1 monocytes likely by binding to TLR4 and activating the Myd88 and NFkB signal transduction pathway. Further studies will be needed to better understand the regulatory mechanisms underlying this complex set of biological responses.

### A365: COLCHICINE EFFECTS ON PLATLET AGGREGATION IN PATIENTS ON DUAL ANTIPLATLET THERAPY

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**Background.** Platelets activation and aggregation with subsequent thrombus formation is the main event involved in the pathophysiology of acute coronary syndrome (ACS) and of stent thrombosis (ST). Once activated, platelets recruit additional platelets to the growing hemostatic plug by several feedback amplification loops, such as ADP and serotonin release and synthesis of de novo proaggregatory thromboxane A2. Antiplatelet therapy with aspirin plus a $P_2Y_{12}$ receptor (clopidogrel, ticagrerol or prasugrel) antagonist is a cornerstone in the management of ACS and ST. In high bleeding risk ACS patients and in patients with stable coronary artery disease (SCAD) undergone to stent implantation, Clopidogrel is the preferred $P_2Y_{12}$ receptor associated to aspirin. However it has been proved that up to 30% of patients are not responders to clopidogrel and show residual high platelet activity. Colchicine (COLC) is an anti-inflammatory agent recently proven to reduce major cardiovascular events in SCAD patients. We have recently demonstrated that COLC might exert its cardiovascular protective effects by interfering with cytoskeleton rearrangement, a phenomenon involved in platelet aggregation, finally reducing platelet aggregation. Aim of the present study was to investigating whether COLC might modulate platelet aggregation in patients treated with aspirin plus clopidogrel (DAPT).
**Methods.** Platelets isolated from a total of 15 SCAD patients on therapy with DAPT were incubated with COLC 10µM at different time points and then activated with Adenosine Diphosphate (ADP, 20µM), Collagen (COLL, 60µg/mL) and Thrombin Activating Receptor Peptide (TRAP 25µM). Platelets not preincubated with COLC served as controls. At each time point, aggregation was measured by light aggregometry. Of the 15 enrolled patients, 5 were specifically pre-selected as not responding to clopidogrel treatment.
**Results.** COLC pretreatment significantly blunted ADP/COLL/TRAP-induced platelet aggregation (up to 35%) in SCAD patients treated with DAPT. Of note, the effects of COLC on platelet aggregation were more significant in 5 patients not responding to clopidogrel: in these patients, COLC caused a rate of antiaggregation similar to that observed in clopidogrel responders.
**Conclusions.** Our data. although *ex vivo*, suggest that beneficial cardiovascular properties of COLC might be due, at least in part, on a direct effect on platelet aggregation. Interestingly, COLC pretreatment significantly reduces platelet aggregation even in patient showing clopidogrel resistance, thus indicating that this drug may represent an "add on" therapy in this subset of patients. Future studies are warranty to explore this effect and verified its use in clinical setting.

## CARDIONCOLOGIA – 2
## Sessione Orale

### A366: DIAGNOSTICA CARDIOVASCOLARE NON INVASIVA DEL DANNO D'ORGANO INDOTTO DA CHEMIOTERAPIA NEL PAZIENTE CON MIELOMA MULTIPLO

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**Background.** Il mieloma multiplo in Italia rappresenta 1,2% delle neoplasie nel sesso maschile e 1,3% in quello femminile, con un'incidenza annuale di circa 9,5 casi ogni 100.000 uomini e 8,1 casi ogni 100.000 donne. Gli inibitori di proteasoma sono farmaci utilizzati, principalmente, nella terapia di salvataggio del MM recidivo o refrattario e il loro meccanismo d'azione è quello di inibire il complesso ubiquitina-proteasoma, coinvolto nella degradazione di numerose proteine intracellulari, riducendo, in questo modo, la degradazione di molecole pro-apoptotiche e regolatrici come NF-kB. L'azione del farmaco si ripercuote, però, a livello cardiovascolare determinando da un lato l'accumulo di proteine "malripiegate" che provoca una precoce alterazione della funzione diastolica, determinando un aumento della rigidità ed una minore complianza delle pareti, mentre l'alterazione di proteine coinvolte nel metabolismo del calcio riduce la contrattilità; e dall'altro un'insufficienza vascolare provocata da una ridotta produzione di monossido d'azoto NO per ridotta attivazione di eNOS.
**Obiettivi e Metodi.** L'obiettivo primario dello studio è quello di determinare gli effetti cardiovascolari derivanti dalla somministrazione dell'inibitore di proteasoma Carflizomib confrontando la funzionalità endoteliale dei pazienti trattati in prima linea, rispetto ai pazienti che ricevono il farmaco secondo linee di trattamento successive, in seguito a recidiva. Lo studio è stato condotto in collaborazione con l'Unità Operativa di Ematologia della ASST Spedali Civili di Brescia. Sono stati arruolati sia

pazienti con prima diagnosi di MM, facenti parte dello studio FORTE, quindi non trattati con altri farmaci oncologici (GRUPPO A) che pazienti con diagnosi di recidiva di MM, in trattamento con Carflizomib (GRUPPO B). I pazienti sono stati valutati al tempo 0 (dopo 24 mesi di terapia) e prima dell'inizio del ciclo successivo, è stata effettuata la misurazione della PA a riposo e sono stati determinati il Reactive Hyperemia Path Index tramite metodica EndoPath e, tramite lo strumento Sphygmocor: Pressione Aortica centrale, Pressione media, Pressione pulsatoria aortica, Augmentation index e Pulse Wave Velocity (indici di rigidità endoteliale).
**Risultati.** Lo studio ha incluso 17 pazienti con diagnosi di Mieloma Multiplo trattati con Carflizomib, in particolare 8 nel gruppo A e 9 nel gruppo B. Età media superiore ai 65 anni e in entrambi i gruppi quasi tutti presentano almeno un fattore di rischio cardiovascolare (83%), in particolare ipertensione arteriosa che è presente in 10 pazienti (58%). I pazienti hanno mostrato un calo dell'indice di reattività vascolare in media di 0,25 ± 0,4, il gruppo A ha presentato una funzione endoteliale migliore (RHI= 2,0 ± 1,15) rispetto al gruppo B (RHI= 1,23 ± 0,45), con una differenza significativa, in media di 0,77 ± 0,7, legata alle precedenti terapie del gruppo B. Si può osservare un aumento degli indici di rigidità aortica, in particolare un aumento della PWV in media di 0,28 ± 0,4 m/sec. L'evento avverso cardiovascolare più frequente è stato rialzo pressorio, che ha necessitato un adeguamento della terapia antipertensiva in 8 casi (47%). L'evento avverso più importante durante la fase di studio è stato uno scompenso cardiaco con severa riduzione della FE (21%) e severa stenosi aortica, che ha richiesto la sospensione del trattamento, il ricovero con ottimizzazione della terapia e l'esecuzione di angioplastica percutanea e di valvuloplastica percutanea.
**Conclusioni.** Questo studio ci ha permesso di confermare gli effetti del trattamento con Carflizomib sulla funzionalità endoteliale. Si è osservata una riduzione dell'indice di iperemia. Si è osservato un aumento della velocità dell'onda pulsatoria PWV, suggerendo un aumento della stiffness arteriosa. Tuttavia i valori si sono sempre mantenuti al di sotto del cut-off indice di danno d'organo. Alla luce di questi dati possiamo dedurre di come sia importante mantenere un controllo ottimale dei fattori di rischio cardiovascolare del paziente, in particolar modo il profilo pressorio ed utilizzare metodiche che permettano di valutare la funzionalità endoteliale, come l'EndoPAT, per individuare pazienti con rischio cardiovascolare subottimale o con aterosclerosi inziale, così da poter individuare alterazioni precoci o eventuali eventi avversi di grado 3 o 4, che richiedono la sospensione della terapia. In merito alla prevenzione secondaria ed il trattamento del danno da cardiotossictà lo studio suggerisce la superiorità di una terapia con molecole che, non solo agiscono sui livelli pressori (come i Calcio-antagonisti), ma anche sul danno d'organo (come Ace-inibitori e Sartani).

### A367: ANALYSIS OF MULTILAYER STRAIN AND MYOCARDIAL WORK IN PATIENTS UNDERGOING CHEMOTHERAPY TREATMENT: A 12 MONTH FOLLOW-UP

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**Introduction.** The aim of this study is the early identification of cardiotoxicity using advanced echocardiographic analysis of the Myocardial Work (MW) and multilayer strain, in patients undergoing chemotherapy treatment.
**Methods.** 60 women with operated breast cancer (average age: 56 ± 10 years) were enrolled for treatment with ANT (epirubicin, 75 mg/m2 or doxorubicin 60 mg / m2). These patients underwent echocardiographic evaluation and blood pressure (BP) measurement before starting chemotherapy and after 3, 6 and 12 months. On average, the duration of treatment with ANT ranged from 4 to 6 months. Standard 2D and speckle tracking echocardiography were performed before chemotherapy and at the of follow-up (FU). Pressure-strain loops (PSL) analysis allowed the calculation of the following indices: Global Work Index (GWI), Global Constructive Work (GCW), Global Work Waste (GWW) and Global Work Efficiency (GWE). The longitudinal endocardial strain (GLS endo), mesocardial strain (GLS mid) and epicardial strain (GLS epi), were calculated using the speckle-tracking technique.
**Results.** GWI was reduced ad 3 and 6 months, compared to baseline, with recovery at 12 months (basal = 2033 ± 356 mmHg%; 3 months = 1929 ± 341 mmHg%; 6 months = 1867 ± 298 mmHg%; 12 months = 1999 ± 485 mmHg; p = 0.02). GCW was significantly reduced at 6 months (baseline = 2337 ± 373 mmHg%; 3 months = 2255 ± 373 mmHg%; 6 months = 2169 ± 349 mmHg%; 12 months = 2312 ± 544 mmHg%; p = 0.03) and the same trend was observed for GWE (baseline = 95.3 ± 2.7%; 3 months = 94.8 ± 2.1%; 6 months = 94 ± 2.1%; 12 months = 94.7 ± 2.7%, p = 0.005). GWW increased in all the follow up phases, compared to baseline, but this increase did not reach statistical significance (basal = 90 ± 64mmHg%; 3 months = 102 ± 58 mmHg%; 6 months = 10 ± 41 mmHg%; 12 months = 108 ± 69 mmHg, p = 0.1). The GLS endo was reduced at 3 and 6 months with partial recovery at 12 months (baseline = -21.5 ± 9.1%; 3 months = -18.2 ± 12.2%; 6 months = -17.8 ± 11.9; 12 months = -19.6 ± 8.9 %; p = 0.02). The reduction of GLS epi was also significant (basal = -17.2 ± 7.6%; 3 months = -15 ± 9.7%; 6 months = -14.2 ± 9.2%; 12 months = -15.8 ± 7.1%; p = 0.03). GLS mid showed lower values compared to baseline, but without a significant difference (baseline, -18.4 ± 8.9%; 3 months, -16.6 ± 10.6%; 6 months, -15.8 ± 10.3%; 12 months, 17.5 ± 7.8 %, p = 0.09). The ejection fraction (FE) was significantly reduced after treatment (baseline = 61.5 ± 4.9%; 3 months = 58.4 ± 6.1%; 6 months = 57 ± 5.6%; 12 months = 58.6 ± 3.8%, p <0.001), however remaining within the limits of normality.
**Discussion and Conclusions.** The study of left ventricular systolic function by MW and multilayer strain multilayer showed a reduction in cardiac performance with a peak at 6 months from the start of chemotherapy and partial recovery after term. Despite the EF reduction, its values remained above the cut-off for the diagnosis of cardiotoxicity. GLSendo and epi, GWI and GWE on the other hand seem to be the most promising and therefore useful parameters for identifying patients who could benefit from cardioprotection during chemotherapy. Further studies on larger populations are needed to confirm these data.

### A368: VALORE DI STRAIN LONGITUDINALE GLOBALE E DISPERSIONE MECCANICA COME INDICI PRECOCI DI DISFUNZIONE DEL VENTRICOLO SINISTRO DA CARDIOTOSSICITÀ ONCOLOGICA

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**Introduzione.** La disfunzione miocardica è la più rilevante delle complicanze cardiovascolari della terapia oncologica con una prognosi sfavorevole, quindi è fondamentale rilevare anomalie cardiache subcliniche per avviare precocemente la terapia cardioprotettiva o aumentare la frequenza di sorveglianza. Il Global Longitudinal Strain (GLS) mediante ecocardiografia speckle tracking (STE) è ritenuto uno strumento valido per valutare la funzione ventricolare sinistra (LV) regionale e globale. Un nuovo indice derivato, la dispersione meccanica (MD) riflette la contrazione miocardica eterogenea, validata in molte cardiopatie.
**Materiali e metodi.** Abbiamo valutato GLS e MD mediante STE-2D, al fine di valutare la possibilità di un valore aggiuntivo di MD nella disfunzione ventricolare sub-clinica da cardiotossicità (CTX). Sono state arruolate 42 donne con tumore al seno trattato con chemioterapia e sottoposte a valutazione clinica ed ETT durante il follow-up di 3 e 6 mesi, rispetto alla valutazione eseguita prima di iniziare la chemioterapia (T0). A seconda del tipo di chemioterapia sono stati identificati 2 gruppi: gruppo 1, trattato con antracicline e Taxolo, e gruppo 2 trattato con anti-HER2. La diagnosi CTX è stata effettuata secondo criteri ESC: LVEF <50%, riduzione LVEF> 10% o di GLS> 15% rispetto al controllo precedente.
**Risultati.** A tre mesi, il 28% delle pazienti sviluppava CTX e, in questo gruppo, MD era maggiore rispetto a T0 (64,4ms±18,6 vs 43,5ms ±7,5 p<0,001). Questo risultato è stato indipendentemente dal gruppo di trattamento: 65,2ms ±5,3 (p<0,0001) nel gruppo 1, e 63,1ms±36,4 (p<0,02) nel gruppo 2. GLS nel gruppo con CTX era ridotto del 9% rispetto a T0 (p<0,02), nel gruppo 1 diminuiva del 18% (p<0,01), mentre nel gruppo 2 diminuiva solo del 5% e non era statisticamente significativo rispetto a T0 (p<0,3). Questi pazienti sono stati trattati con beta-bloccanti o ACE-inibitori. A sei mesi vi era una normalizzazione del valore MD (47,7±15,97 ms nel gruppo CTX), sebbene non significativo rispetto a T0 (p<0,2).
**Conclusioni.** In base ai nostri dati riteniamo che la MD possa essere un predittore di disfunzione ventricolare prima del GLS anche durante il trattamento con Anti-HER2, integrando le informazioni ottenute da GLS sulla disfunzione subclinica.

### A369: ROLE OF MECHANICAL DISPERSION IN THE DETECTION OF EARLY MYOCARDIAL DAMAGE IN BREAST CANCER PATIENTS UNDERGOING ANTI-NEOPLASTIC TREATMENT

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**Background.** Cardiovascular complications of anti-neoplastic drugs are various, including left ventricular dysfunction and heart failure, myocarditis, hypertension, vasospastic and thromboembolic ischemia, prolongation of the QT interval and arrhythmic disturbances. In order to avoid the occurrence of overt complications of anti-neoplastic treatment it is important to stratify patients risk to develop cardiotoxicity and to detect the occurrence of damage in an early subclinical phase. On this purpose measurement of ejection fraction by echocardiography is the most widely used technique. Speckle tracking echocardiography (STE) is a new

technique that evaluate myocardial deformation and it is more sensitive to detect subclinical myocardial dysfunction compared to ejection fraction (EF). Aim of our study was to evaluate the usefulness of a new parameter derivable by STE, mechanical dispersion, to early detect myocardial damage.
**Methods.** A prospective study was carried out on patients with HER2 positive breast cancer (92 women and 1 man; age 56 ± 16 years) underwent to adjuvant or neoadjuvant therapy with anthracycline and then with taxol/taxotere and trastuzumab. Patients were evaluated at T0 (before starting chemotherapy), at T1 (3-6 month after the beginning of therapy) and at T2 (8-12 month after the beginning of therapy). Myocardial function was measured using standard echocardiography implemented by the evaluation of myocardial deformation parameters, including global longitudinal strain and mechanical dispersion (MD). MD is the standard deviation of the systolic contraction times at peak in 16 myocardial segments and it is and indicator of systolic performance.
**Results.** According to literature, EF remained unchanged in our population of patients at follow up (T0: EF 61,47 ± 3,30; T1: EF 57,70 ± 5,61, p 0,068; T2: EF 55,85 ± 6,10, p 0,057), while GLS significantly decreased (T0: GLS 20,82 ± 2,19; T1: GLS 19,35 ± 2,65, p 0,0008; T2: GLS 17,84 ± 2,53, p 0,0006). MD also showed a worsening at follow up compared to baseline (T0: MD 32,5 ± 9,29; T1: MD 36 ± 7,28, p 0,039; T2: MD 39,24 ± 6,40, p 0,028).
**Conclusion.** According to the results of our study, MD seems to be a new sensitive parameter to be evaluated, together with GLS, in order to early detect cardiac damage. Wider studies are needed to confirm this hypothesis, moreover it is important to evaluate the prognostic significance of this data at long term follow up.

### A370: ECHOCARDIOGRAPHIC ASSESSMENT, INCIDENCE AND CLINICAL PREDICTORS OF MEDIUM-TERM CARDIOTOXICITY IN PATIENTS AFFECTED BY LYMPHOMA TREATED WITH ANTHRACYCLINES

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**Aims.** ESC defined cardiotoxicity as a reduction in the Left Ventricular Ejection Fraction (LVEF) of 10% with a value inferior to 53% in asymptomatic patients or in symptomatic patients an EF decrease of 5%. Echocardiography is the method of choice for cardiotoxicity risk assessment through LV-EF evaluation in follow-up care during cancer treatment. In literature, patients exposed to anthracycline show cardiac dysfunction after chemotherapy in more than half of them and around 5% present cardiotoxicity. The study aimed to evaluate the incidence of cardiotoxicity and its association with predictive risk factors.
**Methods.** Lymphoma patients admitted to the hematology department of our hospital between 2008 and 2018 were included in the study retrospectively (168 patients). Of 73 patients treated with anthracycline, 67 completed the echocardiography follow-up. The risk factors investigated were age, BMI, smoking, arterial hypertension, family history of cardiovascular diseases, diabetes mellitus, dyslipidemia, and coronary heart disease.
**Results.** The sample presented a mean age of 55.9 years ± 15.2 (21-77) and the mean follow-up was 43.3 months ± 17.9 (15-116) with no difference between the patients that developed toxicity (p = 0.29). The cancer treatments were R-CHOP in the 46% of patients (n=31), R-COMP and ABVD each one in a quarter of the population (n=17, 25% and n=17, 25%, respectively) and in a non-relevant proportion of patients R MACOP B and BEACOPP (n=1, 1.5%, and n=1, 1.5 %, respectively). The mean baseline EF values were 60.8% ± 2.9 and at the successive follow-up were 58% ± 4.9 with an average delta of -2.8 ± 4.6 (p <0.0001). Toxicity was observed in 8 patients (12%), 6 of the R-COMP group and 2 of the R-CHOP group. The age, as a risk factor, showed a significant correlation with toxicity (Pearson index 0.36; p <0.003). The ROC curve showed an AUC of 0.86 ± 0.05 (CI 95%: 0.67-0.97). The best age cutoff to identify patients at risk was 62 years (100% sensitivity; specificity 67.9%). The increase of the number of risk factors (such as age> 65 years, smoking status, family history of cardiovascular diseases, female sex, dyslipidemia, BMI> 30 and hypertension) is associated with higher toxicity incidence (p = 0.09). Specifically, a total of three or more risk factors relates to higher toxicity (odds ratio 11.31 ± 13.35; p = 0.04; CI95% 1.12-114.3) and to a EF reduction of - 4.67 (CI 95% -7.29 / -2.04), compared to -1.66 of the other risk categories (CI95% -2.6 / -0.69; p = 0.01).
**Conclusions.** Echocardiography demonstrated its effective role in the follow-up of patients at risk of cardiotoxicity for cancer treatments. The toxicity incidence in our population was higher compared to the literature findings (12% versus 5%, respectively). This was caused by a greater portion of patients undergone to RCOMP (36%) and a higher mean prevalence of risk factors. Our study confirmed the age cutoff of 62 years fitting the 65-year cutoff of the ESC guidelines and proved, as supplementary information, the importance of the risk score of the patients in cardiotoxicity.

### A371: UN CUORE TROPPO PESANTE

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**Caso clinico.** Paziente di 55 anni giunge alla nostra osservazione presso l' ambulatorio di scompenso per recente diagnosi di severa disfunzione biventricolare e impossibilità alla titolazione di terapia medica per ipotensione sintomatica. Paziente noto per tratto talassemico e sindrome mielodisplastica in supporto trasfusionale; pregressa splenectomia. Dal punto di vista cardiologico, recente diagnosi di diabete mellito, fibrillazione atriale parossistica. A maggio 2019 ricovero presso altro istituto per shock cardiogeno, necessitante di ricovero in rianimazione, intubazione, supporto circolatorio con inotropi/vasopressori ed emodialisi per anuria. Veniva riscontrata severa disfunzione sistolica biventricolare e trombosi ventricolare sinistra (trattata con warfarin); eseguito studio coronarografico che evidenziava occlusione verosimilmente trombotica della discendente anteriore apicale e assenza di ulteriori lesioni significative. Dimesso dopo oltre 50 giorni di ricovero.
Alla visita, paziente fortemente astenico, ipoteso, NYHA III/IV. PA 85/45 mmHg, FC 55 bpm in ritmo sinusale. Ecocardiogramma: ventricolo sinistro dilatato, con severa disfunzione sistolica (FE 30%) da ipocinesia diffusa; normali dimensioni e funzione del ventricolo destro, non valvulopatie di rilievo, non versamento pericardico. Agli esami ematochimici: anemia (Hb 8.4 g/dl), conta leucocitaria totale nei limiti con neutropenia assoluta e linfocitosi, normale conta piastrinica, normale funzione renale. Assetto marziale: sideremia 542 mcg/dL (v.n. < 170), transferrinemia 1.33 g/L (v.n. 2-3.3), ferritinemia 4297 ng/ml (v.n. < 400).
In considerazione pertanto della recente diagnosi non meglio approfondita di disfunzione ventricolare sinistra e di una simile alterazione dell'assetto marziale, veniva eseguita RM cardiaca con acquisizione di sequenze T2-star. L'esame confermava il dato ecocardiografico di severa disfunzione ventricolare sinistra, assenza di edema miocardico, fibrosi subendocardica in sede apicale allo studio del late gadolinium enhancement (LGE) e significativa riduzione dei valori di T2-star (8 ms, cut-off >20 ms). A carico del ventricolo destro segnalata lieve disfunzione sistolica ed incremento del T2-star, meno significativo rispetto al ventricolo sinistro.
Sulla base della RM, con la collaborazione dei colleghi della Ematologia, il paziente è stato avviato a regime di ferrochelazione endovena e orale, terapia ben tollerata. Il paziente attualmente è ancora in classe funzionale NYHA III, in terapia medica con bassa dose di bisoprololo e warfarin, in attesa di follow up ecocardiografico.
**Discussione.** L'accumulo di ferro a livello miocardico si traduce solitamente in una cardiopatia con fisiologia restrittiva o dilatativo-ipocinetica. La particolarità della storia del paziente è la repentina evoluzione delle disfunzione cardiaca in un arco temporale verosimilmente inferiore ai tre mesi; la risonanza cardiaca tuttavia escludeva altre possibili eziologie della insufficienza cardiaca. Esistono evidenze che un regime di ferrochelazione adeguato possa revertire la disfunzione ventricolare.

## ARITMIE – 4
## Sessione Orale

### A372: NOVEL PERSPECTIVES ON NATURAL HISTORY AND RISK STRATIFICATION FOR PATIENTS WITH ANDERSEN TAWIL SYNDROME TYPE 1

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**Background.** Andersen-Tawil Syndrome type 1 (ATS1) is an ultra-rare arrhythmogenic disorder, caused by loss-of-function mutations in the *KCNJ2* gene. We present here the largest cohort of ATS1 patients with outcome data reported.
**Objectives.** Define the risk of life-threatening arrhythmic events (LAE), identify predictors of such events, and define the efficacy of antiarrhythmic therapy in ATS1 patients.
**Methods.** Clinical and genetic data from consecutive ATS1 patients from 23 centers were entered in a database implemented at ICS Maugeri in Pavia, Italy, and pooled for analysis.
**Results.** We enrolled 118 ATS1 patients from 57 families (23±17 years at enrolment). Over a median follow-up of 6.2 years (IQR 2.7-16.5 years), 17 patients experienced a first LAE, with a cumulative probability of 7.9% at

five years. An increased risk of LAE was associated with a history of syncope (HR 4.54, p=0.02), with the documentation of sustained ventricular tachycardia (HR 9.34, p=0.001) and with the administration of amiodarone (HR 268, p<0.001). The rate of LAE without therapy (1.24 per 100 person-years, py) was not reduced by beta-blockers alone (1.37 per 100 py; p=ns), or in combination with class Ic antiarrhythmic drugs (1.46 per 100 py, p=ns).
**Conclusions.** In a sharp departure from previous reports, we suggest that the clinical course of patients with ATS1 shows a high rate of LAE. A history of syncope or of documented sustained ventricular tachycardia are associated with a higher risk of LAE. Amiodarone is proarrhythmic and should be avoided in ATS1 patients.

### A373: IMPLANTABLE CARDIOVERTER-DEFIBRILLATOR VDD VS VVI

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(a) CITTÀ DELLA SALUTE E DELLA SCIENZA

**Background and objective.** Implantable cardioverter defibrillator (ICD) reduces the risk of sudden death in patients at risk. The use of a single-chamber ICD (VVI) compared to a dual-chamber ICD has the advantage of fewer complications, but less discrimination of supraventricular arrhythmias and risk of a greater number of inappropriate shocks. Single lead with a floating atrial dipole (VDD) is a system including the advantages of single lead invasiveness and dual chamber discrimination. This study aimed to compare electrical performance, rates of inappropriate interventions, complications, clinical outcomes between VVI and VDD ICDs.
**Methods.** Patients who underwent VDD ICD implantation between January 2010 and May 2018 at “Città della Salute e della Scienza Hospital” were compared with patients who underwent VVI ICD implantation selected by propensity matching based on relevant clinical features. Occurrence of death and hospitalizations during follow-up were recorded as well as complications including pneumothorax, cardiac perforation, lead dislodgement requiring intervention, sensing deficit, haematoma, local infection.
**Results.** We enrolled 48 patients who underwent VDD ICD implantation compared with 48 patients underwent VVI ICD implantation; follow-up median duration was 39 months (IQR 13; 61). There were no significant differences in baseline clinical features between patients receiving VDD ICD and those implanted with VVI ICD. There was a trend of less inappropriate interventions in VDD group, mostly shocks (VDD vs VVI: ATPs/shocks, 2% vs 13%, p=0.11; ATPs, 2% vs 10%, p=0.20; shocks, 0% vs 8%, p=0.12). There were no significant differences in any kind of complications (patients with one or more complications VDD vs VVI: 13% vs 13%; p=0.99) neither in all-cause death (VDD vs VVI: 25% vs 33%, p=0.50) neither in cardiovascular death (VDD vs VVI: 15% vs 21%, p=0.59). There were significantly more hospitalizations in VVI group (VDD vs VVI: 27% vs 53%; p=0.012), with a significant difference in heart failure re-hospitalizations (VDD vs VVI: 10% vs 39%, p<0.001). Atrial sensing in VDD ICDs was stable (before discharge vs 36 months: 5.26 ± 2.61 mV vs 5.50 ± 2.65 mV; p=0.533).
**Conclusions.** Patients with single-chamber ICD, compared with patients with single lead and floating atrial dipole, showed a lower trend for inappropriate interventions. Complications and mortality rates were similar in patients receiving a VVI vs VDD ICDs. Patients undergoing VVI ICD implantation experienced more hospitalizations (both total and due to heart failure) compared with those receiving a VDD ICD. Atrial sensing by floating dipole in VDD ICDs remained stable during follow-up.

### A374: LOCAL GENTAMICIN-COLLAGEN SPONGE REDUCES CARDIOVASCULAR IMPLANTABLE ELECTRONIC DEVICE INFECTIONS AND POCKET HEMATOMA

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**Background.** Implantation or replacement of permanent pacemaker (PPM) and implantable cardioverter-defibrillator (ICD), may be associated with serious complications such as bleeding, pocket hematoma and infection. Using COLLATAMP® EG during surgery, a lyophilized collagen impact impregnated with the aminoglycoside antibiotic Gentamicin, significantly reduces the incidence of infectious complications and improves wounds healing.
**Methods.** We conducted a retrospective study between June 2007 and November 2018 and we collected data of implantation or replacement of Cardiovascular Implantable Electronic Device (CIED). 1537 subjects with a mean age of 77,45 (±9,83) years were evaluated. We matched 561 patients with COLLATAMP ® EG (group I) with 976 patients who did not receive COLLATAMP ® EG (group II). The primary endpoint was the reduction of infectious complications and pocket hematoma within a 1 year postoperatively.
**Results.** Infective complications and/or pocket hematoma occurred in 164 of 1537 patients (10,67%); only 12 (0,78%, p <0,05) belonged to group I. The study also states a statistically significant higher incidence (p <0,05) of infective complications in patients undergoing ICD implant or replacement (20 of 369 patients, 5,59%) compared to PPM implant or replacement (17 of 903 patients, 1,5%), probably due to larger size of hardware and to the lifetime of devices. Not statistically significant was the incidence of pocket hematoma within the subgroups mentioned above (p >0,05). Moreover, we considered the impact of risk factors; regarding infective complications, we considered as risk factors old age, diabetes mellitus (DM) and chronic kidney disease (CKD). Within the population of 32 patients that developed an infectious event, just 12 of 32 patients (37,5%) showed no comorbidities (p <0,05).
**Conclusions.** COLLATAMP® EG is a medical device which can be used in addition to local hemostasis and prophylactic doses of systemic antibiotics, with the aim of reducing infective complications and pocket hematoma after permanent CIED implantation or replacement.

### A375: ACUTE CORONARY SYNDROME IN A PATIENT WITH A RESIDUAL AORTIC DISSECTION FLAP AFTER SUPRACORONARY AORTIC REPLACEMENT: THE IVUS ROLE

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**Background.** Acute chest pain caused by aortic dissection (AD) or acute myocardial infarction (AMI) is one of the most serious medical emergencies and requires a very quick differential diagnosis to choose the best timing for treatment. AD and AMI are often manifested with similar symptoms, making it difficult to differentially diagnose these two conditions. After supracoronary aortic repair (SCAR) for type A AD, small intimal flap could remain in the anastomoses area. Aortic intramural hematoma could extend to the coronary ostia causing an extrinsic compression. Intravascular ultrasound (IVUS) is a safe and effective methodology to distinguish an atherosclerotic plaque from an extrinsic compression. We present the case of a 68 years old man, with a recent surgical correction of a Type A aortic dissection referring to our emergency department for an acute coronary syndrome.
**Case report.** A hypertensive 68-years-old man presented to our emergency department, at 2:00 a.m., complaining acute chest pain radiated to the arms and posteriorly to the interscapular area. The patient had a past medical history of a recent (9 months before) Stanford type A aortic dissection corrected, in another hospital, with an urgent SCAR. The electrocardiogram revealed ST-segment elevation in aVR and a diffuse ST-segment depression (Fig 1). His initial vital signs were as follows: heart rate 105 beats/min, blood pressure 150/80 mm Hg, respiratory rate 18 breaths/min, oxygen saturation 94% without oxygen supplementation. While the patient was being prepared for the cardiac catheterization, a transthoracic echocardiography (TTE) was performed showing left ventricle anterior, septal, and apical walls akinesia and a dubious image of small intimal flap in the Valsalva sinus without significant aortic regurgitation. An urgent computed tomography (CT) scan confirmed the presence of a small intimal flap near to the non-coronary cups, proximal to the vascular graft anastomoses (Fig. 2C, 2D). So, we planned an urgent coronary angiography. By the right radial approach, initial angiography showed an isolated subocclusive left main (LM) ostial stenosis (Fig 3A). Intraoperative transesophageal echocardiogram (TEE) was executed to evaluate a dynamic extrinsic compression (Fig. 2A, 2B). Notwithstanding, both angio CT scan and TEE did not allow a definitive diagnosis regarding the AMI etiology. After a gently 2.0 mm semi-compliant balloon inflation in the LM, urgent intravascular ultrasound (a 20-MHz, 2.9 F IVUS system, Eagle Eye, Volcano Corp) was performed to exclude any extrinsic compression such as intramural hematoma: it documented a severe concentric atherosclerotic plaque with a ostial minimal lumen area of 4.2 $mm^2$ (Fig. 3B). Finally, we performed percutaneous coronary intervention (PCI): a 4.0/18 mm drug eluting stent from ostial LM to the proximal left anterior descending artery (LAD) was implanted and a proximal optimization technique with a 4.5/15 mm non-compliant balloon was performed. Final angiography and IVUS confirmed the good procedural result with a LM minimal stent area of 15.6 $mm^2$ (Fig 4A, 4B) After PCI, ST-segment alterations on ECG disappeared and chest pain improved. The patient was discharged on the third day.
**Discussion.** Acute myocardial infarction caused by aortic dissection (AD) is relatively rare, and the reported incidence of myocardial infarction with AD ranges from 3 to 7% in AD patients. Typically, myocardial infarction develops more frequently than an AD in a clinical setting. Therefore, when AD is complicated by acute myocardial infarction, the correct diagnosis of dissection can be elusive and these patients might instead be treated with primary percutaneous coronary intervention (PCI). In these cases, the outcome can be catastrophic. The dissection flap could extend into the ostium of the coronary artery, with consequent risk of acute occlusion and ST segment elevation myocardial infarction. However, evidences from literature regarding patients recently treated for AD and presenting with AMI are scarce. In patients with AD, while the right coronary is more

frequently affected, the left main coronary artery can also be compressed. Neri et al described three major types of coronary malperfusion due to AD. Hori et al described a case of acute coronary malperfusion some hours after SCAR due to a LM dissection recognized by the IVUS and successfully treated with PCI. However, the largest series reporting the outcome of patients treated for type A aortic dissection show a low risk of myocardial infarction at follow-up and only anecdotal cases of flap or hematoma extension to right or left coronary cusps. Our patient presented with a probably high risk non ST-segment elevation myocardial infarction (GRACE score: 140). During the night-time setting, awaiting the activation of the interventional cardiology team, on the basis of the clinical history we performed a TTE and an angio CT scan. Unfortunately, both methods confirmed the presence of a dissection flap extended to the non-coronary cusp, but neither method was able to clarify with certainty the etiology of myocardial infarction. Coronary angiography showed a coronary tree relatively free of atherosclerosis with an ostial subocclusive stenosis of the left main in a patient with an intermediate risk of ischemic heart disease who had undergone a cardiac surgery operation with no events a few months earlier; our major doubt was that we were faced with a retrograde dissection or an intramural aortic hematoma with extrinsic compression of the left main.

**Conclusion.** In this case, only IVUS allowed us to distinguish with certainty between an atherosclerotic etiology and a coronary extrinsic compression. Although there was some suspicion for residual intimal aortic flap based on the history, there were no information about the surgical intervention. Given the clear image of atherosclerotic plaque in the LM, we considered type 1 AMI as the most likely diagnosis treating him with successful primary PCI.

### A376: NEONATAL PERSISTENCE OF FETAL ARRYTHMIA: A CASE OF PHARMACOLOGICAL THERAPY FAILURE

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**Introduction.** Atrial flutter (AF) occurs in 25% of all fetal tachyarrythmias (FT). Echocardiography is the most valuable tool for FT diagnosis. There is no consensus on the best treatment of FT. After birth spontaneous restoration of sinus rhythm usually occurs after 24-48 hours. In case of persistence of tachyarrhythmia, pharmacological treatment with Amiodarone is suggested. Electrical cardioversion (CVE) is indicated in case of unsuccessful pharmacological therapy.

**Case report.** A 35-year-old woman at 28 weeks of gestation, was addressed to our department for FT detected during a routine ultrasound. Fetal echocardiography revealed a tachyarrhythmia with a fetal HR of 250 bpm and initial signs of heart failure. Maternal oral therapy with Digoxin and Flecainide was introduced with a stable reduction of fetal HR (200 bpm) and an improvement of cardiac features. An elective caesarian delivery was successfully performed at 38 weeks. At birth ECG revealed AF with 2:1 atrioventricular conduction and a HR of 187 bpm. Echocardiography confirmed no structural heart disease. Therapy with Amiodarone e.v. was started. After three days Propranolol was added. Due to persistent tachicardia, synchronized CVE was performed. Therapy with Propanolol the day before and Amiodarone the same day was stopped. Sinus rhythm with 130 bpm HR was restored after a third shock with a voltage of 2,28 J/kg. After the procedure, the patient was hemodynamically stable. During the following hours short AF episodes with spontaneous restore of sinus rhythm were detected. Therefore Amiodarone and Propranolol were reintroduced and stable sinus rhythm was achieved. Afterwards clinical conditions were preserved with a normal growth and developmental milestones.

**Discussion.** We have reported a case of fetal AF with unsuccessful intrauterine farmacological cardioversion. Flecainide, Sotalol and Digoxin are the most diffused therapeutic strategies. If the fetus is near term with persistent tachicardia, delivery and treatment after birth may be the best option. Due to the particular clinical presentation of AF in our case, with persistent tachyarrhythmia a prophylaxis for one year was established, although it is not usually necessary. A standard treatment protocol, based on randomized trials, should be established to achieve worldwide management of tachyarrhythmias.

### A377: FLUOROSCOPY USAGE IN CONTEMPORARY INTERVENTIONAL ELECTROPHYSIOLOGY: INSIGHTS FROM A EUROPEAN REGISTRY

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**Background.** Fluoroscopy has been an essential part of every electrophysiological procedure since its inception. However, insights in radiation-induced damage and technology to avoid exposure have evolved substantially over the past two decades. The aim of this Europe-wide multicenter, prospective registry is to assess current norms and identify quality markers required for optimal clinical routine.

**Methods.** Participating centers were requested to provide characteristics of the center, operators, technical equipment as well as procedural settings of consecutive cases. In order to prevent bias from high volume centers and operators a limit of 5 operators per center and 20 cases per operator has been set.

**Results.** 25 centers (72% university clinics, with a mean volume of 526±348 procedures yearly) from 14 European countries provided data on 1788 cases [9% diagnostic procedures (DP), 38% atrial fibrillation (AF) ablations, 44% other supraventricular (SVT) ablations, and 9% ventricular ablations (VT)] conducted by 95 operators (89% male, 41±7 years old). Mean dose area product (DAP) and time was 304±608cGy*cm2, 3.6±4.8min, 1937±608cGy*cm2, 15.3±15.5min, 805±1442cGy*cm2, 10.6±10.7min, 1277±1931cGy*cm2, 10.4±12.3min for DP, AF, SVT and VT ablations respectively. 7% of all procedures were conducted without any use of fluoroscopy. Procedures in the lower quartile of DAP were performed more frequently by female operators (OR 1.707, 95%CI 1.257-2.318, p=0.001), in higher-volume center (OR 1.001 per one additional procedure, 95%CI 1.000-1.001, p=0.002), with the use of 3D-mapping system (OR 2.622, 95%CI 2.053-3.347, p<0.001) and monoplane x-ray system (OR 2.945, 95%CI 2.149-4.037, p<0.001).

**Conclusions.** Exposure to ionizing radiation varies widely in daily practice for all procedure. Significant opportunities for harmonization of exposure towards the lower range has been identified.

## IMAGING CARDIOVASCOLARE – 1
## Sessione Poster

### A378: EXERCISE STRESS ECHO IN THE PREVENTIVE ASSESSMENT OF THE CORONARY HEART DISEASE: LONG LIFE APPLICATION EXPERIENCE, FOCUSED ON THE APPROPRIATENESS AND COST EFFECTIVENESS OF THE TESTS IN THE REAL LIFE

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(a) MIP MEDICAL IN PRACTICE WORKING GROUP. LUGANO; (b) SIC WORKING GROUP MEMBER

The predictive and prognostic value of the functional or anatomical tests in the diagnosis of coronary artery disease (CAD) is still debated also by the recent evidences. The cost-effectiveness ratio play a primary role in the best application of clinical practice. The aim is to present the predictive value of exercise stress echo (ESE) in the diagnosis of CAD, in a longstand outpatient experience.

**Methods.** 3200 pts (1600 men and 1600 women) are selected in the Medical and Cardiological Screening from 2013 to 2017. 2 groups: primary evaluation, or absence of events, and secondary, presence of CAD (cardiovascular event and/or revascularization). Evalueted: Risk Factors (FRC) presence of clinical parameters limiting the predictive value of the Stress ECG from Effort (EE) such as: ECG abnormalities – branch blocks - of ecg, hypertrophic, cardiomyopathy, gender. FRC evaluated Hypertension 2080 (65.5%: 1040 de 1040) Hypercholesterolemia 1084 (37%: 592u; 592d) Smoking 595 (18.6% 298u 297d), Familiarity 1088 (34% 1038, 1042d, Anxiety Depression Dystonia 1210 (37.8%: 780d-65%, 430u-35%); Diabetes 320 (10%: 176u-55% 144d-45%).

**Results.** 900 pts were subjected to ESE: 540u 360d. Outcome at 1 year of CAD for mortality due to myocardial infarction, hospitalization for unstable angina major complications (CM): no pts. After ESE coronary angiography (CG) followed in 60 pts (7%): revascularizations (PTCA/CABG) 8 (1%: all men). ESE/CG correspondence in 100%; comparison of CAD without revascularizations, ie diffuse atheromasia with sub-critical stenosis 35 (4%) 9u-25%, 26d-75%: women) all in primary evaluation (without events) and all hypertensive, compatible as vasospastic ischemia (ie, x syndrome). All the men was in secondary evaluation (CAD events and revascularized) and with multiple risk factors and diabetic also. No pts was exposed to further radioactive stress procedures during the observation period.

**Conclusions.** The functional test with ESE is confirmed as a valid cost-effectiveness tool in the screening and follow-up of CAD. Women and in general the pts with multiple risk factors and having a pathophysiological diversity are different in the development of CAD. They are more exposed to the risk of an unappropriated a useless number investigations, also

radioactive. In general proceeding towards an appropriate medical and clinical choice improves the prognosis and cost-effectiveness ratio in pts management of the CAD.

### A379: CARDIAC SYMPATHETIC DENERVATION IN WILD-TYPE TRANSTHYRETIN AMYLOIDOSIS

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**Background.** Tissue accumulation of misfolded transthyretin (TTR) may occur because of *TTR* gene mutations (variant amyloid TTR amyloidosis, v-ATTR), or as a senile phenomenon (wild-type ATTR, wt-ATTR). Cardiac sympathetic denervation has been reported in v-ATTR, but has never been investigated in wt-ATTR.

**Methods.** Fifteen consecutive patients with wt-ATTR cardiomyopathy (81% men, median age 82 years, no one with prior myocardial infarction) underwent Cadmium Zinc Telluride tomographic acquisition for tissue amyloid ($^{99m}$Tc-hydroxymethylene diphosphonate - $^{99m}$Tc-HDMP), innervation ($^{123}$I-metaiodobenzylguanidine - $^{123}$I-*MIBG),* and perfusion ($^{99m}$Tc-tetrofosmin).

**Results.** Median summed $^{99m}$Tc-HMDP score was 60 (58-62), denoting intense and diffuse amyloid deposition. Summed $^{123}$I-MIBG score was 12 (6-22), with the most prominent denervation in the infero-septal, inferior, and infero-lateral regions; summed rest score was 7 (5-11), with lowest degrees of myocardial perfusion in the inferior and infero-septal regions. The correlation between amyloid deposition (expressed as relative $^{99m}$Tc-HMDP uptake) and innervation (as relative $^{123}$I-MIBG uptake) did not achieve statistical significance at both segmental (r=-0.072, p=0.252) and regional level (r=-0.113, p=0.251). Nevertheless, denervation tended to become progressively more severe in parallel with the amyloid burden, and $^{123}$I-MIBG scores increased with $^{99m}$Tc-HMDP scores. Additionally, segments and regions with more prominent hypoperfusion were those showing the more intense denervation (r=0.500 and 0.591, respectively; both p<0.001).

**Conclusions.** Patients with wt-ATTR cardiomyopathy display cardiac sympathetic denervation, particularly in the inferior and septal myocardial wall. This spatial pattern is similar to myocardial hypoperfusion, while amyloid accumulation is more intense and diffuse.

### A380: MIRROR CMR SCANS

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**Clinical presentation.** Two middle-aged women with a history of Multiple Myeloma on treatment with Lenalidomide were admitted to hospital because of atypical chest pain and raised Troponin I levels. Despite having normal biventricular function at admission, they both developed progressive left ventricular (LV) dysfunction and ventricular arrhythmias, leading to ventricular fibrillation in one patient (successfully treated with DC-shock). Coronary angiogram was normal in both patients. According to the diagnostic workflow of myocardial infarction with non-obstructive coronary arteries (MINOCA), they both underwent cardiovascular magnetic resonance (CMR). Interestingly, CRM findings were closely similar: mildly impaired LV function due to diffuse hypokinesia, with trivial pericardial effusion and severe bilateral pleural effusion. Tissue characterisation showed findings consistent with acute myocardial inflammation: extensive mid-wall and epicardial oedema, as well as early and late gadolinium enhancement (Fig.1A-D, red arrows) of the basal to mid-cavity septum and adjacent anterior and inferior segments. An endomyocardial biopsy, showed instead different findings: while one patient had histological evidence of acute myocardial inflammation – with small amounts of adipose infiltration, necrosis and myocytolysis – the other one only had mild signs of replacement fibrosis with no evidence of inflammation or necrosis, showing focal spots of amyloid fibrils at electron-microscopy.

**Learning points.** Despite showing different histological patterns – possibly subtending different underlying causes – both patients presented similar clinical and imaging patterns, suggesting a common outcome. CMR played a pivotal role in the diagnostic process, by identifying the acute inflammatory process, and guiding the best clinical management. Chemotherapy treatment was discontinued in both patients, with evidence of slow progressive recovery of LV function: a repeat 1-month CMR scan in one of the patients, however, still showed extensive tissue damage.

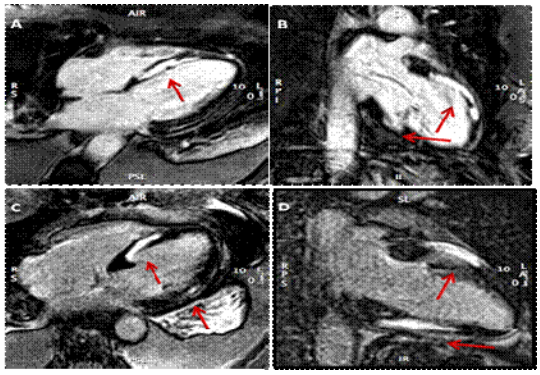

**Figure 1.** CMR-based tissue characterisation; top and bottom panels display the imaging patterns of the two patients, respectively. Four chamber post-contrast view showing extensive mid-wall late gadolinium enhancement (LGE) of the basal to mid-cavity inferoseptum and epicardial LGE of the mid-cavity anterolateral wall (A and C, red arrows). Two chamber post-contrast view showing extensive epicardial/mid-wall LGE of the basal and mid-cavity anterior and inferior walls (B and D, red arrows).

### A381: PROGNOSTIC ROLE OF MULTILAYER STRAIN SPECKLE TRACKING ECHOCARDIOGRAPHY IN PATIENTS WITH SEVERE AORTIC STENOSIS TREATED WITH TRANSCATHETER AORTIC VALVE IMPLANTATION

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**Background.** Myocardial strain evaluation helps to assess the efficacy of therapeutic interventions and to predict the prognosis and clinical outcomes. The aim of the present study was to assess whether Multilayer Global longitudinal strain (GLS) can be useful in estimation of left ventricle (LV) function in patients with severe symptomatic aortic stenosis (AS) who have undergone transcatheter aortic valve implantation (TAVI).

**Methods.** 35 patients with severe AS who successfully underwent TAVI, were enrolled in the study. GLS was measured from the endocardial layer (Endo-LS), epicardial layer (Epi-LS) and full thickness of myocardium before the procedure. Analysis included other parameters such as age, sex, LV volumes and ejection fraction (LVEF), type of prosthesis implanted, right ventricular (RV) dimension and function. Occurrence of cardiovascular (CV) events (rehospitalization for HF or CV death) were collected after 24 months follow-up.

**Results.** CV events occurred in 7 patients (20%). Patients were divided in two groups accordingly with CV events occurrence. No differences in baseline, demographic, echocardiographic and procedural characteristics were found. Patients who developed CV events had a more impaired pre-procedural GLS (-10.2 ± 2.4% vs -12.6 ± 2.2%, p=0.029), mostly due to his subendocardial layer (Endo-LS -10.8 ± 2 vs -13.9 ± 2, p=0.003). Moreover, by ROC curve analysis, a cut-off value of -12.4% of endo LS was associated with CV events (sensitivity of 83% and specificity of 65 %, AUC 0.8, p=0.024), with a log-rank p value assessed by survival analysis of 0.044.

**Conclusion.** Multilayer GLS analysis could provide additional information for prognosis stratification in patients with severe symptomatic AS before TAVI, above and beyond assessment of LVEF alone. Further larger studies are necessary to confirm this potentially interesting data.

| Parameter | Event-group (7/35 pt= 20%) | Non-event group (28/35 pt= 80%) | p |
|---|---|---|---|
| Male sex (n, %) | 2 (28%) | 15 (45%) | NS |
| Age (y.o) | 86 ± 4 | 80 ± 7 | NS |
| LVEDV (ml) | 112 ± 34 | 94 ± 32 | NS |
| LVESV (ml) | 51.2 ± 6 | 56.9 ± 6 | NS |
| E/e' | 14-4 ± 4 | 10.8 ± 6 | NS |
| LV mass /index (g/m$^2$) | 179 ± 30 | 166 ± 42 | NS |
| Mean gradient trans-aortic flow (mmHg) | 39 ± 5 | 43 ± 11 | NS |
| AVA (cm$^2$) | 0.77 ± 0.2 | 0.73 ± 0.2 | NS |
| TTG (mmHg) | 25 ± 1 | 28 ± 6 | NS |
| GLS (%) | -10.2 ± 2.4 | -12.6 ± 2.2 | ***0.029*** |
| Endo-LS (%) | -10.8 ± 2 | -13.9 ± 2 | ***0.003*** |
| Epi-LS (%) | -10.2 ± 2 | -11.9 ± 2 | NS |
| Grad LS | -0.9 ± 0.3 | -1-4 ± 0.7 | NS |

### A382: IMPACT OF DIFFERENT TECHNIQUES FOR MITRAL VALVE REPAIR ON LEFT VENTRICULAR FUNCTION: A 2D/3D ECHOCARDIOGRAPHIC ANALYSIS

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**Aim.** Different surgical techniques are available for mitral valve (MV) repair in patients with degenerative severe mitral regurgitation (MR). Leaflet resection (LR) and neochordoplasty (NP), both including ring annuloplasty (RA), are the most frequently performed techniques for posterior mitral leaflet prolapse/flail repair. Despite NP technique is supposed to preserve LV physiology more than LR, it is unclear which technique provides the best haemodynamic pattern. In the present study, the results of the two different surgical techniques in terms of left ventricular (LV) dimension and function and MV diastolic pressure gradient (PG) are investigated.

**Methods.** 23 consecutive patients who underwent MV surgical repair were enrolled. All patients underwent, before surgery and after 8±2 months, 2D and 3D echocardiography with automatic (Heart Model, Philips) assessment of LV volumes and ejection fraction (EF), left atrial (LA) volume, right ventricular (RV) dimension and function, pulmonary artery systolic pressure (PASP), MR, tricuspid regurgitation (TR) and MVPG quantification. MR was corrected using 1) NP with polytetrafluoroethylene sutures and 2) triangular LR, both with RA. Patients were divided in 2 groups according to the surgical technique.

**Results.** All surgical techniques were able to successfully correct MR. There were no significant differences in baseline echocardiogram and demographic characteristics between the two groups. There were no significant differences in terms of post-surgical MVPG between the two groups. In all patients a trend in reduction in LV dimension at follow-up was observed, but it was statistically significant only in NP patients (pre-surgical end-diastolic volume, EDV 150 ± 41 VS post-surgical EDV 100 ± 27 ml, p=0.03).

**Conclusions.** Both MV repair techniques showed a successful MV repair and an improvement in LV volumes at follow-up, especially in NP group. Further perspective studies are necessary to demonstrate the hypothesis of more physiological haemodynamic pattern associated with NP techniques.

**Table 1.** Pre vs post MV repair.

| Parameter | Pre | Post | p value |
|---|---|---|---|
| EDD RN (mm) | 55 ± 6 | 48 ± 3 | NS |
| ESD RN (mm) | 38 ± 9 | 29 ± 6 | NS |
| LVEDV RN (ml) | 150 ± 41 | 100 ± 27 | ***0.03*** |
| LVESV RN (ml) | 58 ± 20 | 46 ± 14 | NS |
| LVEF RN (%) | 58 ± 8 | 55 ± 7 | NS |
| IM grade RN | 3-4(100%) | 1-2 (100%) | ***<0.001*** |
| PASp RN (mmHg) | 28 ± 9 | 36 ± 14 | NS |
| TAPSE RN (mm) | 21.5 ± 3 | 20 ± 2 | NS |
| EDD RR (mm) | 60 ± 4 | 52 ± 1 | NS |
| ESD RR (mm) | 36 ± 3 | 32 ± 4 | NS |
| LVEDV RR (ml) | 160 ± 58 | 118 ± 31 | NS |
| LVESV RR (ml) | 62 ±11 | 51 ±13 | NS |
| LVEF RR (%) | 59 ± 8 | 57 ± 4 | NS |
| | | | |
| IM grade RR | 3-4 (100%) | 1-2 (100%) | ***<0.001*** |
| PASp RR (mmHg) | 50±15 | 27 ±4 | ***0.002*** |
| TAPSE RR (mm) | 23.6 ± 4 | 21 ± 2 | NS |

RN = Ring + Neochordae; RR= Ring + Resect.

### A383: CHRONIC INTRAMURAL HAEMATOMA OF THE AORTIC ROOT IN THE SETTING OF ACUTE CORONARY SYNDROME

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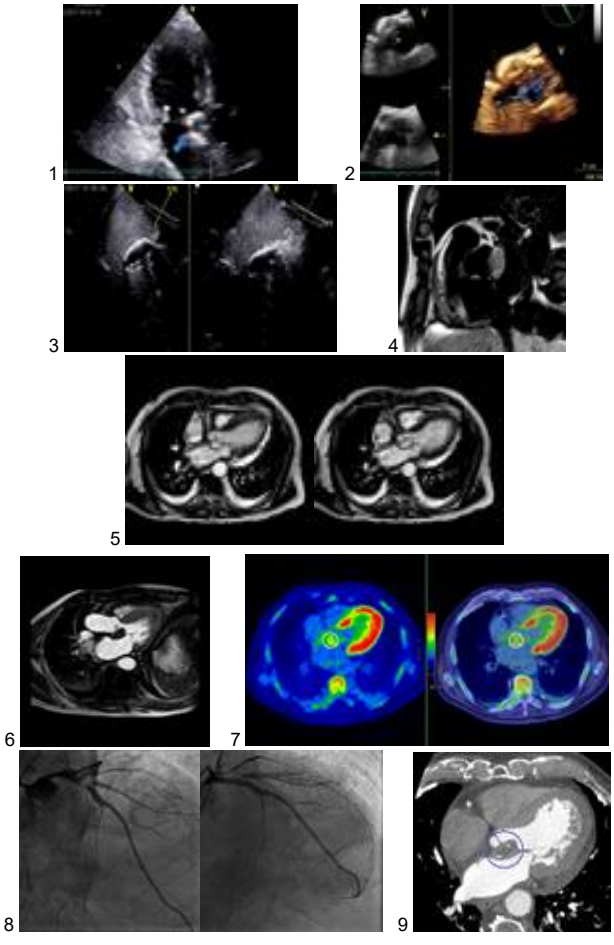
(a) OSPEDALE SAN RAFFAELE

We present a case of chronic intramural haematoma of the aortic root discovered in the setting of an acute coronary syndrome (ACS).

An 84-year-old man was admitted to our emergency department in a state of unconsciousness. The head Computed Tomography (CT) scan performed in urgency and at 24 hours showed no signs of acute ischemic or hemorrhagic stroke. After 36 hours the patient completely recovered from the initial state of unconsciousness. Because of a mild rise in troponin levels (298 ng/L) at the admission, a transthoracic echocardiogram (TTE) was performed. The TTE showed no alterations of regional and global left ventricular systolic function, but an image suspicious for pseudoaneurysm was observed in the left ventricle outflow tract (LVOT) in correspondence of the mitro-aortic curtain (Fig. 1). 2D-3D transoesophageal echocardiography (TOE) confirmed the presence of a cavity between the anterior mitral valve leaflet and the non-coronary cusp (Fig. 2). Color-Doppler analysis and contrast enhanced TOE showed no fistulization between the lesion and the left chambers (Fig. 3). Cardiac magnetic resonance (CMR) confirmed the presence of an ovalar fluid-containing lesion. Lesion's signal intensity was suggestive of chronic collection of blood (Fig. 4); cine CMR showed systolic compression and diastolic expansion of the lesion (Fig. 5) while early phase-contrast sequences showed absence of contrast filling (Fig. 6). All these findings were suggestive of intramural haematoma (IMH). Fluoro-deoxy-glucose positron emission tomography combined with CT was performed and it showed moderate tracer uptake in a circumscribed oval-shaped area, apparently of chronic nature considering the presence of small calcifications at the level of the lesion (Fig. 7). Collaterally, coronary CT angiography demonstrated evidence of severe stenosis of the left anterior descending (LAD) artery. Considering the chronic nature of the intramural haematoma, the patient was not treated by surgery but was referred to the cath-lab and underwent successful percutaneous revascularization of the LAD artery (Fig. 8). The IMH remained stable in dimension and features, as showed by the CT scan performed at 12 months of follow-up (Fig. 9) during which the patient took continuously dual antiplatelet therapy.




### A384: L'ECOCARDIOGRAFIA NELLA DIAGNOSI DI AMILOIDOSI CARDIACA: IL RUOLO DELLO STRAIN

Mariachiara Buffa (a), Iacopo Casella (a), Chiara Ghiglieno (a), Crizia Colombo (a), Cristina Piccinino (a)
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**Introduzione.** L'amiloidosi è una malattia sistemica in cui si assiste ad una deposizione tissutale extracellulare di proteine con conseguente disfunzione d'organo e frequente interessamento cardiaco. Sono state identificate più di trenta proteine amiloidogeniche, ma le principali forme sono due. Amiloidosi AL: causata principalmente da malattie ematologiche come il mieloma multiplo; Amiloidosi TTR (ereditaria o senile): si verifica un accumulo di transtiretina e conseguente disfunzione multiorgano. I quadri clinici che ne derivano sono: cardiomiopatia restrittiva con scompenso cardiaco (all'inizio HFpEF, negli stadi più avanzati HFrEF); angor (infiltrazione dei vasi); disfunzione autonomica e disturbi del sistema di conduzione.

**Caso clinico.** Uomo di 61 anni, iperteso, obeso, ex fumatore. Noto mieloma multiplo IgA/lambda complicato da amiloidosi renale, sindrome nefrosica. Giungeva alla nostra attenzione per sincope ed edemi declivi, per cui veniva ricoverato presso la ns Divisione. All'ECG RS, non alterazioni ischemiche. Il massaggio del seno carotideo è risultato negativo per pause patologiche; il Tilt Test ha documentato una risposta

ipotensiva; all'Ecg-Holter persistente RS, frequenti BEV isolati, non pause. L'Ecocardiogramma mostrava: VS di piccole dimensioni con marcata ipertrofia concentrica, setto disomogeneo, non alterazioni di cinetica, FEvs conservata, non valvulopatie, piccolo gradiente intraventricolare basale (22 mmHg), diastole da alterato rilasciamento. Un ecostress è risultato negativo per significativa ischemia inducibile a basso carico senza incremento del gradiente intraventricolare. All'analisi il GLS è risultato ridotto (-10,2%) con risparmio delle regioni posterolaterali e apicali, EF/GLS: 5,2. Dopo avvio di terapia con furosemide IV e albumina si è assistito ad un discreto miglioramento degli edemi declivi, è stata avviata terapia ematologica con Bortezomib sotto monitoraggio TLM e il paziente è stato dimesso con stretto follow up.

**Discussione e conclusioni.** L'amiloidosi cardiaca è una patologia sistemica infiltrativa con quadri di overlap tra cardiopatia ipertrofica e restrittiva; fondamentale nella DD è l'imaging. L'ecocardiografia mostra un'ipertrofia moderata, concentrica, completo risparmio apicale; disfunzione diastolica spesso severa. In questa patologia è importante la determinazione precoce della funzione sistolica con il Global Longitudinal Strain che risulta più precocemente alterato rispetto alla FEvs. Considerando il risparmio apicale da parte dell'amiloide è stato proposto un nuovo parametro diagnostico ("Echo Parameters for Differential Diagnosis in Cardiac Amyloidosis" Pagourelias et Al, Circ Cardiovasc Imaging 2017): EFSR (ejection fraction strain rate) che corrisponde al rapporto EF/GLS. Essendo il GLS ridotto, EFSR risulta significativamente più alto che negli altri tipi di ipertrofia (5,5±1,5 in CA vs 3,7± 0,5 in HCM). Nel caso in esame il GLS risultava severamente ridotto (average -10%, con un risparmio della regione posterolaterale e apicale corrispondente), EF/GLS 5,2; in linea con i dati della letteratura; questi risultati ci hanno permesso di diagnosticare un coinvolgimento cardiaco da parte della malattia sistemica con conseguente avvio di terapia specifica e stretto follow up del paziente.

### A385: SUBCLINICAL LEFT VENTRICULAR LONGITUDINAL DYSFUNCTION IN PATIENTS WITH MONOCLONAL GAMMOPATHY OF UNDETERMINED SIGNIFICANCE

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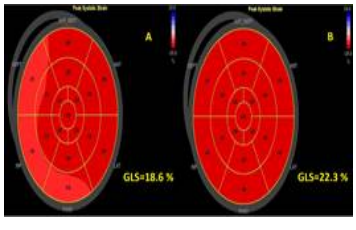
(a) FEDERICO II UNIVERSITY HOSPITAL

**Background.** In cardiac amyloidosis the application of Speckle Tracking Echocardiography allows to identify a specific left ventricular (LV) longitudinal strain (LS) pattern characterized by "apical sparing", with a prominent involvement of basal and middle segments and normal LS of LV apical cap. The pattern of regional LS has been never investigated in monoclonal gammopathy of undetermined significance (MGUS), a condition which can predispose to cardiac amyloidosis.

**Purpose.** To compare LV regional LS patterns and LS base-to-apex behaviour of patients affected by MGUS in comparison with healthy subjects.

**Methods.** We enrolled 30 patients affected by MGUS (M/F=15/15; age 63.1±13.1 years) and a control group of 30 healthy subjects, matched for sex and age. Participants underwent standard echo-Doppler examination, including determination of global and regional LS (considered in absolute values). Global longitudinal strain (GLS). the average LS of six basal (BLS), six middle (MLS), and six apical (ALS) segments and relative regional strain ratio RRSR [(=ALS/(BLS+MLS)] were computed. Exclusion criteria were overt heart failure and/or LV ejection fraction <53%, coronary artery disease, more than mild valve heart disease, primary cardiomyopathies, congenital heart diseases, atrial fibrillation and inadequate echocardiographic imaging.

**Results.** The two groups were comparable for body mass index, blood pressure and heart rate. Among echo parameters, LV mass index, relative wall thickness, left atrial volume index and Doppler-derived LV diastolic parameters did not differ significantly between the two groups. LV ejection fraction was similar in MGUS and healthy controls. GLS resulted significantly lower in MGUS group than in controls (20.2±2.9 vs. 22.5±1.7%, p<0.001). BLS (16.9±4.1 vs. 18.9±2.1%, p<0.01), MLS (19.5±3.5 vs. 21.4±1.6%, p<0.01) and ALS (24.5±3.3 vs. 27.3±3.5%, p=0.003) resulted significantly lower in MGUS in comparison with controls. RRSR did not show significant difference between MGUS and controls (0.71±0.20 vs. 0.68±0.11, p=0.62). The figure depicts a LS bull'eye of a MGUS patients (A) compared with that of a healthy control (B). Of note, only three patients showed the "apical sparing" pattern, with RRSR>1.




**Conclusions.** MGUS patients show a subclinical LV systolic dysfunction. In presence of a normal LV ejection fraction, GLS was lower in MGUS compared to heathy controls. LS regional dysfunction appears to involve in particular LV apical cap, RRSR being **not** able to differentiate MGUS. LV regional longitudinal dysfunction of MGUS is substantially different from the one of cardiac amyloidosis but could be useful to monitor LV systolic changes during follow-up.

### A386: LEFT VENTRICLE NON COMPACTION PHENOTYPE: CAUSE OR CONSEQUENCE?

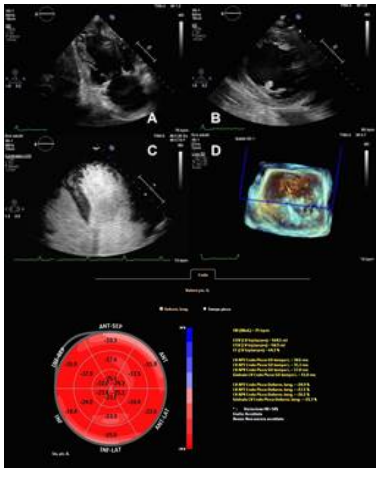
Grazia Casavecchia (a), Vito Di Terlizzi (a), Matteo Gravina (a), Dario Bottigliero (a), Roberta Barone (a), Ilenia Monaco (a), Natale Daniele Brunetti (a)
(a) CARDIOLOGIA UNIVERSITARIA OSPEDALI RIUNITI DI FOGGIA

Left ventricular non-compaction (LVNC) is commonly described as a congenital cardiomyopathy characterized by prominent myocardial trabeculae and deep intertrabecular recesses extending in the left ventricular chamber. Clinical presentation can differ considerably from asymptomatic individuals to those presenting with heart failure and other serious complications. Diagnosis is usually made by two-dimensional transthoracic echocardiography or cardiac magnetic resonance, although speckle-tracking echocardiography (STE) derived strain parameters are known to be reduced in patients with LVNC.

We report the case of a 80-year-old man without known history of heart disease admitted to the emergency department with symptoms indicative of pulmonary edema.

Echocardiography was performed using the Ultrasound system "Philips Epiq 7C" equipped with "Matrix X5-1" probe. The examination was performed using Mmode, 2D, Color Doppler, Continuous-Wave Doppler (CW), Pulsed-Wave Doppler (PW), Tissue Doppler Imaging (TDI), and 3D methods. The intravenous administration of sulphur hexafluoride microbubble (SonoVue) 5 mL was used as contrast agent for echocardiographic study and enhancement of endocardial border (MCE – enhanced myocardial echocardiography). The exam showed dilated, globular and reshaped left ventricle and the presence of accentuated and prominent medium-apical trabeculation particularly evident at the level of anterior wall and interventricular septum. After administration of ecocontrast with SonoVue (1,5 mL), filling of the intertrabecular spaces was present obtaining an end systolic ratio of non compacted to compacted layers of 2,2. Mitral valve presented thickened leaflets with tenting of the posterior leaflet with reduced diastolic excursion and prolapse of the anterior leaflet (scallop A2) leading to olosystolic severe eccentric regurgitation. Moreover aortic valve showed thickened cusps with flail of the left coronary cusp determining eccentric regurgitation of severe degree directed towards the interventricular septum. Speckle tracking method was performed obtaining the global longitudinal strain of -21,3%.

Without taking into account clinical and anamestic features, morphological phenotype alone could lead to overdiagnosis of left ventricle non-compaction. In this perspective, speckle tracking echocardiography could help to differentiate LVNC congenital cardiomyopathy from left ventricle remodelling due to pressure and volume overload.




### A387: TRANSIENT LEFT VENTRICLE DYSFUNCTION RECURRENCE IN SEVERE SEPSIS

Grazia Casavecchia (a), Stefano Zicchino (b), Ilenia Monaco (b), Dario Bottigliero (a), Valeria Le Rose (a), Wandisa Giordano (b), Vincenzo Raddato (b), Matteo Gravina (a), Natale Daniele Brunetti (a)
(a) CARDIOLOGIA UNIVERSITARIA FOGGIA; (b) CARDIOLOGIA OSPEDALIERA CERIGNOLA

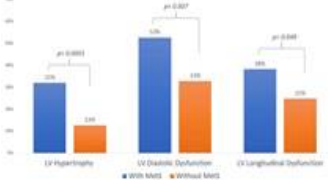
An 86-year-old-man with no medical history presented to the emergency department complaining of oppressive chest pain and asthenia.

Electrocardiogram, lab test and echocardiographic findings were compatible with acute coronary syndrome, but cardiac catheterization did not show obstructive coronary lesions. The patient fully recovered during hospitalization and Takotsubo cardiomyopathy was suspected. About one month after discharge the patient was again admitted to hospital, but this time transient left ventricle apical ballooning pattern was associated with severe sepsis.

### A388: METABOLIC SYNDROME AS AN INDIPENDENT FACTOR OF LEFT VENTRICULAR LONGITUDINAL DYSFUNCTION IN UNCOMPLICATED TYPE 2 DIABETES MELLITUS

Ofelia Casciano (a), Federica Luciano (a), Sara Cocozza (b), Regina Sorrentino (a), Maria Lembo (a), Vincenzo Sellitto (a), Ciro Santoro (a), Roberta Esposito (a), Angela Albarosa Rivellese (a), Maurizio Galderisi (a)
(a) FEDERICO II UNIVERSITY HOSPITAL; (b) G. RUMMO HOSPITAL

**Background.** The risk of cardiovascular (CV) disease in type 2 diabetes mellitus (T2DM) is highly heterogeneous and an adequate risk stratification is needed. CV risk mainly depends on concomitant risk factors, combined in the metabolic syndrome (MetS). Echocardiography is an useful tool for diagnosis of cardiac organ damage and CV risk stratification in T2DM.
**Purpose.** To investigate the effects of MetS on left ventricular (LV) structure and function in patients with T2DM with normal LV ejection fraction (LVEF) and without overt coronary artery disease (CAD) and heart failure symptoms/signs.
**Methods.** We prospectively recruited 384 consecutive, uncomplicated T2DM patients. All patients underwent clinical exam, blood sampling and complete echo-Doppler exam, including determination of 2D-echo derived global longitudinal strain (GLS). LV mass index ≥45 g/m^2.7 in women and ≥49 g/m^2.7 in men was used to characterize LV hypertrophy. LV longitudinal dysfunction was assumed for GLS<20% in absolute values. LV diastolic dysfunction was identified according to 2016 ASE/EACVI recommendations. MetS was defined according to NCEP-ATP III criteria. Significant CAD including previous myocardial infarction, LV systolic dysfunction (= LVEF <50%), hemodinamically significant valvular heart disease, primary cardiomyopathies, permanent atrial fibrillation, glomerular filtration rate <30 ml/min and inadequate echo images were exclusion criteria. The study population was divided according to presence of MetS.
**Results.** 66% of the patients (254/384) met the criteria for MetS diagnosis. They had comparable age and heart rate with controls. Diabetic patients with MetS had higher glycated haemoglobin (HbA1c) (7.2±1.3 vs. 6.9±1.0%, p=0.023) and uric acid (5.5±1.4 vs. 4.9±1.3 mg/dl, p=0.001) than those without, and lower glomerular filtration rate (69.5±15.0 vs 74.0±12,1 ml/min, p=0.004). MetS patients showed a higher LV mass index (p<0.0001) and a greater prevalence of both LV hypertrophy (31.9 vs 12.5%, p<0.0001) and diastolic dysfunction (52.6 vs. 32.8%, p=0.007) (Figure). T2DM patients with MetS also had lower GLS (20.6±2.1 vs. 21.9±2.2%, p=0.001), with a greater prevalence of LV longitudinal dysfunction (38.2 vs. 24.7%, p=0.049) (Figure). After adjusting for age, T2DM duration, sex, HbA1c, uric acid, LV mass index and LV diastolic dysfunction by a multiple regression analysis in the pooled population, GLS reduction was independently associated with MetS (β coefficient = -0.184, p<0.02) and LV mass index (β= -0.94, p=0.04).
**Conclusion.** In patients with T2DM, the presence of MetS induces a greater prevalence not only of LV hypertrophy and diastolic dysfunction but also of LV longitudinal deformation impairment. GLS reduction in diabetic patients is associated with MetS independently of confounders including glycemic control and diabetic duration.



### A389: ANDERSON-FABRY DISEASE IN CMR:TWINS BY TRADITIONAL TISSUE CHARACTERIZATION, DIFFERENT BY PARAMETRIC MAPPING

Camilla Cavallaro (a, b), Andrea Barison (a), Nicola Martini (a), Antonella Meloni (a), Giancarlo Todiere (a), Giovanni Aquaro (a), Francesco Grigioni (b), Alessia Pepe (a)
(a) FONDAZIONE TOSCANA GABRIELE MONASTERIO, PISA, ITALY; (b) UNIVERSITÀ CAMPUS BIOMEDICO DI ROMA, ROMA, ITALY

Anderson-Fabry disease (AFD) is an X-linked recessive lysosomal storage disease, caused by intracellular accumulation of glycosphingolipids due to deficiency of the enzyme α-galactosidase. The cardiac involvement carries a worse prognosis. Myocardial hypertrophy is the most common manifestation due to the intracellular accumulation of glycosphingolipids in myocytes. With disease progression the deposits are replaced by fibrosis although recent data suggest a chronic inflammation also independently to glycosphingolipids accumulation.
Cardiac magnetic resonance (CMR) by tissue characterization using parametric mapping is a unique technique in evaluating AFD progression and in determining enzyme treatment indications and evolution under therapy.
Heterozygous females are not asymptomatic carriers of the AFD mutation, they have a variable clinical presentation; disease expression in females is the result of random inactivation of the X chromosome. Female patients have a. This case provides an example of Fabry disease in a couple of sisters with a third sister with a diagnosis of AFD with cardiac, hepatic, and renal involvement.
The youngest sister with a positive genetic test was symptomatic for chest pain, without any significant coronary arteries disease by coro CT. The ECG showed atrial fibrillation and sign for LVH confirmed by echocardiography. The traditional CMR study by SSFP cine images and LGE technique showed an increased thickness in the basal infero-lateral wall (15 mm) and the anterior interventricular septum (14 mm) with midwall fibrosis in the basal infero-lateral wall. The oldest sister with a positive genetic test was asyntomatic in AF. ECG and ECOC were aspecific. The traditional CMR study by SSFP cine images and LGE technique showed the same finding of the youngest sister.
By T1 mapping based on the normal cut off values of the Lab the older sister reported a short T1 global value (915 ms) and short T1 values in all segment with exception of lateral wall, mid and distal inferior segments and distal septum. Despite the presence of positive LGE in the basal infero-lateral wall the T1 value was normal in this segment due to a pseudo normalization related to the sphingolipid accumulation. Based on the CMR report she started the enzyme replacement therapy and the CMR follow was planned at 1 year.
Conversely, the younger woman reported a long T1 value only in the basal infero-lateral wall with normal T1 value in all the other segments. The positive LGE in the basal infero-later segment (oedema/fibrosis) justifies the long T1 value in this no thickness segment. Based on the CMR report she did not start enzyme replacement therapy.
**Conclusion.** The case of this family show how quantitative parametric mapping could be a unique tool for the clinicians to adjust the therapy and plan the follow up of patients affected by AFD with cardiac involvement.

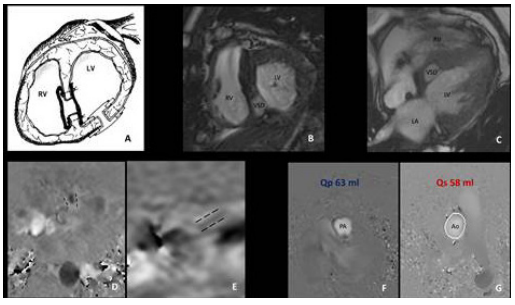
## IMAGING CARDIOVASCOLARE – 2
## Sessione Poster

### A390: AN UNEXPECTED FINDING AFTER DOUBLE-PATCH REPAIR OF POSTINFARCTION VENTRICULAR SEPTAL DEFECT

Laura Ceriello (a), Fabrizio Ricci (b, c, d), Elvira Verrengia (a), Loredana Mantini (c), Sante Donato Pierdomenico (a), Sabina Gallina (b)
(a) DIPARTIMENTO DI SCIENZE MEDICHE, ORALI E BIOTECNOLOGICHE, UNIVERSITÀ DEGLI STUDI G. D'ANNUNZIO, CHIETI-PESCARA, ITALIA; (b) DIPARTIMENTO DI NEUROSCIENZE, IMAGING E SCIENZE CLINICHE, UNIVERSITÀ DEGLI STUDI G. D'ANNUNZIO, CHIETI-PESCARA, ITALIA; (c) FONDAZIONE VILLA SERENA PER LA RICERCA, CITTÀ SANT'ANGELO, ITALIA; (d) DEPARTMENT OF CLINICAL SCIENCES, LUND UNIVERSITY, MALMO, SWEDEN

**Introduction.** Ventricular septal defect (VSD) is a rare but potentially fatal mechanical complication of myocardial infarction. Surgical repair remains the first choice of treatment. In this clinical case we document the importance of non-invasive multimodality imaging assessment after double-patch repair of a posterior post-infarction VSD.
**Case report.** A 53-old man suffered inferior STEMI complicated by cardiogenic shock due to a large posterior septum VSD. Inotropic and intraaortic balloon pump support allowed haemodynamic stabilization and the performance of an extremely high-risk but successful primary PCI of the culprit lesion (RCA) with placement of two drug-eluting stents. After 7 days the patient underwent successful coronary artery bypass surgery with double left internal mammary artery (Y-graft, LIMA-LAD and RIMA-OM) and double-patch repair of post-infarction VSD (Figure 1A). Two weeks after surgery, transthoracic color Doppler echocardiography documented (i) a bidirectional to-and-fro flow across the left sided patch, but not crossing the right-sided patch, in keeping with residual leakage without overt left-to-right shunt; (ii) a diastolic flow directed towards the transducer within the septal defect, in keeping with a small coronary branch draining into the cavity bounded by the double patch repair. A cardiac magnetic resonance (CMR) study was requested for further morphological and hemodynamic assessment. Cine b-SSFP (Figure 1B, C) and phase contrast imaging confirmed the presence of a residual leakage across the left-sided patch (Figure 1D) and the coronary-cameral fistula (Figure 1E), allowed to measure pulmonary-systemic flow ratio with Qp:Qs = 1.1 (Figure 1F, G) and rule-out the presence of significant left-to-right shunt or left-to-left shunt. After successful completion of post-operative cardiac rehabilitation program, the patient will undergo serial assessment of biventricular volumes, Qp:Qs and stress myocardial perfusion imaging by CMR for long-term surveillance of residual

myocardial ischemia, size enlargement or alternatively the spontaneous closure of the fistula.




### A391: DOPPLER ULTRASOUND SELECTION AND FOLLOW-UP OF THE INTERNAL MAMMALIAN ARTERY AS CORONARY GRAFT

Pietro Scicchitano (a, b), Michele Milo (a), Annagrazia Cecere (a), Maria Consiglia Bellino (a), Aldo Agea (a), Rosa Nitti (a), Roberta Ruggeri (a), Giuseppe Parisi (a), Margherita Ilaria Gioia (a), Francesco Massari (b), Marco Matteo Ciccone (a)
(a) CARDIOLOGY DEPARTMENT, UNIVERSITY OF BARI; (b) CARDIOLOGY DEPARTMENT, HOSPITAL "F PERINEI" ALTAMURA (BA)

Coronary heart disease (CHD) is one of the most common cause of death and disability in developed countries. According to the ESC guidelines on myocardial revascularization, coronary artery by-pass graft (CABG) is indicated in patients with two-vessel disease with proximal left anterior descending (LAD) coronary artery stenosis, left main disease, three-vessel disease, and other peculiar situations. LIMA is the best vessel of choice for CABG, because of its location and its own structural characteristics. According to the current literature, Doppler ultrasonography (DU) is the best non-invasive tool to assess LIMA patency after CABG, even if the gold standard remains coronary angiography (CA). DU may only detect severe (>70%) stenosis of the LIMA graft,by means of pulsed-wave Doppler (PDV/PSV <0,5 and Diastolic Fraction (DF)< 50%) or by means of continuous Doppler, evaluating blood cells acceleration in response to exercise or Valsalva manoeuvre. Pharmacological stimuli may be used to evaluate LIMA graft flow under different conditions.

### A392: IS HEART RATE RESERVE NORMAL DURING VASODILATOR STRESS ECHOCARDIOGRAPHY IN DIABETIC AND RENAL FAILURE PATIENTS?

Francesco Maiellaro (b), Daniel Ferraro (b), Michele Bellino (b), Giuseppe Iuliano (b), Gennaro Provenza (a), Federica D'Auria (b), Eugenio Picano (c), Carmine Vecchione (b), Gennaro Galasso (b), Rodolfo Citro (a)
(a) UNIVERSITY HOSPITAL SAN GIOVANNI DI DIO E RUGGI D'ARAGONA, HEART DEPARTMENT, SALERNO-ITALY; (b) CHAIR OF CARDIOLOGY, DEPARTMENT OF MEDICINE SURGERY AND DENTISTRY, UNIVERSITY OF SALERNO-ITALY; (c) INSTITUTE OF CLINICAL PHYSIOLOGY, PISA-ITALY

**Background.** A blunted heart rate reserve (HRR) during dipyridamole stress echo (SE) is a marker of cardiac autonomic dysfunction associated with poor outcome, independently of inducible ischemia, underlying coronary artery disease (CAD) and beta-blocker therapy. Patients with diabetes and/or renal failure have higher prevalence of underlying autonomic dysfunction.
**Aim.** To assess the value of HRR in patients undergoing dipyridamole SE.
**Methods.** We prospectively recruited a sample of 61 patients with known or suspected CAD (mean age 75±10 years; 34 males, 55,7%; 50% on beta-blockers at the time of testing). Coexistent atrial fibrillation or previous pacemaker implantation were considered as exclusion criteria. Three groups were identified a priori: non-diabetic with normal renal function (n=43, Group 1); diabetics, with normal renal function (n=14, Group 2); severely impaired renal function on dialysis (n=4, Group 3). All patients underwent dipyridamole SE (0.84 mg/kg in 10'). Wall motion score Index (WMSI) was calculated with a 17-segment score of left ventricle, each segment scored from 1= normal to 4= dyskinetic. HRR was measured by ECG as the peak/rest HR ratio.
**Results.** A positive SE (stress WMSI> rest WMSI) was present in 2 patients of Group 1 (4.7%), 4 of Group 2 (28.6%) and no patient in Group 3. Heart rate was different, although not significant, among the 3 groups both at rest (66.1±11.1 vs 64.6±8.5 vs 79.0±8.0, p=0.050) and at peak stress (83.8±12.6 vs 75.3±10.3 vs 86.5±11.1, p=0.059). Of note, HRR was statistically different among groups (1.29±0.20 vs 1.19±0.14 vs 1.09±0.06, p<0.047; see figure). There was no difference in HRR between patients off and on-beta-blockers (1.19±0.16 vs 1.24±0.24, p=0.421) and with or without positive SE (1.20±0.14 vs 1.25±0.20, p=0.530). Overall, HRR≤1.17 (median value) was reported in 39.5% of Group 1, 71.4% of Group 2, and 100% of Group 3 pts (p=0.024). No significant correlations between HRR and peak WMSI (p=0.183) or age (0.062) were reported.
**Conclusion.** HRR is frequently abnormal in patients referred for SE testing, especially in presence of concomitant diabetes and advanced renal failure. The blunted chronotropic response is a simple, imaging independent marker of cardiac autonomic dysfunction and may usefully complement the conventional evaluation with regional wall motion abnormalities during vasodilator SE.

### A393: EVIDENCE FOR A COMPREHENSIVE EVALUATION OF NEWLY DIAGNOSED LEFT VENTRICLE DYSFUNCTION BY A NOVEL WHOLE-HEART COVERAGE CARDIAC CT SCANNER: PRELIMINARY RESULTS FROM THE EPLURIBUS STUDY

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(a) CENTRO CARDIOLOGICO MONZINO, IRCCS, MILANO, ITALIA; (b) UNIVERSITÀ STATALE DEGLI STUDI DI MILANO

**Background.** Cardiac magnetic resonance (CMR) is the standard of reference for myocardial fibrosis detection by late gadolinium enhancement (LGE). Cardiac computed tomography (CCT) is emerging as a promising alternative. Aim of the E-PLURIBUS study was to assess feasibility and diagnostic accuracy of a comprehensive functional and anatomical cardiac evaluation with CCT as compared to CMR and invasive coronary angiography (ICA) as standard of reference.
**Methods.** Consecutive patients with a newly diagnosed left ventricle dysfunction (LVD) (LVEF<50%) and a clinical indication to CMR will be screened. Exclusion criteria will be contraindications to contrast agents and impaired renal function. CCT will be performed per protocol within 30 days from CMR. 100 patients will be enrolled within 24 months. CCT volume and ejection fraction of the left and right ventricle, presence, extent and pattern of delayed enhancement (DE) and cardiac venous system were evaluated. Moreover, presence and degree of coronary stenoses will be evaluated among patients undergoing ICA in the 6 months following CCT.
**Results.** Preliminary results of the study were collected on the first 50 patients enrolled in the present study (mean age 61 ± 10, male 37[74%]). All patients underwent a per-protocol CCT, while in 2 (4%) patients CMR was aborted at the time of examination because of claustrophobia and were excluded from the analysis. Biventricular systolic function evaluated by CCT resulted to be accurate without significantly differences for LVEDV, LVESV, LVEF and RVEF quantification when compared to CMR. It should be underlined that a mild, but statistically significative, overestimation of RVEDV and RVES volume was recorded for CCT vs CMR (LVEDV 162.1 ± 58.3 vs 153.7 ± 57.7 respectively, p<0.001). Correlation coefficients were 0.984 and 0.928 for LVEDV and LVEF, while were 0.983 and 0.913 for RVEDV and RVEF, respectively (p<0.001 for all quantitative parameters). A very good diagnostic accuracy for myocardial fibrosis detection by CCT vs CMR on a territory based analysis we reported [91.9 95%CI (89.8-93.7)] with very high specificity [96.8 95%CI (95.1-98.1)] and good sensitivity [75.3 95%CI (68.3-81.4)]; similar results were found on a per-patient basis. Among patients enrolled, 19 underwent clinically indicated invasive coronary angiography (ICA) Only 2 coronary segments resulted to not evaluable at CCTA because of the presence of beam hardening artifacts. CCTA resulted to have excellent diagnostic accuracy on a per-patient level as all patients with significative stenosis at invasive coronary angiography were correctly identified at CCTA. Among the entire population, CCT analysis was concordant with CMR on LV dysfunction etiology in 43 cases [11 (25.6) myocarditis, 17 (39.5) non ischemic DCM, 2 (4.6) LDAC, 2 (4.6) amyloidosis and 11 (25.6) ischemic DCM]. Radiation dose for fibrosis assessment alone was negligible (0.8 ± 0.3 mSv).
**Conclusions.** Cardiac CT appears to be feasible and accurate in the evaluation of newly diagnosed LVD in comparison with CMR and can be considered as an alternative technique in patients with contraindication to MRI.

### A394: A CASE OF GIANT NEGATIVE T WAVES

Francesca Cortese (a), Pietro Scicchitano (b), Serena Di Marino (d), Giacinto Calculli (c), Marco Matteo Ciccone (e)
(a) OSPEDALE GIOVANNI PAOLO II, POLICORO; (b) OSPEDALE F PERINEI, ALTAMURA; (c) OPEDALE MADONNA DELLE GRAZIE, MATERA; (d) OSPEDALE VALLE D'ITRIA, MARTINA FRANCA; (e) POLICLINICO DI BARI

A 29-year-old boy underwent a cardiological visit required to competitive sport. It was his first cardiological visit. He was asymptomatic, without familiarity for cardiovascular disease and sudden death and without any cardiovascular risk factors. The clinical examination and the arterial blood pressure were normal. His electrocardiogram (Figure 1) showed sinus rhythm at 61 bpm, left atrial enlargement, left ventricular hypertrophy, and secondary alterations of ventricular repolarization with giant negative T waves (negative T waves ≥ 10 mm) in precordial leads (V4-V5). The echocardiographic evaluation showed a left ventricle of normal size, with uniform hypertrophy and hypertrophy of the papillary muscles (maximum

parietal thickness: 17 mm), left atrial dilation, in the absence of significant valvulopathies (figure 2). The cardiac magnetic resonance images confirmed the uniform hypertrophy of the left ventricle and of the papillary muscles (maximum parietal thickness: 16.7 mm) (figure 3) in the absence of late impregnation of the contrast agent, expression of fibrosis and other significant anomalies. The giant negative T waves are the expression of an alteration of the ventricular repolarization and are associated with various clinical conditions such as myocardial infarction, pericarditis, hypertrophic cardiomyopathy, the isolated hypertrophy of the papillary muscles, diseases of the central nervous system, electrolyte disturbances, long QT syndrome and the effect of some drugs. In our example, they are one of the electrocardiographic manifestations of papillary muscle hypertrophy in a non-obstructive hypertrophic myocardiopathy.

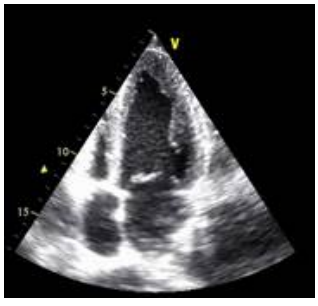

Figure 1

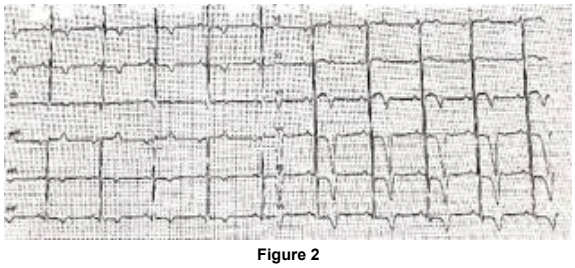

Figure 2

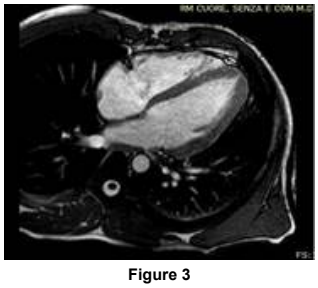

Figure 3

**A395: MID-VENTRICULAR TAKO-TSUBO SYNDROME: AN UNEXPECTED ENCOUNTER**

Matteo Crippa (a), Olsi Braho (a), Emilio Miglierina (a), Antonella Mancinelli (a), Michele Golino (a), Battistina Castiglioni (a), Roberto De Ponti (a)
(a) DIPARTIMENTO CARDIOVASCOLARE, OSPEDALE DI CIRCOLO - UNIVERSITÀ DELL'INSUBRIA, VARESE

Takotsubo syndrome (TTS) can clinically mimic an acute coronary syndrome (ACS) with reversible ventricular motion abnormalities and no major epicardial coronary artery stenosis. Among its presentation patterns, there is the infrequent "mid-ventricular pattern" characterized by hypokinesis of the left ventricle and hypercontractility of the apical and basal segments. We report a case of a hypertensive, smoker, hyperlipidemic 67-year-old woman. She had repeat accesses to the emergency department for angina. She had also patent foramen ovale (PFO) and Hashimoto thyroiditis. She first accessed in 2012 to Cardiology department for "apical takotsubo" with angiography documentation of muscular bridge of the left anterior descending coronary artery (LADA) [Fig. 1]. Two years later, she was again hospitalized with a diagnosis of ACS and angiographic documentation of microvascular and endothelial dysfunction. Afterwards, in 2017, the Patient was for the third time hospitalized for chest pain occurred during mental stress with mild elevation of Troponin T. ECG showed tall and symmetric T waves in V1-V3 leads, the transthoracic echocardiogram (TTE) revealed mid-ventricular ballooning with left ventricular outflow tract obstruction (Max. Grad. 58 mmHg) [Fig. 2] caused by basal segments hyperkinesia, increased left ventricular filling and moderate-severe mitral valve regurgitation [Fig. 3], and the coronary artery computer tomography excluded significant coronary artery stenosis. After medical therapy, TTE showed improvement of LV systolic function without kinetic alterations and/or valve disease. Seven months later, no additional symptoms were reported.

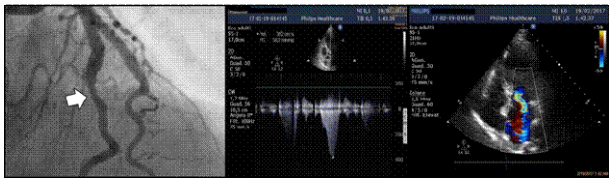

Figure 1 Figure 2 Figure 3

This case shows the occurrence, in the same patient, of "apical" TTS, microvascular ACS and "mid-ventricular" TTS with an unusual association with left ventricular outflow tract obstruction. This case confirms a strict relationship between microvascular dysfunction and TTS.

**A396: EMPAGLIFLOZIN INFLUENCES HEMORHEOLOGY, ARTERIAL MORPHOLOGY AD FUNCTION**

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(a) UNIVERSITÀ DEGLI STUDI MAGNA GRAECIA DI CATANZARO, AZIENDA OSPEDALIERO-UNIVERSITARIA MATER DOMINI

In recent years, the new antidiabetic medication empagliflozin has been reported to reduce cardiovascular mortality and morbidity through mechanisms not yet fully understood. Empagliflozin is a SGLT2 (sodium-glucose cotransporter protein 2) inhibitor whose mechanism of action is mainly to limit the absorption of glucose by the kidney. The osmotic diuresis associated to glycosuria lead to increased hematocrit and likely to tissue hemoglobin availability. This mechanism has been hypothesized as additional mechanism responsible for cardiovascular benefits induced by SGLT-2 inhibitors. Hematocrit influences also wall shear stress (WSS) that is the main hemodynamic force acting on the endothelial surface and modulating the synthesis and the release of vasoactive and anti-thrombotic and anti-atherosclerotic molecules. We have previously demonstrated that low WSS associates with higher arterial wall thickness, increased prevalence of plaques, and lower arterial vasodilation. We have designed the current study with the aim to evaluate whether empagliflozin influences WSS, intima media thickness (IMT) of carotid artery and endothelial function. Thirty-five subjects with type 2 diabetes who were administered empagliflozin or incretin-based treatment in combination with insulin±metformin to improve metabolic control were enrolled. WSS, carotid artery IMT, and brachial artery endothelial function were evaluated at baseline, and after 3 months. WSS was calculated based on the following formula: 4η SPV/ID, were η is blood viscosity, SPV systolic peak velocity and ID internal diameter. Endothelial function was evaluated by ultrasound using the flow-mediated dilation technique. Characteristics of subjects in empagliflozin group (20) and incretin-based therapy group (15) were comparable at baseline. After 3 months glycated hemoglobin as well as fasting plasma glucose significantly decreased in both groups. Shear Stress of carotid and brachial artery significantly increased in empagliflozin group after 3 months, while no change was detected in incretin-based group. Carotid IMT significantly decreased in the empagliflozin group after 1 and 3 months (baseline: 831 ± 156, 1-month 793 ± 150, 3-month 766 ± 127 μm; $p < 0.0001$), while it decreased in incretin-based treatment group after 3 months (baseline: 890 ± 146, 3-month 841 ± 109 μm; $p < 0.01$). Endothelial function at baseline and after 3 months was: 4.8±4.5% and 8.5±5.6% in empagliflozin group ($p<0.04$), and 5.1±4.5% and 4.7±4.7% (p=NS) in incretin-based group. The present study demonstrates that empagliflozin, but not incretins, significantly increases carotid and brachial artery WSS. After 1-month treatment wall thickness decreased and endothelial function increased. The benefit determined by empagliflozin was evident also after 3 months. Subjects taking incretin-based therapy showed a reduction of IMT only after 3 months. Endothelial function improved only in empagliflozin group. The study offers the opportunity to investigate the additional effects of gliflozin that may contribute to the beneficial cardiovascular effects of this drug.

**A397: ECHOCARDIOGRAPHIC ACCIDENTAL FINDING OF ASYMPTOMATIC CARDIAC AND PULMONARY EMBOLISM DUE TO CEMENTAL LEAKEAGE AFTER PERCUTANEOUS VERTEBROPLASTY**

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(a) DIPARTIMENTO DI SCIENZE MEDICHE E SANITÀ PUBBLICA - UNIVERSITÀ DEGLI STUDI DI CAGLIARI

**Introduction.** Percutaneous vertebroplasty (PVP) is a therapeutic, inter-ventional radiological procedure involving bone cement injection into a fractured vertebral body in order to obtain pain relief and mechanical

stability of the vertebral body. Complications are uncommon, and among them is the bone cement leakage into the spinal canal, the paravertebral tissues, or the perivertebral venous system and right heart/pulmonary embolism.
**Case report.** A 68 year-old woman with a history of diabetes mellitus type 1, neuropathy, arterial hypertension, hypercholesterolemia, surgery for right knee and left hip prosthesis and several PVP procedures two year earlier, came to our attention for echocardiographic evaluation of her arterial hypertension and for a suspected amyloidosis. So, she underwent a transthoracic echocardiogram, by which we excluded cardiac amyloidosis, but we found, in the apical four-chamber view, a hyperechogenic linear image in the right ventricle (RV), going from the apical portion of RV to the right atrium. The patient was asymptomatic.
After diagnostic confirmation at transoesophageal echocardiography and chest computed tomography (CT), the patient was sent to the cath lab to perform an attempt of removal via right cardiac catheterism, that was unsuccessful, with the breaking of the material in two parts, one of those migrated to the left pulmonary vein; a chest CT showed it in the latero-basal segment of the left inferior lung. A surgical attempt of removal was judged inopportune, due to a low risk/benefit ratio.
**Conclusions.** Although PVP is considered a minimally invasive procedure, it may result in cardiovascular complications, which are infrequent and consist in bleeding at the puncture site, local infection, cement leakage into the spinal canal, the paravertebral tissues or the perivertebral venous system, and several instances of pulmonary embolism. Although the surface of fresh or aged bone cement is not thrombogenic in vitro, its presence into the could be capable of causing cardiac perforations. According to our experience, we think that Transthoracic echocardiography is an easily available examination that should be always performed after PVP to easily identify cement cardiac embolization.

### A398: INVERTED TAKOTSUBO CARDIOMYOPATHY WITH ATYPICAL PRESENTATION INDUCED BY DOBUTAMINE STRESS ECHOCARDIOGRAPHY

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**Case report.** A 48 year old female with a history of atypical chest pain, discharged from a peripheral general hospital in which had been admitted because of a prolonged chest discomfort secondary to an emotional stress; during cycloergometric test performed at discharge, an asymptomatic ST segment depression in the infero-lateral leads was observed, so the patient has been referred to our centre to undergo a dobutamine stress echocardiography (DSE). The patient's history revealed an early menopause (45 years), a smoking habit and hypercholesterolaemia. A standard DSE protocol was used; at 40 mcg/kg/min of dobutamine and following 0.5 mg of atropine, we noticed anterior wall mid-basal hypokinesia without any ECG abnormalities; dopamine infusion was promptly stopped but during recovery we observed a worsening of the kynetic pattern with a marked systolic hypokinaesia followed by akinesia of all left ventricular mid-basal segments and severe impairment of global systolic function (LVEF 25%). Ventriculography confirmed the abovementioned diagnostic findings and coronary angiography showed no coronary lesions. The patient was then admitted to our ICU, plasma troponin I levels were monitored (normal during all the hospital stay) and serial transthoracic echocardiograms were performed, showing a complete resolution of systolic regional and global impairment after 48 hours. A cardiac MRI performed one month later confirmed the complete recovery of systolic function and showed no gadolinium late enhancement. Two months later, to verify the cardiac sympathetic activity, a 123I-MIBG scintigraphy was performed, which showed an early decreased uptake in the whole left ventricle with an increased washout in the late images. On this basis, a beta-blocker therapy was initiated. Six months later, the patient remained asymptomatic.
**Conclusions.** Although transient cardiomyopathy induced by pharmacological stress has been previously reported, this is a rare case of dobutamine-induced inverted (mid-basal dysfunction) Takotsubo, which occurred with an atypical presentation (no chest pain, no ECG abnormalities, and a lack of increase in cardiac troponin). Several aetiological factors have been proposed for Takotsubo cardiomyopathy, including microvascular dysfunction, multivessel epicardial coronary spasm, catecholamine cardiotoxicity, and neurogenic stunned myocardium. One or more of these pathogenetic interpretations conform to our patient's physical and clinical profile: an anxious, perimenopausal female who was a heavy smoker. The reduction of 123I-MIBG uptake agrees with the previous results and seems to imply an impaired cardiac adrenergic activity. This finding suggests that in some cases, like ours, the disturbance of cardiac innervation may be structural and, at least in part, independent of the ultimate cause triggering neurogenic myocardial stunning. On the basis of ours and other studies, it is likely that in takotsubo syndrome a structural disturbance of cardiac innervation may be, at least in part, independent of the ultimate cause triggering neurogenic myocardial stunning.

### A399: MATERNAL HEMODYNAMICS, ARTERIAL STIFFNESS AND ELASTIC AORTIC PROPERTIES IN UNCOMPLICATED TWIN PREGNANCIES: A LONGITUDINAL STUDY

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(a) DEPARTMENT OF CARDIOLOGY AND CARDIOVASCULAR DISEASES, UNIVERSITY OF BRESCIA, ITALY; (b) DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, UNIVERSITY OF BRESCIA, ITALY; (c) DEPARTMENT OF OBSTETRICS AND GINECOLOGY, UNIVERSITY OF PARMA, ITALY; (d) DEPARTMENT OF STATISTICS AND QUANTITATIVE METHODS, UNIVERSITY OF MILANO-BICOCCA, MILAN, ITALY; (e) DEPARTMENT OF MEDICAL EPIDEMIOLOGY AND BIOSTATISTICS, KAROLINSKA INSTITUTET, STOCKHOLM, SWEDEN

**Objectives.** During pregnancy profound hemodynamic changes occur. There is scarce information available about maternal cardiovascular performance status during twin pregnancies. The aim of this study is to investigate longitudinal changes in maternal arterial stiffness, elastic aortic properties and ventricular-arterial coupling (VAC) in uncomplicated twin pregnancies compared to singleton ones.
**Methods.** In this prospective longitudinal study, we performed pulse-wave analysis (PWA) and transthoracic echocardiography in the first (T1), second (T2) and third trimesters (T3) in women with uncomplicated twin pregnancies, both monochorionic and dichorionic. Heart-rate-corrected augmentation index (AIx) standardized for a heart rate of 75bpm (AIx@75) was studied as indicator of arterial stiffness. Aortic diameters were assessed at end-diastole at four levels: Valsalva sinuses, sino-tubular junction, tubular tract and aortic arch. Aortic M-mode and tissue Doppler imaging (TDI) parameters were measured. Aortic compliance, distensibility, stiffness index (SI), Peterson's elastic modulus (EM), pulse-wave velocity (PWV) and M-mode strain were calculated using standard formulae. Aortic expansion velocity, early and late diastolic retraction velocities and peak systolic tissue strain (TDI-ε) were determined. VAC was defined as the ratio between aortic elastance (Ea) and LV end-systolic elastance (Ees). Finally, stroke volume (SV), cardiac output (CO) and total vascular resistance (TVR) were evaluated. The findings were compared to those of women with uncomplicated singleton pregnancies.
**Results.** 30 women with twin gestations (11 monochorionic) and 30 singleton controls were obtained for analysis. Blood pressure significantly decreased from T1 to T2 and then rose in T3, with higher values in twins than in singletons. AIx@75 showed the same trend in both groups with lower values at T2 in twins compared to singletons. SV and CO linearly increased throughout gestation with no significant difference between the two groups. On the contrary, TVR varied according to blood pressure in both groups and was higher in twin than in singleton pregnancies. Aortic diameters and elastic properties remained stable throughout gestation, with no significant intergroup differences. Both Ea and Ees were greater in twins than in singletons at T1 and T3 (worse Ea and better Ees), showing a significant linear trend towards reduction in the two groups, meaning better aortic elasticity and greater LV stiffness. VAC showed a trend to increase in singleton pregnancies, without differences with respect to twins. At linear regression models blood pressure, TVR, Ea and Ees depended from both multiple gestation and gestational age.
**Conclusions.** In twins, maternal hemodynamics does not seem to undergo more significant changes than in singletons being characterized by higher blood pressures with no differences in CO, TVR and aortic dimensions and function.

### A400: EVOLUTION OF SYSTO-DIASTOLIC CARDIAC FUNCTION AND ARTERIAL STIFFNESS IN SUBJECTS WITH NEW DIAGNOSIS OF COELIAC DISEASE WITHOUT CARDIOVASCULAR RISK FACTORS

Edoardo Sciatti (a), Enrico Vizzardi (a), Nicola Bernardi (a), Lucia Dallapellegrina (a), Francesca Valentini (a), Davide Fabbricatore (a), Marta Scodro (a), Annunziata Cotugno (a), Andrea Dell'Aquila (a), Gianmarco Arabia (a), Chiara Ricci (b), Marco Metra (a)
(a) DEPARTMENT OF CARDIOLOGY AND CARDIOVASCULAR DISEASES, UNIVERSITY OF BRESCIA, ITALY; (b) DEPARTMENT OF GASTROENTEROLOGY, UNIVERSITY OF BRESCIA, ITALY

**Objectives.** Coeliac disease (CD) is a genetically determined lifelong intolerance to gluten from dietary cereals, with 1% prevalence among the general population, and it is now considered a multi-system disorder involving all medical specialties for its diagnosis. In literature, there are conflicting opinions on the risk of developing cardiovascular disease in patients with CD. The aim of this study is to investigate aortic elastic proprieties and left ventricular geometry and function in young subjects with new diagnosis of CD and without cardiovascular risk factors.
**Methods.** 21 consecutive patients with new diagnosis of CD and without cardiovascular risk factors were prospectively enrolled and underwent

transthoracic echocardiography to analyse ascending aorta elastic properties (i.e., compliance, distensibility, stiffness index, Peterson's elastic modulus, M-mode strain, tissue strain) and left ventricular 2D strains, and applanation tonometry by SphygmoCor (to assess central blood pressure, radial augmentation index (AIx@75) and carotid-femoral pulse wave velocity (cfPWV). Cases were compared with 21 age- and sex-matched healthy controls.
**Results.** Brachial and central blood pressure was higher in the CD group, while AIX@75 and cfPWV did not differ between the two groups. Elastic properties of the ascending aorta were all impaired in the CD group; in particular tissue strain was altered in 57% of cases (0% of controls, p<0.001). In the same group, concentric remodelling and grade I diastolic dysfunction were present in 38% and 24% of cases, respectively (p<0.001). Global longitudinal strain was normal in all subjects, while radial and circumferential strains were altered in 67% and 35%, respectively (p<0.001).
**Conclusion.** In young subjects without cardiovascular risk factors, a newly diagnosed CD is associated to altered aortic elastic properties, left ventricular concentric remodelling and diastolic dysfunction, and altered radial and circumferential strain.

### A401: CAROTID INTIMA MEDIA THICKNESS AND ENDOTHELIAL FUNCTION IN SUBJECTS WITH NEUROFIBROMATOSIS 1

Antonio Cutruzzolà (a), Marco Frazzetto (a), Martina Parise (a), Rosa Gullace (a), Salvatore De Rosa (a), Daniela Concolino (a), Agostino Gnasso (a), Concetta Irace (a)
(a) UNIVERSITÀ DEGLI STUDI MAGNA GRAECIA DI CATANZARO, AZIENDA OSPEDALIERA-UNIVERSITARIA MATER DOMINI

**Background.** Neurofibromatosis 1 (NF1) is a common genetic disease, affecting approximately 1 in 3500 subjects. It is characterized by cafe-au-lait spots, dermal neurofibromas, skeletal dysplasia, Lish nodules, and optic glioma. Subjects with NF1 have increased risk for cardiovascular diseases that can be responsible of the excess mortality. Vascular complications are poor studied and etiology of "NF1 vasculopathy" is not yet well understood. The protein product of the gene affected in the NF1 disease, neurofibromin, is expressed in the endothelial cells and vascular smooth muscle cells. It is possible that neurofibromin may influence endothelial function, preserve endothelial structure and modulate proliferation and migration of smooth muscle cells.
**Aim.** Based on the histological evidences suggesting that the defective neurofibromin induces thickening of arterial wall and possibly endothelial dysfunction, we have designed the current study with the aim to evaluate carotid intimal-media thickness (IMT) and endothelial function by ultrasound in subjects with NF1 and control subjects without any known cardiovascular disease.
**Methods.** Consecutive subjects with NF1 attending the Pediatric Clinic at the University Magna Graecia Catanzaro and healthy volunteer students were enrolled from June 2017 to April 2018.
Carotid ultrasound was performed to obtain IMT measurement of both sides. Endothelial function was evaluated by the FMD technique using two different stimuli, ischemia with reactive hyperaemia (RH) and rhythmic hand-grip exercise (HX).
**Results.** 22 subjects with NF-1 and 20 healthy volunteers, comparable for sex and age, were recruited. Carotid IMT was significantly higher in subjects with NF-1 compared with control group: 556 vs 483 □m, p<0.001. Endothelial function evaluated by both RH and HX-FMD was significantly lower in NF-1 subjects as displayed in Figures 1 and 2.
**Conclusions.** The present findings demonstrate that subjects with NF-1 have impaired endothelial function compared with healthy subjects, and higher wall thickness of common carotid artery. The results of our study suggest that subject with NF-1 should be also monitored for atherosclerosis in order to manage concomitant cardiovascular risk factors and likely reduce the risk of cardiovascular events.

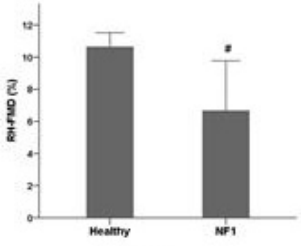

Figure 1

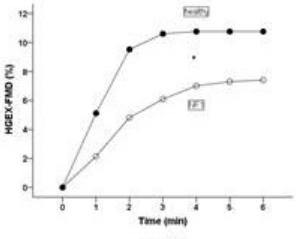

Figure 2

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 2
## Sessione Poster

### A402: FABRY ISEASE: IS RIGHT VENTRICLE INVOLVED? A SPECKLE-TACKING ECHOCARDIOGRAPHIC STUDY

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**Background.** Fabry disease (FD) is a rare X-linked disorder caused by α-Galactosidase A (α-Gal A) deficiency as a result of GLA gene mutations, leading to a progressive accumulation of glycosphingolipids, resulting in organ failure. While left ventricular hypertrophy is a common feature in Fabry disease-related progressive infiltrative hypertrophic cardiomyopathy, little is known about the role of right ventricular (RV) function in this setting, expecially at an early stage of the disease.
**Aim.** To describe RV structure and function, including RV strain through 2D-speckle tracking echocardiography (STE), in a small cohort of treatment-naïve FD patients, in comparison to healthy controls.
**Methods.** 8 consecutive FD patients at diagnosis (mean age = 59±18 yy, 5 males) and 10 age and sex- matched healthy controls underwent a comprehensive standard and advanced trans-thoracic echocardiographic evaluation. Particularly, the following RV parameters were obtained: RV free-wall thickness at the thinnest measurable portion at end-diastole (RVAWd), RV end-diastolic basal diameter, tricuspid annular plane systolic excursion by M-mode (TAPSE), pulsed Tissue Doppler derived systolic velocities of lateral tricuspid annulus, fractional area change (FAC), RV global longitudinal strain (RV-GLS) and RV longitudinal strain of free wall (RV-FWS).
**Results.** FD patients showed increased values of RV wall thickness compared to healthy controls (11.5±0.8 vs 8.3±2.1 mm, p= 0.004). No significant difference of standard RV functional indices, such as TAPSE, RV end-diastolic basal diameter, pulsed Tissue Doppler derived systolic velocities of lateral tricuspid annulus were found between the two groups. Of note, FD patients had significantly lower values of FAC and RV-GLS compared to healthy controls (46.7±6 vs 54.2±4.2%, p=0.01; -18.6±3.5 vs -23.04±3.9%; p=0.039, respectively). RV-FWS was lower in FD group, even if no statistical significance was reached (23.4±4.03 vs 26.5±4.8%; p= 0.204).
**Conclusions.** RV involvement is common in Fabry disease and ultimately progresses to severe systolic and diastolic RV dysfunction. Advanced echo parameters, such as RV strain through 2D-STE, could be useful to detect RV myocardial dysfunction in an earlier subclinical stage, before the changes in standard RV functional indices.

### A403: A MOTHER'S DAY TO MAKE THE HEART EXPLODE: THE CASE OF A BIVENTRICULAR TAKO TSUBO CARDIOMYOPATHY IN AN ELDERLY WOMAN

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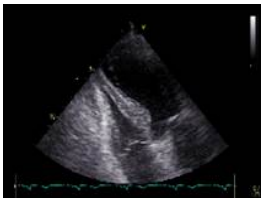
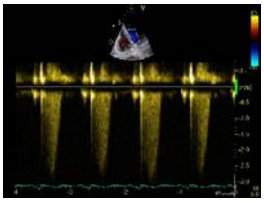
**Background.** Takotsubo cardiomyopathy (TC) is a syndrome characterised by transient ventricular dysfunction and most commonly involving left ventricle. Right ventricular dysfunction is usually less marked and biventricular dysfunction is recognized affecting about 25% to 42% of cases.
**Case report.** A 71 year old postmenopausal and hypertensive woman with a history of previous pancreatic cancer, admitted to our emergency department on may 2019 for epigastric and chest pain with dyspnea; the first ECG showed sinus rhythm conducted with left anterior hemiblock (already existing) and positive myocardial necrosis index at blood analysis (*hs*-TNI 771,5 ng/L); she was hemodinamically stable (HR 85 bpm, BP 100/70 mmHg). At the echocardiography: acinetic apical and mid-distal walls with hyperdinamic basal segments of the left ventricle; a moderate depressed ejection fraction (FEVSx 38%). Acinetic apical and mid-distal segments of the right ventricle, reduced FAC (21%). Elevated systolic polmonary hypertension (PAPs=50 mmHg). At the chest radiography: right pleural effusion, central congestion. There was no evidence of coronary artery disease at cardiac catheterization. She denied a major stressfull event but a period of emotional stress and sadness and anger at his loneliness on Mother's Day. According to the Mayo Clinic's diagnostic criteria the diagnosis of TakoTsubo was done and we use standard therapy of heart failure with : inhibitor of angiotensin converting enzime, beta blocker, diuretic and ASA.
During the hospitalization the ECG evolved with negative T wave in V1 and aVL and diphasic T wave in V2 and deep antero-lateral T waves. She was discharged after 7 days and instructed to follow up in 1 month after a rehabilitation cycle. During the follow up visit an ecocardiogaphy was performed and it showed a complete resolution of the biventricular

dysfunction with a normal ejection fraction and no residual wall-motion abnormalities.

[A]  [B] 

Echocardiogram of the patient showing hypokinetic apical and mid-distal walls [A] and elevated PAPs [B].

**Conclusion.** Tako Tsubo is a complex entity and its pathophysiology is not well defined. In this case, despite the absence of a determining stressful event, the period of emotional stress caused cathecolamine overdrive. The envolvement of the right ventricle had an impact on the in hospital events and the clinical presentation (heart failure and hypotension); the hospitalization was longer than expected due to the persistence of symptomatic hypotension treated with fluid filling, but it did not compromise the short term outcome perhaps thanks to an optimal medical therapy and an adequate rehabilitation cycle.

### A404: ACUTE ISCHEMIC STROKE DURING ACUTE POST-PARTUM MYOPERICARDITIS: A SUCCESSFUL LEFT VENTRICLE MECHANICAL THROMBECTOMY CASE REPORT

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A.C., woman, 32 years old, in a past history of pericarditis, was admitted to our UTIC for the onset of heart failure on the second postpartum day. The patient was already febrile from the immediate peripartum with an important increase in the phlogosis laboratory indexes. The echocardiogram showed normal cavity size of left ventricle with a moderate depression of contractile function and evidence of a smoke effect inside it, in the presence of an extensive apical akinesia, right sections within the limits, no significant valve vices, slight circumferential pericardial effusion. An intravenous diuretic therapy and an antibiotic and anti-inflammatory therapy were therefore set up with a progressive improvement of the compensatory picture and of the infectious-inflammatory state. Although a subcutaneous Enoxaparin therapy had also been undertaken, the presence of a thrombotic, pedunculate and fluctuating formation in the left ventricular apical site was found, for which heparin was increased and the oral anticoagulant started. The hospitalization was however complicated by the onset of a clinical-instrumental picture of ischemic stroke manifested with sudden aphasia and right hemiplegia with documented ischemic area to the brain TAC. The patient was therefore urgently submitted to mechanical thrombectomy with immediate recovery of cognitive and motor functions. At the subsequent echocardiographic examination there was the presence of apical thrombotic formation, reduced in size, but always pedunculate and extremely mobile. In consideration of the anatomical data indicating a high risk of an eventual embolic recurrence and the impossibility of practicing an anticoagulant therapy at an effective dosage due to the risk of haemorrhagic infarction of the recent cerebral ischemic area, the case was discussed collegially in the heart team and decided for surgical removal of the thrombus. The patient was therefore transferred to the reference cardiac surgery center where she was subjected to manual removal of the thrombotic formation by a median sternotomy, in the absence of complications. For diagnostic completion screenings were performed for any negative coagulopathies and a cardiac MRI that described outcomes of myocardial inflammation compatible with a myocarditic picture. At the following follow-up a state of clinical well-being was documented and a complete recovery of the left ventricular contractile function to echocardiographic control was documented.

### A405: FINGERPRINT METABOLICA E RISCHIO ARITMICO NEI PAZIENTI AFFETTI DA CARDIOMIOPATIA IPETROFICA OSTRUTTIVA E NON OSTRUTTIVA

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**Introduzione.** La cardiomiopatia ipertrofica (CMI) è la più comune tra le patologie cardiovascolari a trasmissione genetica. I pazienti che ne sono affetti hanno un rischio aumentato di morte aritmica, in particolare quelli portatori della forma ostruttiva (CMIO) rispetto a quella non ostruttiva (CMINO). Scopo di tale studio è stato valutare l'esistenza di alterazioni metaboliche potenzialmente legate al rischio aritmico.

**Materiali e metodi.** Sono stati arruolati 30 pazienti consecutivi (16 maschi e 14 femmine) affetti da CMPI (14 CMPIO e 16 CMPInO), diagnosticata secondo i criteri stabiliti dalle linee guida europee del 2014 sulla diagnosi e gestione della CMPI. Tutti i pazienti sono stati sottoposti a rivalutazione clinica, ECG a 12 derivazioni, ecocardiogramma convenzionale e TDI con valutazione dei parametri standard di funzione sisto-diastolica del ventricolo sinistro e misurazione del GLS 2DSTE e 3D-STE. Tutti i pazienti hanno inoltre effettuato un prelievo di sangue venoso per lo studio del profilo metabolomico mediante GC_MS.
**Risultati.** L'HCM-SCD score è risultato più alto nei gruppo CMIO rispetto a quello CMINO (3.7 ± 1.8% vs 2.1 ± 0.9%, p <0.05), in linea con i dati della letteratura. La valutazione ecografica ha evidenziato le caratteristiche tipiche della malattia di base con una riduzione della funzione longitudinale del ventricolo sinistro, valutata sia con il TDI (Onda S': 7.1 ± 1.4 cm/sec) che con la STE (GLS 2D: 13.4 ± 5.7%). Una volta divisi in base al fenotipo di malattia, i pazienti con CMIO hanno presentato, rispetto agli individui affetti dalla forma non ostruttiva, valori maggiori in modo statisticamente significativo di FE 2D (66.5 ± 3.3 % vs 60.6 ± 1.8 %; p<0.01), onda S' (7.6 ± 1.1 vs 6.3 ± 0.7 cm/sec, p < 0.01), GLS 3D (17.2 ± 4.2, vs 13.4 ± 1.3 %; p<0.05). L'analisi PLS-DA a 2 ha mostrato una chiara clusterizzazione tra pazienti con forma ostruttiva e non ostruttiva con buoni valori di R2 (R2x= 0.889) e Q2 (0.622), mentre l'analisi del plot dei loading e delle VIP ha permesso di individuare i metaboliti maggiormente discriminanti e maggiormente espressi nella due classi. Molto interessante è risultato di una maggio attività metabolica (che ben correla con la minore compromissione della funzione sistolica longitudinale) ed il riscontro di valori più elevati degli acidi grassi arachidonico e palmitoleico, associati ad un maggiore rischio di aritmia ventricolari, nei soggetti affetti da CMIO rispetto a quelli affetti da CMINO.
**Conclusioni.** I dati della letteratura dimostrano che gli acidi arachidonico e palmitoleico sono in grado di alterare le proprietà della gap junctions e della membrana mitocondriale, provocando alterazioni della ripolarizzazione dei cardiomiociti che potrebbero generare aritmie ventricolari. L'aumento di tali metabiliti e l'evidenza di una maggiore quantità di tessuto metabolicamente attivo (verosimilmente legato ad un diverso rapporto tra tessuto fibrositico e contrattile, come dimostrato dalla meno compromesso funzione longitudinale) nelle forme di CMIO, potrebbero essere alla base della differente suscettibilità alle aritmie nei due fenotipi della CMI.

### A406: DA UNA FALSA IMMAGINE ALLA VERA DIAGNOSI

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Un uomo di 83 anni si ricoverava presso il reparto di Pneumologia del nostro P.O. per dispnea ingravescente e contestuale riscontro radiografico di versamento pleurico destro. In anamnesi: ipertensione arteriosa, FA permanente in trattamento anticoagulante orale, IRC di grado moderato. All'esame obiettivo venivano riscontrati edemi declivi improntabili e reflusso epato-giugulare. L'ECG mostrava: FA ad RVM di circa 72 bpm, BBDx completo, EAS, alterazioni aspecifiche della ripolarizzazione in sede laterale e relativi bassi voltaggi nelle derivazioni periferiche. Agli esami ematochimici, si repertava un incremento dei valori di BNP (6559 pg/ml) e creatinina sierica (1.5 mg/dl) ed un movimento stabile in 3 determinazioni della TnI (0.5 ng/ml). L'elettroforesi proteica, eseguita in seguito all'esame scintigrafico, mostrava dei valori di Gammaglobuline di 18,9 % con componente in zona gamma di 0,42 g/dl; il dosaggio delle catene leggere K/L evidenziava incremento delle catene L (227 mg/dl) ed alterato K/L (1,02). Veniva eseguita TC torace che evidenziava diffuse calcificazioni polmonari e linfonodali con dubbio rilievo di difetto di opacizzazione dell'auricola atriale sinistra per cui si richiedeva un ecocardiogramma transesofageo che tuttavia escludeva la presenza di trombosi intracardiaca ma evidenziava in via collaterale una marcata ipertrofia cardiaca. Per il quadro di scompenso cardiaco congestizio resistente alla terapia, oltre che alla relativa esiguità del quadro funzionale polmonare, veniva disposto il trasferimento presso la nostra U.O. di Cardiologia. All'ingresso si eseguiva ecocardiogramma transtoracico che mostrava: ventricolo sinistro di normali dimensioni cavitarie e marcata ipertrofia concentrica delle pareti (LVMI 137 g/m2) prevalente a carico del SIV con disomogenea ecogenicità (Sparkling pattern). La funzione sistolica globale del ventricolo sinistro risultava lievemente ridotta (EF 50% al Simpson biplano), in assenza di franche alterazioni della cinesi segmentaria. Si evidenziavano inoltre segni indiretti di elevate pressioni di riempimento con una velocità onda E 1,4m/s, average E/e' 27 e volume atriale sinistro di 60 ml/m2; lieve insufficienza valvolare aortica, stenosi di grado lieve della valvola mitrale per ipomobilità del LPM con pseudoprolasso del LAM realizzante insufficienza moderata, insufficienza severa della valvola tricuspide, PAPs derivata circa 90 mmHg. Si poneva pertanto diagnosi di HFpEF secondario a cardiomiopatia restrittiva, verosimilmente infiltrativa. Si poneva il sospetto di cardiomiopatia amiloidea o sarcoidosi cardiaca con interessamento polmonare. Si

eseguiva RMN cardiaca che confermava l'ispessimento asimmetrico delle pareti del ventricolo sinistro e la riduzione della funzione biventricolare; non risultava tuttavia dirimente per la diagnosi differenziale della cardiomiopatia a causa della scarsa compliance del paziente che non rendeva valutabili le sequenze post-contrastografiche. Si proseguiva dunque l' iter diagnostico con scintigrafia con bifosfonati marcati con 99Tc che dimostrava una diffusa captazione cardiaca del radiofarmaco confermando il sospetto di amiloidosi ATTR. Veniva programmata infine una biopsia miocardica per una migliore definizione dell'eziopatogenesi della cardiomiopatia, in virtù della positività delle light chain e della contemporanea captazione scintigrafica specifica per TTR, che tuttavia non è stata effettuata per il sopraggiunto exitus del paziente per dissociazione elettro-meccanica con arresto di circolo refrattario ad ogni tentativo rianimatorio lasciandoci così il dubbio diagnostico riguardo la sua forma amiloidotica.

### A407: LMNA-RELATED CARDIOMYOPATHY: AN EMERGING ISSUE IN CLINICAL PRACTICE

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Lamins A and C are major structural components of the nuclear lamina, a protein meshwork supporting the inner nuclear membrane and are encoded by the *LMNA* gene. Lamins are involved in multiple cellular processes, such as nuclear stability, DNA replication, chromatin organization, modulation of gene expression, and nucleo-cytoskeletal coupling. Since the discovery of the first mutation in the *LMNA* gene about 20 years ago, an increasing number of mutations have been identified and associated with a wide spectrum of human diseases, overall referred to as laminopathies. They are characterized by large phenotypic heterogeneity, encompassing cardiac, neuromuscular, metabolic disorders and premature aging syndromes. Heart and skeletal muscles are the most affected systems, accounting for about 80% of total *LMNA* mutations. The cardiac phenotypes of laminopathies may include electrical disturbances, such as conduction system defects and both supraventricular and ventricular arrhythmias. In the heart, the phenotypic spectrum can also include structural abnormalities, which mainly range from left ventricular dysfunction to dilated cardiomyopathy, but enclose also left ventricular non-compaction, arrhythmogenic right ventricular cardiomyopathy, hypertrophic cardiomyopathy and, more recently, restrictive cardiomyopathy. The progression of cardiolaminopathies is variable and often includes sudden cardiac death, end-stage heart failure requiring heart transplantation and thromboembolic events as the most severe complications. The poor prognosis requires suitable risk stratification. The purpose of this review is to analyse *LMNA*-related cardiac phenotypes and the studies examining risk stratification of sudden cardiac death in cardiolaminopathies.

### A408: TEMPORAL TREND IN AGE AT DIAGNOSIS OF HYPERTROPHIC CARDIOMYOPATHY: AN ANALYSIS OF THE SHARE REGISTRY

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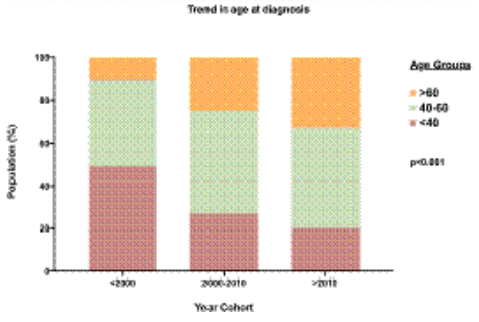
**Introduction.** Over the last 50 years, the epidemiology of hypertrophic cardiomyopathy (HCM) has changed. However, updated data on this relevant matter from large multinational HCM cohorts are lacking.
**Hypothesis.** In the last decades, HCM has been increasingly diagnosed leading to a broader spectrum of clinical and instrumental features.
**Methods.** We retrospectively analyzed records from the ongoing multinational SHaRe registry updated to the first quarter of 2018. Patients >18 years old at diagnosis were divided into three temporal groups (<2000, 2000-2010, >2010), and variables of interest plotted against quinquennial periods.
**Results.** Overall, 4608 HCM patients diagnosed between 1961 and 2018 were included. Number of diagnoses increased over time (<2000 -N=1179, 2000-2010 -N=2004, >2010 -N=1425). Mean age at diagnosis increased (41±14 vs 49±15 vs 52±15 years in patients diagnosed <2000 vs 2000-2010 vs >2010 respectively, p<0.001), both in US and non-US sites, with a stable male-to-female ratio of about 3:2. Prevalence of patients diagnosed >60 years was highest after 2010 (11 vs 25 vs 33%, p<0.001, Figure). Degree of left ventricular hypertrophy became progressively less marked over time (20±6 vs 18±5 vs 16±5 mm, p<0.001). Genetic testing was performed in 3061 patients: 44% were found to carry pathogenic/likely-pathogenic variants, but their identification decreased over time (55 vs 42 vs 37%, p<0.001). Prevalence of family history of HCM at diagnosis declined over time. Heart failure symptoms at presentation became less frequent after 2000 (NYHA III/IV: 17 vs 14 vs 11%, p<0.001), with diagnoses in asymptomatic patients rising to 56% >2010.
**Conclusions.** We observed a progressively greater representation of older patients with sporadic disease, mild phenotypes and genotype-negative status irrespective of geographical region. These findings should prompt a thorough revision of our current perspective and approach to the HCM disease.




### A409: IN THE MIDST OF A DANGEROUS INTERSECTION WITH UNCLEAR THERAPEUTIC STRATEGIES

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**Introduction.** One out of seven patients with severe aortic stenosis (AS) undergoing transcatheter aortic valve replacement (TAVR) may be affected by transthyretin cardiac amyloidosis (ATTR-CA), mostly presenting with low-flow low-gradient AS with mildly reduced ejection fraction (EF). Whether TAVR may have a prognostic benefit in ATTR-CA patients with symptomatic severe AS remains unclear, posing doubts on the best management strategy in this increasingly recognized subset of patients. We present a case exemplifying this clinical challenge.
**Case presentation.** A 87-year-old man with a history of hypertensive cardiomyopathy, moderate aortic stenosis, permanent atrial fibrillation, left bundle branch block and preserved EF presented to our clinic with effort angina, New York Heart Association (NYHA) III functional class and signs of pulmonary and systemic venous congestion. Cardiac ultrasound documented left ventricle (LV) hypertrophy (septum 21 mm, posterior wall 15 mm, LV mass index 350 gr/m$^2$) with severe concentric remodeling, mildly reduced EF (50%), severely depressed global longitudinal strain (-6%) and an average mitral annular Tissue Doppler S' of 5.5 cm/sec. Increased LV filling pressures and severe biatrial dilation were also apparent. Aortic valve evaluation revealed low flow-low gradient severe AS (stroke volume index 21 ml/m$^2$, max/mean gradient 30/16 mmHg, indexed aortic valve functional area 0.4 cm$^2$/m$^2$). Intravenous diuretics and vasodilators were administered with progressive decongestion and clinical improvement. Based on the low-flow low-gradient AS phenotype in the background of severe concentric hypertrophy, biatrial dilatation, S'wave depression, conduction abnormalities and unexpectedly low QRS-voltage (Sokolow-Lyon 30 mm)-to-LV-mass ratio, a diagnosis of amyloid cardiomyopathy was suspected. Bone tracer scintigraphy was performed revealing high diffuse myocardial uptake (Perugini score 3), diagnostic for ATTR-CA. The patient was unsuitable for ATTR-CA specific treatment because of current national reimbursement policies. A Heart team evaluation was carried. In consideration of the high procedural risk (EuroSCORE II 11.4%) TAVR was considered indicated for severe AS treatment. However, considering the patient frailty, the advanced-stage ATTR-CA and the clinical stability on oral diuretics following compensation, a final decision was made to discharge the patient on heart failure medical therapy, with an indication for percutaneous aortic valvuloplasty in case of further acute decompensation. At the last (3-month) follow-up the patient is alive, with no ensuing cardiac rehospitalizations.
**Conclusions.** In the presented case, we deemed the natural history of ATTR-CA to negatively affect both the prognosis and the procedural risk of the patient, adversing TAVR indication despite symptomatic severe AS. No clear evidence is currently available to guide decision making in this setting, advocating for prospective studies aimed to clarify if TAVR favourably impacts the prognosis of patients with ATTR-CA.

### A410: WRIST TRACER UPTAKE IN TRANSTHYRETIN AMYLOIDOSIS CARDIOMYOPATHY PATIENTS DIAGNOSED USING BONE SCINTIGRAPHY

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**Background.** Carpal tunnel syndrome (CTS) is a common finding among patients with transthyretin amyloid cardiomyopathy (ATTR-AC). However, it is not known whether bone scintigraphy used to diagnose ATTR-AC could demonstrate any specific tracer uptake at the wrist level. We examined the prevalence and characteristics of wrist 99mTc-HMDP uptake in a population of ATTR-CM patients and in an age and sex-matched control sample of patients with a history of breast or prostate cancer without bone metastases.
**Materials and methods**: We used a dedicated nuclear software (Xeleris; GE Healthcare) to perform a visual and a semi-quantitative measurement of tracer uptake at the level of the two wrists, with the average expressed as a percentage of the whole body uptake. Tracer uptake by the soft tissues was also estimated.
**Results.** We examined 21 ATTR-AC wild-type cases and 21 controls (81.1±5.8 years and 17 males in both groups). Visual quantification of tracer uptake at the wrists was negative, mildly positive and positive in 22%, 45% and 33% of the whole sample, respectively, with a similar distribution in cases and controls (data not shown). Semi-quantitative estimation of tracer uptake at the wrists was slightly lower in cases than controls (0.7±0.2% vs. 0.8±0.2%, p=0.041), whereas soft tissue uptake did not significantly differ between the two groups (0.39±0.11% vs. 0.35±0.08%, p=0.122). A history of monolateral and bilateral CTS was present in 2 (3.5%) and 7 (33.3%) of ATTR-AC cases, respectively. Tracer uptake at the wrists was similar in ATTR-AC patients with and without a history of CTS (0.7±0.2% in both groups, p=0.497).
**Conclusions**: Our preliminary findings show that there is no significant difference in wrist tracer uptake in ATTR-AC patients compared to matched controls, regardless of a history of CTS. The spatial resolution and the planar nature of the test are important limitations to this study, warranting future investigations with dedicated wrist imaging.

### A411: EFFECT OF ETHNIC BACKGROUND ON PHENOTYPE AT PRESENTATION IN V122I-RELATED HEREDITARY CARDIAC AMYLOIDOSIS

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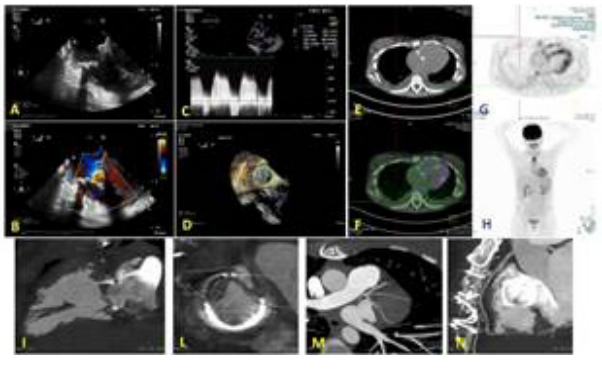
**Aim.** V122I-related hereditary Transthyretin Amyloidosis (hATTR) is commonly associated with a cardiac phenotype. While mostly reported in patients of African descendant, a cluster of Caucasian V122I carriers has been identified in central Italy and sporadic cases have been reported worldwide. The aim of this study was to evaluate whether ethnic background is associated with differences in clinical and cardiac phenotype at presentation.
**Methods.** Clinical files of three amyloid referral centres were reviewed and V122I patients identified. Only patients with definite cardiac involvement (as defined by mean of endomyocardial biopsy or by a combination of echocardiography and bone tracer scintigraphy) were included. Baseline demographic and clinical data at diagnosis were collected, together with echocardiographic and electrocardiographic (ECG) parameters.
**Results.** 89 patients with V122I hATTR cardiac amyloidosis were identified: 70 black and 19 caucasian. Most patients were male in both groups (63% vs 79% respectively; p:0.188), and black patients were younger at presentation (72±8 vs 75±5, p:0.026). Heart failure was the common clinical presentation in both groups, with overall 61% of patients presenting with NYHA class ≥ 3 and no differences in levels of NTproBNP (median: 3124 pg/mL vs 2744 pg/mL, p: 0.878). Both groups presented with a similar degree of wall thickening (interventricular septum [IVS]: 17±4mm vs 17±3mm, p:0.823; posterior wall [PW]: 17±4mm vs 16±2mm, p:0.408; for black vs caucasian, respectively), but black patients presented with a smaller cavity size (left ventricle diastolic diameter [LVEDD]: 44±7mm vs 47±5mm, p:0.021) as a result of a more extensive concentric remodelling (relative wall thickness [RWT]: 0.79±0.23 vs 0.67±0.13, p:0.033). There were no differences in measures of systolic function (ejection fraction [EF]:36±16% vs 42±15%, p:0.150; myocardial contraction fraction [MCF]: 14±7 vs 13±7, p:0.515; for black vs caucasian respectively). Atrial fibrillation was prevalent in both groups (black: 27%, caucasian: 37%; p: 0.385), as was low voltage on ECG (black: 48%, caucasian: 37%; p:0.373). A higher prevalence of pseudo-infarct pattern was noted among black patients (51% vs 22%, p: 0.031). Carpal tunnel syndrome, a marker of tenosynovial amyloid infiltration, was almost two-fold more prevalent in black patients (64% vs 31%; p:0.018).
**Conclusion.** Irrespective of their ethnic background, patients with V122I present with a relatively uniform and highly symptomatic phenotype of infiltrative cardiomyopathy. The younger age of black patients at presentation, together with a higher degree of left ventricular remodelling and a higher prevalence of extracardiac markers of amyloid infiltration, may suggest a more aggressive disease course for black patients, resulting in earlier symptom onset. Further studies are warranted to address the role of ethnic background in influencing the phenotypic expression of TTR gene mutations.

## IMAGING CARDIOVASCOLARE – 3
## Sessione Poster

### A412: ENDOCARDITE SU VALVOLA PROTESICA TRICUSPIDALICA: IL RUOLO DELL'IMAGING MULTIMODALE

Andrea Chiampan (a), Laura Lanzoni (a), Luca Ghiselli (a), Anna Anselmi (a), Edoardo Adamo (a), Stefano Bonapace (a), Carmelo Cicciò (a), Emiliano Dalla Chiara (a), Matteo Salgarello (a), Giovanni Carbognin (a), Enrico Barbieri (a)
(a) IRCCS SACRO CUORE DON CALABRIA, NEGRAR DI VALPOLICELLA

**Introduzione.** Una donna di 27 anni accedeva presso il reparto di cardiologia per febbre con alterazione degli ematochimici suggestivi per infezione in atto (leucocitosi, incremento PCR e procalcitonina). In anamnesi la paziente era tossico-dipendente ed era stata sottoposta 11 mesi prima a plastica della valvola tricuspide per endocardite da MRSA, dopo due mesi era stata effettuato successivo intervento di sostituzione valvolare tricuspidalica con bioprotesi per persistenza di endocardite. In cronico assumeva metadone e trittico.
**"Work-up" diagnostico.** All'ecocardiogramma transtoracico (ETT) e transesofageo (ETE) si evidenziava un'area di aumentata ecorigrangenza a carico del lembo anteriore della valvola tricuspide (Fig. 1A), tale masserella non appariva mobile con il ciclo cardiaco ma determinava un aumentato aliasing all'indagine colordoppler ed un incremento del gradiente transprotesico (Fig. 1B-C). La ricostruzione 3D derivata dall'ETE confermava la possibile vegetazione a carico del lembo anteriore della tricuspide (Fig. 1D). L'angio-TAC del torace mostrava l'incrementato spessore del lembo valvoalre ed escludeva possibili complicanze locali quali deiscenza della protesi, ascessi o pseudoaneurismi (Fig. 1I-L). Inoltre si eseguiva lo studio dell'anatomia coronarica in modo non invasivo, anche nell'ottica di un possibile nuovo intervento cardiochirurgico, evidenziando un albero coronarico privo di lesioni significative (Fig. 1 M-N). A completamento è stata effettuta anche indagine PET/TAC con 18F-FDG (Fig. 1E-F-G-H) che concludeva per omogenea captazione cardiaca aspecifica in assenza di focali riscontri cardiaci sospetti in presenza di numerose aree d'iperattività in sede splenica, linfonodale mediastinica, midollare ossea e a livello della pregressa sternotomia. Durante il ricovero sono state eseguite multiple emocolture risultate positive per Steptococcus pyogenes. Si concludeva con la diagnosi di recidiva di endocardite considerata la positività di due dei criteri maggiori di Duke (positività delle emocolture e imaging positivo per endocardite infettiva).



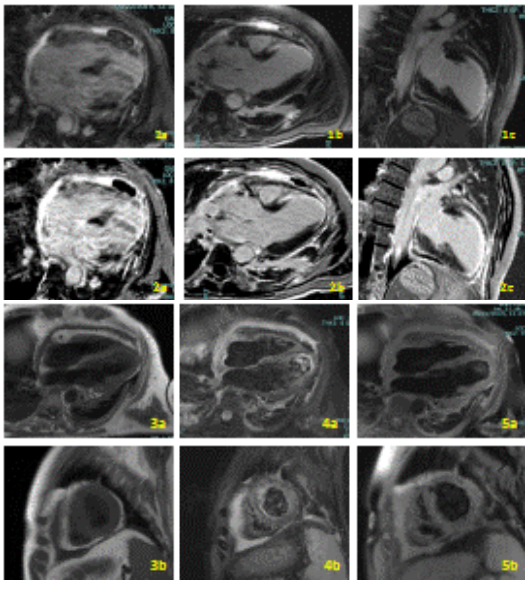
**Conclusioni e "take home message".** L'endocardite infettiva su valvola protesica è la forma più severa di endocardite, è associata a prognosi spesso infausta e può rappresentare una patologia difficile da diagnosticare e da gestire con la terapia medica. Le metodiche di imaging

cardiaco sono cruciali nella diagnosi di endocardite infettiva e la scelta di usare un approccio di multimodality imaging aumenta l'accuratezza diagnostica dei criteri di Duke e può avere un ruolo crociale nella diagnosi precoce anche nei casi più complicati. Nel nostro caso, l'ecocardiografia è stata fondamentale per identificare la sospetta vegetazione valvolare, l'indagine TAC ha escluso complicanze locali mentre la PET/TAC, sebbene non identificasse chiaramente patologico uptake a livello della protesi (possibile falso negativo), evidenziava il coinvolgimento infettivo/infiammatorio sistemico.

### A413: A TRICKY CASE OF HEMOPERICARDIUM AFTER A BLUNT TRAUMA DIAGNOSED WITH CARDIAC MAGNETIC RESONANCE

Clementina Dugo (b), Emiliano Dalla Chiara (c), Carmelo Cicciò (c), Laura Lanzoni (b), Andrea Chiampan (b), Stefano Bonapace (b), Luca Ghiselli (b), Anna Anselmi (b), Giovanni Carbognin (c), Enrico Barbieri (b)
(a) IRCCS SACRO CUORE DON CALABRIA - NEGRAR DI VALPOLICELLA (VERONA); (b) CARDIOLOGY DEPARTMENT - IRCCS SACRO CUORE DON CALABRIA - NEGRAR DI VALPOLICELLA (VERONA); (c) DIAGNOSTIC IMAGING - IRCCS SACRO CUORE DON CALABRIA - NEGRAR DI VALPOLICELLA (VERONA)

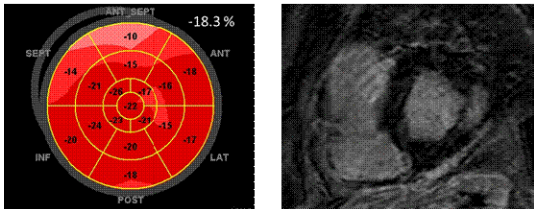
A male patient, 56 year-old, was admitted to the Rehabilitation Department as standard follow up medical process after a car accident, which lead to multiple fracture (rib scapular and hip). Moreover, as a consequence of the blunt trauma, an anterior trans-mural myocardial infarction (MI) occurred due to traumatic dissection of left anterior descending coronary artery as it was detected during the coronary angiography. Echocardiography showed an apical and anterior MI with moderate to severe reduced left ventricle ejection fraction (LVEF) with a persistent pericardial effusion. A cardiac magnetic resonance (CMR) was performed to better assess cardiac morphology and function, myocardial viability and pericardium anatomy. Cine sequences confirmed the regional wall abnormalities and the reduced LVEF (31%) with apical and anterolateral transmural MI and near 50% trans mural extent in the anterior wall (fig. 1a: MAG LGE HLA view; fig. 1b: MAG LGE LVOT view; fig. 1c: MAG LGE VLA view; fig. 2a-c: PSIR sequence for LGE). The pericardium showed diffuse increased LGE with a small oval area with no LGE next to the right ventricle free wall near to the apex. On T1-weighted spin echo sequences the pericardial space was increased (up to 12 mm) and it showed intermediate signal intensity (fig. 3a-b); on T2-weighted STIR images, the pericardium had increased signal intensity (fig. 4 a-b). T1 weighted spin echo sequences with fat saturation pulse showed that the pericardial space had intermediate signal intensity (fig. 5 a-b). No real-time free breathing sequences performed, due to a technical issue. Considering the clinic course and the CMR features described, we went for the diagnosis of an old haemopericardium with the presence of a pericardial clot just near the apex. Follow up echocardiography performed after 3 months showed no signs of evolution in constrictive pericarditis (no ventricular interdependence, no pulsed-wave neither tissue Doppler specific patters). A follow up CMR scan is scheduled as well, to evaluate cardiac function after an adequate period of optimal medical therapy and to assess the evolution of the pericarditis.
This case report is characterized by unusual findings on CMR, which may be misleading in interpreting the exam. In this situation, we found that the integration between clinical information and echocardiography were pivotal in analysing the CMR exam and in reaching a possible diagnosis.



### A414: MULTILAYER STRAIN AND LATE GADOLINIUM ENHANCEMENT IN ANDERSON-FABRY DISEASE

Roberta Esposito (a), Regina Sorrentino (a), Ciro Santoro (a), Andrea Ponsiglione (a), Maria Lembo (a), Eleonora Riccio (a), Massimo Imbriaco (a), Antonio Pisani (a), Maurizio Galderisi (a)
(a) AOU FEDERICO II, NAPOLI

**Background.** In Anderson-Fabry disease (AFD), the accumulation of glycosphingolipids in cardiomyocytes causes inflammation, hypertrophy and interstitial fibrosis which is first limited to the mid-myocardial layers, then spreads to transmural fibrosis. Speckle tracking echocardiography allows the estimation of layer-specific strain, differentiating longitudinal strain (LS) at subendocardium and subepicardium (LSsubendo and LSsubepi, respectively).
**Purpose.** To investigate the matching of functional and structural abnormalities in newly diagnosed, never treated AFD patients by comparing multi-layer LS and late gadolinium enhancement (LGE) cardiac magnetic resonance (CMR).
**Methods.** Twenty newly diagnosed, never treated AFD patients (age = 37±13 years; F/M =10/10) and 20 healthy controls, matched for age and sex, underwent comprehensive evaluation of target organs and a standard echo-Doppler exam, including assessment of relative diastolic wall thickness (RWT) and left ventricular mass index (LVMI). Left ventricular hypertrophy (LVH) was defined as LVMi>47 g/m^2.7 in women and >50 g/m^2.7 in men. Speckle tracking echocardiography derived left ventricular transmural global longitudinal strain (GLS), LSsubendo, LSsubepi and LS gradient (LSsubendo - LSsubpepi) were also determined. CMR sequences including assessment of LGE were also performed.
**Results.** AFD patients had normal renal function and comparable body mass index, blood pressure, heart rate, ejection fraction and diastolic indices with healthy controls. LVMi (p=0.006) and RWT (p<0.02) were greater in AFD patients than in controls. GLS (p=0.006), LSsubendo (p=0.005) and LSsubepi (p<0.001) were lower in AFD patients. By CMR, only four patients (F/M=3/1), 3 with LVH (75%), exhibited focal LGE, always localized in the midwall. LGE was detected at basal lateral wall in three patients and at the septal insertional points with the right ventricle in the remaining one. AFD patients with LGE had higher LVMi than those without LGE (47.2±11.0 vs. 34.5±11.6 g/m^2.7, p=0.04). There was no correspondence of LGE with both regional LS and layer specific LS impairment (Figure). However, AFD patients with LGE had higher LS gradient compared to those without LGE (5.8±0.65 vs. 4.8±0.66, p<0.02).
**Conclusions.** Treatment naïve AFD patients show a reduction of longitudinal deformation, which involves both subendocardial and subepicardial layers. Patients with LGE present higher LV mass and increased LS gradient, without a correspondence of LGE with both regional and layer specific LS impairment. Accordingly, this impairment might due to myocardial inflammation occurring in the early disease stages more than to myocardial fibrosis itself.




### A415: CARDIOVASCULAR MAGNETIC RESONANCE FEATURE TRACKING IN LANDRACE PIGS - A REPRODUCIBILITY AND SAMPLE SIZE CALCULATION

Alessandro Faragli (a), Radu Tanacli (b), Christian Stehning (c), Heiner Post (a), Burkert Pieske (a, b), Sebastian Kelle (a, b), Alessio Alogna (a)
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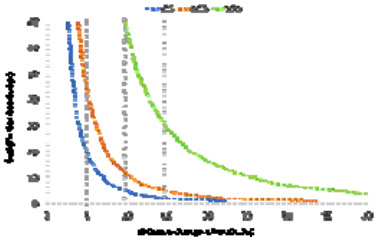
**Background.** Cardiovascular magnetic resonance feature tracking (CMR-FT) is a novel tissue tracking technique developed for non-invasive assessment of myocardial motion and deformation. This study aimed to evaluate the observer's reproducibility of left ventricular (LV) CMR-FT in a porcine model of hyper- and hypo-contractility and to define sample size calculation for future trials.
**Methods.** Ten anaesthetized, healthy Landrace pigs were acutely intubated, mechanically ventilated and transported to the MRI 3 Tesla facility for measurements. After baseline measurements (BL), two steps were performed: I) dobutamine-induced hyper-contractility (Dob) and II) verapamil-induced hypocontractility (Ver). At each protocol, MRI images were acquired at short axis (SAX), 2Ch, 3Ch and 4Ch views. The software MEDIS Suite 3.1 was utilized to analyze the global longitudinal (GLS), the circumferential (GCS) and the radial strain (GRS). The sample size required to detect a relative change in baseline strain was calculated.
**Results.** The highest inter-observer reproducibility was observed for GLS

during BL (ICC 0.88) and for GLS during Ver (ICC 0.79). During Dob measurements the inter-observer reproducibility was low for all LV strain values, in particular for GRS. The intra-observer reproducibility was the highest for GCS during BL, Dob and Ver steps (ICC 0.98, 0.97, 0.95, respectively) and for GLS during BL, Dob and Ver (ICC 0.81, 0.87, 0.75, respectively). The intra-observer reproducibility of GRS was overall weaker than GLS and GCS. Comparative analysis shows that GLS is the most sensitive parameter to detect changes in myocardial deformation (e.g. a sample size of five animals to detect a relative 5% change – see figure below).

**Conclusion.** This study shows a good to excellent inter- and intra-observer reproducibility of CMR-FT technique in pigs under different inotropic states. Furthermore, according to the sample size calculation for GLS analysis, a small number of animals could be enough for future trials, for instance to test the myocardial effect of a novel compound.



### A416: NON-INVASIVE BLOOD OXYGEN SATURATION IN THE HEART USING BLOOD-OXYGEN-LEVEL-DEPENDENT T2 MRI IN A PORCINE MODEL OF ACUTE SYSTEMIC HYPER- AND HYPOXEMIA

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(a) CHARITE UNIVERSITÄTSMEDIZIN IN BERLIN - KARDIOLOGIE; (b) DEUTSCHES HERZZENTRUM IN BERLIN; (c) CLINICAL SCIENCE - PHILIPS HEALTHCARE

**Background.** Quantification of blood oxygen saturation is essential for the clinical evaluation of patients with cardiovascular diseases such as heart failure and pulmonary hypertension. However, a non-invasive method to quantify O2 saturation in vessels and heart chambers has not yet been established. The blood-oxygen-level-dependent (BOLD) effect has recently emerged as an effective way to non-invasively assess the O2 saturation by exploiting the paramagnetic properties of hemoglobin through T2 magnetic resonance imaging (T2-MRI). Aim of this study was to evaluate the accuracy of BOLD-T2-MRI against cardiac catheterization in a porcine model of acute systemic hyper- and hypoxemia.

**Methods.** Ten anaesthetized, healthy Landrace pigs were acutely instrumented closed-chest with arterial and right atrial catheters for invasive blood gas analysis in the MRI-suite at the time of scan acquisition. After baseline measurements, following hyper- and hypoxemia protocol steps were performed: I) ventilation on 100% O2 (100% O2) II) dobutamine-induced systemic hyperperfusion, III) verapamil-induced systemic hypoperfusion IV) room air ventilation (21% O2). At each protocol step, arterial and central venous blood O2 saturation (ScvO2) were measured by invasive catheter sampling and blood gas analysis before and after the acquisition of T2 MRI data. Blood T2 was measured in the ventricles by means of T2 maps (τ180 = 12, 15, 25 ms). A multiparametric Luz-Meiboom (L-M) model was used to jointly process the data and to derive estimates for ScvO2.

**Results.** Baseline ScvO2 (84±6%) significantly increased during hyperemia (to 90±5% at 100% O2, p<0.05), while progressively decreased during the hypoxemia steps, Vera and 21% O2 (64±5% and 33±8%, respectively, both p<0.05). Dob failed to recruit a further ScVO2 reserve (87±4%). Arterial O2 saturation decreased significantly only during 21% O2 (73±13 %, p<0.05), while being preserved at every other step. In line with the catheter derived ScvO2, T2-relaxation time in the RV increased during hyperemia (146±45 ms vs 167±38 ms, baseline vs 100%O2, p<0.05), and decreased during Vera (91±29 ms, p<0.05 vs baseline), while did not show any change (148±54 ms) during Dob. Furthermore, T2 times did not further decrease during 21% O2 on top of Vera (94±16 ms). When estimating ScvO2 from T2 times, Dob and 21% O2 data showed a higher variability, presumably due to the sensitivity of T2 maps to pronounced hemodynamic as well as saturation changes. Linear regression analysis including all the other measurement steps showed a significant correlation between BOLD-derived and catheter derived O2 saturation (p<0.0001, r2=83%).

**Conclusion.** BOLD-T2-MRI mapping shows a significant correlation with cardiac catheterization in a clinically relevant range of O2 saturations. However, pronounced hemodynamic changes as well as very low O2 saturation negatively impacts on the accuracy of BOLD-T2-MRI. This technique may add important information in the clinical evaluation of patients with heart failure and further studies are granted.

### A417: MORPHOLOGIC AND FUNCTIONAL EVALUATION OF THE RIGHT VENTRICLE USING THREE-DIMENSIONAL ECHOCARDIOGRAPHY AND CARDIOVASCULAR MAGNETIC RESONANCE: A COMPARISON BETWEEN THE TWO TECHNIQUES

Chiara Giuntini (a), Maddalena Lattuada (a), Marco Curti (b), Francesca Ceriani (a), Morena Rossi (a), Roberta Giani (a), Mariangela Lattanzio (a), Sergio Ghiringhelli (a), Alessandro Beneventi (b), Roberto De Ponti (a)
(a) DIPARTIMENTO CARDIOVASCOLARE, UNIVERSITÀ DELL'INSUBRIA, OSPEDALE DI CIRCOLO, VARESE; (b) SERVIZI DI RADIOLOGIA, UNIVERSITÀ DELL'INSUBRIA, OSPEDALE DI CIRCOLO, VARESE

**Background.** Three-dimensional transthoracic echocardiography (3D-Echo) is rising as an alternative to cardiovascular magnetic resonance (CMR), which is presently regarded as gold standard in morpho-functional evaluation of the right ventricle (RV).

**Aim.** Validation of 3D-Echo in evaluating RV volumes and function in comparison with CMR.

**Methods.** Between June 2018 and June 2019, we performed CMR and 3D-Echo in 35 patients. 17 were affected by right ventricular failure-causing cardiopathy (15 had pulmonary artery hypertension, 2 had isolated RV cardiomyopathy), while 18 were healthy controls. Patients with contraindications to CMR, sub-optimal acoustic window, massive tricuspid regurgitation or interventricular septal defects were excluded. CMR ECG-gated scans were performed using a 1.5 T Siemens Avantofit system. Image post-processing was realized by Argus Siemens software. It consisted of semi-automatic identification of LV epicardium and endocardium, as well as of RV endocardium, both in end-diastole and end-systole on contiguous short-axis scans. 3D-Echo was performed on a GE Vivid™ E80 machine, using a 4V-D probe and multi-slice, multi-beat acquiring. Image post-processing was carried out on a separate workstation with Echopac™ software. Once some reference points have been pointed out manually, the software automatically identified RV endocardial borders in end-diastolic and end-systolic frames, allowing the operator to analyze them. Both techniques lead to definition, and therefore comparison, of right ventricular end-diastolic volume (RVEDV), end-systolic volume (RVESV), RV stroke volume (RVSV), and RV ejection fraction (RVEF). The variables were expressed as mean ± standard deviation. Pearson correlation coefficient (r) was determined, defining values > 0.7 as significant.

**Results.** We found a significant correlation between 3D-Echo and CMR in the evaluation of RVEF, RVEDV and RVESV (r = 0.92, r = 0.66 and r = 0.79 respectively; p < 0.00001). We point out a relevant difference between the mean volumes obtained with 3D-Echo (RVEDV = 77 ml, RVESV 44 ml) and with CMR (RVEDV = 157 ml, RVESV 87 ml), since 3D-Echo volumes were systematically lower than those calculated by CMR. We found no correlation for RVSV (r = 0.42, p= 0.01): this may be due to the discrepancy in the determination of RVEDV and RVESV. Furthermore, we found a stronger correlation between RVEDV and RVESV with the two techniques in cases (r= 0.66 and r = 0.76 respectively) rather than in controls (r = 0.56 and 0. 37 respectively).

**Conclusions.** Despite the volumetric underestimation with 3D-Echo, RVEF values with both techniques showed a strong correlation. Because of the many different contraindications to CMR, 3D-Echo could be considered as an alternative method, both at baseline and during follow-up. An improvement in three-dimensional echocardiographic reconstruction would be pivotal for an accurate evaluation of RV.

### A418: DIAGNOSIS AND QUANTIFICATION OF MID-TERM RESIDUAL INTERATRIAL SHUNTS AFTER PERCUTANEOUS PATENT FORAMEN OVALE CLOSURE: USEFULNESS OF A NON INVASIVE AGITATED SALINE TEST

Chiara Giuntini (a), Emilio Miglierina (a), Antonella Mancinelli (a), Battistina Castiglioni (a), Roberto De Ponti (a)
(a) DIPARTIMENTO CARDIOVASCOLARE, UNIVERSITÀ DELL'INSUBRIA, OSPEDALE DI CIRCOLO, VARESE

**Background.** The efficacy of percutaneous patent foramen ovale (PFO) closure is not always functionally evaluated in clinical practice, even though adverse events related to residual interatrial shunt have been reported in literature. The entity of residual shunts depends on the different devices used and is identified by transoesophageal (TOE) or transthoracic (TTE) echocardiography after 6 to 12 months after the procedure.

**Aim.** To identify and non-invasively quantify mid-term residual interatrial shunts after percutaneous PFO closure. This was achieved performing a direct comparison between TTE and transcranial Doppler (TCD) with median cerebral artery or basilar artery sampling.

**Methods.** We selected 77 patients who had undergone percutaneous PFO closure with the same device (Amplatzer) between 2011 and 2018. After 8 ± 2 months from the procedure, 40 patients (mean age 46 years, 52% females) were evaluated with TTE and TCD. Each examination was performed with agitated saline test, both in basal conditions and after Valsalva maneuver (VM). The presence of a residual interatrial shunt was defined as the immediate appearance of microbubbles in the left atrium and/or a sudden perturbation of Doppler signal in the median cerebral artery or in the basilar artery (micro-embolic-signal, MES). The shunt was

defined mild if ≤ 10 microbubbles/MES were found, moderate in presence of 10-20 microbubbles/MES and severe if there were > 20 microbubbles/MES.
**Results.** 24 patients (60%) did not show a residual interatrial shunt with both techinques. Among the 16 patients with positive tests, 11 (27%) showed a mild residual shunt, while 5 (13%) had a moderate residual shunt. We point out a discrepancy between TDC and TTE in 5 patients, who had just mild residual shunts. As expected, we found no significant statistical correlation between atrial septal aneurism, which was found by TOE performed before the closure procedure in 20 patients, and residual shunts at follow-up.
**Conclusions.** The percentage of residual interatrial shunts evidenced in our study is notably higher than those reported in literature (4% to 11% using TTE or TOE) for this specific device. This may be due to the use of different echocardiographic techniques: TOE, despite being the "gold standard" for morphologic evaluation of PFO, might underestimate the entity of the shunt because of patient's inability to perform an adequate VM, which on the contrary is possible during TCD. For these reasons, functional agitated saline tests (TTE and TCD) might yield to a higher diagnostic sensitivity after interatrial closure device implantation.

### A419: T1-MAPPING AND CARDIAC MAGNETIC RESONANCE FEATURE TRACKING IN MITRAL VALVE PROLAPSE

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**Background.** Several studies suggest that mitral valve prolapse (MVP) can be related to sudden cardiac death, owing to sustained ventricular arrhythmias (VAs). In patients with sudden cardiac death and complex VAs, a high percentage of left ventricle (LV) inferobasal fibrosis has been described using cardiac magnetic resonance (CMR) with late gadolinium enhancement technique (LGE). However, LGE presents several technical limitations and requires contrast agent administration. Thanks to T1 mapping (T1-map) and feature tracking (FT) techniques, CMR may identify myocardial fibrosis and deformation abnormalities respectively. We sought to demonstrate that, in patients with MVP, T1 map can accurately identify the presence of myocardial fibrosis which, being related to myocardial stiffness, is associated to abnormal deformation indexes at CMR FT strain evaluation.
**Methods.** 73 consecutive patients (age: 57 ± 13) with indication to mitral valve repair for severe mitral regurgitation due to mitral valve prolapse and 42 healthy subjects were prospectively enrolled. CMR including Modified Look-Locker (MOLLI) sequences for T1 mapping was performed in each patient. In addition, CMR FT analysis of steady state free precession (SSFP) short axis cine images was performed to obtain 2D global and segmental circumferential and radial strains.
**Results.** Compared to controls, in MVP patients: 1) global average myocardial T1 native values (nT1) were significantly higher ($p<0.05$); 2) nT1 were significantly higher in the basal and mid inferolateral LV wall (both $p<0.05$); 3) global LV circumferential strain (GCS) was reduced ($p=0.004$); 4) segmental circumferential and radial strains of the basal and mid inferolateral LV wall were reduced (both $p<0.05$)
**Conclusions.** In patients with MVP and severe mitral regurgitation global nT1 are higher compared to controls and are associated to reduction of GCS. Moreover, segmental nT1 of the LV inferolateral are higher compared to controls and associated with reduced circumferential and radial strains. Further studies are needed to evaluate if these changes are associated with higher risk for VA.

### A420: INFECTIVE ENDOCARDITIS WITH PSEUDOANEURYSM OF THE SINUS OF VALSALVA WITH A FISTULA GOING TO THE LEFT ATRIUM. A CASE REPORT

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Infective endocarditis is the infection of the endocardial surface of the native valve or prosthetic heart valve. Bacterial endocarditis is commonly encountered in clinical practice and is a life-threatening disease associated with high morbidity and mortality.
We report the case of a 73-year-old male who was admitted in our hospital for fever, toracic pain and arthralgia. The ECG revealed diffused alterations of repolarization phase. Transesophageal echocardiogram showed infective endocarditis with abscess, pseudoaneurysm of the non-coronaric sinus of the aortic valve and a fistula going to the left atrium. The blood culture grew S. gordonii.
Streptococcus gordonii is among some of the initial colonizers of the periodontal environment and is recognized to cause bacterial endocarditis. However, there are only a few case reports of S. gordonii causing pseudoaneurysm in the literature. At first, medical treatment with antibiotics was started. But after 5 days from admission, he progressively gone worse and unfortunately the patient died before surgery. This case shows how endocarditis is a pathology difficult to diagnose and burdened by high mortality.

### A421: SEQUENZA DWI NELL'IMAGING CARDIACO: UNA VALIDA ALTERNATIVA CONTRAST-FREE ALLO STUDIO MORFOLOGICO E DI LATE ENHANCEMENT, NEI PAZIENTI CON INFARTO MIOCARDICO ACUTO.

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**Introduzione.** La DWI (Diffusion Weighted Imaging) è una sequenza di risonanza magnetica (RM) che sfrutta il grado di libertà di movimento dei protoni idrogeno legati alle molecole d'acqua presenti nei diversi tessuti. Attualmente essa viene regolarmente utilizzata in molti protocolli, tra cui l'imaging cerebrale per la valutazione dell'ischemia in pazienti con infarto cerebrale acuto. Allo stato attuale, la DWI non rientra nei protocolli standardizzati di RM Cuore.
**Obiettivi.** Review sugli articoli inerenti l'utilizzo della sequenza DWI nei protocolli RM cardio, e in particolare nei protocolli implementati nei pazienti con infarto miocardico acuto.
**Materiali e metodi.** Questo studio si divide in 2 parti: la prima di analisi statistica quantitativa sulle caratteristiche fisiche delle sequenze DWI utilizzate nei diversi studi; la seconda parte di raccolta dei principali risultati ottenuti. Inizialmente sono stati selezionati 87 articoli mediante PubMed, di cui solo 28 inclusi nello studio. Tutti i dati raccolti sono stati analizzati e confrontati mediante approccio osservazionale.
**Risultati.** Dall'analisi statistica è stata ottenuta la caratterizzazione del profilo ideale di una sequenza DWI per lo studio dell'ischemia miocardica: Single shot Spin Echo EPI, eseguita con uno spessore di slice compreso tra 6 e 10 mm, per un totale di 4-12 slice e pesata con 5 valori di b factor, compresi tra 0 e 500, per una durata totale di 5/7 minuti. Per la definizione dell'ipotetico impiego della DWI nell'ischemia miocardica, sono stati presi in considerazione i risultati degli articoli più significativi. In particolare, i risultati riguardano il confronto tra le sequenze T2w e T2w-STIR vs. DWI, e LGE vs. DWI. Nel primo caso, tutti gli studi hanno mostrato una più elevata sensibilità della DWI. Mentre, l'LGE e la DWI si sono dimostrati ugualmente efficace nella valutazione della fibrosi miocardica.
**Conclusioni.** Gli studi hanno dimostrato che la sequenza DWI rappresenta una potenziale valida alternativa alle sequenze morfologiche e di enhanchement tardivo standard. Nei pazienti in acuto, il protocollo RM Cuore standard potrebbe essere sostituito da un protocollo contrast-free di circa 15 minuti (CINE + DWI) che consentirebbe di modificare l'iter diagnostico terapeutico in maniera precoce, anche nei casi con bassa compliance, fornendo un elevato rapporto costo/beneficio.

### A422: MYOCARDIAL BRIDGING AND HYPERTROPHIC CARDIOMYOPATHY

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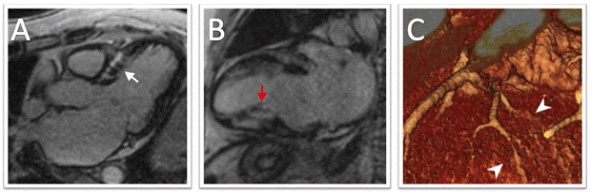
**Clinical presentation.** A 40-year-old man, with family history of sudden cardiac death, was diagnosed with non-obstructive asymmetric hypertrophic cardiomyopathy (HCM) on trans-thoracic echocardiogram; he was then referred to cardiovascular magnetic resonance (CMR) to assess ventricular function and presence and extent of myocardial fibrosis (class IIa level B), according to current guidelines. CMR confirmed the diagnosis of asymmetric non-obstructive HCM with normal biventricular volumes and function (LV EF 66%, LV iEDV 86 ml/$m^2$, RV EF 70%, RV iEDV 84 ml/$m^2$). A focal area of myocardial oedema was detected at the insertion points, extending mid-wall into the septum. On post-contrast images, extensive mid-wall late gadolinium enhancement (LGE) was noted in the basal to mid-cavity septal (Fig.1A, white arrow) and inferior walls, and in the postero-medial papillary muscle; subendocardial LGE, with focally almost transmural extent, was also noted in the mid-cavity to apical inferior wall (Fig.1B, red arrow). Given the evidence of an ischemic LGE distribution pattern in the inferior wall, a coronary CT angiography (CCTA) was advised as the patient, who had multiple cardiovascular risk factors, complained of new onset atypical chest pain; CCTA ruled out obstructive coronary artery disease (CAD), but showed partial intramyocardial course of the intermediate branch and of the second obtuse marginal (Fig.1C, white arrowheads).
**Learning points from this case.** Myocardial bridging can be found in up to 30% of HCM patients, and can be associated with chest pain, inducible myocardial ischemia and ventricular arrhythmias. Myocardial infarction with non-obstructive CAD is not uncommon in HCM patients, but it is

frequently difficult to diagnose clinically. CMR post-contrast imaging allows the recognition of ischemic damage in HCM patients, guiding the most appropriate management.




### A423: WHEN CORONARY ANGIOGRAPHY IS NOT ENOUGH: THE ROLE OF CARDIAC MAGNETIC RESONANCE IN DIFFERENTIAL DIAGNOSIS OF ATYPICAL CHEST PAIN AND LEFT VENTRICULAR SYSTOLIC DYSFUNCTION

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A 42-year-old man presented to the outpatient clinic for episodes of atypical chest pain, which started some months before and were not related to physical exercise. He denied any significant cardiovascular risk factors and had no other relevant comorbidities, apart from a recent history of diffuse paraesthesias and scintillating scotomas, with evidence of non-specific gliosis at cerebral magnetic resonance.
The electrocardiogram showed sinus rhythm with little inferolateral Q-waves. At blood samples, the patient had mildly elevated inflammation markers. A moderate dilation and systo-diastolic global dysfunction of the left ventricle (LV) was revealed by echocardiogram.
The patient underwent coronary angiography, with evidence of non-critical lesions of the posterior interventricular branch, the first diagonal branch and the posterolateral branch of the circumflex artery, consistent with thrombus recanalization.
Given the diagnostic suspicion of dilated cardiomyopathy with no coronary artery disease, the patient was referred to cardiac magnetic resonance (CMR). CMR confirmed LV moderate systolic dysfunction, with akinesis of the inferior wall, hypokinesis of the anterior and anterolateral wall and dyskinesis of the medium-apical inferolateral wall. STIR T2-weighted sequences revealed oedema in the inferior wall, confirmed by T2 mapping (50 msec vs 40 msec of the interventricular septum). In the same sequences, there was evidence of hypointensity in the lateral wall, likely due to the presence of myocardial hemorrhage. The late gadolinium enhancement (LGE) was diffuse and non-homogeneous in the inferior, inferolateral, anterolateral and anterior walls, following an ischemic pattern. T1 mapping showed diffuse high values, with a subsequent high estimated extracellular volume (1040+20 msec, 32% respectively). Oedema and LGE pattern were highly suspected of multiple and repetitive thrombotic events, and suggested a possible vasculitic origin of the disease. Indeed, further laboratory analysis demonstrated the positivity of anticardiolipin IgG, anti-beta2 glycoprotein IgM-IgG and Lupus Anticoagulant.
Antiphospholipid syndrome is a systemic autoimmune disorder of acquired hypercoagulability, characterized by obstetrical complications and diffuse thrombotic events in patients positive for antiphospholipid antibodies. Ischemic events are highly prevalent in these patients and may be the first presentation of the disease especially in the young. In this case, CMR tissue characterization played a pivotal role in the differential diagnosis and management of the patient, highlighting the fundamental role of CMR in patients with atypical chest pain and LV dysfunction with non-significant coronary artery disease.

## IMAGING CARDIOVASCOLARE – 4
## Sessione Poster

### A424: ARHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY DISCOVERED DURING SEIZURE

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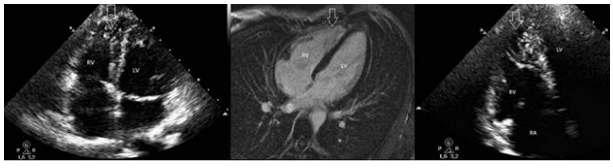
**Introduction.** A 18 year old girl of african origins was admitted to our hospital for Seizure. During a diagnostic EEG (Electroencephalogram), performed togheter with an ECG recording, she lost consciousness and a prolonged torsade de pointes was observed. The 12 leads ECG (Electrocardiogram) recorded during the recovery phase showed the presence of Epsilon-waves.
**Materials and Methods.** The patient was therefore admitted to the Cardiology Department where she underwent a complete echocardiogramm and a cardiac magnetic resonance (MRI). On the Echocardiogramm a very small, circumscribed area of “sacculation” in the lateral right ventricular apex was observed through off axis sections. The Cardiac MRI confirmed the presence of a thin bulging of the right ventricle apex, interpreted as non diagnostic for dysplasia.
**Discussion.** After discussing the case with family and Patient (an agonist Athlet), it was decided to implant a subcutaneous implantable cardioverter-defibrillator. During the follow-up, the defibrillator was activated once, during a ventricular tachycardia which degenerated to a ventricular fibrillation.
**Conclusion.** This clinical case shows how subtle Arrhythmogenic Myocardial Dysplasia could be. In fact, without the incidental registration of torsades de point during a diagnostic EEG, the disease would have been misdiagnosed with fatal consequences.



### A425: STRESS ECHOCARDIOGRAPHY AND SPECKLE TRACKING ANALYSIS IN PATIENTS WITH HEART FAILURE AND PRESERVED EJECTION FRACTION

Rita Cristina Myriam Intravaia (a), Daniela Di Lisi (a), Ambra Lupo (a), Fabiana Castellano (a), Ignazio Raspante (a), Oreste Fabio Triolo (a), Giovanna Evola (a), Renato Trapani (a), Daniela Manichino (a), Alfredo Ruggero Galassi (a), Giuseppina Novo (a)
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**Background.** Heart failure with preserved ejection fraction (HFpEF) is characterized by heart failure symptoms despite preserved LV systolic function together with at least one among left ventricle hypertrophy/left atrial enlargement plus diastolic dysfunction (DD) and increased brain natriuretic peptide levels. Rest echocardiography could still be normal despite patients experience HF symptoms. Speckle tracking analysis (STE) analyzes myocardial deformation and is able to identify subtle left ventricular dysfunction.
**Purpose.** To analyze the added value of stress echocardiography to improve diagnostic accuracy in patients with normal ejection fraction and unexplained dyspnoea by evaluating DD, lung B lines and STE.
**Methods.** Main inclusion criteria were: suspected heart failure, EF>40%, DD up to moderate at rest (E/e'<14), age<85 and >18 years, satisfactory acoustic window. Exclusion criteria were: comorbidities limiting the prognosis, valvulopathy more than moderate, coronary artery disease, moderate to severe DD at rest (E/e'≥14; E/A≥2), pregnancy or lactation. Each patient underwent physical stress echo and STE by GE Vivid 7, (AFI).
**Results.** After measuring diastolic function parameters variation with stress, HFpEF was diagnosed in 8 patients, who had baseline non-diagnostic echocardiogram (Table 1). In the remaining 20 patients a non-cardiac etiology of dyspnoea was diagnosed (NCD). EF did not significantly change from rest to stress either in HFpEF group (58±6 vs 61±8.7 p:0.62) or in NCD group (59±8 vs 62.2±7.4; p:0.26). GLS values tended to decrease in patients with HFpEF (-18.5±2.2 at baseline vs -15.96±6.67 at peak stress; p:0.33), and it was stable in NCD (-17.69±1.15 at baseline vs - 18.04±2.02 at peak stress; p:0.64).
**Conclusions.** Study of diastolic function during stress echocardiography is a useful diagnostic tool to reveal HFpEF in patients with dyspnea and unremarkable baseline echocardiogram. STE could offer useful adjunctive diagnostic information but further studies are needed to confirm its value.

| | HFpEF | NCD | p | HFpEF | NCD | p |
|---|---|---|---|---|---|---|
| GLS | -18,5±2,2 | -17,6±1,15 | 0,23 | -15,96±6,67 | 18,04±2,02 | 0,26 |
| E/A | 0,8±0,1 | 1±0,7 | 0,55 | 1,67±0,7 | 1,26±0,6 | 0,07 |
| E/e' | 10,1±2,2 | 9,9±3,7 | 0,4 | 16,4±0,9 | 13,8±5 | 0,16 |
| PAP | 25,6±4,1 | 22,33±0,55 | 0,57 | 49,8±9,65 | 28,27±4,35 | 0,001 |
| LA | 35,5±8,5 | 23,44±4,9 | 0,001 | 34,45±4,88 | 27,32±7,33 | 0,018 |
| EF | 58±6 | 59±8 | 0,6 | 61±8,7 | 62,2±7,4 | 0,7 |

### A426: ADDITIONAL ROLE OF 18F-FDG PET/CT IN THE DETECTION OF A MYCOTIC CORONARY ANEURYSM IN A PATIENT WITH ENDOCARDITIS

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Mycotic coronary aneurysm is a rare infective disease of arterial vessel walls. The cause of this infection could be related to the presence of an infective endocarditis or could represent a primary infection at the site of

an implanted intracoronary stent. Bacterial agents as Staphylococcus aureus are the most common etiological agents. The diagnosis could be challenging, because we have no patognomonical clinical features. Prognosis is characterized by high morbidity and high mortality rates, so a tempestive diagnosis and treatment are required. It has been demonstrated that PET/CT has a great diagnostic value in case of infections. The aim of this clinical case is to evidence the importance of 18F-FDG PET/CT in addition to the coronary angiography in the detection of a mycotic coronary aneurysm in a patient with endocarditis.
A 70 year old man, who underwent percutaneous revascularization with stents implantation on left anterior descending artery (LAD) and on right coronary artery (RCA), referred to our Nuclear Medicine Department because of an echocardiographic suspect of endocarditis of the mitral valve. Two weeks before he was admitted to our hospital in a septic state with Multiple Organ Failure (MOF), which needed cardiovascular support with sympathomimetic amines; at that time from the emocoltures it was isolated as microbial agent a Staphilococcus Aureus MSSA; the transesophageal echocardiography performed in that period was negative for the presence of vegetations. We decided to perform a 18F-FDG PET/CT in order to confirm the diagnosis of endocarditis. The images of the 18F-FDG PET/CT scan showed intense uptake of the radiotracer in the mitral valve plane, that confirmed the presence of endocarditis; we also noticed another intense area of uptake of 18F-FDG at the ostium of the right coronary artery (RCA). A coronary angiography showed the presence of a mycotic aneurysm on RCA.
**Conclusions** This case report suggests the important role of 18F-FDG PET/CT combined with the coronary angiography in the detection of a mycotic coronary aneurysm in a patient with a concomitant endocarditis.

### A427: VALUTAZIONE PRE E POST OPERATORIA NEI PAZIENTI SOTTOPOSTI A TAVI

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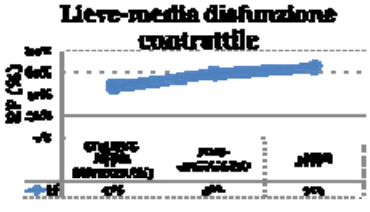
**Background.** Circa il 30% dei pazienti con stenosi valvolare aortica calcifico-degenerativa non può sottoporsi ad intervento chirurgico per la sostituzione della valvola aortica, a causa dell'età avanzata, e per la presenza di altre comorbidità.In alternativa ad esso si pone la metodica terapeutica dell'impianto percutaneo di una protesi valvolare aortica (TAVI).
**Materiali e metodi.** Per una valutazione retrospettiva dei pazienti, sono stati presi in considerazione i dati clinici ed ecocardiografici prima dell'intervento, nel periodo immediatamente dopo e a 3 mesi dal trattamento percutaneo. I pazienti (15 ricevuti nel periodo di follow-up; 8 uomini e 7 donne con età di 80 ±6.53 anni), sono risultati essere ad alto rischio chirurgico soprattutto per l'età al momento dell'impianto e sintomatici per stenosi valvolare aortica di entità severa con elevato gradiente transvalvolare (Gradiente Massimo 97± 31.97 mmHg, Gradiente Medio 61± 23.85 mmHg, AVA Doppler 0,6 $cm^2$ e VTI ratio 0,16). L'intervento a cui sono stati sottoposti è stato eseguito nell'anno 2018 in anestesia locale attraverso approccio trans-femorale destro in 11 pazienti (73%) e sinistro in 4 pazienti (27%). Su tutti i pazienti si è proceduti ad impiantare una valvola aortica percutanea "Medtronic CoreValve" su valvola nativa e in 2 pazienti è stata eseguita la procedura denominata "valve in valve".
**Risultati.** Abbiamo riscontrato, nelle tre fasi di campionamento dei dati, come la procedura sia riuscita con successo in tutti i 15 pazienti valutati nel follow-up, nei quali si è potuto appurare una diminuzione dei gradienti transvalvolari e la presenza di un leak paravalvolare, di lieve entità, prevalentemente in sede anteriore (87%), in sede anteriore e posteriore (7%) e in sede posteriore (6%). Il leak paraprotesico nei nostri pazienti risulta quindi la complicanza minore più frequente durante la procedura e non tende però a peggiorare al follow-up di 3 mesi. Tre pazienti giunti in follow-up sono stati sottoposti ad impianto di PM per insorgenza di bradiaritmie successive all'intervento. Confrontando i valori della PAPs tra la fase post-operatoria e quella a 3 mesi dalla procedura, attraverso il calcolo della variazione percentuale, si è riscontrato un miglioramento nel 20% di tutti i casi studiati, anche nei pazienti con disfunzione contrattile di grado lieve-medio. Il trend della funzionalità contrattile globale del ventricolo sinistro (FE) migliora dalla fase pre-operatoria a quella a 3 mesi dalla procedura, soprattutto nei pazienti con disfunzione contrattile di grado "lieve-medio e "significativo", nei quali si riscontra rispettivamente un miglioramento del 38% e del 35%.




**Conclusioni.** La TAVI è un opzione terapeutica valida nel trattamento dei pazienti con stenosi aortica degenerativa giudicati ad alto rischio chirurgico ed i tassi di complicanze sono bassi. I nostri dati mostrano la validità della procedura anche nei pazienti con lieve-media disfunzione ventricolare sinistra a rischio cardiovascolare globale medio-basso, suggerendo una maggior efficacia della procedura in una fase precoce della malattia.

### A428: REPRODUCIBILITY AND AGREEMENT OF 2D VERSUS M-MODE ECHOCARDIOGRAPHIC MEASUREMENTS OF LEFT VENTRICLE MASS CALCULATED BY CUBE FORMULA IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

Davide Rossi (a), Federica Alessi (a), Egidio Traversi (a), Giandomenico Pinna (b)
(a) ICS MAUGERI - IRCCS MONTESCANO - PAVIA (CARDIOLOGIA RIABILITATIVA); (b) ICS MAUGERI - IRCCS MONTESCANO - PAVIA (SERVIZIO DI BIOINGEGNERIA)

**Background.** Increased left ventricle (LV) mass is associated with increased mortality rates in patients with heart failure with reduced ejection fraction (HFrEF). The M-mode method (cube formula) is the most widely used approach to estimate LV mass because it is simple, fast and well validated. Because 2D echocardiography facilitates orientation perpendicular to the LV long axis, it is a widely accepted practice to use the 2D measures of LV diameter and wall thicknesses in the original formula for the estimation of the LV mass. It might therefore be expected that this procedure would improve the reproducibility of LV mass estimates as compared to M-mode. Normal values of LV mass estimates, obtained by 2D measurements in the cube formula, are less well established than for M-mode measurements.
**Objectives.** The aim of the study was two-fold: 1) to assess the inter- and intra-observer reproducibility of 2D versus M-mode measurements of the LV mass, and 2) to assess the agreement between the two methods, in patients with HFrEF. The assessment was also extended to the three linear measurements included in the cube formula.
**Methods.** Two expert sonographers performed baseline image acquisition and cardiac chamber measurements to assess intra- and inter-observer variability in 56 patients. Inclusion criteria were: 1) moderate-to-severe heart failure (New York Heart Association class: II-III); 2) left ventricle ejection fraction (LVEF) <= 40%; 3) stable clinical condition and optimal medical treatment. The only exclusion criterion was poor image quality. Variables considered were LV end diastolic diameter (LVEDD), septal wall thickness (LVSWT), posterior wall thickness (LVPWT) and LV mass indexed by body surface area (BSA). The outcome measure of reproducibility for all variables was absolute percentage difference between repeated measurements (% difference). The agreement between the two methods was assessed by Bland-Altman method.
**Results.** Inter-observer reproducibility of LV mass was slightly better using 2D echocardiography (% difference: 9±6 versus 13±9; p=0.01), while intra-observer reproducibility was very similar (p=0.29). M-mode and 2D inter- and intra-observer reproducibility of LVEDD, LVSWT and LVPWT were very similar (p>0.26 for all). Agreement analysis is shown in the table.

| | M-mode mean | 2D mean | Bias | p value | 95% limits of agreement |
|---|---|---|---|---|---|
| LV mass/BSA(g/m²) | 153 | 145 | -8 (-5%) | 0.001 | -42 26 |
| LVEDD (mm) | 69 | 68 | -1 (-1.5%) | 0.001 | -5.1 3.2 |
| LVSWT (mm) | 9.4 | 9.4 | 0.0 (0.2%) | 0.85 | -2.1 2.1 |
| LVPWT (mm) | 9.2 | 8.9 | -0.3 (-3.5%) | 0.01 | -2.2 1.6 |

**Conclusions.** In patients with HFrEF, LV mass estimates obtained by 2D measurements in the cube formula, are significantly lower and have a slightly better inter-observer reproducibility than those obtained by M-mode. Although the magnitude of these changes is small, limits of agreement between the two methods are rather large. This study suggests that normal values of LV mass obtained by 2D linear measurements, should be established.

### A429: FLUSSO REVERSE NELL'ARCO AORTICO DISTALE NEL TERZO TRIMESTRE DI GRAVIDANZA: VALORE PREDITTIVO NEI FETI "A RISCHIO DI COARTAZIONE".

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(a) SERVIZIO DI CARDIOLOGIA FETALE ASP - REGGIO CALABRIA (CASA DELLA SALUTE DI SCILLA); (b) OSPEDALE PEDIATRICO BAMBINO GESÙ ROMA

**Introduzione.** Durante l'esecuzione di un ecocardiogramma fetale nel terzo trimestre di gravidanza è di frequente riscontro una lieve prevalenza delle sezioni destre del cuore e del tronco dell'arteria polmonare considerata "parafisiologica". Tuttavia in alcuni feti tale prevalenza destra, per motivi ancora in parte oscuri, diviene particolarmente espressa e ciò correla con una certa restrittività dell'arco aortico posteriore e con un aumentato rischio di coartazione aortica neonatale. In questo setting generalmente si riscontra un grosso dotto che diventando particolarmente "invasivo" può condizionare un flusso reverse nell'arco aortico distale.
**Materiali e metodi.** Scopo di questo lavoro è quello di valutare in una

serie consecutiva di 5 feti con flusso reverse al Color nell'arco aortico distale (nelle sezioni ecocardiografiche fetali dei "tre vasi con trachea" e "sagittale dell'arco"), se questo elemento nel terzo trimestre di gravidanza si associa ad una aumentata incidenza di coartazione aortica neonatale rispetto a feti con caratteristiche simili ma senza la presenza di reverse flow nell'arco aortico posteriore.
**Risultati.** Nei 5 feti osservati con rilevante prevalenza destra, grosso dotto e reverse flow nell'arco aortico distale in nessun caso si osservava una evoluzione neonatale sfavorevole verso coartazione aortica vera. La prevalenza esasperata delle sezioni destre rientrava verso la normalità nelle prime 24-72 ore di vita e questo segno non appariva predittivo di coartazione aortica istmica post-natale.
**Conclusioni.** In questa breve casistica di 5 casi consecutivi di feti "a rischio di coartazione" il reverse flow nel terzo trimestre nell'arco aortico distale non sembrava appesantire l'outcome post-natale di questi feti e non si associava al riscontro di una reale evolutività verso coartazione aortica istmica neonatale.

### A430: CARDIAC RECURRENCE OF MYXOID LIPOSARCOMA IN INTERVENTRICULAR SEPTUM

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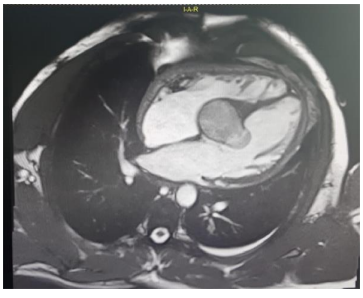
Cardiac tumors can be classified in primitive or cardiac metastasis. Final diagnosis is frequently challenging and includes detailed anamnesis and exams such as trans-thoracic, trans-oesophageal echocardiography, CT total body, Cardiac Magnetic Resonance and PET scan.
We present a case of a 43 year old man which was admitted to the hospital for dyspnea and chest pain. Further investigation revealed a recurrence of myxoid liposarcoma localized in his interventricular septum which caused out-flow tract obstruction and pericardial effusion.
Cardiac surgery was excluded considering the localization, extension of neoplasm and the high risk of complications. Therefore this patient started chemiotherapy treatment with echocardiographic follow-up.
Cardiac tumors are rare entities which need multidisciplinary discussion in order to decide the best feasible approach.



### A431: CARDIAC MAGNETIC RESONANCE: ROLE IN THE STUDY OF PULMONARY HYPERTENSION

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Tommaso Lanzilotto (a), Giulia Mazzuca (a), Federica Pala (a),
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Cardiac magnetic resonance (CMR) is the reference method for the evaluation of cardiac structures, volume and function. It is also the alternative method to echocardiography and right catheterization (RCC) because it produces high resolution, 3D, multi-planar and multi-parametric images in a non-invasive mode [1]. CMR is used in heart failure caused by pulmonary arterial hypertension (PAH) because it gives predictive information of the disease (useful for the follow up) that correlates and implements those obtained from RCC such as: mean pulmonary artery pressure (PAPm) and vascular resistance (RVP) [2]. The values obtainable on the right heart with CMR are: ventricle mass, ejection fraction, end-diastolic and end-systolic volume, related to the survival of patients with PAH [3]; the same parameters are also studied for the left side of the heart. From the biventricular evaluation it is possible to derive the VMI (ventricular mass index) which expresses the ratio between the mass of RV and LV, providing indications on the evolution of the pathology. In addition to changes in shape and function, the continuous haemodynamic stress produces tissue alterations of the myocardium with the formation of fibrotic zones, which can be detected by delayed enhancement phase-sensitive inversion recovery (PSIR) sequences with different contrast medium kinetics in pathological areas [4]. PAH involves changes in vascular structures such as caliber irregularities and the possible presence of intravascular blood clots that can be visualized with the angiographic study. Furthermore, MRI is able to provide precise measurements on: arterial pressure, flow velocity and cardiac output. Our study proposes the validation of the CRM protocol as a reference method in the diagnosis and follow-up process in the PHA with respect to the RCC.
**Materials and methods.** MAGNETOM Verio 3T Siemens, Body Matrix coil 6-channel coil, protocol; morphological (TSE T1-T2w), morphofunctional (SSFP Cine RM), tissue characterization (STIR and MdC Delayed enhancement), flow (Phase Contrast), angiography (3D Fast SPGR). Cohort: 17 patients (10♀, 7 ♂), average age 53.5 years (28-80), PAH diagnosed with effort tests and RCC.
**Conclusions.** CRM is a valid tool to determine specific therapeutic planning suitable for different patients, modulating the rigidity of clinical classification according to individual variability also in response to medical therapy. Accuracy and non-invasiveness make the method fundamental in the follow up. MRI is multiplanar and multiparametric, so it allows the study of many aspects of the cardiac district and of the different pathological markers obtaining a better evaluation of the disease.

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### A432: INCIDENTAL FINDING OF RARE CONGENITAL CORONARY ANOMALIES

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**Introduction.** The origin anomaly of a single coronary artery (CAA) is a rare congenital pathology (incidence 0.2-5.6%) [1] characterized by the absence of clinical symptoms whose finding is usually incidental. In more severe cases it can lead to ischemia and sudden death [2], (5% -35% of cases) [3] in young subjects. Coronary anomalies may be associated with congenital heart disease, the most frequent is bicuspid aortic valve (0.5-2%)[4]. During an in-depth study in a medical facility outside our University Hospital, the following two clinical cases were presented.
**Materials and methods.** Coronary CT Examination (CCTA) with CT Revolution 256 GE Healthcare.
**Case 1.** Woman, 24 years old, anomalous origin of the right coronary artery from the left coronary sinus, intra arterial course between aorta and pulmonary trunk with slit-like appearance of the ostium, elliptical aspect at the origin, acute angle of emergency (22,7°) and uniformly reduced proximal tract with a longitudinal extension of 15 mm.
**Case 2.** Male, 48 years old, presence of type 0 bicuspid aortic valve according to Sievers, balanced dominance, left coronary with long common trunk, which originates from the medial coronary sinus in posterior position and runs between aorta and left atrium without wall or caliber pathology.
**Results.** Both patients were asymptomatic. Case 1: CCTA examination following positive CEMRI. Case 2: CCTA examination for screening. According to world literature, our case reports highlight the absence of symptoms in these congenital cardiac anomalies, whose diagnosis is always incidental.
**Conclusions.** CCTA should be considered the first choice method for the diagnosis of congenital coronary anomalies, as it allows the simultaneous evaluation of the vessel wall, the presence of coronary artery disease and the relationship between coronary arteries and large arteries. The use of high-performance equipment allows an important dose saving (≤1mSv), a relevant topic since this pathology is frequently encountered in young subjects. It is also useful in the pre-surgical evaluation and even more in congenital heart disease because it allows the evaluation of the patency of the ducts and the anatomical relationships with the cardiac structures. For the future, the greater use of CCTA as a diagnostic method of reference is desirable because it's non-invasive, inexpensive and has favorable dosimetry.

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### A433: TWO DIFFERENT SHAPES IN A SINGLE LEFT ATRIUM APPENDAGE: A CLINICAL CASE

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**Background.** Atrial fibrillation (AF) is the most common heart arrhythmia with increased prevalence in older age. Non-Valvular AF (NVAF) may lead to formation of thrombosis in left atrium (LA), in 95% of the cases inside in left atrium appendage (LAA), which can lead to ischemic stroke. LAA morphology can be classified in 4 different shapes: chicken wing (48%), cactus (30%), windsock (19%) and cauliflower (3%). Transoesophageal echocardiography (TOE) is recommended by current Guidelines prior to direct current cardioversion (DCC) of more than 48 hours lasting AF, in order to rule out the presence of LAA thrombi, to minimize the risk of ischaemic stroke and to properly investigate LAA morphologhy. Tricky LAA shapes can sometimes mymic the presence of spontaneous thrombus formation in LAA. In such cases, a multi-imaging approch with the help of cardiac computer tomographic angiography (CCTA) can discriminate between thrombosis and particular LAA shapes.
**Case summary.** We report a case of a 75 years old man with persistent AF symptomatic for exertional dyspnoea (NYHA II) with indications for DCC. A first TOE prior to DCC was executed which demonstrated spontaneous echocontrast in LAA and an image suspected for thrombosis, despite proper anticoagulation therapy with DOAC for more than 30 days since the first diagnosis of AF, so DCC was delayed. After 30 days, a new TOE was executed by a different operator and showed a complex LAA morphology with two simultaneous morphologies (cauliflower with an extra chicken wing lobe) and a suspect thrombus. In order to rule out the presence of LAA thrombus and better describe the structure, we performed a CCTA which confirmed a very complex morphology of LAA and showed absence of thrombosis. The day after, DCC with single 150 J shock was performed, successfully restoring stable sinus rhythm without complication.
**Discussion.** LAA study prior to DCC of AF in order to rule out the presence of LA/LAA thrombus can be very difficult in certain complex anatomy, particularly when LAA morphology can mimic thrombosis in TOE. A multimodal approach with CCTA can overcome this issue and it can help to minimize the risk of ischemic stroke after a DCC of AF.

### A434: SYSTOLIC DYSFUNCTION IN PATIENT WITH SYSTEMIC SCLEROSIS: HOW TO ASSESS AND WHAT TO KEEP IN MIND

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**History.** A 52 year old lady affected by sistemic sclerosis (SSc) presented to our outpatient clinic for routine examination. Diagnosis of SSc was made in 2011, a year after Raynaud's phenomena and positivity to marker SCL70 first appeared. Capillaroscopy showed scleroderma pattern, but no skin affection. In 2013 her conditions worsened, with arthritis affecting hands and wrists and the first signs of oesophagus organ damage. In 2014 she started complaining of palpitations. Her 24-hour ECG monitoring showed numerous ectopic beats. Her medical history included an M-GUS (IgA-lambda) and mediterranean anemia.
**Cardiology investigations.** A first echocardiogram in 2017 showed concentric remodeling, a left ventricular ejection fraction (LVEF) of 45% and an aneurismatic aspect of the basal inferior wall. Mild tricuspid insufficiency was present with no pericardial effusion or other indirect signs of pulmonary hypertension. All other parameters were within range.
In January 2019 she underwent another echocardiogram which showed concentric remodeling, a LVEF of 52% and an aneurismatic aspect of the basal inferior wall. Indirect criteria of pulmonary hypertension were noted (pericardial effusion, D-shape with a sphericity index=0.80). In order to assess her pericardial effusion she was further evaluated after three months: her echocardiogram was overall comparable to the previous one, apart from impairment of the systolic function (EF 45%). In this occasion the patient also complained of numerous ectopic beats, which were also registered during the echocardiographic examination, and reported as affecting her quality of life. She was started on a low dose of beta-blocker. By June 2019, although indirect criteria of pulmonary hypertension were still recorded at the echocardiogram, her systolic function had improved to 50%. Her ectopic burden had reduced with beta-blockers. However she started complaining of chest pain during mild exertion (CCS 3). Her stress test was positive for angina; she is now awaiting a coronary angiography.
**Diagnostic hypotheses.** (1) the systolic disfunction is secondary to scleroderma-related cardiomyopathy. Her global longitudinal strain calculated by speckle tracking measurement was, in fact, reduced well before the onset of chest pain, indicating a possible sublicinical heart impairment. (2) The patient's impaired systolic dysfunction was secondary to a tachycardiomyopathy induced by her ectopic beats. (3) The patient's impaired systolic function is related to ischeamic heart disease.

### A435: 4D FLOW CMR FOR DIASTOLIC FUNCTION ASSESSMENT IN CARDIAC AMYLOIDOSIS

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**Background.** Cardiac involvement (CI) due to systemic light-chain amyloidosis leads to LV diastolic and systolic dysfunction, culminating with end-stage heart failure. Brain natriuretic peptides and echocardiography are commonly used for diagnosis and prognosis; CMR is becoming a standard to diagnose and track CI changes thanks to tissue characterization by late gadolinium enhancement (LGE) and T1 mapping. 4DFlow is a new technique that can quantitively assess LV 3D blood flow properties over the cardiac cycle with novel markers of diastolic dysfunction, superior to other techniques because of lack of restriction to imaging planes, high isotropic spatial resolution, low operator dependency. Specifically, quantification and timing of mechanical stimuli (wall shear stress, WSS) that blood flow exerts on LV wall and changes in blood momentum (hemodynamic forces, HF) during LV relaxation.
**Aim.** To compare LV diastolic function assessed by 4DFlow in pts with cardiac amyloidosis vs controls and to correlate 4DFlow markers with tissue characterization, echocardiographic and laboratory parameters.
**Methods.** A group of pts with cardiac amyloidosis defined by echocardiography underwent a comprehensive clinical, laboratory, CMR assessment with LGE, T1 mapping, and 4DFlow. Exclusion criteria were severe renal failure or other contraindications to CMR. 4DFlow was processed to quantify diastolic components of: i) WSS, ii) time-to-peak WSS (TTP); iii) HF along base-apex (HFba), septal-lateral (HFsl), posterior-anterior (HFpa) directions, the ratio between HFsl and HFba (HFsl-ba). Healthy subjects (n=15, 8 males, age 33±10) served as controls.
**Results.** Ten treatment naïve amyloid pts with CI (8 males, age 54±11 years) were analyzed (n=7/2/1 in stage III/II/I, Mayo cardiac staging 2004). Pts showed significantly increased LVmass, native myocardial T1, extracellular volume (ECV), LGE extension (by QALE score) and decreased LV end-diastolic volume (LVEDV) and ejection fraction (LVEF) vs controls. WSS was lower and TTP higher in pts vs controls; CI was also associated with significant reduction in all HF components. In amyloid pts, WSS and HFsl were correlated with left atrial area (r=.88, p<.01; r=.73, p=.01, respectively), and HFsl-ba with EF (r=.73, p=.02). As to tissue characterization, HFsl-ba correlated with myocardial native T1 (r=.71, p=.02). For echo diastolic data, correlation was found between TTP and e/e' (r=.77, p=.01), HFsl-ba with E/A (r=.80, p<.01) and PAPs (r=.73, p=.02). Correlation was found between NT-proBNP, cTnI and LV native T1 (r=.82, p=.01; r=.62, p=.05 respectively) and between HFpa and serum free light chain (dFLC), r=.65, p NS.
**Conclusions.** 4DFlow CMR detected alterations in LV diastolic function in amyloid vs controls. Preliminary analyses highlighted good correlation with CMR tissue characterization, echocardiographic and laboratory markers of diastolic impairment and disease severity.

### A436: UNA FORMA TENACE DI TACHICARDIA VENTRICOLARE E UNA STRANA CARDIOPATIA DILATATIVA

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Una donna di 51 anni con storia di cardiopalmo si presentava in Pronto Soccorso per dolore toracico con riscontro di tachicardia ventricolare (TV) sostenuta polimorfa con morfologia prevalente a tipo blocco di branca destra, non responsiva ad amiodarone e lidocaina; pertanto si somministrava flecainide, che si mostrava efficace nel mantenere il ritmo sinusale. L'ECG evidenziava un QRS ampio e frammentato con aspetto tipo blocco di branca destra e onde T negative nelle derivazioni laterali. All'ecocardiogramma: ventricolo sinistro (LV) dilatato con lieve riduzione della funzione di pompa per alterazioni della cinetica in sede medio-apicale e iper-trabecolatura della parete laterale; ventricolo destro lievemente dilatato e disfunzionante. La troponina I e i marker di infiammazione risultavano aumentati. La paziente veniva sottoposta a coronarografia che escludeva una coronaropatia, per cui veniva eseguita una biopsia endomiocardica che risultava però non dirimente mostrando alterazioni istologiche aspecifiche. Per la presenza di numerosi tratti di TV polimorfa,

veniva sospesa flecainide e impostata terapia con amiodarone e metoprololo, con peggioramento del burden aritmico; solo l'esmololo sembrava ridurre la frequenza e la durata delle aritmie ventricolari. Per identificare la sottostante cardiomiopatia, si poneva indicazione a RM cardiaca, eseguita in corso di infusione continua di esmololo; tuttavia, dopo le sequenze funzionali, l'esame veniva interrotto per recidiva degli episodi di TV sostenuta e stato di agitazione della paziente. Si somministrava flecainide per ev, oltre all'esmololo, con ripristino del ritmo sinusale. Le limitate immagini ottenute con la RM cardiaca confermavano la lieve disfunzione sistolica biventricolare con LV non compatto e dilatazione del tratto di efflusso del ventricolo destro. Veniva programmata una PET-RM total body, che mostrava una cardiomiopatia infiammatoria con aumentata captazione di FDG solo a livello della parete laterale del LV; era presente late gadolinium enhancement (LGE) transmurale nei segmenti apicale e medio della parete antero-laterale e come stria epicardica nella parete infero-laterale. La paziente veniva dimessa dopo 33 giorni, in terapia domiciliare con flecainide e metoprololo. Quattro mesi dopo, una RM di controllo confermava la dilatazione biventricolare, la parete laterale del LV assottigliata e discinetica con persistenti aree di LGE transmurale.
I dati clinici ci potevano indurre a pensare ad una cardiopatia ischemica. Una volta esclusa questa diagnosi, l'iter diagnostico diventava più complesso ma stimolante. La non compattazione potrebbe essere dovuta a una cardiomiopatia dilatativa e può essere la conseguenza di un rimodellamento del VS, piuttosto che la sua causa; peraltro il rilascio di troponina è atipico in questo contesto. La sarcoidosi cardiaca si localizza comunemente nei segmenti basali, in particolare del setto, e l'assottigliamento della parete non è la prima manifestazione. La PET-RM mostrava una infiammazione del LV con disfunzione biventricolare. In letteratura, l'uso crescente della RM ha mostrato che nella cardiomiopatia aritmogena il coinvolgimento del LV è molto più comune dell'atteso e una considerevole percentuale di pazienti ha una malattia del LV pari o addirittura superiore a quella del ventricolo destro, come in questo caso. Con la progressione della malattia, la fibrosi epicardica può diventare transmurale, causando assottigliamento della parete miocardica nel tempo. Secondo noi, la diagnosi più probabile è una cardiomiopatia aritmogena in fase attiva.

## CARDIOLOGIA INTERVENTISTICA E STRUTTURALE – 1
## Sessione Poster

### A437: A RARE CASE OF ASYMPTOMATIC VENTRICULAR SEPTAL DEFECT AFTER TAVI

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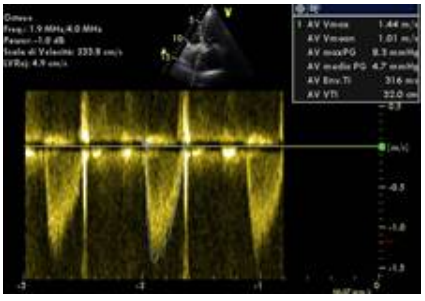
**Background.** Ventricular septal defects (VSD) are rarely reported as a complication following transcatheter aortic valve replacement (TAVR), presenting with signs of heart failure or, in few cases, asymptomatic.
**Case description.** We describe a rare case of 85-years-old woman with asyntomatic VSD after TAVR. Her medical history included hypertension, venous thromboembolism on long-term anticoagulation with rivaroxaban, cronic ischemic heart disease with previous proximal IVA coronary angioplasty and severe aortic stenosis treated with TAVR (Portico 25 mm). Four mounth after TAVR she presented with a cough and dyspnea on mild effort and high systolic pressure (160/90 mmHg); echocardiography showed good performance of aortic prothesis (mean gradient 7 mmHg), normal left ventricular ejecton fraction, normal dimension and motion of right ventricule. However, there was a small ventricular medium septal defects, that it hasn't releaved in pre-procedural ecocardiography. Coronarography exam showed no coronary atherosclerotic disease but at ventriculography the presence of left-to-right septal shunt. Right heart catheterization demonstrated absence of pulmonary hypertension; interventricular shunt was restrictive (Qp/Qs ratio of 0.9). Given the high surgical risk and the demonstration of restrictive VSD the heart team decided (the patient was discharged)



optimizing antihypertensive therapy. At follow-up control after six month the patient was asymptomatic with NYHA functional class I; transthoracic echocardiography showed that the VSD remained restrictive.
**Conclusions.** Ventricular septal defects (VSD) after TAVI are rarely post-procedural complications. There are few cases described in literature. They often cause congestive heart failure by left-to-right shunt, but they are seldom asymptomatic. Our case wants to underline the complexity of post-procedural follow-up in these patients.

### A438: PERCUTANEOUS COREVALVE EVOLUTE R TRANSCATHETER VALVE IMPLANTATION FOR POST.LEFT VENTRICULAR ASSIST DEVICE AORTIC REGURGITATION

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Damiano Regazzoli Lancini (a, b), Lucia Torracca (b),
Alessandro Barbone (b), Giovanni La Canna (b), Daniela Pini (a, b),
Renato Maria Bragato (b), Maurizio Gasparini (b)
(a) HUMANITAS UNIVERSITY; (b) ISTITUTO CLINICO HUMANITAS

**Background.** Aortic regurgitation (AR) frequently develops in patients supported with continuous flow left ventricular assist devices (LVADs) and is associated with worse prognosis. In patients with a high operative risk, transcatheter aortic valve implantation (TAVI) may be considered.
**Case presentation.** A 63-year-old man with refractory systolic heart failure due to ischemic heart disease underwent LVAD (HVAD, HeartWare, Inc, Framingham, MA) implantation and concomitant coronary artery bypass graft. His medical history included renal impairment, chronic obstructive pulmonary disease, and a previous cerebral hemorrhage with no sequelae. Preoperative echocardiography showed grade I AR with degenerative changes of the aortic valve cusp. After a complex post operative course, the patient recovered well and, apart from recurrent driveline infections, had a good quality of life in the subsequent seven years. Thereafter, he developed progressive symptoms of heart failure (HF) despite maximal diuretic therapy and severe hyponatriemia requiring hospitalization. Physical examination revealed a new diastolic murmur. Transesophageal echocardiography (TEE) showed severe AR due to cusp retraction, with normal systolic opening, and left ventricular overload. The circulatory loop caused by AR caused a severe reduction of cardiac output; due to misalignment of the inflow cannula, increasing LVAD pump speed caused suction alarms. An interventional approach was agreed on because the patient was a poor reoperative candidate, as reflected by a predicted surgical mortality (The Society of Thoracic Surgeons [STS] score) of 21%. Computed tomography confirmed TAVI feasibility. Therefore, the patient underwent transfemoral percutaneous implantation of a 34 mm CoreValve Evolut R Transcatheter Valve (Medtronic Inc, Minneapolis, MN) under general anesthesia (with concomitant driveline repositioning), with valve deployment implemented during complete HVAD stoppage and rapid pacing. Post-interventional TEE showed an excellent result, with mild residual AR. More efficient operation of the HVAD as a result of elimination of the circulatory loop was immediately reflected by HVAD flow characteristics. At follow-up the patient reported an improvement of functional capacity, without congestion despite less diuretic therapy.
**Discussion and conclusions.** AR is increasingly being recognized as a cause of recurrence of symptomatic heart failure (HF) in LVAD patients. The resulting circulatory loop renders LVAD operation inefficient, leading to recurrence of symptomatic HF and poor prognosis. The underlying mechanisms are multifactorial and risk factors have been identified, including pre-implant AR. Pre- and post-implantation management strategies should be developed to prevent and treat this complication. In patients with a high reoperative risk, TAVI may be a favourable approach.

### A439: ROTABLATION AND CORONARY ANEURISM IN SEVERE CALCIFIED CORONARY ARTERY DISEASE

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**Background.** Severe coronary arthery calcification (CAC) correlate with the degree of coronary artery desease (CAD) and with future cardiac adverse events. Advanced age, renal disease and diabetes are associated with CAC that are present in up to 20% of patients treated with PCI. Heavily calcified lesions are at high risk to be treated percutaneusly due to the difficulty for an adequate lesion dilatation, stent deliverability and the risk of stent underexpantion. Several techniques to facilitate PCI in in this setting have been developed and one of the most diffused and effective is percutaneous transluminal rotational atherectomy (PTRA), validated in the last 80ies by Fourier et al. Coronary aneurysms (CA) are detected in 1.2-4.9% of patients undergoing coronary angiography and have multiple etiologies: atherosclerosis, Kawasaky disease, autoimmune diseases, trauma, coronary dissection. The co-presence of CA and CAC is an infrequent but not rare condition where the use of PTRA may be mandatory but at risk of a higher rate of complications. Aim of the present study was to evaluate efficacy and safety of PTRA in patients presenting CA and severe CAC.

**Methods.** We performed a multicenter retrospective analysis of patients treated with PTRA from 2015 and we collected a case series of six patients with severe CAC and concomitant presence of significant CA. Long term follow up was conducted by phone and data about serious adverse events such as all cause death, cardiovascular death, re-hospitalization for myocardial infarction (MI) and target lesion failure were collected in our dedicated database protected by password.

**Results.** Our case series was represented by six patients, 67% males, aged 71.7±5.8 with a mean ejection fraction of 53+/-5.1%. Diabetes and active smoke was present in 17% of patients, 67% showed hypertension, 50% dyslipidemia and 33% family history of CAD. Renal function was normal or mild reduced (creatinine 1.03±0.56 mg/dL, eGFR 82 ± 33 ml/min/m2) and a mild anemia (haemoglobin 12.3 ± 1.8) was present at baseline. In 50% of cases the indication to angiography was an acute coronary syndrome and rotablation was performed during staged procedure. All patients underwent 7 French femoral approach with mean time fluoroscopy 27±11min and mean contrast volume 210±124ml. In 83% left anterior descending was the target vessel and only one case involved left circumflex. Mean lesion length was 29.8±17.5mm, proximal and distal reference diameter (PRD-DRD) were 3.4±0.6mm and 2.4±0.5mm respectively. Mean aneurism diameter was 4.4±1.1mm and in 50% of cases the calcific lesion involved a bifurcation. Floppy rotawire was used in 66% and ratio burr 1/DRD was 0.56±0.17. Mean stent length was 53.0±23.8mm and in 66% of patients the procedure was IVUS guided. All the procedures showed final TIMI flow 3 and the absence of major complications such as no-reflow or coronary perforation. Residual stenosis was poor (2.5±4.2%) with a good stent expansion. Mean time for the duration of dual antiplatelet therapy was 232 ± 153 days (two patients were in therapy with direct oral anticoagulant and one with Vit k antagonist). The mean follow up was 252±152 days and no severe adverse events such as all cause death, cardiovascular death, re-ospitalization for MI and target lesion failure were reported.

**Conclusion.** Our case series showed safety and efficacy of PTRA among high risk selective patients with calcified coronary lesions involving coronary aneurism. Future large studies are certainly needed to confirm our findings and to validate the use of PTRA in this particular setting.

### A440: ESTRAZIONE IBRIDA DI ELETTROCATETERE VENTRICOLARE SINISTRO

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(a) CARDIOLOGIA

**Introduzione.** Negli ultimi anni il numero di complicanze legate ai dispositivi elettronici impiantabili (CIED) è aumentato in relazione al maggior numero di impianti ed all'incremento dell'aspettativa di vita. Dai dati del registro europeo ELECTRa condotto dall'EHRA, nel 52.8% delle estrazioni l'indicazione era l'infezione, nel 19.3% dei casi sistemica. L'8.4% degli elettrocateteri estratti era localizzato in seno coronarico. L'intervento del chirurgo cardiotoracico si è reso necessario nel 7.3% dei casi. Riportiamo il caso di un'estrazione di catetere ventricolare sinistro che ha richiesto l'intervento del cardiochirurgo per difficoltà riscontrate durante approccio transvenoso.

**Descrizione del caso.** Paziente maschio di 79 anni affetto da cardiomiopatia ipertrofica portatore di ICD biventricolare in prevenzione secondaria. Si ricovera per sepsi in corso di endocardite mitrale ed aortica con neoformazioni su catetere atriale, per cui si pone indicazione ad estrazione del device con approccio transvenoso. Durante la procedura, all'atto della trazione del catetere ventricolare sinistro, si reperta sottoslivellamento del tratto ST al monitor ECG, per cui si procede ad esame coronarografico che reperta occlusione del ramo circonflesso in corso di trazione. Nel sospetto di incarceramento fibrotico del catetere si procede alla rimozione dello stesso mediante approccio chirurgico in sternotomia, procedura eseguita in cardioplegia e circolazione extracorporea. All'atto della rimozione del catetere si è assistito a rottura della guaina di rivestimento esterna, con permanenza di un frammento non metallico < 4 cm al controllo radiologico.

**Discussione.** Le procedure di estrazione di CIED vengono generalmente effettuate mediante approccio transvenoso con una ridotta incidenza di complicanze intraprocedurali. In alcuni casi tuttavia la reazione fibrosa è tale da incarcerare gli elettrocateteri al vaso e/o alle camere cardiache in cui sono stati inseriti, richiedendo quindi l'utilizzo di dispositivi dedicati (e.g. estrattori meccanici, laser). Questi dispositivi, tuttavia, non possono essere inseriti in seno coronarico a causa delle loro dimensioni, rendendo quindi obbligatorio l'approccio chirurgico per l'estrazione degli elettrocateteri ventricolari sinistri non rimuovibili con la sola trazione.

### A441: PCI AD ALTO RISCHIO CON SUPPORTO MECCANICO AL CIRCOLO (IMPELLA 2.5) IN PAZIENTE CON SCA-NSTEMI PORTATORE DI PROTESI AORTO-BISILIACA E CON RECENTE SANGUINAMENTO UROLOGICO

Mirko Beltrame (a), Andrea Angelozzi (a), Elisa Nicolini (a), Tommaso Piva (a)
(a) EMODINAMICA G.M. LANCISI, OSPEDALI RIUNITI DI ANCONA

Paziente di 86 anni, con in anamnesi intervento di protesi aorto-bisiliaca per aneurisma dell'aorta addominale e pregresse resezioni endoscopiche di neoformazioni vescicali. In data 4.6.2019 viene sottoposto ad intervento urologico endoscopico per recidiva di neoformazioni vescicali multiple. Il 6.6.2019 comparsa di dolore toracico, ECG: ST sottoslivellato da V3 a V5, significativo aumento della troponina ad alta sensibilità.

Ecocardiogramma: FEVS 47-50% con ipocinesia dei segmenti medio-basali del SIV. Alla CGR: stenosi critica di TC distale, stenosi critica di IVA e CX prossimale, occlusione cronica di CD. Durante incannulazione della coronaria sinistra episodio ipotensivo seguito da BAV totale. Regressione dopo qualche minuto. Veniva impostata terapia e il paziente veniva trasferito presso il nostro centro. Durante la degenza in UTIC evidenza di frustoli e coaguli a livello del lavaggio vescicale in sede con progressiva anemizzazione: Hb 8,1 g/dl (per cui il pz veniva trasfuso) e significativo rialzo della creatinina 0,8 ± 2,5. All'Eco-renale rilevata idrouretronefrosi dx. Veniva quindi stamponato manualmente voluminoso coagulo vescicale con fuoriuscita di numerosi coaguli rosso vivo. Si assisteva ad un progressivo miglioramento della funzionalità renale con lavaggi vescicali chiari. Dopo discussione in Heart-Team si optava per PCI con supporto meccanico al circolo (Impella 2,5). Veniva prima effettuata arteriografia addominale con avanzamento di catetere Pigtail 125cm da a. radiale dx che evidenziava protesi aorto-bisiliaca integra di buon calibro in assenza di significative tortuosità. Calcificazioni delle a.femorali bilateralmente, calibri nei limiti. Effettuata puntura eco-guidata dell'a.femorale comune dx, posizionato duplice sistema di emostasi Proglide, avanzamento di introduttori 10 e 13 Fr. Posizionato infine catetere Impella 2.5 L in Vsn con buone curve pressorie e motorie. La valutazione IVUS confermava la presenza di severe calcificazioni concentriche di CX e TC-IVA. Si procedeva quindi a Debulking rotazionale con fresa Rotalink 1.5 mm in asse CX ed impianto IVUS guidato di 2 DES. Successivo Debulking rotazionale con fresa Rotalink 1.5 mm in asse TC-IVA ed impianto in asse TC-IVA di 1 DES, postdilatazione in asse IVA e POT su TC con palloni NC. Dopo l'angiolplastica: Weaning rapido come da protocollo, rimozione di catetere Impella e successiva emostasi efficace. Al controllo angiografico buona pervietà dell'asse iliaco-femorale dx in assenza di alterazioni di parete. Integrità dell'endoprotesi. Paziente trasferito dopo 5 giorni in buone condizioni cliniche presso l'ospedale di riferimento con indicazione a doppia terapia antiaggregante con Plavix per 3-6 mesi.

### A442: IMPELLA-CP ASSISTED PERCUTANEOUS BALLON AORTIC VALVOTOMY VIA TRANS-RADIAL APPROACH

Mirko Beltrame (a), Andrea Angelozzi (a), Elisa Nicolini (a), Tommaso Piva (a)
(a) EMODINAMICA GM LANCISI, OSPEDALI RIUNITI DI ANCONA

A 78-year-old man, with hypertension, permanent atrial fibrillation, mild chronic kidney disease and moderate COPD, presented to his local hospital with NSTEMI and cardiogenic shock. EKG: AFib120 bpm. PAS 60 mmHg. Echocardiogram: EF of 25% and severe aortic stenosis: (AVA 0.7 $cm^2$; mean gradient, 40 mmHg). Diagnostic coronary angiography showed a chronic occlusion of the proximal left circumflex coronary artery, with homocoronary collaterals, stenosis of 90% of mid and distal right coronary artery. His surgical risk was prohibitive, so we tried to perform both BAV and PCI with use of mechanical support.

The Impella CP was inserted and hemodynamic support was initiated. The 6-Fr sheath in the right radial artery was replaced with an 8-Fr sheath. A 20mm x 40mm Cristal balloon was advanced across the aortic valve over an extra-stiff wire and a valvuloplasty was performed. Hemodynamic measurements demonstrated a reduction in the gradient from 33 mmHg to 5 mmHg. Then, PTCA of the right coronary was

performed with the implantation of 2 DES. After a prolonged ICU stay due to pleural effusion requiring a thoracentesis, creatinine elevation, and post operative anemia, the patient was finally sent back to his local hospital.
Percutaneous balloon aortic valvotomy (BAV) is a minimally invasive structural intervention for management of symptomatic severe valvular aortic stenosis (AS). Vascular access is usually obtained via femoral artery, which carries with it some degree of risk of bleeding and vascular complications. Trans-radial BAV has been developed to reduce peripheral complications and make the procedure safer. Moreover, patients with severe AS and concomitant depressed LVEF or ischemic heart disease are particularly susceptible to hemodynamic decompensation and, despite the use of percutaneous ventricular assist devices such Impella has been contraindicated in severe AS, there are various benefits reported in using PVADs in this setting.

### A443: CARDIAC ARREST IN PATIENT WITH GITELMAN SYNDROME

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(a) POLICLINICO TOR VERGATA

Gitelman's syndrome (GS) is an AR tubulopathy. GS is characterized by hypokalemic metabolic alkalosis, sodium depletion, coexistence of hypomagnesemia and hypocalciuria,activation of the SRAA with increased plasma levels of angiotensin II, with normo-hypotension, reduced peripheral resistance and hyporesponsiveness to pressure agents, resulting from inactivating mutations of the gene encoding the thiazide-sensitive sodium chloride co-carrier in distal convoluted tubule. GS is often characterized by transient periods of weakness and fatigue, presyncope,vertigo, ataxia and blurred vision, although in a small percentage of cases, it is associated with sudden cardiac death. We present a case of a man, 50-year-old patient, without previous CRF, affected by GS, referred into our ER for oppressive chest pain. ECG evidenced atrial fibrillation with anterior STEMI,severe hypokalemia (1.8 mEq/L) and elevated Tn I 298ng/mL.The pt was immediately transferred in Cath Lab for a primary PCI that was performed with implantation of 2 Zotarolimus-eluting stent in LAD. During procedure was necessary treat pt with 3 DC shock for repeated VF also due to severe hypokalemia corrected with iv infusion. Pharmacological management was also difficulty, due to severe reduction of EF (30%), who required high dose of diuretics that often induced severe hypokaliemia. Pt was discharged after 7 days with EF 55%. We evaluated pts with a coronary CT after 12 months that show patency of the stent.No further rehospitalization were required after discharge.The strong hydroelectrolyte deficiency can predispose to the occurrence of malignant tachyarrhythmias, as happened in the clinical case reported above. However,our attention was drawn to the condition of intracoronary thrombosis of the anterior descending artery in a 50-year-old patient without CRF and major cardiological previous.In reflecting on the possible pathogenetic causes we have noticed how the increased activation of SRAA, in patients with GS, is already a thrombogenic factor. Furthermore, the reduced Mg concentration seems to play a role in the failure of platelet aggregation, potentially increasing plaque instability. Considering also the greater reabsorption of calcium and the loss of potassium as potential vasospasm factors, we could hypothesize an association between GS and a prothrombotic condition in affected patients. Few data are in the literature concerning the association between CVE and Gitelman's syndrome.

### A444: INCIDENCE, PREDICTORS AND OUTCOMES OF VALVE-IN-VALVE TAVI: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objectives.** Surgical aortic valve replacement has been the treatment of choice for patients with aortic valve disease before the arrival of transcatheter aortic valve replacement (TAVI), although limited by degeneration of the bioprosthesis. "Redo" intervention itself is burdened by high risk of complications and valve-in-valve (ViV) TAVI could be a valid strategy of redo for patients with comorbidities. The aim of this meta-analysis is to give an overview of the state of the art of ViV TAVI in high-risk patients, analyzing efficacy, safety, intra-hospital outcomes and 1-year outcomes in literature and assess with meta-regression some possible predictors of survival at short and mid-term follow up.
**Methods.** In this systematic review and meta-analysis, two independent reviewers screened all studies investigating patients undergoing ViV TAVI. PubMed database was searched for reports published in English according to the following highly sensitive strategy, in compliance with established methods and incorporating wildcards (identified by *): (Transcatheter[All Fields] AND "aortic"[All Fields]) AND valve-in-valve[All Fields] AND "implantation"[All Fields] NOT (review[pt] OR editorial[pt] OR letter[pt])AND "humans"[MeSH Terms]). Mortality at 30 days and at 1 year were the primary end point, while procedural and short-term outcomes and echocardiographic parameters at hospital discharge were the secondary end points.
**Results.** Of 286 studies identified, 26 articles were included in this review, representing a combined total of 1448 patients. Median age was 78.8 years, 57.7% of the patients were male. Median STS-predicted risk of mortality was 9.4 % while median Logistic EuroSCORE was 31.3%. Median age of the bioprosthesis was 10 years with 84.6% of stented valves. Stenosis (45%), followed by regurgitation (31%) and mixed defects (21%) were the causes of prosthesis failure. The diameter of the degenerated valve was <=21 mm in 25.4%, 22-25 mm in 55% and >25mm in 11.7% of the patients. Transfemoral approach was preferred (76%), with a prevalence of balloon expandable valve (73.3%). Mean post procedural gradient was 16.7±0.8 mmHg. Mean follow up was 376 days. Overall and cardiovascular mortality at 30 days was 6.5% and 5.5% respectively, while at 1 year it was 14.5 % and 8.9% respectively. Regarding short-term outcomes, overall bleeding (10.4%), pacemaker implantation (9.4%) and vascular complications (8.3%) were the most common peri-procedural complications, while stroke (2.3%), myocardial infarction (2.7%) and coronary obstruction (2.8%) were less frequent. At meta-regression analysis study year ($p<0.001$), Logistic Euroscore ($p<0.01$) and valve diameter <=21 mm ($p<0.05$) at 30 days, and stenosis as reason for failure ($p=0.05$) at 1 year were identified as possible predictors of survival.
**Conclusions.** In the era of the trans-catheter techniques, percutaneous valve-in-valve aortic valve implantation offers a valid strategy to treat high risk patients with a degenerative bioprosthesis. The short and mid-term outcomes are substantially superimposable to those of TAVI, except for coronary obstruction which appears more frequent. Considering the possible need to approach and treat a following coronary artery disease, this feature has to be taken in account in the selection of the patients and in the planning time of the procedure. Future studies are needed to find predictors of long term survival and outcomes in lower risk patients.

### A445: CLINICAL AND IMAGING LONG-TERM FOLLOW-UP OF STEMI PATIENTS TREATED WITH ABSORB BVS

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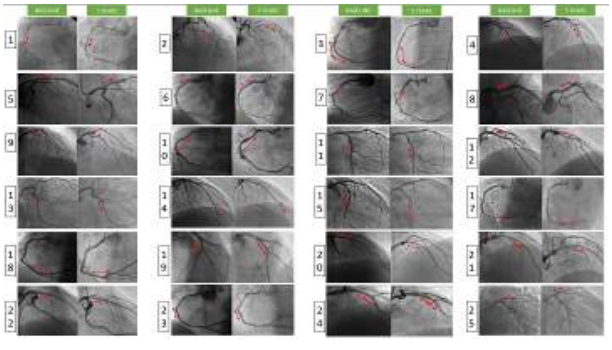
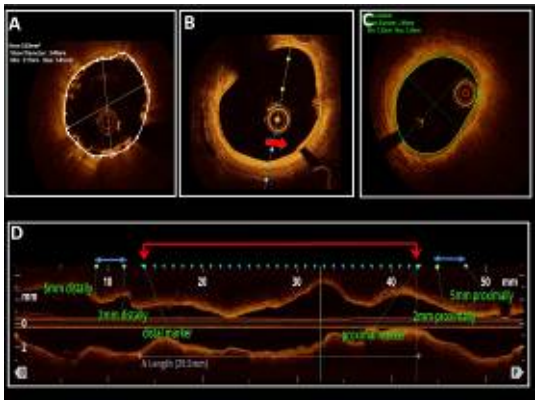
(a) UNIVERSITY HOSPITAL KRAVLOSKE VINOHRADY - THIRD FACULTY OF MEDICINE - PRAGUE; (b) CENTRAL MILITARY HOSPITAL - FIRST FACULTY OF MEDICINE - CHARLES UNIVERSITY - PRAGUE

**Aims.** Bioresorbable scaffold Absorb clinical use has been stopped due to higher rate of device thrombosis. Second generation devices are being developed. This study evaluates long-term clinical and angiographic outcome in STEMI patients.
**Methods and results.** PRAGUE-19 study is an academic study enrolling consecutive STEMI patients with intention to implant Absorb BRS. A total of 83 STEMI patients between December 2012 and March 2014 fulfilled entry criteria. Primary combined clinical endpoint (death, myocardial infarction or target vessel revascularization) occurred in 12.6% during the five-year follow-up with overall mortality 6.3%. Definite scaffold thrombosis occurred in 2 patients in the early phase after BRS implantation. Quantitative coronary angiography (25 patients) after 5 years demonstrated low late lumen loss of 0.11 ± 0.35 mm with binary restenosis rate of 0%. Optical coherence tomography (14 patients) demonstrated complete resorption of scaffold struts and mean lumen diameter of 3.25 ± 0.30 and 3.22 ± 0.49 (P=0.73) at baseline and after 5 years, respectively. Three patients developed small coronary artery aneurysm in the treated segment.






**Conclusion.** Clinical and invasive imaging results 5 years after BRS implantation in STEMI patients are encouraging and provide proof of concept for the future generation of BRS technology.

## A446: TRATTAMENTO TRANSCATETERE VALVE-IN-VALVE PER DEGENERAZIONE DI BIOPROTESI MITRALICA

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(a) CLINICA DELLE MALATTIE DELL'APPARATO CARDIOVASCOLARE - OSPEDALE POLICLINICO SAN MARTINO - GENOVA

La valvulopatia mitralica è la problematica valvolare più comune nei paesi sviluppati e la chirurgia è ancora il trattamento di riferimento. A causa di un crescente utilizzo di protesi valvolari biologiche rispetto alle meccaniche, la degenerazione di bioprotesi mitralica è una problematica emergente. Il reintervento comporta spesso un rischio elevato a causa dell'età, delle comorbilità multiple e dell'anatomia ostile.

La sostituzione valvolare mitralica transcatetere è una nuova opportunità di trattamento per degenerazione di bioprotesi mitraliche, ma anche in caso di anuloplastiche non riuscite o calcificazioni dell'anulus, in pazienti ad alto rischio per chirurgia convenzionale. I dispositivi attualmente utilizzati sono stati progettati per la posizione aortica, impiantati per via transapicale o transettale.

Presentiamo il caso di una donna di 84 anni, andata incontro nel 2010 a sostituzione valvolare mitralica con impianto di bioprotesi Perimount 29 mm. In anamnesi inoltre risulta BPCO di grado moderato, malattia renale cronica al terzo stadio, pregressa frattura di bacino con deambulazione ridotta e sanguinamento intracranico postraumatico sottoposto ad evacuazione chirurgica.

Ad inizio 2019 un ecocardiogramma effettuato per comparsa di dispnea ingravescente ha dimostrato degenerazione della bioprotesi mitralica con patologico aumento del gradiente medio (14 mmHg), a fronte di buona funzione biventricolare in assenza di anomalie volumetriche. Dopo discussione in Heart Team, è stata posta indicazione a sostituzione valvolare mitralica transcatetere, scegliendo una Edwards Sapien 3 ULTRA num 29 per approccio transettale. Il work-up preprocedurale ha incluso una coronarografia con riscontro di coronarie indenni da lesioni e l'analisi di un esame TC, che ha permesso di simulare la posizione della Sapien a livello del tratto di efflusso ventricolare sinistro, per stimare il rischio di ostruzione all'efflusso post-impianto, risultato non significativo. La procedura è stata effettuata via vena femorale destra, in anestesia generale con guida ecocardiografica transesofagea, che ha permesso una corretta puntura transettale in sede superiore e posteriore. Successivamente la bioprotesi degenerata è stata crossata con l'utilizzo di un catetere JL4 e guida idrofilica, scambiata con una coppia di guide ad alto supporto. Il setto interatriale è stato successivamente dilatato con un pallone da 14 mm per permettere il passaggio del delivery system, ed una Sapien 3 ULTRA 29 mm è stata rilasciata all'interno della Perimount degenerata senza utilizzo di rapid pacing. Nel decorso postoperatorio è stato necessario supporto con inotropi per circa 48 ore, emotrasfusioni ed antibioticoterapia, ma la paziente è stata dimessa dopo 12 giorni dall'intervento in buone condizioni generali. Il gradiente medio transprotesico alla dimissione era 4,5 mmHg.

Il nostro risultato suggerisce che questa procedura è fattibile ed è un'opzione ragionevole per i pazienti con degenerazione di bioprotesi mitralica ad alto rischio per chirurgia tradizionale. Un'appropriata pianificazione del caso attraverso esame TC può aiutare a identificare i pazienti con anatomia adeguata e a stimare il rischio di ostruzione all'efflusso ventricolare sinistro, la complicanze più frequente. Sono comunque necessarie casistiche più numerose per definire l'outcome a lungo termine, considerando anche lo sviluppo di device specificatamente dedicati.

# CARDIOLOGIA INTERVENTISTICA E STRUTTURALE – 2
## Sessione Poster

## A447: A RARE CORONARY-PULMONARY ARTERY FISTULA DETECTED DURING PERCUTANEOUS CORONARY INTERVENTION: A CLINICAL CASE REPORT

Fabrizio Nicolò Stefano Perrone (b), Francesco Geuna (b), Marina Vellini (b), Saverio Muscoli (b), Massimiliano Macrini (b), Marcello Chiocchi (b), Francesco Romeo (b), Valeria Cammalleri (b)
(a) LAZIO; (b) POLICLINICO TOR VERGATA

Coronary-pulmonary artery fistula (CPAF) is a rare congenital or acquired coronary anomaly described as a communication between a coronary artery and one of the cardiac chambers or a great pulmonary vessel. Generally, the right coronary is the most common origin site and the right chambers are the most common drainage site. The majority of patients affected by CPAF is asymptomatic and the diagnosis is accidental during a coronary angiography. Sometimes young patients affected by acute heart failure may have a CPAF with a severe left-to-right shunt. In this case, a continuous cardiac murmur can be detected during the physical examination. Other patients, growing up, may present with myocardial ischemia or infarction because of the steal phenomenon, congestive heart failure or sudden death.

We describe a case of a 73-year-old male patient with a history of hypertension and ischemic heart disease, previously undergone to coronary angioplasty with drug eluting stent (DES) in the left anterior descending artery, right coronary artery and marginal branch for acute coronary syndromes. A coronary fistula was previously described. He arrived to the emergency room (ER) complaining a mild chest pain. The patient's electrocardiogram showed ventricular repolarization abnormalities. The time 0 high-sensitive troponin I level was elevated at 43.7 ng/L and after three hours 59.4 ng/L. Elevated cardiac enzymes and electrocardiography results suggested non ST-segment elevation myocardial infarction. The coronarography showed a intra-stent restenosis on the right coronary stent, treated with a balloon angioplasty and DES implantation. During the coronarography a coronary fistula originated from the left anterior descending artery and directed to the main pulmonary artery was detected. To better evaluate the anatomy of the fistula, a coronary CT scan was performing, confirming a tortuous single communication between the left anterior descending artery and the main pulmonary artery. Taking in consideration the clinical history of the patient, and the anatomy of the coronary anomaly, we decided to realize a myocardial perfusion scintigraphy that demonstrated no reduction of the coronary flow reserve in the area of the coronary anomaly with a preserved ejection fraction. Therefore, we decided to follow up the patient.

A single fistula is usually closed with a transcatheter technique using a coiling system, a coated stent or the Amplatzer duct occluder. This is the choice specially when there is a single, linear fistula. Multiple, tortuous fistulas should be treated with a surgical approach based on the fistula obliteration by epicardial and endocardial ligations.

Our case demonstrates a possible conservative management of a coronary-pulmonary artery fistula, accidentally encountered during a percutaneous coronary intervention in a patient with multiple coronary angioplasty and hospitalizations for chest pain. As previously described, we want to stress the role of the myocardial perfusion scintigraphy to evaluate the coronary flow reserve in patient with coronary fistula and challenging clinical history.

## A448: STENOSI AORTICA E MITRALICA SEVERE: IMPIANTO TRANSCATETERE SIMULTANEO DI BIOPROTESI AORTICA E MITRALICA PER VIA TRANSAPICALE

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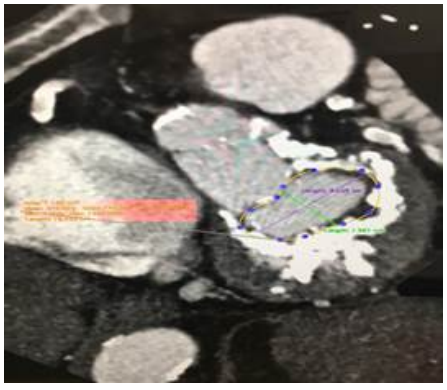
(a) OSPEDALE SAN CAMILLO FORLANINI, ROMA

**Introduzione.** Ad Aprile 2019, si presenta presso il nostro Istituto, paziente di 71 anni, femmina, BMI 21,2, classe NYHA IV.

In anamnesi: recente scompenso cardiaco trattato con valvulopastica aortica, BPCO di grado severo, IRC in emodialisi, epatopatia HCV-relata, polivasculopatia severa con recente ischemia di gamba trattata con fasciotomia ed infezione locale. All'Ecocardiogramma TE si evidenzia stenosi aortica severa, stenosi mitralica moderato-severa, insufficienza tricuspidale moderata. Inoltre, disfunzione sistolica biventricolare (FE 40%, TAPSE 15). Viene eseguita una cardio-TC che mostra calcium score valvolare aortico pari a 5400 ed una massiva calcificazione dell'annulus mitralico.

**Trattamento.** La paziente viene considerata inoperabile per via cardiochirurgica tradizionale e, dopo discussione in Heart Team, si decide per un trattamento transcatetere. Viene valutata, sulla base dell'Ecocardiogramma transesofageo e della cardio-TC, la fattibilità di un doppio impianto di protesi transcatetere. La paziente, pertanto, viene

sottoposta ad impianto di bioprotesi aortica Edwards Sapien 3 Ultra 26 mm e di bioprotesi in sede mitralica Edwards Sapien 3 29 mm, per via transapicale.
**Risultati.** L'ecocardiogramma TE intraoperatorio ha mostrato assenza di rigurgiti significativi, bassi gradienti transvalvolari, non ostruzione al tratto di efflusso ventricolare sinistro.
**Conclusioni.** Si è dimostrata la fattibilità di un trattamento transcatetere doppio in caso di concomitante stenosi aortica severa e stenosi mitralica significativa, in presenza di massiva calcificazione anulare.



**A449: SINDROME TAKOTSUBO POST ANGIOPLASTICA CORONARICA:CASE REPORT**
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**Introduzione.** La sindrome Takotsubo è una cardiomiopatia da stress, caratterizzata da transitorie alterazioni della cinesi ventricolare. Il primo caso è stato descritto nella popolazione asiatica nel 1983, mentre l'appellativo Takotsubo risale invece ai primi anni 90. La Takotsubo rappresenta circa l'1-3% dei casi di sospetto STEMI. La sindrome è spesso innescata da stress emotivo o fisico, che porta ad uno stato ipersimpatico e all'eccesso di catecolamine. In questo articolo riportiamo un caso di Takotsubo dopo una efficace angioplastica coronarica con impianto di stent (PCI).
**Descrizione del caso.** Si tratta di una donna di 75 anni candidata ad esame coronarografico dopo un test un test da sforzo positivo per ischemia inducibile eseguito per una angina da sforzo presente da circa 4 mesi. L'esame obiettivo cardiaco e toracico e l'ECG all'ingresso non mostravano elementi degni di nota. La coronarografia mostrava una lunga stenosi (90%) nel tratto medio dell'Interventricolare anteriore (IVA) successivamente caratterizzata con ecografia intravascolare (IVUS) per ottimizzare la successiva PTCA. Sono stati quindi impiantati 3 drug eluting stent (DES). La procedura si è conclusa con un buon risultato angiografico e la corretta espansione degli stent è stata dimostrata con una seconda corsa IVUS. Al termine della procedura la paziente lamentava una certa dolenzia retrosternale e l'ECG eseguito poco dopo l'uscita dalla sala di emodinamica mostrava un certo sopraslivellamento del tratto ST nelle derivazioni anteriore. Nel corso delle successive 24 ore la paziente ha continuato a lamentato dolore toracico oppressivo continuo, seppur di lieve intensità. L'ECG eseguito la mattina successiva ha mostrato onde T negative di nuova insorgenza da V2 a V6 e in DI aVL con prolungamento dell'intervallo QT (QTc corretto secondo la formula Bazzet 505msec). Un ecocardiogramma transtoracico ha mostrato acinesia dell'apice in toto e ipocinesia dei segmenti medi con funzione globale di pompa severamente depressa (FE 30%). La paziente è stata subito sottoposta ad esame coronarografico: L'angiografia coronarica è risultata invariata, e gli stent precedentemente impiantati apparivano ben espansi e con flusso normale. La ventricolografia ha mostrato ipocinesia dell'apice e dei segmenti medi con il tipico aspetto di "Apical Ballooning" con ipercinesia dei segmenti basali. È stata perciò posta diagnosi di sindrome Takotsubo. Dopo 3 giorni di terapia medica ottimale, un nuovo ecocardiogramma ha mostrato un miglioramento della cinesi cardiaca, oggettivando una FE 43%. È stato consigliato un follow-up ecocardiografico a 10 giorni che ha mostrato una completa normalizzazione della cinesi ventricolare sinistra.
**Discussione.** Nel nostro caso la presenza di alterazioni ischemiche all'elettrocardiogramma e alterazioni della cinetica ventricolare, in assenza di malattia coronarica ostruttiva, ma in presenza di tipica ventricolografia ci ha consentito di porre diagnosi di sindrome Takotsubo. La distinzione tra Takotsubo e MINOCA (infarto miocardico in assenza di patologia coronarica critica) talvolta può risultare complessa. Il buon risultato della PTCA è stato confermato oltre che dall'immagine angiografica anche da un secondo passaggio IVUS. La coronarografia di controllo ha escluso qualsiasi forma di complicanza legata al precedente stenting. Il quadro clinico sembra quindi non essere correlato a una complicanza periprocedurale.

**A450: COWBOYS ENDOVASCOLARI: QUANDO IL LAZO FALLISCE...**
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**Introduzione.** In letteratura sono riportati numerosi casi di perdita di guide angiografiche negli assi vascolari e i vari sistemi di recupero, sia chirurgici sia percutanei (tra cui lo snare loop). Recentemente è stato descritto l'uso della metodica di trapping al fine di recuperare frammenti di cateteri o guide rotte. Presentiamo il primo caso di trapping per il recupero di una guida angiografica idrofilica.
**Caso clinico.** Un paziente maschio di 81 anni giungeva presso il Nostro Centro per sottoporsi ad uno studio coronarografico in seguito al riscontro scintigrafico di ischemia miocardica inducibile in sede apicale. In anamnesi presentava una nota cardiopatia ischemica trattata con triplice bypass aorto coronarico: arteria mammaria sinistra (AMIS) sequenziale su arteria discendente anteriore (DA) e primo diagonale (DG1), arteria mammaria destra (AMID) su arteria discendente posteriore di coronaria destra (DX); successivamente si era sottoposto a plurime angioplastiche con stent su tronco comune (TC), DA e arteria circonflessa (CX). L'ultima coronarografia eseguita nel 2015 mostrava l'occlusione di AMIS su DA, di DX e Cx. Alla luce del dato scintigrafico, si eseguiva una nuova coronarografia, che mostrava buon esito delle pregresse angioplastiche su TC e CX, DA con stenosi critica al tratto medio e restenosi intrastent distale (Fractional Flow Reserve 0,75), AMIS su DG1 pervia e occlusa su DA. Nel tentativo di cross over per visualizzare AMID, si assisteva però a perdita di posizione della guida idrofilica nell'asse vascolare a livello di un kinking. Si procedeva a plurimi tentativi di recupero della guida con materiale dedicato (snare), senza successo. Pertanto si tentava il recupero con la tecnica di trapping e, dopo lunghi tentativi, si reintroduceva l'estremità prossimale della guida nel catetere guida per AMIS e si retraeva mediante trapping con gonfiaggio di pallone nel catetere. Risolto l'imprevisto, si eseguiva l'angioplastica su DA al tratto medio con impianto di stent medicato.
**Discussione e conclusioni.** Lo sviluppo di nuovi materiali dedicati per il recupero e la conoscenza di quelli a disposizione sono requisiti fondamentali per la gestione delle complicanze e il buon esito delle procedure in pazienti complessi dal punto di vista vascolare.
Abbiamo qui descritto il primo caso di trapping per il recupero di una guida angiografica idrofilica. La metodica risulta sicura ed evita il ricorso alla chirurgia vascolare, ma richiede abilità tecnica e sangue freddo da parte dell'operatore.

**A451: DIAGNOSTIC UTILITY OF STRESS EXERCISE WITH ST/HR HYSTERESIS ANALYSIS IN PATIENTS WITH ASYMPTOMATIC AORTIC STENOSIS**
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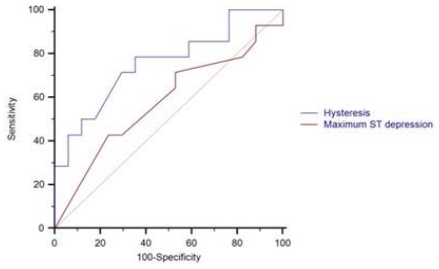
**Background.** Detection of coexisting coronary artery disease (CAD) in patients with severe aortic stenosis (AS) provides relevant implications for clinical management and therapeutic strategy, besides prognostic impact. Moreover, CAD risk stratification adds useful information for timing of coronary angiography in the setting of transcatheter aortic valve implantation (TAVI). However, non-invasive evaluation by exercise electrocardiographic (ECG) stress testing (ExET), although recommended by current guidelines in physically active patients with AS, is very often underperformed as perceived unsafe and unreliable. In patients with AS, analysis of ST-segment depression/heart rate (HR) hysteresis has been advocated to increase ExET diagnostic accuracy.
**Aim.** To test the discriminative capacity of ST/HR hysteresis during ExET to detect CAD in patients with asymptomatic AS over the "sole" standard criterion of ST segment maximum depression (ST-max).
**Methods.** We enrolled 31 consecutive patients (mean age 75.8 ± 7.4 years; 69 % males) with severe asymptomatic AS. ExET was perfomed within 30 days of coronary angiography at 5 cardiology centers.
**Results.** Significant CAD was detected in 13 patients (42 %). At Receiving Operating Characteristics (ROC) analysis, ST/HR hysteresis performed better than ST-max criteria as documented by a significantly larger area under the curve value (AUC, P=0.017) (Figure).




**Conclusions.** Analysis of ST/HR hysteresis provides better diagnostic performance than ST-max criteria and ameliorates diagnostic accuracy of ExET in the detection of coexistent CAD in patients with asymptomatic AS.

### A452: UNA CAUSA RARA DI TROMBOSI TARDIVA DI STENT: DIAGNOSI E GESTIONE CLINICA

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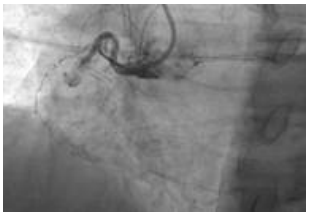
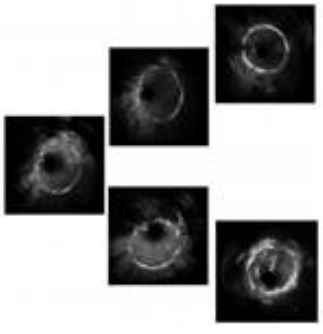
(a) AZIENDA OSPEDALIERO UNIVERSITARIA CAREGGI; (b) ASST BERGAMO EST,BERGAMO ITALY

**Premessa.** La frattura tardiva di stent (> 1 anno) negli stent medicati di seconda generazione è una complicanza rara. La frattura di stent è frequentemente associata ad un'alta incidenza di restenosi e trombosi intrastent.
**Materiali e metodi.** L'utilizzo dell'imaging intracoronarico ha permesso di identificare chiaramente la presenza di un'aneurisma coronarico con importanti ricadute sul tipo di strategia di riperfusione da intraprendere. In considerazione dell'estensione dell'aneurisma si è deciso di impiantare uno stent che coprisse sia il colletto prossimale che quello distale dell'aneurisma, così facendo abbiamo ridotto la possibilità che nell'impianto di multipli stent ricoperti potesse accadere un nuovo disallineamento degli stessi all'interno dell'aneurisma. A tal fine dopo il posizionamento del primo lungo stent medicato abbiamo impiantato due stents ricoperti di cui il primo a livello del colletto prossimale ed il successivo in senso prossimale-distale.
**Risultati.** In seguito al posizionamento di uno stent medicato lungo e al suo interno di due stent medicati in overlap, è stata ottenuta una buona ricanalizzazione del vaso con flusso TIMI 3.
**Conclusioni.** Una rapida identificazione di questo tipo di complicanza e un ottimale planning procedurale possono permettere di ottenere ottimi risultati in termini di riperfusione del vaso e di outcome del paziente.





### A453: EDGE-TO-EDGE MITRAL VALVE REPAIR AS A BAIL-OUT STRATEGY FOR CARDIOGENIC SHOCK AND ACUTE MITRAL REGURGITATION SECONDARY TO PAPILLARY MUSCLE RUPTURE

Ottavia Francesca Cozzi (a), Carlo Pivato (a), Chiara Valeriano (a), Sara Baggio (a), Giuseppe Pinto (a), Fabio Fazzari (a), Bernhard Reimers (a), Giulio Giuseppe Stefanini (a), Gianluigi Condorelli (a)
(a) ISTITUTO CLINICO HUMANITAS

Papillar muscle rupture is a rare cause of acute ischemic mitral regurgitation (MR) with an extremely poor prognosis. The treatment of choice is open surgical repair or replacement of the valve. Patients affected are often elderly and in critical conditions, thus, surgical treatment carries high mortality, so they may be considered not eligible for surgical management. In these acutely ill patients with refractary cardiogenic shock, percutaneous mitral valve repair may be considered as a rescue therapy. Evidence about the efficacy and safety profile of MitraClip device for acute mitral regurgitation is lacking. Here we present the case of acute mitral regurgitation, specifically in the setting of papillary muscle tear, treated with edge-to-edge mitral valve repair.
An 81-year-old woman was admitted to the emergency department of our hospital due to worsening dyspnoea of about one week duration, following an episode of persistent chest discomfort that she managed at home. Her past medical history comprised arterial hypertension and rheumatoid arthritis. The echocardiogram revealed a moderate left ventricular systolic disfunction (EF 40-45%), hypokinesis of the infero-posterior and of the apex, mild mitral regurgitation. The electrocardiogram suggested a recent infero-posterior ST-elevation myocardial infarction.
The patient was admitted to the Coronary Care Unit for hemodynamic compensation with intravenous diuretics, then she underwent coronary angiogram showing subocclued circumflex artery, occluded marginal artery, and a critical stenosis of the left anterior descending artery (LAD). While treating circumflex artery, severe no-reflow occurred. As a consequence she developed hemodynamic instability. Overlapping stent was placed in the circumflex artery (final TIMI 1) and revascularization was completed with LAD stenting. After returning to the CCU, an unstable haemodynamic situation remained in the following 24 hours with intractable pulmonary oedema and cardiogenic shock, requiring counterpulsation for hemodynamic support, despite intravenous loop diuretics and vasodilators therapy. Transoesophageal echocardiography showed akinesis of the infero-lateral, antero-lateral and inferior wall and of the apex, with an ejection fraction of 40%; new severe mitral regurgitation secondary to partial rupture of the posteromedial papillary muscle and tethering of the posterior leaflet.
The patient was evaluated by the Heart Team and deemed at prohibitive surgical risk [STS score 39%], thus she was referred for emergency transcatheter mitral valve repair with two MitraClips (a first clip was implanted at the A3–P3 scallop and a second one at the A2-P2 scallop). The final result was with an effective reduction of mitral regurgitation from severe to mild, while creating a single, lateral, orifice valve with an residual area of 3.5-4 $cm^2$ (mean gradient 7-8 mmHg).
Back on the CCU, the patient was extubated and weaned off intra- aortic balloon counterpulsation after 24 hours. The post procedural course was uneventful and the patient was transferred to a regular ward 1 week later and on the 11th post procedural day was transferred to a rehabilitation facility. She was discharged home two weeks later on standard heart failure therapy including bisoprolol, ramipril, torasemide, spironolactone, and on DAPT (Clopidogrel plus Aspirin). Cardiological and echocardiographic follow-up were programmed at 1 and 6 months.

### A454: ANTEGRADE TRANSVENOUS TRANSSEPTAL WIRING OF A DEGENERATED MITROFLOW BIOPROSTHESIS WHICH COULD NOT BE CROSSED RETROGRADELY FOR VALVE IN VALVE PROCEDURE

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**Case summary.** We present a case of VIV TAVR in an elderly woman with a degenerated surgical bioprosthesis. Given the impossibility to wire the degenerated prosthesis retrogradely, a transseptal puncture via the right femoral vein, antegrade crossing and snaring of the wire in aorta, allowed us to safely deliver a catheter in the LV and then deploy the TAVR valve into the failed surgical prosthesis. A stent was afterward implanted in both right and left coronary ostium according to the "chimney technique" to mitigate the risk of delayed coronary obstruction.
**History.** A 81-year-old woman who underwent surgical aortic valve replacement with a 23 mm Mitroflow bioprosthesis and substitution of the ascending aorta in 2011 presented with dyspnea NYHA class III. A transthoracic echocardiogram documented a severe stenotic degeneration of the bioprosthesis. The computed tomography angiography excluded significant coronary stenosis and supplied information about the prosthesis diameter, the anatomy and vascular access. As the patient was considered to be at high surgical risk the Heart Team established a TAVR VIV as the best treatment option.
**Procedure.** Under general anesthesia, a right femoral artery operative

approach was adopted. Despite multiple attempts to cross retrogradely the Mitroflow with various catheters and wires, the LV could not be wired. Venous access through the right femoral vein was obtained and transseptal puncture successfully performed under transesophageal echocardiography guidance. A 5Fr JR catheter over a 0.035'' J tip Terumo wire was advanced to the LV and the valve easily crossed antegradely. After snaring of the wire in the aortic arch and externalization through the sheath in the right femoral artery, a pigtail catheter was delivered in LV and the device could be finally implanted via retrograde transfemoral approach over a supportive Safari wire. After implantation, despite documentation of maintained coronary flow, the two stents were implanted according to the "chimney technique" to mitigate the risk of delayed coronary obstruction.

**Conclusion.** In case of impossible retrograde wiring before TAVR, a transeptal puncture and antegrade crossing can be an easy way of accessing the LV.

### A455: ULTRASOUND-GUIDED PUNCTURE IN THE FIELD OF ELETTROPHISIOLOGY AND CARDIAC ELETTROSTIMULATION: MONOCENTRIC EXPERIENCE

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**Background.** Venous catheterization plays an important role in electrophsilogical interventional cardiology procedures.

Numerous data in the literature have confirmed that the use of ultrasounds for the puncture of arterial and venous vessels in anesthetic fields is useful to reduce the number of complication.

**Aim.** The aim of the present work is to report our experience on the use of ultrasound-guided puncture in electrophisiology and electrostimulation procedures by veryfying feasibility and safety.

**Materials and methods.** 93 patients between 43 and 90 years of wich 63 men and 30 women were admitted to our Cardiologic Intensive Care with indication to electrophisiology procedure or device implantation.

All patients were subjected to venosa puncture(femoral vein,axillary vein and subclavia vein) according to modified Seldinger technique: of these 30 with the use ultrasound; 63 with conventional technique "blind"with the aid of radioscopy and or with the use of contrast medium.

**Results.** 30 patients subjected to ultrasound-guided venosa puncture showed a procedural time for a single patient from a minimum of 2 minutes to a maximum of 10 minutes with on average time of 4,6 minutes and 2,3 percutaneous puncture attempts per patient; 63 patients undergoing at venosa blind showed a minimum time of 3 minutes to maximum of over 30 minutes with on average of 10,63 minutes; percutaneus puncture attempts for patient were 6,4. In our population, in accordance with the data presented in the literature, patients who underwent ultrasound-guided puncture didn't present the cases of pneumothorax, to report only 2 cases of arterial puncture. Patients undergoing conventional technique have presented 18 accidental arterial punture, 2 pneumothorax, 2 cases of failure with the need for controlateral access.

**Conclusions.** The ultrasound- guided puncture of vascular accesses confers advanteges to the operator and to the patient reducing the number of ineffective attempts of execution times with a lower incidence of complications. The approuce with an ultrasound guided technique is a validy defence for interventional cardiology procedures guaranteeing a standard high in both elective and urgent procedures.

### A456: IMPACT OF VALVE TYPE ON PERIPROCEDURAL MYOCARDIAL INJURY AND MORTALITY AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT: A SINGLE-CENTER, PROPENSITY-MATCHED ANALYSIS

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**Background.** Myocardial injury after transcatheter valve replacement (MI-TAVR) is a common complication occurring in up to 60% patients, and often remaining silent. MI-TAVR can be associated to worse postprocedural outcome and higher mortality. No large datasets, however, are available to describe its significance and the role of specific valve types (VT) on MI incidence.

**Methods.** The study cohort comprised 645 patients who underwent successful TAVR between November 2009 and April 2019 in a single, high-volume TAVR centre. After accounting for several baseline factors (age, sex, prior myocardial infarction, coronary artery disease, chronic kidney disease, and diabetes) we performed a 1:1 propensity-matched analysis to evaluate: 1) the association between self-expandable (as opposed to balloon-expandable) valve type and MI; 2) the impact of MI-TAVR on 30-day and 1-year mortality (accounting for VT). A total of 410 patients were matched, with 205 receiving a self-expandable and 205 receiving a balloon-expandable valve. MI-TAVR was defined according to the Valve Academic Research Consortium (VARC)-2 criteria, as a post-procedure elevation of troponin (with a peak value exceeding 15x as the upper reference limit) within 72 hours after the index procedure, at least in one sample. If troponin was increased at baseline (>99$^{th}$ percentile), a further increase in at least 50% post-procedure was required and the peak value must have exceeded the previously stated limit. Adequacy of the propensity model was confirmed by checking covariate balance between group. We derived standardized mean differences before and after propensity score matching, hence expressing all differences in standard deviation (SD) units with 0.1 SD unit indicating the smallest potentially meaningful difference.

**Results.** Mean age was 83.8±4.7 years, 184 (48.9%) patients were men. Median follow-up was 21.0 (IQR 11.3-37.6) months. At admission, 144 (35.1%) were in NYHA class I-II. TAVR was transfemoral in 374 (91.2%) patients. We observed 88 (21.5%) VARC-2 defined acute kidney injury (AKI) and 80 (19.5%) post-procedural arrhythmia (PPA).

Self-expandable valve deployment was associated with higher incidence of MI-TAVR (68.8% vs. 53.9%, OR: 1.89, 95%CI: 1.35-2.65, p<0.001); this association was confirmed at multivariate analysis (OR: 1.79, 95%CI: 1.14-2.84, p=0.012) adjusted for other MI-TAVR predictors (AKI, PPA, NYHA class, and access site). Thirty-day and 1-year mortality rates were 2.2% and 7.9%, respectively. After accounting for AKI, Cox regression analysis revealed MI-TAVR as independent predictor of 1-year (11.6% vs. 4.4%, HR: 2.44, 95%CI: 1.27-4.68, p=0.007), but not of 30-day mortality (3.2% vs. 1.3%, HR: 2.62, 95%CI: 0.73-9.38, p=0.140). However, at prespecified subgroup analysis according to different VT, self-expandable valve deployment had no impact on 30-day and 1-year mortality despite periprocedural MI development (p for interaction = 0.706).

**Conclusions.** Self-expandable valve deployment is associated with greater cardiac biomarker elevation and a higher incidence of MI, but not with short- or long-term mortality. Periprocedural MI-TAVR importantly affects 1-year mortality highlighting the need of carefully patient selection and continuous technical skills improvement.

### A457: IMPACT OF BODY MASS INDEX ON ACUTE KIDNEY INJURY AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT: UNVEILING THE OBESITY PARADOX

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**Background.** Acute kidney injury (AKI) has emerged as a common complication of transcatheter aortic valve replacement (TAVR), particularly in patients with pre-existent kidney disease and multiple comorbidities. Several studies have shown the existence of an obesity paradox in TAVR; however, the impact of body habitus on the occurrence of TAVR-AKI has been poorly investigated.

**Methods.** We evaluated the relationship of AKI with 30-day, 6-month, and 1-year all-cause mortality, and whether these relationships differed across the BMI spectrum. According to the Valve Academic Research Consortium (VARC)-2 criteria, AKI was defined as an increase of at least 0.3 mg/dL in serum creatinine or a urine output worsening (<0.5 mL/kg for <12 hours) occurring within 7 days after the procedure. BMI group stratification was performed according to standard criteria (<25 kg/m$^2$ normal weight, 25-30 kg/m$^2$ - overweight, >30.0 kg/m$^2$ - obese).

**Results.** The study cohort comprised 626 patients who underwent successful TAVR between November 2009 and April 2019 in a single centre, with a mean follow-up of 9.3±4.6 months. Three hundred two (46.8%) patients were normal-weight, 185 (28.7%) overweight, and 81 (12.6%) obese. AKI occurred in 141 (21.9%) patients, and in 70/302 (23.2%), 43/185 (23.2%), and 19/81 (23.5%) of the 3 BMI groups. Besides other significant predictors (sex, bleeding complications, baseline eGFR and NT-proBNP), a multivariate analysis revealed self-expandable valve deployment (OR:1.786, 95%CI:1.003-3.180, 0.049) and myocardial injury (OR:2.901, 95%CI:1.385-6.081, 0.005) as independent predictors of AKI.

Thirty-day, 6-month, and 1-year mortality rates were 2.2%, 3.7%, and 7.9%, respectively. In a multivariate model adjusted for type of percutaneous access, AKI (OR:3.390, 95%CI:1.105-10.402, p=0.033) and COPD (OR:4.518, 95%CI:1.487-13.734, p=0.008) were associated with 30-day mortality, displaying a reverse trend across BMI groups (normal weight 8.6%, reference; overweight 2.3%, OR:0.044, 95%CI:0.002-0.892; obese 0.0%, OR:0.021, 95%CI:0.001-0.529; p for interaction=0.042). AKI appeared as independent predictor of 6-month mortality (OR:3.616, 95%CI:1.476-8.857, 0.005) together with COPD (OR: 3.447, 95%CI: 1.392-8.538, p=0.007), besides other significant predictors (peri-procedural MI, age, and type of percutaneous access). Six-month death rate decreased across BMI groups (normal weight 14.3%; overweight 4.7%, OR: 0.059, 95%CI:0.006-0.585; obese 5.3%, OR:0.032, 95%CI:0.003-0.398; p for interaction=0.011). After accounting for other significant predictors (baseline NT-proBNP, COPD, bleeding complications, and type of percutaneous access) AKI was independently associated with 1-year mortality (14.9% vs.

6.0%, OR:2.433, 95%CI:1.093-5.414, p=0.029) displaying a reverse trend across BMI groups (normal weight 24.3%; overweight 7.0%, OR:0.017, 95%CI:0.002-0.140; obese 5.3%, OR:0.039, 95%CI:0.004-0.378; p for interaction<0.001).
**Conclusions.** Obesity seems to be a protective factor for TAVR-related AKI, which is associated with a significantly increased mortality. Despite the need of further studies to describe pathological mechanisms of AKI and the potential protective effect of obesity, careful peri-procedural surveillance and management are essential to improve TAVR outcomes.

## CARDIOLOGIA INTERVENTISTICA E STRUTTURALE – 3
## Sessione Poster

### A458: FRACTIONAL FLOW RESERVE-GUIDED TREATMENT STRATEGY FOR LEFT MAIN CORONARY ARTERY STENOSES. TEN-YEAR CLINICAL OUTCOME

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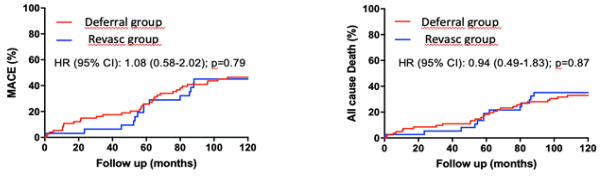
**Background.** Revascularization decisions regarding left main (LM) coronary stenoses are often very challenging. Non-invasive tests can yield false negative results. On the other hand, some technical aspects of fractional flow reserve (FFR) measurement, as well as the interpretation of their results, are less codified than for other coronary segments.
We aimed to investigate the 10-year clinical outcome of patients with isolated angiographically intermediate LM coronary stenosis in whom the treatment strategy was based on Fractional Flow Reserve (FFR) measurements.
**Methods.** From 1999 to 2009 we included 96 patients with isolated intermediate LM coronary disease (DS% 30-70%) evaluated with FFR measurement. When FFR was >0.80, patients were deferred to medical therapy (Deferral-group, n=71). When FFR was ≤0.8, surgical revascularization therapy was proposed (Revascularization-group, n=25). Death, the occurrence of myocardial infarction (MI) and the need for target vessel revascularization (TVR) were evaluated in both groups.
**Results.** There were no significant differences in clinical characteristics between the 2 groups. Mean DS% was 35% in the Deferral-group and 43% in the Revascularization-group (p<0.01). Average FFR was 0.88 in the Deferral-group and 0.71 in the Revascularization-group (p<0.01). In the latter, the 10-year survival estimate was 72% while it was 77% in the Deferral group (HR [95% CI]: 1.28 [ 0.53-3.10]; p=NS). No difference was found between the 2 groups in terms of MI (4.5% vs. 1.6%; HR [95% CI]: 3.5 [ 0.22-56.0]; p=NS) or TVR (9% vs. 12%; HR [95% CI]: 0.94 [ 0.20-4.43]; p=NS).




**Conclusions.** The use of FFR to defer revascularization in patients with non-significant isolated LM stenosis is safe and is associated with favourable clinical outcome at 10 years.

### A459: CLINICAL OUTCOME AFTER CORONARY BIFURCATION STENTING. A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS OF PCI BIFURCATION TECHNIQUES COMPRISING 5566 PATIENTS

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**Background.** The optimal PCI technique for bifurcation lesions remains a matter of debate. Several RCT have compared different bifurcation PCI techniques. Provisional stenting has been recommended as the default technique for most bifurcation lesions. However, emerging data suggests that double-kissing crush technique can be considered in true left main bifurcation lesions and has been endorsed by the European Society of Cardiology Guidelines.
**Purpose.** To compare clinical outcomes of different bifurcation PCI techniques.
**Methods.** We searched PubMed and Scopus for randomized clinical trials (RCT) comparing PCI bifurcation techniques for coronary bifurcation lesions. Outcomes of interest were major adverse cardiovascular events (MACE) defined as the composite of cardiac death, myocardial infarction (MI) and target vessel or lesion revascularization (TVR/TLR), and the individual components of MACE. Stent thrombosis was assessed as defined by the ARC. Stratification based on left-main or distal bifurcations was performed. We evaluated the studies' risk of bias in accordance to the Cochrane Handbook for Systematic Reviews of Interventions, and certainty of evidence using the Grading of Recommendations Assessment, Development and Evaluation framework. We estimated summary odds ratios (ORs) using pairwise and Bayesian network meta-analysis.
**Results.** We identified 716 studies and of these included 19 RCT including 5566 patients treated with five bifurcation PCI techniques namely provisional stenting, T/TAP, Crush, Culotte and double-kissing crush. Median follow-up was 12 months (IQR 8 to 36). When all bifurcation lesions were combined, double-kissing crush technique reduced the occurrence of MACE (OR 0.40; CrI 0.27 to 0.58) compared to provisional stenting. This difference was driven by a reduction in TVR (OR 0.46; CrI 0.29 to 0.69). No differences were found in cardiac death, MI or stent thrombosis among analyzed PCI techniques. No differences in MACE were observed between provisional stenting, Culotte, T/TAP, crush. In distal bifurcations (n= 17 studies, 4634 patients), double-kissing crush also showed to reduce MACE (OR 0.45; CrI 0.26 to 0.73 vs. Provisional).
**Conclusions:** In this network meta-analysis, PCI bifurcation techniques were similar with respect to the occurrence of cardiac death, myocardial infarction and stent thrombosis. When all coronary bifurcations were combined, an advantage of double-kissing crush was observed in terms of MACE driven by lower rate of repeated revascularization.

### A460: RENAL DENERVATION FOR REFRACTORY ARTERIAL HYPERTENSION: 2012-19 EXPERIENCE IN TUSCANY

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The majority of patients with hypertension do not reach the optimal targets because of incomplete drug response or poor patient compliance. Renal denervation is a novel catheter based treatment for arterial hypertension that may improve hypertension control. The conflicting evidence from randomized clinical trials has limited its clinical application, opening questions on immediate and long-term efficacy of the technique.
We reviewed all the cases performed in Tuscany between 2012 and 2019 using both the first generation Symplicity single electrode catheters (10 patients) and the more recent Spyral multielectrode catheters and the balloon-based Paradise, One-Shot and EnligHTN systems (28 patients).
Patients had uncontrolled essential hypertension and were on an average of 4.5 antihypertensive drugs. The majority of patients had one or more other risk factors for atherosclerotic disease including smoking (14.3%), hypercholesterolaemia (93.7%), diabetes (50.0%). Moreover, 50% of patients had overt coronary or peripheral artery disease, and 4.1% of patients had suffered a previous stroke. The Table below reports the key demographic and procedural characteristics in the two groups.

| | Age (yrs) | No. pre-RDN drugs | Pre-OBP (syd/dia) | Pre-ABPM 24h (sys/dia) | Number of ablations | Procedure Duration (minutes) | Follow-Up (yrs) | No. post-RDN drugs | Post-OBP (sys/dia) | Post-ABPM 24h (sys/dia) |
|---|---|---|---|---|---|---|---|---|---|---|
| Single Electrode (10 patients) | 64.0 | 5.8 | 156/75 | 153/72 | 12.0 | 99 | 6.1 | 4.8 | 153/76 | 152/72 |
| Multiple Electrode/Balloon (28 patients) | 60.1 | 3.6 | 154/87 | 148/85 | 16.1 | 60 | 5.1 | 2.8 | 148/84 | 147/82 |

The only procedural complications were hematomas at the puncture site (4.1%). A reduction of more than 5 mmHg in average ABPM persisted in 14.2% of patients with the majority of patients (75.0%) still with incomplete control (>130/85 mmHg) at follow-up. Despite the negative indications from current guidelines renal denervation remains in clinical use for patients not responding or not compliant with pharmacological treatment. Novel denervation systems reduced procedure duration and fluoroscopy/contrast use. The absence of persistent BP improvement observed with single but also multi electrode denervation systems is at first glance disheartening but a similar albeit poor BP control was achieved after denervation with a marked reduction of drug intake. An in depth analysis will be provided to assess the clinical and procedural predictors of long-term success.

### A461: FRACTIONAL FLOW RESERVE (FFR) AND RESTING FULL CYCLE RATIO (RFR) EVALUATION FOR OSTIAL AND TANDEM LESIONS IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENT

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Fractional flow reserve (FFR) is a technique used in coronary catheterization to measure pressure differences across a coronary artery stenosis for myocardial ischemia determination. It requires an hyperemic condition obtained with adenosine infusion. The Resting Full Cycle Ratio (RFR), non-hyperemic index, scans through diastole and systole for the largest drop in pressure over the entire cardiac cycle and circumvent the limit of using adenosine when it is contraindicated.

A 69-year-old men, intubated for respiratory failure, was admitted to our cathlab for acute coronary syndrome STEMI and a primary percutaneous coronary intervention (PCI) was performed with proximal Left Descending Anterior artery (LDA) stenting. There was also a Left Main artery intermediate ostial stenosis to be re-evaluated in more stable clinical conditions. Four days later a new coronary angiography was repeated and it showed also a LDA middle segment stenosis.

We decided to evaluate the stenosis severity and myocardial vitality first in the middle LDA segment and then in the ostial Left Main artery. As We couldn't use continous intravenous adenosine infusion because of severe patient chronic obstructive pulmonary disease (COPD) we chose a different protocol: we started measuring distal stenosis pressure and aortic pressure ratio (Pd/Pa) and RFR without adenosine and then FFR with intracoronary adenosine. All of the indexes were positive for myocardial ischemia (FFR: 0.74; Pd/Pa:0.84; RFR: 0.78) for the mid LDA stenosis. Then we used the same protocol to evaluate the Left Main Artery and the results were negative for myocardial ischemia (FFR: 0.88; Pd/Pa: 0.95; RFR: 0.95). So we treated mid LDA stenosis with PCI and direct stenting with an optimal final result.

At this point a re-evaluation of left main artery was performed and it showed a complete different setting. In fact all the indexes were positive for myocardial ischemia (FFR: 0.78; Pd/Pa: 0.88; RFR: 0.85). This result demonstrated how the mid LDA stenosis underestimated the ostial Left Main artery stenosis. After the treatment of the first one, improving Pa and reducing Pd upstream of the lesion stented, the FFR, Pd/Pa and RFR became positive for myocardial ischemia.

Then we used also intravascular ultrasound (IVUS) to choose the best stent sizing for the Left Main Artery and the distal landing zone for a better overlapping with proximal LDA stent. Therefore left main artery PCI was performed with a provisional stenting technique obtaining an optimal final result.

This case report shows the importance of invasive functional evaluation during coronary angiography to establish coronary stenosis severity especially when there are tandem and ostial lesions. Furtheremore Resting Full Cycle Ratio (RFR) adds a valuable information about coronary stenosis in patients in whom adenosine is contraindicated.

### A462: SUBCLINICAL LEAFLET THROMBOSIS AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT: PREVALENCE AND PROGNOSTIC IMPLICATIONS

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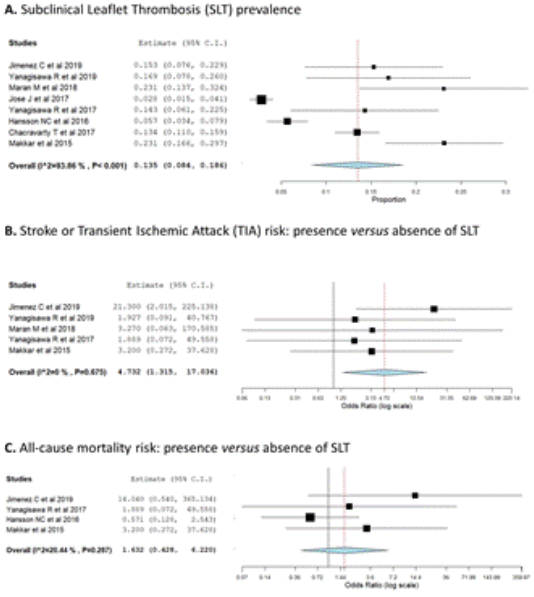
**Background.** Subclinical leaflet thrombosis (SLT) following transcatheter aortic valve replacement (TAVR) has been increasingly detected on multidetector computed tomography (MDCT). Its actual prevalence and consequences are unclear. Therefore the aim of this study-level meta-analysis was to investigate the prevalence of SLT detected by MDCT after TAVR and its prognostic impact in terms of stroke or transient ischemic attack (TIA) incidence and all-cause mortality.

**Methods.** We searched the literature for studies reporting SLT after TAVR detected by MDCT. Pooled analysis of incidence was performed with a random effect model. Endpoints of interest were stroke or transient ischemic attack (TIA) and all-cause mortality. A univariate meta-regression analysis was conducted to explore the potential moderator effect of age, gender, ejection fraction (EF), dual antiplatelet therapy and oral anticoagulation therapy after TAVR (continuous variables were expressed as mean and dichotomous variables were expressed as percentage).

**Results.** Overall, 8 observational studies met our inclusion criteria, with a total of 2257 patients; mean age was 82.8 ± 1.8; 42% were male and mean follow-up was 9.5 ± months. 35.5% of patients received oral anticoagulation and 54% received dual antiplatelet therapy. Mean EF was 56%. Meta-analytic pooling of event rates showed an SLT rate of 13.5% (95% CI 8.4% - 18.6%; $I^2$: 94% - Fig. 1A). At meta-regression analysis none of the parameters taken into account showed an interaction with SLT. SLT was associated with an increased risk of stroke or TIA (OR 4.73; 95% 1.32-17.04; P = 0.017 – Fig. 1B) and with a non-significant increased risk of all-cause mortality (OR 1.63; 95% CI 0.43 – 6.22; P = 0.47 – Fig 1C) compared with the absence of SLT at MDCT.




**Discussion.** Our meta-analysis, pooling the largest cohort of patients who underwent TAVR that were systematically screened for SLT with MDCT shows that SLT has an important prevalence in this population. Moreover, our results demonstrate that SLT may affect prognosis as its presence is associated with an increased risk of stroke or TIA. Therefore strategies aimed at detecting, with MDCT scan, and treating or preventing SLT, such as with oral anticoagulation, may be indicated especially in patients at increased risk for it.

### A463: PROTOCOLLO INTERAZIENDALE PER L'ESECUZIONE DI PROCEDURE DI TAVI IN UN CENTRO SPROVVISTO DI CARDIOCHIRURGIA

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Le procedure di TAVI sono in costante aumento nelle emodinamiche italiane ed i risultati brillanti dei recenti studi sul trattamento con TAVI nei pazienti a basso rischio di fatto potrà portare ad un ulteriore estensione di indicazioni e numero di procedure.

Tuttavia ad oggi il numero di procedure per milione di abitante nel nostro paese e soprattutto nella nostra regione pur se in costante ascesa non raggiunge il target desiderato né si avvicina a quello della media europea. Una delle limitazioni potrebbe essere riconosciuta nell'attuale necessità di presenza della cardiochirurgia in loco per effettuare tali procedure nei laboratori di emodinamica.

L'Azienda Ospedaliera Cardarelli è sprovvista di un reparto di Cardiochirurgia e per tale motivo non è stata avviata l'attività di TAVI: tuttavia la nostra Azienda è quella con il maggior numero di accessi al pronto soccorso di tutto il Sud Italia. Tale enorme mole di pazienti rende di fatto frequente il riscontro di stenosi valvolare aortica severa in pazienti afferenti al nostro nosocomio.

Per assicurare ai pazienti il trattamento di questa patologia e per evitare complesse procedure di trasferimento vista la carenza di posti letto nella nostra regione si è deciso di dar vita ad una convenzione tra la Cardiologia UTIC ed Emodinamica dell'AORN A. Cardarelli ed il Laboratorio di Emodinamica dell'UOS di Angiologia del DAI Emergenze Cardiovascolari, Medicina Clinica e dell'Invecchiamento dell'AOU Federico II.

Il protocollo d'intesa tra le due Aziende prevede che il paziente con diagnosi di stenosi aortica severa con rischio chirurgico elevato-intermedio esegua tutti i test diagnostici e strumentali (Ecocardiogramma, Angio TC, Coronarografia, esami ematochimici), propedeutici alla procedura di TAVI presso la Cardiologia UTIC dell'AORN Cardarelli, e la valutazione del rischio anestesiologico e chirurgico tramite i colleghi anestesisti dell'AORN Cardarelli e il Consulente Cardiochirurgo della Federico II. Successivamente in caso di indicazione alla procedura di

TAVI viene effettuata riunione collegiale con i colleghi del Laboratorio di emodinamica della Federico II per la valutazione clinica del caso e fattibilità tecnica della procedura.
Il paziente viene quindi preparato alla procedura secondo protocollo infermieristico nel raparto di Cardiologia dell'AORN Cardarelli dove dopo colloquio con il paziente ed i parenti viene ottenuto consenso informato per al procedura.
Il paziente viene quindi accompagnato in giorno dell'intervento dal personale medico ed infermieristico della Cardiologia UTIC ed Emodinamica dell'AORN Cardarelli presso l'Emodinamica della Federico II e la procedura di TAVI viene eseguita congiuntamente dagli operatori della Federico II e dell'AORN Cardarelli.
Dopo la procedura il paziente viene monitorato presso l'emodinamica della Federico II e se non sussistono complicanze viene ritrasferito prontamente sotto monitoraggio e con PM temporaneo presso l'UTIC dell'AORN Cardarelli con ambulanza rianimatoria e con la presenza del cardiologo e dell'infermiere della struttura di provenienza.
La degenza post procedurale viene quindi effettuata interamente presso il reparto di Cardiologia UTIC dell'AORN Cardarelli dapprima in UTIC e poi a quadro clinico stabile presso la sub intensiva da dove viene dimesso con indicazione ai successivi programmi di follow up.

### A464: PROTOCOLLO AZIENDALE PER L'ESECUZIONE DI PROCEDURE DI CHIUSURA PERCUTANEA DI PFO: QUANDO CUORE E CERVELLO SONO IN SINTONIA

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La pervietà del forame ovale consente la comunicazione tra atrio destro e atrio sinistro ed è presente come difetto congenito nel 15-35% della popolazione, la maggioranza dei quali rimane asintomatica per tutta la vita mentre nel 30-40% dei casi può essere causa di ictus cerebrale. Numerose evidenze suggeriscono che il PFO sia una condizione, correlata ad alcune caratteristiche anatomiche, predisponente all'ictus criptogenetico, come risultato di embolia paradossa. Secondo tale ipotesi, la chiusura del PFO dovrebbe quasi annullare il rischio di recidiva di ictus ischemico nei pazienti con ictus criptogenetico "secondario" al PFO. In accordo con i risultati dello studio RESPECT si è osservato un progressivo incremento di procedure effettuate. In questo scenario risulta indispensabile una collaborazione interdisciplinare allo scopo di individuare tra i pazienti con diagnosi di PFO in quanto causa di ictus criptogenetico quelli in cui il trattamento di chiusura percutaneo sia superiore alla terapia medica, migliorando così l'outcome dei pazienti.
In questo contesto l'AORN Cardarelli ha implementato la collaborazione con il reparto di Neurologia ed in particolare con la Stroke Unit allo scopo di delineare un percorso diagnostico e terapeutico virtuoso che consenta l'ottimale trattamento del paziente che giunge con ictus ischemico. L'Azienda Ospedaliera Cardarelli conta il più alto numero di accessi al pronto soccorso di tutto il Sud Italia, è fornita di un reparto di Neurologia e Stroke Unit 24/24 ore. Per tale motivo è stato attivato un protocollo di collaborazione con tale reparto volto ad individuare i pazienti a rischio per recidiva di ictus criptogenico al fine di trattarli con chiusura di PFO nel Laboratorio di Emodinamica della stessa AORN. Il protocollo prevede che il paziente acceda al reparto di Cardiologia dopo aver praticato nel reparto di Neurologia gli esami diagnostici strumentali inerenti alle più frequenti cause di ictus cerebrale (TC con mezzo di contrasto per documentare l' evento ischemico, RM, EEG, ecografia dei tronchi sovraortici); una volta che siano state escluse cause prettamente neurologiche si procede con lo screening cardiologico che prevede l'esecuzione di ecocardiogramma transtoracico, ecocolor Doppler transcranico ed ecocardiogramma transesofageo, allo scopo di confermare la presenza di uno shunt dx-sn dovuto alla pervietà del forame ovale, e di valutarne le dimensioni lo stesso. Quando le caratteristiche anatomiche del forame ovale pervio consentono l'approccio percutaneo si procede alla selezione della corretta metodica di chiusura del difetto. Il nostro laboratorio di Emodinamica ha infatti implementato l'utilizzo di entrambe le metodiche di closure con Amplatzer e con NobleStitch. La procedura di chiusura del PFO si svolge quindi nel Laboratorio di Emodinamica dell'AORN Cardarelli con il supporto anestesiologico; nella maggioranza dei casi tuttavia la procedura è ben tollerata dal paziente e viene quindi condotta in anestesia locale o in blanda sedazione. Al termine dell'intervento il paziente viene monitorizzato ed accolto in reparto per 24-48 h di osservazione, al termine della quali viene dimesso con duplice terapia antiaggregante (ASA e clopidogrel) per 6 mesi se è stato utilizzato un Amplatzer o acido acetilsalicilico per 30 giorni. Successivamente i pazienti vengono indirizzati a un ambulatorio dedicato per i controlli di follow-up. Il protocollo aziendale applicato correttamente ha permesso di trattare pazienti che avessero una precisa e chiara indicazione alla chiusura percutanea del forame ovale, ottenendo ottimi risultati e riducendo il numero di re-ospedalizzazioni in una popolazione spesso giovane e già colpita da eventi ischemici cerebrali (ictus/TIA).

### A465: ECOCARDIOGRAMMA E RISERVA DI FLUSSO CORONARICO (RFC) NEL FOLLOW UP DEI PAZIENTI SOTTOPOSTI A PTCA DEL TRONCO COMUNE

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**Premessa.** La riserva di flusso coronarico (RFC) rappresenta un importante elemento di valutazione nel follow-up dei pazienti con cardiopatia ischemica: viene misurata come rapporto tra il flusso coronarico iperemico, ottenuto con dipiridamolo/adenosina ed il flusso coronarico in condizioni basali. In condizioni normali, sotto stimolo iperemico massimale, la RCF può mostrare un incremento di 4-6 volte, ed è considerato normale un valore >2.
**Materiali e metodi.** Per questo motivo abbiamo valutato 54 pazienti sottoposti ad angioplastica del tronco comune nell'anno 2018 (65% con diagnosi di SCA ed 35% con cardiopatia ischemica stabile) e successivamente ad ecocardiogramma transtoracico con RFC dell'arteria discendente anteriore (adenosina 0.160 mg/kg in 2 minuti come agente iperemico) per valutare l'esito dell'angioplastica alla dimissione, a 30 giorni e a 6 mesi. Le angioplastiche del tronco comune sono state eseguite secondo standard of care, applicando nel 41% dei casi tecnica provisional, nel 33% dei casi tecnica a doppio stent (TAP) e nel 26% DK crush. Tutti i pazienti arruolati non avevano malattia significativa né intermedia dell'arteria discendente anteriore nel tratto medio-prossimale ed avevano una finestra ecocardiografica sufficientemente valida per consentire la valutazione di RFC.
**Risultati.** Il Syntax score medio dei pazienti è di 28, il valore medio della FE intorno al 45%. Il cut off della RFC considerato patologico è quello riconosciuto a livello scientifico internazionale < 2.0. Il valore medio di RFC alla dimissione è di 3.5 ± 1.1 ed a distanza di 30 giorni vi è stato un aumento ulteriore dei valori per ogni paziente di circa il 20%, con miglioramento anche della FE. Alla valutazione semestrale, in 7 dei 54 pazienti abbiamo riscontrato una variazione nei valori di RFC, con valori al di sotto del cut off di 2, motivo per cui sono stati sottoposti ad angiografia coronarica di controllo. In 5 dei 7 pazienti si è evidenziata la presenza di lesioni de novo in tratti dell'arteria discendente anteriore non interessati precedentemente; in 1 caso una restenosi non significativa intrastent, indagata con IVUS, con valori di MLA>6 mm2, ed in 1 solo paziente una restenosi critica trattata con angioplastica con pallone medicato e successivo IVUS.
**Conclusioni.** Dalla nostra seppur limitata osservazione la valutazione della RFC post-PCI del tronco comune nei soggetti con determinate caratteristiche può rappresentare una metodica valida, ripetibile, facilmente accessibile per pazienti ed operatori e con un buon grado di sensibilità e specificità nel follow-up delle PCI del tronco comune in alternativa alle metodiche di imaging tradizionale.

### A466: OLD BUT GOLD: TRANS-SUBCLAVIAN TRANSCATHETER AORTIC VALVE IMPLANTATION IN INTERMEDIATE RISK PATIENTS. A SINGLE CENTER EXPERIENCE

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**Introduction.** Severe valvular aortic stenosis (AS) is a chronic and progressive disease with an increased rate because of the aging. Symptomatic AS is associated to a 50% death rate at two years, unless valve replacement is promptly performed. Currently, transcatheter aortic valve implantation (TAVI) is a guidelines-approved option for most of the old patients at high surgical risk. Transfemoral (TF) access is the preferred vascular route of access due to its safety and effectiveness. However in a minority of patients, it is not suitable: (e.g. small vessels, severe calcification/stenosis, tortuosity or previous surgical intervention) in these cases subclavian/axillary, carotid, transapical, direct aortic, and transcaval access are described alternatively. However, to date a direct comparison of these alternative route of access does not exist. Our study aims at describing a single center experience of subclavian (TS) vs. transfemoral TAVI in intermediate surgical risk patients.
**Methods.** A total of 108 patients who underwent TAVI were retrospectively evaluated. All patients were at intermediate surgical risk (STS score 4-10%). Of these, 13 underwent TS access and 95 TF access. Subclavian artery was surgically exposed by a vascular surgeon and prepared for sheath insertion. The primary endpoint was 30-day mortality. Secondary endpoints were: vascular complications, bleedings, periprocedural myocardial infarction, periprocedural transient ischemic attack (TIA) and stroke: all these complications were reported according to the Valve Academic Research Consortium (VARC)-2 criteria. Definitive

post procedure pacemaker (PMK) implantation, valve malpositioning (such as valve migration, valve embolization and ectopic positioning according to VARC-2 criteria) and a significant paravalvular leak requiring successive percutaneous closure were also evaluated as additional endpoints.
**Results.** Patients who underwent TS-TAVI had a significant higher prevalence of peripheral artery disease (10,52% vs 61,5%, *p*=0,012), as indicated by the ankle-brachial index, the doppler ultrasound examination and computed tomography angiography (CTA) performed as pre-operative test. No difference in survival rate between TS and TF group (*p=0,133*) at 30-days, 6 months and 1 year follow-up was observed. Three types of valves were implanted (CoreValve Evolute, Portico and Direct Flow), but no differences in size and/or type of valve implanted among the two groups were recorded. In the TF group in 2 patients (2,10%) underwent a Valve in Valve procedure because of a device degeneration. Furthermore, a similar rate of aortic valvuloplasty prior valve implantation was observed in the 2 groups. In 5 (5,26%) patients of the TF group, a misplacement of the prothesis into the ascending aorta occur, in 4 of whose the prothesis was successfully removed and re-implanted. In 1 patient the prothesis was retracted into the ascending aorta and a new prothesis was implanted. Definitive post procedural PMK implantation occurred in 16 (16,84%) patients in TF group and in 2 (25%) patients in TS group (p=0,626). In all cases high-grade atrioventricular block was observed. No significant differences in severe paravalvular leaks and vascular complications were reported between the two groups.
**Conclusion.** In our experience TS approach shows a similar safety and effectiveness compared to TF access, Thus it appears to be a valid alternative access route in selective patients, where the conventional TF approach is not feasible.

### A467: INTRAVASCULAR LITHOTRIPSY FOR THE TREATMENT OF SEVERELY CALCIFIED CORONARY LESION IN HIGHT-RISK PATIENTS

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**Background.** Severely calcified coronary lesions represent a challenge for successful percutaneous coronary intervention (PCI), especially in patients with either clinical or angiographic high-risk features. Current therapies used to facilitate PCI of calcified lesions include high-pressure balloons, cutting/scoring balloons and atherectomy, all of which imply highly traumatic manipulation of coronary arteries. Recently, a novel tool for modification of heavily calcified coronary plaques based on intravascular lithotripsy (IVL) has been introduced. This technology is based on the use of a balloon catheter that uses pulsatile mechanical energy to disrupt calcified lesions. We present our early experience with IVL-assisted PCI in high-risk patients with severely calcified coronary lesions.
**Methods.** This prospective, observational, single-center study enrolled patients with severely calcified coronary lesions undergoing PCI and treated with IVL between January 2019 and May 2019. All patients presented at least one of the following high-risk features: left ventricle ejection fraction (LVEF) <40%, chronic kidney disease (CKD), severe valvular disease, multivessel PCI, aorto-ostial lesion, left main stem lesion. In-hospital and 30-day clinical outcomes were monitored.
**Results.** We enrolled a total of 15 patients (53.3% male; age, 76 ± 6.7 years). Indication for PCI was acute coronary syndrome in one patient (6.7%). Two patients (13.3%) underwent transcatheter aortic valve implantation during the same procedure. Left main stem was treated in 4 patients (26.7%). Eight patients (53.3%) underwent multivessel IVL-assisted PCI. IVL use was planned upfront in 3 patients (20%), whereas it was used as a bailout strategy in the remaining cases (n=12, 80%). Angiographic success (residual stenosis >30%) was obtained in all cases. No procedural complications were recorded, although in 10 cases (66.7%) premature ventricular contractions were observed during IVL without clinical consequences. No adverse events were recorded in-hospital and at 30-day follow-up.
**Conclusion.** Our early experience suggests that IVL-assisted PCI is effective and safe in treating high-risk patients with severely calcified coronary lesions. This technology is feasible in most clinical and procedural scenarios, allowing efficient plaque modification without increasing procedural time and complexity.

### A468: NSTEMI AD ANATOMIA COMPLESSA: QUANDO LA STRATEGIA TERAPEUTICA È GUIDATA DALL'INSTABILITÀ CLINICA

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Non sempre una sindrome coronarica acuta (SCA) che si presenti con un NSTEMI viene ritenuta grave come uno STEMI perché si ipotizza che comunque una certa quota di flusso coronarico sia preservata; a volte, invece, il quadro angiografico può essere sorprendentemente peggiore in un soggetto con un NSTEMI, come quello che abbiamo osservato con la sig. ra M.D.V, di 61 anni, ricoverata per NSTEMI (Grace score 172) con angina da sforzo cominciata da circa 2 mesi.
Circa 8 mesi prima la paziente era stata ricoverata per angina instabile con evidenza angiografica di malattia coronarica ateromasica monovasale trattata con angioplastica primaria ed impianto di stent medicato nel tratto medio dell'arteria discendente anteriore. I fattori di rischio cardiovascolari erano rappresentati da ipertensione arteriosa e dislipidemia (valori di LDL 112 mg/dl) e la paziente era in trattamento con ASA e ticagrelor, ramipril 2,5; atenololo 50, PPI 40 mg e simvastatina/ezetimibe 40/10. L'ECG non mostrava particolari alterazioni e all'ecocardiogramma erano presenti acinesie nel tratto medio delle pareti laterale e postero-laterale con FE circa 40%.
Veniva eseguito esame coronarografico a 4 ore dall'accesso con evidenza di una stenosi critica della triforcazione del tronco distale coinvolgente l'ostio dell'arteria discendente anteriore (occlusa), del ramo intermedio (subocculso) e del ramo circonflesso (subocculso). Vista la sintomatologia e l'instabilità del caso si procedeva ad angioplastica della triforcazione: dopo aver posizionato 3 guide coronariche nei tre rami interessati e predilatato le lesioni, veniva impiantato uno stent medicato all'ostio del ramo circonflesso e un altro nel tratto dal tronco comune verso il ramo intermedio con tecnica T-stenting, kissing balloon finale e POT del tronco comune. A quel punto veniva ri-crossata l'arteria discendente anteriore ed effettuato impianto di stent medicato all'ostio con tecnica TAP. Il buon risultato angiografico della procedura era accompagnato da risoluzione della sintomatologia; la paziente è stata dimessa in quinta giornata in terapia con ramipril 5 mg/die, atenololo 50 mg /di, PPI 40 mg/die, atorvastatina 40 mg/die, ezetimibe 10 mg; evolocumab, ASA 100 mg/die, ticagrelor 90 mg bid.
Attualmente dopo 6 mesi di follow-up la sig.ra M.D.V. è asintomatica per angor e/o dispnea con buon recupero della funzione contrattile globale e valori di pressione arteriosa e dislipidemia a target ed ecostress famracologico negativo per ischemia inducibile.

## CARDIOLOGIA INTERVENTISTICA E STRUTTURALE – 4
## Sessione Poster

### A469: SICUREZZA ED EFFICACIA DELL'UTILIZZO DEL PALLONE SHOCKWAVE PER IL TRATTAMENTO DELLE STENOSI CORONARICHE OSTIALI SEVERAMENTE CALCIFICHE

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**Background.** L'innovazione tecnologica degli ultimi anni ha consentito di sviluppare device sempre più performanti per il trattamento delle stenosi coronariche complesse, tuttavia le stenosi coronariche severamente calcifiche restano una sfida per il cardiologo interventista. Recentemente è stato introdotto nella pratica clinica un device per litotrissia intravascolare, il pallone ShockWave, costituito da un catetere a palloncino che eroga onde d'urto capaci di creare microfratture nel calcio che infiltra la parete arteriosa. Ciò indebolisce significativamente la struttura della calcificazione circonferenziale del vaso, consentendo successivamente una buona predilatazione della stenosi con cateteri a palloncino non complianti. Le stenosi calcifiche degli osti coronarici rappresentano una particolare sottocategoria poichè gli osti hanno di per sè caratteristiche anatomiche uniche a causa della componente fibrosa, prevalente nella parete arteriosa, che conferisce al vaso peculiari caratteristiche di resistenza e di elasticità. Il pallone ShockWave è un ottimo device per questo tipo di lesioni e supera i limiti dell'aterectomia delle lesioni ostiali.
**Materiali e metodi.** Nel nostro centro abbiamo utilizzato questo approccio innovativo in due casi di stenosi severamente calcifiche dell'ostio della coronaria destra. La nostra strategia in questi casi consiste nella scelta di un catetere guida 6 french Judkins Right, ben orientabile e poco supportivo, che consente di avvicinarsi all'ostio senza grande forza di incannulazione, evitando di indovarsi nella stenosi e generare damping. Il filo guida scelto è stato di tipo supportivo per compensare lo scarso supporto offerto dal catetere guida e mantenere l'assialità del sistema. Il pallone ShockWave ha un crossing profile leggermente più grande di un comune palloncino di pari dimensioni e maggiore rigidità, tuttavia ha una capacità di crossare stenosi serrate migliori di molti scoring balloon, per il profilo liscio, senza protrusioni. Nel primo caso la stenosi è stata predilatata con pallone non compliante 2.5 x 20 mm a 18 ATM e successivamente è stata effettuata litotrissia con ShockWave 2.5 x 12 mm espanso a 4 ATM per 3 cicli. La stenosi è stata quindi dilatata con pallone non compliante 2.75 x 20 mm a 16 ATM con buon risultato ed è stato impiantato DES 2.75 x 28 mm rilasciato a 18 ATM con buon risultato angiografico immediato. Nel secondo caso la stenosi ostiale è stata

dilatata con pallone non compliante 2.5 x 15 mm a 14 ATM e 3.0 x 15 mm a 16 ATM senza ottenere una buona predilatazione. Il palloncino da litotrissia 3.5 x 12 mm è stato posizionato all'ostio coronarico, protrudendo in aorta ed è stato dilatato a 4 ATM erogando 3 cicli di litotrissia. È stata effettuata ulteriore dilatazione con pallone non compliante 3.5 x 15 mm a 18 ATM ed è stato impiantato DES 4.0 x 20 mm a 14 ATM con buon risultato angiografico immediato.

**Risultati.** Il pallone ShockWave, in entrambi i casi, ha crossato con facilità lesioni subocclusive severamente calcifiche e ha consentito una qualità di predilatazione difficilmente ottenibile con altri device. Inoltre le stenosi aorto-ostiali espongono al rischio di formazione di rime di dissezione dei seni di Valsalva se si usano tecniche di predilatazioni aggressive con palloni da debulking o HP.

**Conclusioni.** Nella nostra esperienza il pallone da litotrissia intravascolare ShockWave si è dimostrato un approccio efficace per il trattamento delle stenosi ostiali severamente calcifiche, consentendo di ottenere in modo atraumatico e sicuro una predilatazione ottimale.

### A470: LA STRATIFICAZIONE DEL RISCHIO CARDIOLOGICO MEDIANTE CORONAROGRAFIA DI ROUTINE NEI PAZIENTI CANDIDATI A CHIRURGIA CAROTIDEA

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Numerosi ricercatori negli ultimi anni si sono rivolti con crescente interesse alla ricerca di una valida dimostrazione del legame esistente tra aterosclerosi carotidea e malattia coronarica. Essendo l'aterosclerosi una malattia infiammatoria sistemica, può interessare contemporaneamente più distretti e la presenza di lesioni aterosclerotiche, sintomatiche o asintomatiche, in un distretto vascolare deve indurre il controllo di altri territori, essendo la malattia aterosclerotica multidistrettuale invariabilmente associata ad un peggiore outcome clinico. La prevalenza di malattia coronarica in pazienti candidati a chirurgia vascolare maggiore è stata riportata fra il 39 e il 71% dei casi; inoltre, complicanze coronariche postoperatorie in pazienti sottoposti a TEA carotidea sono state identificate in circa il 20% dei casi, con un'incidenza di mortalità per cause cardiache a 1 anno tra il 6 e il 10%. Lo screening preoperatorio per malattia coronarica in pazienti candidati a TEA carotidea è tutt'ora oggetto di controversie: le linee guida ESC/ESVS 2017 pongono indicazione IIb B allo studio coronarografico in pazienti in attesa di TEA elettiva. Tuttavia, l'uso di altre metodiche diagnostiche non invasive può presentare severe limitazioni e un'adeguata stratificazione del rischio può contribuire a determinare la necessità di eseguire una coronarografia per ulteriori approfondimenti. Infatti, gli stress test cardiologici da sforzo o farmacologici hanno tassi di risultati falsi negativi o di dubbia interpretabilità fino al 40% dei casi. L'angioTC coronarica, grazie al suo elevatissimo valore predittivo negativo, può essere presa in considerazione nei pazienti con bassa probabilità pre-test di malattia coronarica (<10%) o con test funzionale dubbio, ma è ancora poco affidabile nella gestione di pazienti a medio-alto rischio di malattia coronarica, ove spesso fornisce risultati contradditori; inoltre presenta un aumento del rischio stocastico di lesioni da radiazioni e di complicanze renali. Nel nostro istituto, tra Gennaio 2016 e Dicembre 2017, sono stati trattati 192 pazienti per malattia critica carotidea (175 asintomatici, 17 con sintomatologia neurologica): tutti i pazienti sono stati sottoposti a studio coronarografico elettivo preoperatorio, con una mortalità correlata dello 0% e una morbidità dello 0,5% (1 caso di TIA con Modified Rankin Score di 0 alla dimissione). 56 pazienti (29%) hanno mostrato concomitanza di lesioni coronariche critiche e sono stati sottoposti a intervento combinato chirurgico (in caso di stenosi carotidea bilaterale e di malattia del tronco comune) o percutaneo. In questo gruppo di pazienti affetti da simultanea malattia severa carotidea e coronarica, l'analisi statistica ha mostrato una significativa maggior incidenza di diabete (p= 0.014) e di moderata disfunzione renale (p=0.0045) rispetto ai pazienti senza concomitante coronaropatia. In conclusione, i pazienti diabetici e con moderata disfunzione renale potrebbero rappresentare, a nostro avviso, un sottogruppo che potrebbe giovarsi di sistematico studio coronarografico prima di interventi di chirurgia vascolare maggiore.

### A471: SUCCESSFUL VALVE-IN-VALVE IMPLANTATION FOR ANNULAR RUPTURE LEADING TO IATROGENIC GERBODE DEFECT AFTER TAVI

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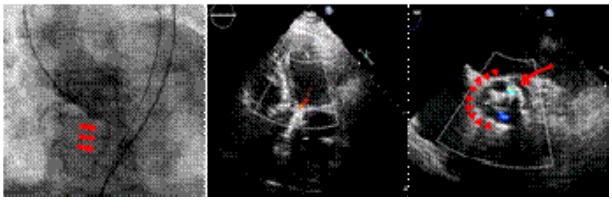
**Background.** Gerbode defect (GD) is a rare congenital cardiac anomaly, it is a high ventricular septal defect with associated anomaly of tricuspid valve septal leaflet leading to communication between the left ventricle and the right atrium. It represents less than 1% of congenital cardiac abnormality, but in recent years the number of acquired GD has increased. Acquired iatrogenic GD is an uncommon complication of surgery and percutaneous intervention performed near the membranous atrio-ventricular (AV) septum (aortic or mitral valve replacement, ventricular or atrial septal defect repair; AV node ablation, endomyocardial biopsy, and tricuspid annuloplasty). Non-iatrogenic causes of acquired GD include endocarditis, right coronary artery myocardial infarction and cardiac trauma. We present a case of acquired iatrogenic GD after transcatheter aortic valve implantation (TAVI).

**Case presentation.** A 84-year-old woman with severe aortic stenosis symptomatic for dyspnoea on minimal exertion, underwent TAVI with Corevalve Evolut R bioprothesis implantation. She had history of atrial fibrillation, respiratory comorbidities (asthma, chronic obstructive pulmonary disease, obstructive sleep apnoea syndrome), hypertension and obesity. TAVI procedure was performed through femoral approach, with direct bioprosthesis implantation, without pre-dilation. After post-dilation, a pathological contrast medium leakage was seen with fluoroscopy. The patient was hemodynamically stable, but transthoracic echocardiography was inconclusive: mild paravalvular regurgitation and no pericardial effusion. She was intubated and a transoesophageal echocardiography was performed: it showed intramural aortic hematoma and a colour jet originating between the left and non-coronary aortic cusps directed to the right atrium (Figure, from left to right: fluroroscopy; transthoracic echo showing mild paravalvular regurgitation; transoesophageal showing aortic hematoma [triangles] and aortic-to-right atrium shunt [arrow]). After excluding a possible surgical approach, it was decided to perform a valve-in-valve implantation, with the attempt to stabilize the aortic hematoma as well as the aortic-to-right atrium shunt. The procedure was successful, with reduction of both paravalvular leakage and aortic-right atrium shunt, no change in aortic hematoma. The day after the procedure the patient required pacemaker implantation due to complete AV block, then she was extubated. Successive course was free of complications and she was discharged after an echocardiographic confirmation of the defect stability.

**Discussion and conclusion.** Annular rupture is only exceptionally reported with self-expanding valves mostly if post-ballooning is performed for paravalvular leakage. Predisposing factors include: LVOT subannuluar or extensive annular calcification, oversized balloon dilatation (≧20 % area). Our experience suggests that transcatherter valve-in-valve implantation with Evolut R may be effective in reduction of aorta-right atrium fistula due to annular rupture.



### A472: SUCCESSFUL PERCUTANEOUS TREATMENT OF PARAVALVULAR LEAK IN RAPID DEPLOYMENT BIOPROSTHETIC AORTIC VALVE WITH BALLOON DILATATION

Carlo Andrea Pivato (a), Beniamino Pagliaro (a), Damiano Regazzoli (a), Alexia Rossi (a), Giulio Giuseppe Stefanini (a), Daniela Pini (a), Bernhard Reimers (a), Gianluigi Condorelli (a)
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An 82-year-old man presented to our ER with congestive heart failure. He suffered from type 2 diabetes mellitus, hypertension, dyslipidaemia, chronic kidney disease (stage IV), thalassaemic trait and Zencker diverticulum. In the past year he received complete coronary revascularization through percutaneous coronary intervention and subsequent drug eluting stent deployment in the circumflex and obtuse marginal arteries for stable coronary artery disease. Five months before, he underwent aortic valve replacement (AVR) with a Rapid Deployment (RD) Edwards 21-mm Intuity Elite valve (Edwards Lifesciences, Irvine, California) for low-flow low-gradient severe aortic stenosis with reduced ejection fraction (EF=30-35%). The intraoperative echocardiogram showed that the valve was sufficiently seated with only a trivial paravalvular leak (PVL). The patient's post-operative recovery was complicated by the need for inotropic support and i.v. diuretics.

Since then he remained symptomatic, NYHA III, until he developed acute heart failure and presented to our clinic. The transthoracic echocardiogram showed a moderate-to-severe aortic regurgitation due to PVL. Unfortunately, it wasn't possible to perform transoesophageal echocardiogram, but the computed tomography scan showed that the PVL was secondary to a poorly apposed stent skirt in the annulus (Figure 1). The causes of malapposition were both the undersizing of the bioprosthetic valve and the oblique position of the bioprosthesis in the anulus. After resolution of congestion's signs obtained with high dose i.v. diuretic therapy, the patient was discussed in our heart-team and he was judged inoperable for re-do cardiac surgery; the only way considered to reduce the PVL was percutaneously. Among the interventional techniques available, we decided to dilate the valve skirt through a balloon valvuloplasty. A transcatheter aortic valve and dedicated closure devices were ready as backup in case of possible complication.

Dilatation was performed with a 23-mm True balloon (Bard Peripheral Vascular, Tempe, Arizona) inflated at 4 atm and then 6 atm during rapid pacing at 180 bpm (Figure 1). The postoperative course was uncomplicated and the echocardiogram showed good result of the procedure with only a trivial PVL and development of a new mild intra-prothesis regurgitation. Patient's symptoms disappeared after the procedure. At 1 month follow up visit patient resulted in NYHA class I in absence of congestion's signs; the echocardiogram showed no residual PVL.
RD valves thanks to a faster implantation through minimally invasive incisions have reduced the time of the operation and of the aortic cross-clamping. In the recent years they have become a common solution for AVR, maybe because an option between the classic surgical AVR and the transcatheter AVR. Nevertheless, the rate of PVL is not trivial and recommendations on how to treat it are missing. In the TRANSFORM (Multicenter Experience With Rapid Deployment Edwards INTUITY Valve System for Aortic Valve Replacement) trial the rates of moderate and severe PVL were 1.2% and 0.4%, respectively (1). In the GARY registry (German Aortic Valve Registry) the rate of  2 residual regurgitation in RD valves was 1.2% (2).
Patients treated with RD valve should be monitored strictly after the operation seeking for such possible complications. Percutaneous dilatation of the valve skirt if performed carefully is a safe treatment option for treating PVL of Intuity valve, especially in patients with prohibitive risk for surgery.

## A473: AN UNEXPECTED COMPLICATION AFTER IMPELLA USE FOR HIGH-RISK PERCUTANEOUS CORONARY INTERVENTION

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**Background.** percutaneous mechanical circulatory support (pMCS) for high-risk percutaneous coronary intervention (HR-PCI) is a useful tool aimed to reduce myocardial work and improving coronary and systemic perfusion. Different devices are available like IABP, TandemHeart, ECMO and Impella. Among these Impella CP, inserted via a single arterial access, is able to generate continuous blood flow up to 4L/min. However its use is not free from complications related to the vascular access, its positioning in the heart or bleeding.
**Case presentation.** a 85-year-old male with severe aortic stenosis and multivessel coronary artery disease (with calcified lesions and distal left main involvement) was referred to our institution to have proper evaluation and treatment. The patient had undergone recent hospitalization for acute pulmonary edema. He was known for previous PCI (right coronary artery), atrial fibrillation and COPD. A recent echocardiogram showed a mildly reduced LVEF (45-50%). After evaluating the case in Heart Team, the decision to proceed with percutaneous revascularization and successive transcatether aortic valve replacement (TAVR) was made. Since the HR-PCI, a pMCS was necessary and Impella CP (via right transfemoral access) was chosen. A successful complete revascularization was performed with 4 DES implantation in RCA and LM-LAD-Cx bifurcation. The Impella CP was removed at the end of the PCI. After the procedure a new apical holosystolic murmur was evident and a transesophageal echocardiogram showed severe (4+/4+) mitral regurgitation (MR) due to chordal rupture and flail of anterior mitral leaflet (A3 scallop). The patient was hemodynamically stable and minimal inotropic support was needed only for the first days. The case was re-evaluated in Heart Team and it was established to do a percutaneous two-step approach to treat aortic and mitral valvular diseases. So few days later the patient underwent TAVR with a self-expanding bioprosthesis (Symetis Acurate neo M). The procedure was successful with good post-procedural aortic gradients (mean gradient = 7 mmHg) and mild-to-moderate aortic regurgitation due to a posterior paravalvular leak. The patient was monitored in Coronary Care Unit where a stable hemodynamic status was maintained in the following days. So he was discharged with the intention to do a strict clinical and echocardiographic monitoring. Few weeks later the patient experienced worsening dyspnea, so he was referred again at our institution. After the patient was stabilized and congestive status improved, the decision to perform transcatether mitral valve repair through MitraClip was made. So two clips were successfully implanted and a residual moderate MR (2+/4+) was achieved. The hospital stay was characterized by hemodynamic stability, without ominous arrhythmias. The patient's symptoms improved, especially dyspnea, and he was discharged few days later.
**Conclusion.** nowadays PCI is the most common modality of revascularization and the continuous technical advances make it feasible even in the most challenging scenarios. In this context the adoption of pMCS is very useful. Complications related to pMCS are not rare. However their prompt recognition and treatment is crucial for the good outcome of procedures deemed to be at high risk.

## A474: ORIGINE ANOMALA DELLA CORONARIA DESTRA DAL SENO DI VALSALVA SINISTRO: CLINICAL CASE

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Si definiscono anomalie congenite delle arterie coronarie tutte quelle condizioni in cui le coronarie hanno delle caratteristiche che sono rinvenibili in meno dell'1% della popolazione. Le anomalie coronariche sono la seconda causa di morte improvvisa nei giovani di età inferiore a 35 anni. Ve ne sono numerose tipologie e di difficile classificazione, ma in poche sono state correlate al rischio di morte improvvisa. Tra queste vi è l'anomala origine delle coronarie dal seno opposto. L'origine della coronaria destra dal seno coronarico sinistro è più frequente rispetto all'origine della coronaria sinistra dal seno coronarico destro, ma è gravata da un rischio nettamente inferiore di morte cardiaca improvvisa specialmente nei pazienti con più di 40 anni. Il meccanismo fisiopatologico ed anatomico che predispone a questa drammatica complicanza non è ancora ben definito. Il decorso interarterioso, il decorso intramurale e l'orifizio "slit-like" sono le caratteristiche anatomiche che sono state collegate a complicanze maligne (angina, IMA, morte improvvisa). Studi autoptici dimostrerebbero che decorsi intramurali più lunghi con orifizi slit-like giochino un ruolo centrale nella malignità dell'anomalia.
Presentiamo il caso di una donna di origine indonesiana, di 49 anni, senza fattori di rischio cardiovascolare e asintomatica, che a marzo 2019, si sottoponeva a ECG a 12 derivazioni per ottenere nullaosta per estrazione dentaria. L'ECG basale documentava ritmo sinusale con sottoslivellamento del tratto ST-T in sede infero-laterale. Su indicazione del cardiologo, la paziente veniva sottoposta a test da sforzo secondo il Protocollo di Bruce, il quale veniva interrotto al III minuto del III stadio per comparsa di dolore toracico oppressivo associato a sottoslivellamento orizzontale del tratto ST-T di massimo 2 mm da V4 a V6, a lenta regressione nella fase di recupero. La paziente quindi eseguiva coronarografia che documentava origine della coronaria destra dal seno di Valsalva di sinistra ed assenza di stenosi angiograficamente significative dell'albero coronarico. Nel dubbio di decorso interarterioso veniva successivamente eseguita una TC cardiaca sincronizzata che confermava il decorso interarterioso della coronaria destra, anteriormente all'aorta e posteriormente all'arteria polmonare. Alla luce di tali risultati veniva posta controindicazione allo svolgimento di attività fisica moderata e veniva posta indicazione ad esecuzione di una scintigrafia miocardica da sforzo.
L'identificazione, la stratificazione del rischio e la gestione terapeutica dei pazienti con tale anomalia rappresentano una vera e propria sfida clinica.
L'approccio chirurgico dovrebbe essere riservato ai pazienti sintomatici per ischemia, con ischemia documentata al test provocativo o con storia di morte cardiaca improvvisa. La scelta del tipo di intervento deve essere individualizzata sulla base delle caratteristiche dell'anomalia e del paziente.

## A475: A PATIENT SPECIFIC REALISTIC 3D-PRINTED MODEL TO OPTIMIZE TAVI PROCEDURES

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**Background.** The development of novel interventional tools for heart valve disease, planning of complex procedures and training of young operators require a set-up that realistically reproduces cardiovascular anatomy, biomechanics and fluid dynamics. 3D-printed models provide the ideal basis for such investigations. Aim of the present study was the development of a patient specific model for transcatheter heart valve implantation (TAVI) which was tested and validated within a realistic procedure.
**Methods.** A 3D-model of a thoracic aorta was segmented from patient's CT-images and manufactured using a PolyJet™ 3D-printer. The printer allowed a mixture of two materials, to obtain a flexible model with tissue-like mechanical properties. The printed model comprised a functional tri-leaflet aortic valve. To allow a video guidance of the TAVI procedure, two extra branches were realized in the model, to give access with a surgical endoscope from both sides of the aortic valve. The model was connected to a mock circulation setup, providing pulsatile pressures and flows.
**Results.** The TAVI procedures were successfully executed in a hybrid OR setting. Due to the extra branches, the procedures could be guided in real-time, with both fluoroscopy and high definition video. The presence of the 3D printed tri-leaflet aortic valve was a unique feature that gave the opportunity to reproduce the crossing of the aortic valve. These features resulted beneficial, especially for training of TAVI procedures designed for aortic valve regurgitation with a "leaflet-related" deployment mechanism.
**Conclusions.** A functional and patient specific 3D-model was produced and successfully tested under realistic conditions. 3D printed models are an excellent tool to investigate the design and test of novel devices/prostheses. Such patient-individualized optimizations of complex procedures ensure more precise interventions and therefore help to improve clinical outcomes.

### A476: WOVEN CORONARY ARTERY: CASE REPORT

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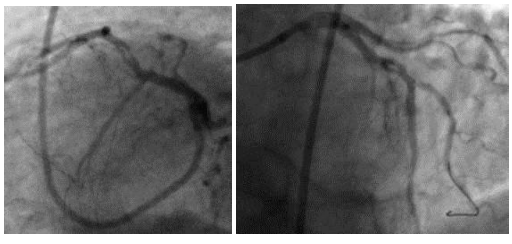
La "woven coronary artery" è un'anomalia delle coronarie estremamente rara. Essa consiste nella diramazione dell'arteria coronaria in vasi di minor calibro, che dopo un breve tratto si rianastomizzano a valle convergendo in un condotto unico. Sulla sua eziologia e le sue implicazioni cliniche si sa ancora poco, considerato l'esiguo numero di casi ad oggi riportati in letteratura. Ciò nonostante è importante riconoscere tale anomalia quando si presenta durante uno studio coronarografico, al fine di condurre un'appropriata diagnosi differenziale con la presenza di trombi o dissezioni intracoronariche, che potrebbero portare a decisioni terapeutiche errate e potenzialmente dannose per il paziente. Portiamo alla vostra attenzione il caso di un paziente di 62 anni con diagnosi di STEMI inferiore trattato mediante posizionamento di sei stent medicati sulla coronaria destra. Alla valutazione della discendente anteriore veniva riscontrata, tuttavia, un'immagine a "doppio lume" seguita da stenosi lunga significativa. Dopo adeguato studio mediante metodica angioTC veniva confermata la presenza della coronaria "woven". Il paziente veniva dunque nuovamente sottoposto a coronarografia, e si procedeva allo stenting della stenosi a valle dell'anomalia coronarica sulla discendente anteriore. Esistono pochissimi casi al mondo riguardanti la "woven coronary artery" che presentano conclusioni molto distanti tra loro. Alcuni considerano tale anomalia come condizione benigna, altri la associano a sindrome coronarica acuta, morte cardiaca improvvisa e ictus ischemico. La variante coronarica da noi riscontrata risultava associata a stenosi che pur se significativa non era culprit. Alla luce di quanto detto si ritiene necessario ulteriore approfondimento riguardo alle implicazioni cliniche dell'anomalia definita "woven coronary artery", su cui ad oggi non sono espresse opinioni univoche a causa dell'esiguo numero di pazienti studiati.



### A477: PATOLOGIA BIVASALE CRITICA IN PAZIENTE CON STEMI: CASO CLINICO

Francesco Paolo Ariano (a), Sofia Schino (a), Nicola Porchetta (a),
Francesco Geuna (a), Elisa Beggio (a), Massimiliano Macrini (a),
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(a) UNIVERSITÀ DEGLI STUDI DI ROMA -TOR VERGATA

La patologia coronarica multivasale rappresenta un'evenienza che si riscontra in circa il 25-50% dei pazienti deceduti per trombosi coronarica nelle casistiche autoptiche e rappresenta pertanto un riscontro non infrequente in corso di angioplastica primaria. Le ultime linee guida della Società Europea di Cardiologia (ESC) sulla rivascolarizzazione miocardica, pubblicate nel 2018, si esprimono chiaramente sulla gestione dello STEMI in pazienti con patologia coronarica multivasale in cui è possibile identificare con precisione quale sia la lesione culprit. Lo stato dell'arte prevede che la PCI primaria su più vasi in caso di STEMI non complicato da shock cardiogeno dovrebbe essere considerata in pazienti con stenosi critiche multiple o lesioni altamente instabili se vi sono segni di ischemia persistente dopo aver effettuato angioplastica sulla lesione ritenuta culprit. Al contrario, nel caso di paziente con STEMI complicato da shock cardiogeno le linee guida non raccomandano di provvedere sempre in corso di PCI primaria alla rivascolarizzazione completa delle arterie in cui siano identificate lesioni critiche; tuttavia la necessità di rivascolarizzazione va individualizzata e ponderata sulla base del quadro clinico ed angiografico di ciascun paziente. Presentiamo il caso di un paziente di 58 anni con plurimi fattori di rischio cardiovascolare sottoposto nel 2015 a rivascolarizzazione coronarica per NSTEMI con PCI ed impianto di quattro stent medicati su coronaria destra e primo ramo marginale ottuso. Nel 2017 STEMI trattato con PCI primaria con impianto di uno stent medicato sulla discendente anteriore ed uno stent medicato sulla coronaria destra con PEBA sul primo ramo marginale ottuso per restenosi intrastent e nel 2018 STEMI anteriore trattato con PCI primaria con POBA sul primo ramo diagonale, PEBA su stent precedentemente impiantato sul ramo marginale ottuso e posizionamento di uno stent medicato sulla discendente anteriore per restenosi intrastent. A luglio 2019 si presentava alla nostra attenzione con diagnosi di STEMI inferiore associato ad ipotensione. Allo studio coronarografico veniva riscontrata occlusione di stent sia a carico della coronaria destra che della discendente anteriore occorse a seguito della sospensione della terapia antiaggregante con Ticagrelor. In considerazione del quadro clinico-anamnestico del paziente e del vasto territorio di irrorazione dei vasi occlusi, veniva sottoposto a PCI primaria con impianto di uno stent medicato su discendente anteriore e di uno stent medicato sulla coronaria destra. Questo caso evidenzia la fondamentale importanza della conoscenza approfondita delle linee guida nella valutazione di un percorso terapeutico, pur tenendo sempre a mente che le condizioni cliniche generali del paziente, la sua storia clinica e l'aspetto angiografico debbano essere tutte parimenti considerate nel valutare quale sia la scelta terapeutica più adeguata.

### A478: CORONARY ARTERY ANEURYSM SIX MONTHS AFTER EVEROLIMUS ELUTING STENT IMPLANTATION: A CASE REPORT

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**Background.** The onset of coronary aneurism (CAA) after drug-eluting stent (DES) implantation is uncommon, with an incidence from 0.8% to 1.3%. However, associated adverse clinical events may present as a result of DES thrombosis and restenosis. Furthermore, the occurrence of DES thrombosis appears to be particularly high in patients with CAA who discontinued dual-antiplatelet therapy. Importantly, most previous studies have been conducted involving patients treated with first-generation DES implantation alone and, although concerns about the development of CAA after DES implantation have decreased after the introduction of second-generation DESs, occurrences of CAA even after second-generation DES implantation have been reported in recent case reports.
**Case report.** 6 months previously, a 66-year-old woman with a medical history of hypertension, dyslipidemia and former smoker presented with unstable angina. In 2018 she underwent a coronary bypass grafting. Percutaneous coronary intervention was successful performed with implantation of a 3.0 mm x 18 mm everolimus-eluting stent (XIENCE Sierra™, Abbott, Santa Clara, Calif., USA) in left main-proximal circumflex artery. Six months after the procedure, the patient was referred to our institution for chest pain associated with dyspnea and sweat. The coronary angiography showed dilation of coronary artery tree in the stented regions, but the stent to be patent without relevant in-stent restenosis (Figure 1). Frequency-domain optical coherence tomography (FD-OCT) assessment exhibited vessel wall dilation well as covered/apposed and uncovered/malapposed stent struts without evidence of thrombosisas, which were also demonstrated in the 3-dimensional reconstruction (Figure 2). We decided for a long-term dual-antiplatelet therapy.

**Figure 1**

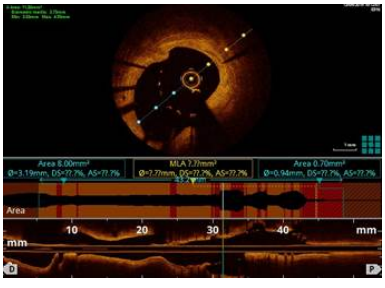


**Figure 2**

**Conclusion.** At this time, to our knowledge, the incidence of CAA after second-generation DES implantation has not been evaluated, and even more concerning, the clinical implication of angiographic CAA after second-generation DES placement remain uncertain.

### A479: CHIMNEY TECHNIQUE AND BIOPROSTHETIC VALVE FRACTURE DURING VALVE-IN-VALVE TRANSCATHETER AORTIC VALVE IMPLANTATION: CASE REPORT

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Paolo Spontoni (a), Giulia Costa (a), Andrea Pieroni (a),
Marco De Carlo (a), Anna Sonia Petronio (a)
(a) AZIENDA OSPEDALIERO UNIVERSITARIA PISANA, CARDIO THORACIC AND VASCULAR DEPARTMENT

**Background.** Valve-in-valve (ViV) transcatheter procedures have emerged as a feasible, less-invasive treatment option for bioprosthetic

structural valve deterioration. However, in the presence of a small bioprosthesis, a significant residual gradient after ViV procedures often occurs and has been associated with poorer clinical outcomes. Furthermore ViV transcatheter aortic valve implantation is associated with an increased risk of coronary obstruction because the surgical valve leaflets are pushed toward the coronary ostia and they also cover the TAVI stent which loses its free-flow nature. In these patients at high risk for coronary occlusion, consideration should be given to prophylactic techniques to prevent coronary occlusion. The chimney snorkel coronary stenting technique as a predictable procedural approach for the management of this potentially challenging clinical scenario.

**Case report.** An 76 year old female patient received surgical aortic valve replacement. Five years later, echocardiography revealed a pressure gradient of peak/mean 82/52 mmHg. In this iconic case, a Corevalve Evolut R n23 was implanted inside a degenerated surgical Mosaic (Medtronic Inc, Minneapolis, MN) n23 prosthesis. The prophylactic chimney snorkel technique for the prevention of acute coronary occlusion was performed. The left coronary was protected with preventive implantation of a drug-eluting stent 4.0 × 26 mm and the right coronary with preventive implantation of a drug-eluting stent 4.0 × 28 mm. After deployment of a 23 mm CoreValve Evolut R self-expanding TAVR prosthesis, the mean gradient was reduced to 32 mmHg. BVF was then performed with a 23 mm True Balloon, and the bioprosthetic ring fractured at 10 atm. Final haemodynamics demonstrated a mean gradient of 12 mmHg (Figure 1). At 1 month follow up, the patient was doing well, with New York Heart Association class 1 functional status. An echocardiogram at that time demonstrated a mean transvalvular gradient of 13 mmHg, with a peak Doppler velocity of 2.2 m/s.

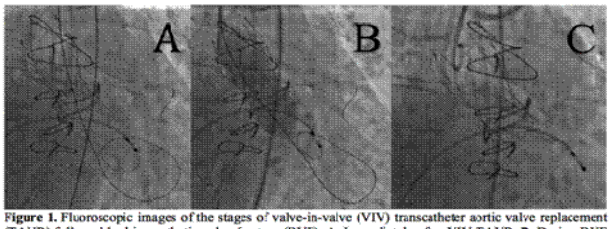


**Figure 1.** Fluoroscopic images of the stages of valve-in-valve (VIV) transcatheter aortic valve replacement (TAVR) followed by bioprosthetic valve fracture (BVF). **A,** Immediately after VIV TAVR. **B,** During BVF before fracture of surgical ring. **C,** Final fluoroscopic results.

**Conclusion.** Bioprosthetic valve fracture can be performed safely in small surgical valves to facilitate VIV TAVR with and results in reduced residual transvalvular gradients and increased valve effective orifice area.

## CARDIOLOGIA INTERVENTISTICA E STRUTTURALE – 5 - TELECARDIOLOGIA ED E-HEALTH
## Sessione Poster

### A480: UN CASO DI DISSEZIONE AORTOCORONARICA IATROGENA

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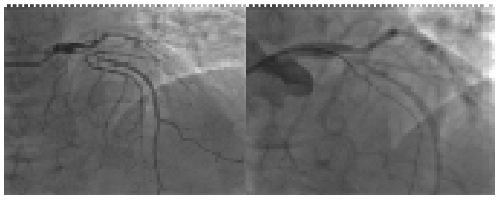
Una donna di 77 si presentava c/o il Pronto Soccorso in seguito ad un episodio sincopale. La paziente, ipertesa, riferiva una storia di episodi anginosi indagati mediante test ergometrici effettuati negli anni precedenti e risultati negativi. All'arrivo in Pronto Soccorso la paziente si presentava emodinamicamente stabile con valori pressori di 119/54 mmHg, una frequenza respiratoria di 18 atti/min e una saturazione di O2 del 96%. La paziente veniva quindi sottoposta a TC cranio che non riscontrava lesioni ischemiche cerebrali acute. L'ECG documentava un ritmo sinusale con la presenza di onde T negative profonde e simmetriche in regione antero-settale. In considerazione dei valori di troponina lievemente aumentati (41.9 ng/L; v.n.<20 ng/L) e del riscontro ecocardiografico di acinesia del setto distale e della parete anteriore distale la paziente veniva quindi condotta in sala di Emodinamica per l'esecuzione di coronarografia diagnostica. Veniva quindi eseguita, tramite accesso radiale destro 6F, coronarografia che documentava una coronaria destra ipoplasica, tronco comune e arteria circonflessa indenni da stenosi angiograficamente significative e una lesione subocclusiva a livello dell'arteria interventricolare anteriore prossimale estesa a livello di un grosso ramo settale. Si procedeva quindi ad angioplastica su IVA. In seguito alla predilatazione della lesione risultava evidente una dissezione coronarica coinvolgente IVA prossimale e tronco comune con evoluzione, alle iniezioni successive di mezzo di contrasto, verso il seno coronarico di sinistra. Si è quindi proceduto con stenting del vaso a livello dell'IVA prossimale e del tronco comune al fine di chiudere il flap di dissezione. Alle successive immagini angiografiche si assisteva all'estensione della dissezione a livello dell'ostio dell'arteria circonflessa per cui si rendeva necessario il posizionamento di un DES a livello dell'arteria circonflessa prossimale. Le immagini eseguite a fine procedura documentavano una totale obliterazione del flap a livello della radice aortica con la persistenza di un esiguo ematoma intramurale a livello del tratto prossimale dell'IVA. La paziente è stata quindi sottoposta, in considerazione dei valori di pressione arteriosa persistentemente al di sopra dei 200 mmHg, ad infusione di Clonidina con buona risposta emodinamica. L'angio TC eseguita dopo circa 3 giorni di ricovero in UTIC ha documentato l'assenza di immagini compatibili con dissezione aortica residua. Il caso è stato discusso in Heart Team e, nonostante la chiara indicazione ad un ottimizzazione della PCI su tronco comune, IVA e arteria circonflessa prossimale (eventualmente con l'ausilio di imaging intracoronarico) si è preferito rivalutare la paziente a 3 mesi tramite esecuzione di angio-TC di controllo al fine di evitare una nuova manipolazione di cateteri a livello del tratto di aorta precedentemenet dissecato. La dissezione aortica (associata o meno a dissezione coronarica) rappresenta una complicanza rara ma potenzialmente mortale dell'angioplastica coronarica che non conosce un trattamento condiviso e standardizzato. Presentiamo un caso di dissezione aortocoronarica iatrogena come complicanza di un'angioplastica coronarica in corso di sindrome coronarica acuta.



### A481: NEUTROPHIL TO LYMPHOCYTE RATIO IS ASSOCIATED WITH PACEMAKER IMPLANTATION IN PATIENTS UNDERGOING TRANSCATHETER AORTIC VALVE REPLACEMENT

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**Background.** High neutrophil to lymphocyte ratio (NLR) is an index of progression of atherosclerosis and hence of inflammation. The calcific aortic stenosis, in its severe degree, can represent a burden of inflammation; in this setting previous studies have showed an elevated NLR. How this index impacts on prognosis in patients undergoing transcatheter aortic valve replacement (TAVR) is not clearly defined.

**Methods.** A total of 57 consecutive patients hospitalized at Fondazione Giovanni Paolo Secondo in Campobasso were enrolled in this study. Baseline characteristics, Computed Tomography data, Echocardiographic measurements, laboratory tests were collected and analyzed. NLR was calculated as ratio of absolute neutrophil count to absolute lymphocyte count, prior to TAVR procedure.

**Results.** Baseline characteristics are reported in the table. Among patients receiving TAVR, 17,5% (10) needed pacemaker implantation following TAVR procedure. Admission NLR values were 4.78±3.98 and 3.01±1.31 in patients receiving and not pacemaker implantation, respectively (p 0.01) (see table). Multivariate analysis, adjusted for age, sex, left ventricular ejection fraction, diabetes, peripheral and cerebrovascular disease, showed that NLR was associated with pacemaker implantation following TAVR procedure (OR: 1.275, 95% CI: 1.035-1.570).

**Conclusions.** The role of NLR in predicting events in TAVR patients is not fully clarified. In our patients receiving TAVR higher NLR was associated with the need of pacemaker implantation. These preliminary results need to be elucidated with larger and more specifically designed studies.

### A482: PREDICTORS OF MILD TO MODERATE PARAVALVULAR LEAKAGE AT DISCHARGE AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT

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**Background.** Transcatheter aortic valve replacement (TAVR) represents a valid and acceptable option for aortic valve stenosis treatment. Paravalvular leak (PVL) after TAVR remains an important issue. The focus of this study was identifying predictors of mild PVL at discharge.

**Methods.** A total of 55 consecutive TAVR candidates, hospitalized at Fondazione Giovanni Paolo Secondo in Campobasso, were enrolled in this study. Baseline characteristics, CT data including Free state Aortic valve Calcium computed tomography score (FACTS), echocardiographic measurements, laboratory tests were collected and analyzed. A qualitative score was used to assess cusp calcification degree. Patients with mild-moderate PVL (n=29) on transthoracic echocardiography at discharge were compared to those without (n=26).
**Results.** There were no differences between the two groups in patient baseline characteristics (table 1). Higher FACTS score (8.31±3.70 vs 6.04±3.28, p=0.02), moderate calcification of left coronary cusp (1.83±1.10 vs 1.04±0.87, p=0.005), higher annulus perimeter (7.8 cm vs 7.3 cm, p=0.02), annulus area (4.75 cmq vs 4.17 cmq, p= 0.02), average annulus diameter (2.45±0.27 cm vs 2.32±0.17 cm, p= 0.03) were significantly associated with mild-moderate PVL. In addition, non-significant differences were found in eccentricity index, cover index and area cover index (table 2). Finally, a FACTS score >9 was predictive of mild-moderate PVL at discharge (sensivity 41.8%, specificity 92.31%, AUC 0.674, p=0.017).
**Conclusions.** In our patients receiving TAVR, higher FACTS score, left coronary cusp calcification, and higher annulus size were associated with mild-moderate PVL after TAVR procedure. Further studies are needed to understand their mechanism and significance.

### A483: GUIDEWIRE ENTRAPMENT DURING PCI: DESCRIPTION OF AN UNCOMMON CASE

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**Introduction.** During PCI procedure, complications as entrapped devices (catheters, balloon or guidewires) are not common and are associated with increased morbidity and mortality. There are limited data to guide management of retained devices and there is no agreement between surgical or percutaneous removal of the device versus leaving it in situ. We report a case of a guidewire entrapment complicating a PCI.
**Case report.** A 53 years old man with a history of hypertension presented to emergency department with atypical chest pain: initial ECG did not show signs of acute ischemia, but blood biochemical tests documented an increase in biomarkers of cardiac necrosis, so it was diagnose a NSTE-ACS. Patient was conduct to cath lab to perform coronary angiography. The exam showed an ulcerated plaque subocculding the first tract of left anterior descending (LAD) coronary artery. A standard 0.014' guidewire was used to downstream of vessel. PCI was performed through the direct placement of a 3 x 14 mm drug eluting stent (DES) following optimization with a 3,5 x 8 mm non compliant balloon. Angiographic control displayed TIMI III flow. After procedure, the stent balloon was removed without difficulty, but it resulted impossible to remove the guidewire. The guidewire appeared entrapped through the stent. It was decided to place a new guidewire to remove the other but during the attempt guidewire was sheered in the vessel. Because the patient remained hemodynamically stable with TIMI 3 flow, it was decided to abort the case and discuss further management options. Patient was admitted to Intensive Coronary Care Unit. After two days it was performed a new coronary angiography to try to remove entrapped wire. Through a 12F right femoral artery approach, a 40 mm snare and endovascular forceps were placed to unsuccessfully recover distal margin of the wire. With a balloon it was possible to got back guidewire to proximal tract of LAD coronary up to left main. Following, it was placed a 3.5 x 24 mm DES in LAD and a 4 x 8 mm DES in left main, leaving free circumflex artery ostium, to entrap there the guidewire. The angiographic control documented a flow improvement in the LAD parapical tract. Patient remained hemodynamically stable. After five days he was discharged. A month later it was performed an angiographic control showed patency of previous implanted stents and stability of entrapped wire. Patient remained asymptomatic and continued medical terapy
**Conclusion.** Retained devices are rare in contemporary practice and their management is not unique, but it has to take account of type of device entrapped, location of the retained device and patients' clinical condition. Treatment decisions should be individualized weighing the risk and benefits of removal versus conservative management.

### A484: LEFT VENTRICULAR SIZE PREDICTS CLINICAL BENEFIT AFTER PERCUTANEOUS MITRAL VALVE REPAIR FOR SECONDARY MITRAL REGURGITATION: A SYSTEMATIC REVIEW AND META-REGRESSION ANALYSIS

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**Background.** The benefit of percutaneous mitral valve repair (PMVR) in patients with secondary MR is still debated. We aimed to compare the outcome of PMVR with optimal medical therapy (OMT) versus OMT alone in patients with secondary mitral regurgitation (MR), and to assess the role of potential effect modifiers.
**Methods.** We performed a systematic review and meta-analysis of 2 randomized clinical trials (RCT) and 7 non-randomized observational studies (nROS). Hazard ratios (HR) and 95% confidence intervals (CI) were pooled through inverse variance random-effect model to compute the summary effect size for all-cause death, cardiovascular death and cardiac-related hospitalization. Subgroup and meta-regression analysis were also performed.
**Results.** An overall population of 3,118 individuals (67% men; mean age, 73 years) was included: 1,775 PMVR+OMT and 1,343 OMT patients, with mean follow-up of 24±15 months. PMVR+OMT was associated with a lower risk of all-cause death (HR: 0.77; 95% CI: 0.68-0.87), cardiovascular death (HR: 0.55; 95% CI: 0.34-0.89) and cardiac-related hospitalization (HR:0.77; 95% CI: 0.64-0.92). Meta-regression analysis showed that larger left ventricular end-diastolic volume index (LVEDVI) portends higher risk of all-cause death, cardiovascular death and cardiac-related hospitalization after PMVR (p<0.001 for all).
**Conclusions.** This study-level meta-analysis shows that PMVR+OMT is associated with reduced all-cause death, cardiovascular death and cardiac-related hospitalization when compared with OMT alone in secondary MR. LVEDVI is a predictive marker of efficacy, as patients with smaller LVEDVI have been shown to derive the largest benefit from PMVR.

### A485: HOW DOES A SEVERELY CALCIFIED CORONARY LESION APPEAR AFTER ROTATIONAL ATHERECTOMY AND INTRAVASCULAR LITHOTRIPSY? OCT FINDINGS

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**Introduction.** Calcific lesions represent a complex setting of PCI, where the importance of specific "dedicated" tools is crucial. Sometimes only the proper combination of different devices is the key to procedural success. Optical Coherence Tomography (OCT) intracoronary imaging can be crucial to guide the procedure.
**Case summary.** A 63-year-old male patient, recently treated with Primary PCI of the Right Coronary Artery for inferior STEMI, was referred to our Cath-lab to undergo completion of revascularization for a short severely calcific lesion of the proximal Left Anterior Descending, planned to be treated with IntraVascular Lithotripsy (IVL, Shockwave Medical Inc., Fremont, CA -USA). - The lesion was approached with a 6F transradial guiding catheter. After crossing the lesion with a high-support guidewire (Extra S'port – Abbott Vascular Inc.), this appeared to be un-crossable both with Shockwave system and common balloon devices. Several dilatations were performed by using small balloons (1.5 and 2.0 mm), with poor luminal gain. We decided to switch to a different approach by using a 7.5F Sheatless guiding catheter and, after delivering the dedicated "rota-wire", Rotational atherectomy was performed with a 1,5 mm burr (to modify the anatomy of the plaque and to allow balloon crossing) and then 50-60 IVL pulses were delivered across the lesion before balloon rupture. We proceeded by further preparing the lesion for stent implantation, however both Non-Compliant (2.5 and 3.5 mm) and a super-high pressure balloon (OPN 3.0 mm) broke during inflation. - At this point we performed intracoronary imaging with OCT, showing a severe circumferential and thick (>0.5mm) calcification, with several cracking and moderate luminal gain. Cross-sections showed significant depth of fractures in calcium and longitudinal view showed their length (Figure). Ultimately we proceeded with stent implantation and proper NC post-dilation, with optimal stent expansion.

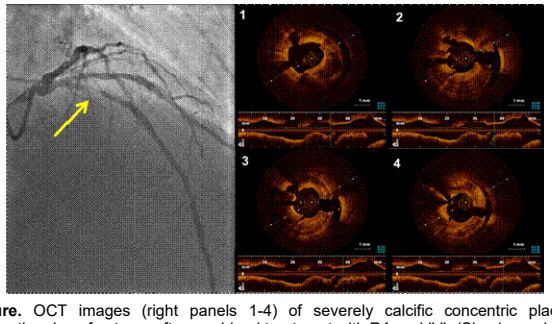


**Figure.** OCT images (right panels 1-4) of severely calcific concentric plaque, presenting deep fractures after combined treatment with RA and IVL (Shockwave).

### A486: IN-HOSPITAL AND LONG-TERM CLINICAL OUTCOMES OF ROTATIONAL ATHERECTOMY AND INTRAVASCULAR LITHOTRIPSY IN PATIENTS WITH COMPLEX CALCIFIED CORONARY LESIONS: A DOUBLE-CENTER REGISTRY

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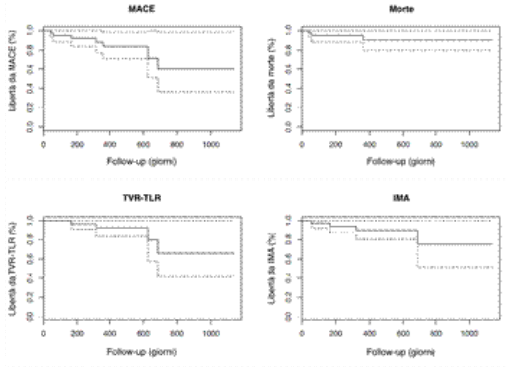
**Background.** Rotational atherectomy (RA) can favorably modify heavily calcified coronary lesions with known results; new technologies are currently at our disposal in this setting of patients but real-world data are lacking.

**Objectives.** To assess procedural and long-term outcomes of RA and intravascular lithotripsy (IVL) in a cohort of patients with complex calcified coronary lesions.

**Methods and Results.** We retrospectively collected data regarding all patients treated with RA and IVL (separately or in combination). Follow-up was obtained by clinic visit or telephone interview. Seventy patients with de novo complex calcified coronary lesions treated with RA and/or IVL (64 RA; 8 IVL; 2 combined RA+IVL treatment) were analyzed. Mean age was 72.5 ± 9.5 years, 38 patients (55.1%) had diabetes mellitus and 30 patients (43.5%) had chronic renal failure. Total stent length/patient was 52.5 mm. Angiographic success rate was 97%, with only 1 case of RA failure due to massive calcification. The incidence of in-hospital major adverse cardiac events (MACE), defined as death, myocardial infarction (MI), and target vessel revascularization (TVR), was 2.9%, driven by death in 2 complex fragile patients. Long-term follow-up was available for 40 patients (60% of entire population). At a median follow-up period of 12.5 months (range 2-36), the cumulative incidence of MACE was 17.5%, with Kaplan-Meier MACE-free survival rate of 84% (95% CI 0.72-0.98). Death occurred in 7.5% (cardiac death only 2.5%), MI in 10.0% and target lesion revascularization (TLR) in 10.0% (MI/TLR overlap in 3 out of 4). One definite (2.5%) and one probable (2.5%) stent thrombosis leading to MI and cardiac death were observed. The small subgroup of patients treated with IVL showed absence of significant procedural and clinical events, likely because of the short period of observation (5 months on average).

**Conclusion.** This study confirms good clinical outcomes of both RA and IVL, with a high rate of procedural success and low incidence of TLR and MACE at long term, considering this subset of extremely complex patients and lesions.The results of the recently introduced IVL technology appear promising and combined treatment with RA followed by IVL appeared to be feasible and effective for the treatment of calcified coronary lesions.




### A487: PACEMAKER DEPENDENCY AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION: INCIDENCE, PREDICTORS AND LONG-TERM OUTCOMES.

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**Aims.** To determine the appropriateness of permanent pacemaker implantation (PPI) after TAVI through an analysis of PM dependency at follow-up, and to assess long-term outcomes of patients undergoing PPI after TAVI.

**Methods and Results.** From June 2007 to February 2018, 1116 consecutive patients without prior PM underwent TAVI in our Institution. We assessed incidence and predictors of PM dependency of patients who underwent PPI within 30 days, and 6-year outcomes among patients who underwent and did not undergo PPI at 30 days.At 30-day PPI was reported in 145 patients (13.0%). Rates of PM dependency were 35.7%, 35.8% and 33.3% at 1-, 6- and 12-month, respectively. Analysing PPI timing, implantation on day 1 was found a predictor of PM dependency at 6 months (OR 20.7 [CI 3.4-126.7]; p=0.001) and 12 months (OR 7.5 [CI 1.4-40.2]; p=0.019). An interaction between PM dependency and the presence of baseline right bundle branch block (RBBB) at 6 months (pinteraction=0.024) and 12 months (pinteraction=0.028) was reported when PPI was performed on the same day of TAVI.At 6-year, patients who received a PM at 30 days showed a higher all-cause death rate (KM estimate 41.7% vs. 57%; plog-rank=0.034).

**Conclusions.** Among patients receiving PPI after TAVI, PM dependency rates were about 33-36% at 1-year. Patients with a baseline RBBB undergoing PPI at day 0 or at day 1 when severe CDs persisted for 24 hours after TAVI, irrespectively from baseline CDs, had higher chances to be PM dependent at follow-ups. Finally, PPI after TAVI was associated with increased 6-year mortality.

### A488: INTEGRATION OF POLYGENIC RISK SCORE IN CAD RISK MODELS FOR CLINICAL USE

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Different groups have developed Polygenic Risk Scores (PRS) for Coronary Artery Disease (CAD) based on inference from millions of Single Nucleotide Polymorphisms (SNP). In one study, a PRS-based model was able to identify the 8% of the individuals of the European population with a CAD risk, comparable to that conferred by monogenic mutations. In a second study, men in the top 20% of PRS distribution reached a threshold of 10% cumulative CAD risk by 61 years of age, ten years earlier than men in the bottom 20% distribution. However, although PRS-based risk models demonstrate higher predictive performances than any currently used risk factor they are not yet used in clinical practice. We therefore addressed the following questions to build the use case for the use of PRS into current clinical risk models. Following analyses are based on the UK Biobank population of European descend. First, we assessed the impact of adding published PRSs to clinical risk models (e.g., Framingham score). At present, a 10% 10-year risk threshold is used in risk models to decide whether life-style or medical interventions should be implemented. We found that the addition of PRS to the Framingham score determined consistent reclassification of individuals based on the 10% risk threshold. Second, we tested if PRSs were able to stratify individuals already considered at risk on the basis of conventional risk factors. For men with family history of CAD for example, we detected a strong PRS-based stratification with CAD prevalence ranging from 2.5% to 23% for the first and last percentile of PRS distribution. This indicates that even in individuals with family history, risk trajectories can be substantially modulated by the addition of PRSs. Additionally, we find no correlation between PRS and LDL-cholesterol blood levels indicating that these are orthogonal risk factors. Finally since the majority (99.9%) of SNPs composing such PRSs have a low median effect size (10-6), researchers have argued about the relevance of such SNPs in contributing to the overall PRS predictive performances. By generating PRS with different subsets of SNPs, we found that full set PRS (6.6 millions SNPs) displays higher Positive Predictive Values compared with either effective-SNPs PRS (top 0.1% SNPs) or genome-wide significant PRS (74 SNPs). This shows that even low weight SNPs play a role in classifying a large proportions of individuals into the higher risk CAD category.

### A489: INFORMATION TECHNOLOGY EXECUTIVES CLUB IN ROME: POSITION PAPER ON INFORMATION TECHNOLOGY APPLICATIONS IN MEDICINE

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(a) INFORMATION TECHNOLOGY EXECUTIVES CLUB IN ROME

The Information Technology Executives Club (CDTI) is the largest non-profit association of ICT executives in Rome. Founded in 1984, it is part of FIDA Inform, the Italian Federation of IT executives, which includes over 1,000 Italian managers.

On 2014 the CDTI produced a White Paper on Telemedicine. Recently (2019) a Position Paper on Information Technology applications in Medicine – Digital Health from caring to care - has been prepared by a group of Medical Doctors and ICT Managers associated with CDTI. The most important aspects discussed in the document are: Digital Therapeutics, App development and utilization, Big Data analysis, Internet of Things in Medicine, 5G and Edge Computing, Machine Learning, Artificial Intelligence, Blockchain technology, Dematerialization, Education Medical Doctors and Managers, IT and Management. Most of arguments presented in the Position Paper are crucial in the application of IT and the future in Cardiology, but they are not studied and discussed by Cardiologists. Moreover, educational dedicated activities on IT are not common.

All the aspects of this document deals with Cardiovascular Medicine. The organization of cardiological activities is leaded by IT. Many aspects of IT

are very important for the research in Cardiology. In particular aspects of Telemedicine and technology applied to imaging were closely related the common cardiological practice.
To the best of our knowledge this is the first example of a Position Paper in IT applied to Medicine elaborated by a Group of expert in different fields.

### A490: M-HEALTH AND TELEMEDICINE, ARE PEOPLE READY FOR THE FUTURE?

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**Background.** Digital health is nowadays an issue of great concern and many scientific societies stress the importance of using e-Health in their guidelines and position papers. Are we truly ready for this changing *scenario* in the cardiovascular field? In consideration of the current little evidence, we conduct a real-world data analysis on this topic.
**Objective.** The aim of this study is to assess the attitude of a single-centre population towards the use of m-Health apps and telemedicine in cardiovascular prevention and healthcare organization.
**Methods.** An observational cross-sectional study surveying 200 adult subjects with a paper questionnaire was carried out during a local health-fair event.
**Main measure.** We gathered self-reported demographics, digital skills, sport and dietary habits, the attitude toward telemedicine along with the strengths and the weaknesses of m-Health both in cardiovascular prevention and healthcare organization.
**Key results.** Of the 200 surveyed subjects only 179 completed the poll [RR 89.5%]. 40% [n=71] appears to be aware of telemedicine and 45% [n=81] states to be interested in its use for everyday health-organization and cardiovascular prevention. According to the respondents, smartphone and wearable devices appear as good instruments for improving treatment adherence [median value: 4 out of 5 - IQR 4-5] and to develop tailored approach [median value: 4 out of 5 - IQR 1-5] but m-Health result to be known by the minority of the interviewed subjects [44% | n=78]. 38% [n=68] and 29% [n=52] of the respondents currently use apps for sport and diet monitoring, respectively. Overall, only 14% [n=25] are willing to employ such tools for the monitoring of cardiovascular parameters and among sick subjects [39% | n=23] privacy is the most reported barrier. On the other hand, it accounts for 19.4% [n=20] of healthy peopleÕ answers [$p$=0.04]. Moreover, 30.5% of the sick respondents do not use apps because it is not advised by their physician or GP.
**Conclusions.** According to the survey, our population looks with favour at the advantages of telemedicine and m-Health in everyday health-management and primordial prevention (i.e. sport and diet) even if the knowledge of these tools is still low. Only a few participants monitor cardiovascular parameters using apps and people affected by cardiovascular disease are more worried about privacy and reliability concerns than healthy people. The reasons for this may lie in the greater sensibility of the sick to data confidentiality and in their need of a direct contact with a physician. Many considerations of public and social interest so turned up: first it is important to raise awareness on existence of these tools both among medical staff and the population, furthermore, there is a need for a standardization of these apps to make them safe, reliable and available by medical personnel nationwide so as to offer a more patient-centred and tailored healthcare.

## CARDIOPATIA ISCHEMICA – 4 - ATTIVITÀ FISICA E CARDIOLOGIA DELLO SPORT
## Sessione Poster

### A491: THE RELATIONSHIP BETWEEN THE INFLAMMATORY BIOMARKER AND EJECTION FRACTION AND THEIR EVOLUTION UNDER THE TREATMENT WITH NEBIVOLOL VS BISOPROLOL IN PATIENTS UNDERGOING CORONARY ANGIOPLASTY

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**Purpose.** To evaluate the correlation between inflammatory biomarker (hsCRP) and ejection fraction, and their evolution under the treatment with nebivolol vs bisoprolol in patients with stable angina pectoris undergoing coronary angioplasty(PCI).
**Methods.** In the study, 162 patients with SAP undergoing PCI with stent implantation, in sinus rhythm (age 59.72±0.59 years), were divided into two groups: I group - 100 patients who administered nebivolol 5mg/day and the II group - 62 patients who administered bisoprolol 10 mg/day, tangential to conventional therapy. Patients were monitored during 12 months. Both groups were assessed the hsCRP (mg/l) in blood: preprocedural, postprocedural (24 hours) and at intervals of 1 month, 3, 6,12 months after PCI. The cardiac function was assesed using echocardiography, upon inclusion and 12 months of treatment.
**Results.** Upon inclusion, ejection fraction (EF) was 53.6±0.8% in I group and 52.3±1.1% in II group. After 12 months EF increased vs. baseline: in I group 55.1±0.9% ($p<0.05$) and in II group 53.5±1.4% ($p>0.05$). The hsCRP levels were high and similar in both groups at baseline: group I-5.54±0.58 and group II-5.95±1.17 mg/l. The postprocedural biomarker level increased significantly statistically from baseline in I group: 7.8±0.77 ($p<0.001$), and in II group the increase was insignificant: 7.07±0.96 mg/l ($p>0.05$). During the first month there was a decrease in the hsCRP levels in all patients compared to the baseline values: in I group -3.34±0.44 vs. 3.9±0.42 mg/l - II group; $p>0.05$. In dynamics at 3 months, the hsCRP continued to decrease and recorded statistically significant values from baseline in I group -2.58±0.26 mg/l ($p<0.001$) and group II - 3.56±0,49 mg/l ($p>0.05$). Continuously, at 6 months was recorded the same tendency: I group-2.56±0.2 ($p<0.001$) and II group- 3.66±0.61 mg/l ($p>0.05$). At the 12-month phase on the background of the treatment with nebivolol the biomarker level decreased versus the baseline by 40.3% ($p<0.05$), but also compared with the bisoprolol group by 23.2%.
**Conclusions.** The high serum levels of hsCRP confirm the presence of pro-inflammatory substrate in patients with SAP eligible for angioplasty. Unlike bisoprolol, the therapeutic benefits of long-term treatment with nebivolol (12 months) have been manifested by the regression of the inflammatory process and the significant increased of ejection fraction.

### A492: CHRONIC TOTAL OCCLUSION PERCUTANEOUS REVASCULARIZATION IN ELDERLY POPULATION

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**Background.**Percutaneous revascularization of Chronic Total Occlusion (CTO) is one of the most effective techniques in dealing with refractory angina. Although CTO recanalization improves symptoms and quality of life, it has higher procedural risk compared to standard percutaneous coronary intervention (PCI). Thus, CTO PCI is often not considered in older patients with refractory angina.
**Purpose.** to evaluate safety and efficacy of CTO PCI in an older population (older than 75 years old) compared to standard population.
**Methods.** we analysed data of all the patients scheduled for elective CTO PCI from 01/01/2013 to 01/01/2019 in our centre. The primary efficacy endpoint was the incidence of major adverse cardiac events (MACEs) during the follow-up in the two groups of the study population (older and younger than 75 years old). The safety endpoint was procedure-related complications during the hospitalization.
The Kaplan–Meier analysis was performed to evaluate MACE-free survival rates between the groups.
**Results.** 121 patients were included in the study, 28 of them were older than 75 years old (23%) and 17 were female (14%). 32% of the whole study population has diabetes, 8% chronic kidney disease (creatinine above 2 mg/ml), 76% hypertension and 40% familiarity for coronary artery disease. There were no statistically significant differences in the distribution of the risk factor between the two age groups. During the follow-up 8 MACEs (4 cardiac deaths, 3 target vessel revascularization and 1 target lesion revascularization) were detected, 2 (7%) in the over 75 group and 6 (6.5%) in the other group. This difference was not statistically significant. The average follow-up period was 9 months for the over 75 and 12 for the under 75 years old group. The Kaplan-Meier analysis for MACE-free survival rates did not differ significantly between the two subgroups. Only 3 procedure-related complications (all of them coronary perforation, of which one requiring pericardiocentesis) were reported. The success rate of the revascularization procedure was almost equal between the two groups (70% for the over 75 group versus 72% for the younger group).
**Conclusion.** efficacy and safety of CTO PCI does not seem to be affected by age. Although further analyses must be carried out, CTO PCI could be a valuable option for refractory angina also in older patients.

### A493: ANALISI DELLO STRAIN LONGITUDINALE E CORRELAZIONE CON IL TIMI FRAME COUNT IN PAZIENTI AFFETTI DA ANGINA MICROVASCOLARE

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**Obiettivi.** Lo studio si propone di valutare in pazienti affetti da angina microvascolare (MVA) lo strain miocardico longitudinale con l'ausilio dell'ecocardiografia speckle-tracking 2D (2D-STE). È stata inoltre valutata la correlazione tra il grado di disfunzione microvascolare, valutata tramite un indice angiografico come il TIMI frame count e l'entità dell'alterazione dello strain longitudinale globale e regionale.
**Materiali e metodi.** Lo studio ha incluso 39 pazienti (25 uomini, 14 donne), di età compresa tra i 45 e i 75 anni, ricoverati per angor o equivalenti anginosi che erano stati in precedenza sottoposti ad uno stress test risultato positivo e che hanno mostrato alla coronarografia coronarie indenni. Si tratta quindi di una tipica popolazione di pazienti con angina microvascolare. Tutti i pazienti inclusi presentavano funzione sistolica ventricolare sistolica sinistra conservata (FE> 50%) e assenza

alterazioni della cinesi segmentaria. Sono stati esclusi dallo studio pazienti in con documentata ischemia miocardica, pazienti affetti da valvulopatie di entità moderata e severa, malattie del miocardio, e i pazienti portatori di PM/ICD. È stato calcolato il TIMI frame count per i tre vasi coronarici secondo le indicazioni di Gibson, avendo cura di dividere il valore ottenuto per l'arteria interventricolare anteriore per un fattore di correzione pari a 1,7.

**Risultati.** Al momento del ricovero 32 pazienti presentavano storia recente di dolore tipico per angor, i restanti pazienti avevano manifestato dispnea o astenia ingravescenti. Il grado di angina medio al ricovero secondo la scala CCS era il II. All'analisi strain, la popolazione con MVA presentava un GLS lievemente ridotto (-18,61) rispetto alla popolazione di controllo (-19,64) ma tale riduzione non raggiungeva la significatività statistica (p= 0,207). È stato osservato che pazienti con alterazione del TFC in almeno un vaso coronarico (tTFC medio di 99,38 fps, pazienti in cui eseguita analisi strain), clinicamente identificabili come pazienti con angina microvascolare, presentavano valori di GLS ridotti (-17,88) rispetto al totale della popolazione di controllo, e tale riduzione risultava statisticamente significativa (p= 0,028). Nei pazienti con angina microvascolare è stata inoltre ricercata una possibile correlazione tra l'alterazione del TIMI frame count per ogni singola coronaria (IVA, Cx, CD) e il GLS medio dei segmenti miocardici perfusi dallo stesso vaso. È stata poi valutata la correlazione tra lo strain dei 18 segmenti miocardici con il TFC del vaso tributario nel totale della popolazione con MVA. Si è osservata una correlazione statisticamente significativa tra strain longitudinale dei segmenti perfusi dalla coronaria destra e TFC di CD che è risultato il più alto tra i TFC dei tre vasi coronarici. Si osservava infine una correlazione statisticamente significativa (p= 0,021) tra valore di GLS e corrispettivo valore di tTFC con un coefficiente di correlazione di 0,418.

**Conclusioni.** Nei pazienti con angina microvascolare si è osservata una riduzione del GLS statisticamente significativa. Tale riduzione è risultata più marcata nei pazienti che presentavano un TFC notevolmente aumentato. Si è osservata dunque una correlazione statisticamente significativa tra TFC e GLS nei pazienti con MVA. Il TFC e lo strain longitudinale appaiono pertanto due metodiche affidabili, sensibili e facilmente accessibili per lo studio delle alterazioni della microcircolazione coronarica e la caratterizzazione dei pazienti con angina microvascolare.

## A494: PERSISTENT LEFT VENTRICULAR DYSFUNCTION IN STEMI IS ASSOCIATED WITH VARIABLES EASILY ASSESSED IN THE ACUTE PHASE

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**Background.** ST-segment elevation myocardial infarction (STEMI) represents a clinical emergency in daily clinical practice. Early revascularization by primary percutaneous coronary intervention (PCI) is associated with a better outcome in term of morbility and mortality. Depressed left ventricular function with reduced ejection fraction (LVEF) is associated with a worse clinical outcome during follow-up. The aim of this study is to evaluate the clinical, laboratory and angiographic variable that may impact the LVEF at 6-month follow-up after primary PCI.

**Methods.** One hundred thirteen patients (96 M, 17 F mean age 62±13, range 34-86 yrs) admitted to our emergency department also from spoke centers with diagnosis of STEMI were considered. Two patients died early from cardiac tamponade upon arrival and sepsis, respectively. This patient population was subdivided in three groups according to the value of LVEF at 6-months: ≤35%, 35-50%, >50%. Among these three groups, the variable listed in the table, including first medical contact to balloon time (FMCT) and symptoms to balloon time (STBT), were compared to find any significant difference that may have an impact on an unfavorable evolution. For the culprit coronary vessel, the patients were dichotomized into left anterior descending (LAD) and no-LAD lesion.

**Results.** The 55 patients with LAD lesion had a significantly higher troponin T and NTpro-BNP peak values compared to the no-LAD lesion patients (8717±6647 vs. 5217±4312 p<0.001;2588 ±4619 vs. 898±859 p <0.001). In the group with worse LVEF at 6-month follow-up, significant higher values of troponin T and of NTproBNP and a significantly higher proportion of patients with diabetes and cardiac arrest were observed; all patients in this group had LAD lesion. A worse evolution was not dependent on FMCT and left ventricular function at 6-month follow-up. Especially in this population, specific education to reduce the time from onset of symptoms and the access to the medical services, which is unacceptably high in this experience, seems crucial. A favorable outcome may be observed regardless of FMCT exceeding the 2 hours.

| | LVEF ≤35% | 35 < LVEF ≤50 | LVEF >50 | p value |
|---|---|---|---|---|
| Troponin T peak (ng/L) | 16026 ± 5818 | 8227 ± 5960 | 4090 ± 3572 | <0.01 |
| NTproBNP peak (ng/L) | 8736 ± 6768 | 2165 ± 3640 | 669 ± 962 | <0.001 |
| FMCT (minutes) | 137 ± 54 | 134 ± 53 | 156 ± 93 | <0.320 |
| STBT (hours) | 7.72 ± 6.9 | 6.8 ± 6.1 | 5.9 ± 5.2 | 0.593 |
| LAD culprit lesion (%) | 100 | 52 | 37 | 0.0018 |
| Thrombotic occlusion (%) | 89 | 75 | 64,8 | 0.25 |
| Diabetes (%) | 22 | 23 | 1,8 | 0.004 |
| Male sex (%) | 89 | 77 | 77,8 | 0.72 |
| Arterial hypertension (%) | 66.7 | 60.4 | 44.4 | 0.19 |
| Dyslipidemia (%) | 33.3 | 52 | 38.9 | 0.32 |
| Cardiac arrest (%) | 33.3 | 16.7 | 3.7 | 0.0139 |

## A495: MINIMAL ELECTROCARDIOGRAPHIC CHANGES DURING MYOCARDIAL ISCHEMIA MAY BE INDICATIVE OF SEVERE CORONARY ARTERY DISEASE IN PATIENTS WITH CHEST PAIN

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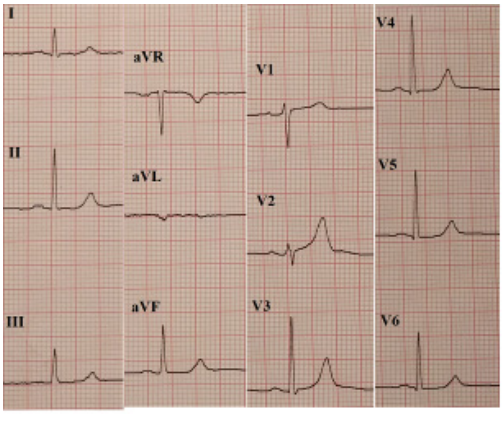
Our common practice sometimes fail to recognize acute coronary artery occlusion that does not present with ST segment elevation as depicted in the guidelines. The patients with non STEMI-diagnostic ECG findings would be given the diagnosis of NSTEMI, with consequently missed coronary occlusion up to 30%, as currently reported in literature. This substrate of patients have longer time-to-revascularization, higher mortality, worse outcomes and worse ejection fractions compared to NSTEMI patients with no occluded coronary artery.

We report the clinical case of a 55-year-old male, active smoker with no comorbidities nor other known cardiovascular risk factors, presented to the Emergency Department complaining of prolonged episode of oppressive chest pain. The previous days he suffered from recurrent chest pain during efforts, which resolved with rest. At the time of the evaluation (14:30) he was asymptomatic; physical exam, chest X-ray and vital signs were normal. The first ECG was performed (14:36) and interpreted as "normal": it showed a very low voltage QRS in V2 and a tall T-wave in V3. The ECG was repeated an hour later (15:38) and signed as "unchanged": in V2 there is a hyper-acute T-wave, that is symmetric and huge in proportion to the QRS, with subtle ST elevation in V2 and V3 and straight ST segments in I-II-III-aVF and V4-V6. Analized retrospectively it is suspicious for acute coronary occlusion according to the clinical presentation. During observation, soon after the 2nd ECG was taken, the patient had a syncope preceded by recurrence of chest pain. A 3rd ECG was recorded (15:54) and it showed sinus rhythm with significant antero-lateral ST segment elevation. The echocardiogram confirmed regional wall motion abnormality with akinetic left ventricular septum and apex with LVEF 45%. The coronary angiography showed proximal subtotal occlusion of left anterior descending artery and the patient underwent PTA and stenting. Post-reperfusion ECG showed isolated Q wave in V2 and subtle persistent ST elevation in V2-V3. Rapid electrocardiographic and enzymatic evolution (peak troponin T 3681 ng/L) was consistent with successful myocardial reperfusion and a following echocardiogram showed LVEF 58% with isolated left ventricular apical septum and anterior apex akinesis.

Myocardial infarction is a dynamic process with alternating phases of occlusion and reperfusion.

Coronary occlusion may occur in patients presenting with symptoms suggestive for myocardial ischemia with a non-diagnostic ECG pattern. Many overlooked ECG patterns such as subtle STE, hyper-acute T-waves, de Winter ST/T-wave complex and Wellen's T-wave pattern may indicate total or subtotal acute coronary occlusion and accurate analysis of those non-striking ECG findings is needed for correct patient management.



### A496: ISCHEMICO O NON ISCHEMICO, QUESTO È IL DILEMMA

Giuseppe Verolino (a), Luca Paolucci (a), Luca Navarini (a), Simona Mega (a), Federica Pirro (a), Carlo Cosimo Quattrocchi (a), Antonella Afeltra (a), Francesco Grigioni (a)
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**Background.** Paziente di 48 anni, ipertesa, obesità di I grado (BMI 34.6 kg/m$^2$), con anamnesi positiva per sindrome da anticorpi antifosfolipidi, deficit proteina C ed S, sindrome miastenica. Pregresso duplice episodio di NSTEMI con evidenza coronarografica e coronaro-TC di assenza di lesioni coronariche. Pregresso episodio di trombo embolia polmonare trattato con TAO.

**Quadro clinico e decorso.** Sintomatica da circa 4 giorni per dispnea associata a dolore addominale e nausea. All'ingresso in policlinico ECG nei limiti, esami ematochimici con evidenza di anemia (Hb 9.2 g/dl) e rialzo dei markers di miocardionecrosi (TnI 35.000 pg/ml). Ecocardiogramma transtoracico nei limiti con evidenza di lieve riduzione della funzione sistolica calcolata al Global Longitudinal Strain (GLS). Eseguite angio-TC torace per il sospetto di dissezione aortica acuta ed embolia polmonare, risultate negative, e coronaro-TC per il sospetto di cardiopatia ischemica, anch'essa negativa per lesioni coronariche su base aterosclerotica. Evidenza alla angio tac di manifestazioni infiammatorie a livello dei grandi vasi. Durante la degenza il trend della TnI ha mostrato un incremento significativo (valore picco 135.000 pg/ml) in assenza di sintomi clinici. RMN cardiaca che ha evidenziato esiti ischemici di recente insorgenza nei territori di vascolarizzazione di ADA e CDX, in assenza di riscontri compatibili con miocardite.

L'insieme dei dati clinici e strumentali ha orientato per NSTEMI secondario a infiammazione coronarica nel contesto di sindrome da antifosfolipidi.

**Trattamento.** Terapia steroidea ad alto dosaggio associata a terapia con antiaggregante ed anticoagulante per la sindrome immunologica.

**Conclusioni.** Diagnosi di MINOCA da infiammazione coronarica.

### A497: HEART AND BODY PARAMETERS IN SCUBA DIVING WITH DIFFERENT GAS MIXTURE: A PILOT OBSERVATION

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**Aim.** To evaluate the heart and body parameters in the diving underwater to help the detection the safety during recreational diving: in order to identify clinical changes. Wich phenomena can to be related in functional performance and the health,such as degenerative disease cardiorespiratory insufficiency, embolism and decompression desease (MDD).

**Method.** The observation concerned 4 recreational males divers, median age (range) 46 (34-55) years. three different gas mixtures used (compressed air dives, Nitrox32 dives and Trimix dives). Blood samples were taken before diving and immediately after diving to 30 meters for 30 minutes, as well as measurement of vital parameters and transthoracic cardiac echocardiography.The blood values were hematocrit, C reactive proteine, NT- pro BNP and EMPs count. Time: two different at10 minutes and 60 minutes post dive. The difference between the two mesuraments was judged against desirable bias derived from biological variation.

**Results.** Interesting changes was observed for EMPs count, bubbles production and diastolic function.EMPs 10 minutes post dive, were surprisingly few. Circulating bubbles has been documented and quantified by trans-thoracic echocardiography in all divers during both normal respiratory and Valsalva maneuvers after each dive. The bubble production is greater in compressed air dives, smaller in Nitrox32 dives an even smaller in Trimix dives, Regardless of the breathing gas, bubbles have been highlighted in all dives, at least up to an hour after diving. The echocardiographic examinations showed changes, after dives: reduction in left ventricular compliance, increase of E/A ratio, decrease of DT, reduction in diameters, Left Ventricular Ejection Fraction (LVEF) unchanged. Subjects bubbles variability was found.

**Conclusion.** The suggestion of this though a small observational analysis is bring attention to the security of physical claims due to the development of the bubbles such as EMPs count, bubbles diastolic function. The components gas mixture it seems to appear also important. Even if the poor number of the study did not provide significance value, the results show interesting way for further evaluation in the safety underwater dive.

In confirm the great heterogeneity of the individual predisposition in bubbles formation, as it was already has been described 40 years ago and most recently and is currently termed is "RESISTANCE TO BUBBLE FORMATION". Although it has already been established with certainty that they tend to increase in response to inflammatory conditions.

### A498: AGE AND SEX DIFFERENCES IN SPORT CERTIFICATE: A 1 YEAR RETROSPECTIVE ANALYSIS

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**Background and aim.** Regular physical activity is a cornerstone in the prevention and treatment of cardiovascular disease thanks to its anti-inflammatory effects. Thus, favouring the access to sports is of importance for promoting the wellbeing. The aim of the present study was to investigate how the practise of different sports is distributed among different age and between men and women, by taking a picture of the of medical certificate request in 2017 for sports in the population of the province of Modena, Italy.

**Methods.** We analysed the difference in distribution of requested medical certificate from 18,874 males and 7,625 females stratified for age (under 18 years, from 18 to 40 years and over 40 years) and for different sporting disciplines (athletics, football, bike, swimming, basketball, volleyball, tennis, other team sports, other individual sports and disabled sports).

**Results.** The distribution of requested certificates differs significantly (Chi-square test p<0.0001) at different age and between males and females of same age.

**Conclusions.** In order to decrease the imbalance between men and women access to sports, it is mandatory to promote a healthy life style and reduce, as consequence, cardiovascular risks, mostly in women after 40 years.

### A499: NUOVE APPLICAZIONI DELL'ECOCARDIOGRAFIA SPECKLE TRACKING NELLA VALUTAZIONE DEL CUORE D'ATLETA

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**Introduzione.** Il cuore dell'atleta va incontro ad adattamenti modesti sulla base del tipo di attività praticata. L'ecocardiografia (ETT) è la metodica più utilizzata per valutarne gli adattamenti, mentre pochi sono gli studi sulla deformazione miocardica e sul lavoro del cuore in sportivi. Recentemente è stato introdotto l'utilizzo della speckle-tracking echo (STE) per il calcolo non invasivo del lavoro cardiaco o Myocardial Work (MW), che correla il Global Longitudinal Strain ventricolare (GLS) con la pressione del ventricolo sinistro (VS), promettendo un valore aggiunto alla valutazione della funzione miocardica.

**Obiettivo.** Valutare l'applicazione di GLS e MW durante stress fisico, in soggetti sani, sedentari o allenati.

**Materiale e metodi.** 12 maschi sani (età 26±4 anni), divisi in tre gruppi in base alla loro attività, sedentari (4 pz), praticanti attività sportiva di resistenza (Atl-Res 5 pz) o di potenza (Atl-Pot 3 pz), sono stati sottoposti a valutazione clinica, ECG ed ETT a riposo e durante esercizio massimale al letto-cicloergometro, secondo protocollo con carico iniziale di 60W incrementati di 30 W ogni 2 minuti. Le immagini sono state acquisite durante la fase di pre-test (base) e all'acme dello sforzo (peak), considerato all'85% della FC teorica massima prevista, e valutate le modifiche di GLS e MW (indice globale-GWI), diviso in lavoro costruttivo (GCW) e lavoro non costruttivo (GWW).

**Risultati.** Atl-Res presentavano GLS maggiore a riposo (Tab.1), migliorava durante lo stress fisico in tutti i gruppi, con maggiore incremento in Atl-Pot. Il GWI (Tab.2) aveva un incremento maggiore nei soggetti sportivi rispetto ai sedentari e, tra gli atleti, l'incremento maggiore si è osservato in Atl-Pot rispetto a Atl-Res. L'incremento del GCW era significativamente maggiore in Alt-Pot rispetto a Atl-Res e superiore in quest'ultimi rispetto ai sedentari. L'incremento del GWW era maggiore in Atl-Pot.

**Tabella 1**

| | LV GLS % base Media ± DS | LV GLS % peak Media ± DS | P |
|---|---|---|---|
| Sedentari | -19,25 ± 0,96 | -22,33 ± 0,58 | 0,035 |
| Atl-Res | -20,60 ± 1,14 | -24,25 ± 0,96 | 0,044 |
| Atl-Pot | -18,67 ± 1,15 | -22,67 ± 0,58 | 0,020 |

**Tabella 2**

| | GWI mmHg % | | | GCW mmHg % | | | GWW mmHg % | | |
|---|---|---|---|---|---|---|---|---|---|
| | base | peak | P | base | peak | P | base | peak | P |
| Sedentari | 1722 ± 214 | 2001 ± 533 | 0,46 | 2088 ± 295 | 3448 ± 531 | 0,11 | 68 ± 27 | 182 ± 91 | 0,093 |
| Atl-Res | 2053 ± 180 | 2643 ± 508 | 0,16 | 2411 ± 283 | 4485 ± 491 | 0,006 | 83 ± 43 | 134 ± 39 | 0,272 |
| Atl-Pot | 1603 ± 85 | 2366 ± 381 | 0,10 | 1825 ± 83 | 4088 ± 556 | 0,018 | 84 ± 55 | 383 ± 35 | 0,029 |

**Conclusioni.** L'incremento del GCW maggiore negli atleti di potenza rispetto a quelli di resistenza e superiore in quest'ultimi rispetto ai sedentari, potrebbe significare che il lavoro costruttivo nei soggetti praticanti sport presenta un maggiore incremento durante stress fisico rispetto ai soggetti sedentari. L'incremento del GWW maggiore negli atleti di potenza è probabilmente legato al caratteristico rimodellamento cardiaco tipico di questi atleti, che si presenterebbe fin da subito anche in assenza di alterazioni morfologiche valutabili.

### A500: AGE-RELATED DIFFERENCES IN CARDIOVASCULAR PLASTICITY INDUCED BY PHYSICAL TRAINING

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**Background.** Cardiovascular adaption occurs in disease, but also with ageing and in response to exercise. An understanding of physiological cardiovascular plasticity is important to understand disease pathophysiology and may help targeting non-pharmacological interventions in different age groups. We exploited the natural intervention of marathon running to explore adaptation to age and exercise and derive disease relevant insights.
**Methods.** 237 untrained healthy male and female prospective first-time marathon runners were recruited. At baseline and after 6 months of unsupervised training, race completers underwent tests including 1.5T cardiac magnetic resonance, brachial and non-invasive central blood pressure (BP) assessment. Runners were divided in "under 35" (U35), ≤34y.o., and "over 35" (O35), ≥35 y.o.
**Results.** 138runners (U35: n=71, age=29±4, females=49%; O35: n=67, age=46±4, females=51%) completed the race. O35 were slower (median race time 4:38 vs 5:15 HH:MM in U35 vs O35), with similar completion (70%) and injury (22%) rates among groups. After training LV mass increased by ~3 g/m$^2$ (p<.0001) in both groups. In U35 only, ventricular sizes increased. A decrease in systemic vascular resistances (SVR) and in BP driven by O35 was noted. See Table 1 for full results.
**Conclusions.** The cardiovascular impact of short-term, unsupervised, moderate intensity physical training in healthy sedentary individuals is age dependent, with mainly cardiac plasticity in the young and mainly vascular plasticity with afterload reduction in older subjects.

**Table 1**

| | Whole cohort | | | U35 (≤ 34 years) | | | O35 (≥ 35 years) | | | p condition | p age | p interaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SBP/DBP (mmHg) | Baseline | 121/75 | ±14/7 | 119/72 | ±11/5 | | 124 | ±15 | §§ | <.0001 | 0.026 | 0.049 |
| | FU | 117/72 | ±13/7 | 116/72 | ±10/5 | * | 118 | ±15 | *** | | | |
| cSBP/DBP (mmHg) | Baseline | 112/76 | ±13/7 | 109/75 | ±10/5 | | 115/78 | ±14/8 | §§ | <.0001 | 0.03 | 0.011 |
| | FU | 108/74 | ±13/7 | 106/73 | ±10/5 | * | 109/74 | ±15/8 | *** | | | |
| SAC (ml/m$^2$) | Baseline | 3 | ±0.8 | 3.2 | ±0.7 | | 2.9 | ±0.9 | §§ | 0.022 | 0.001 | 0.98 |
| | FU | 3.2 | ±0.7 | 3.4 | ±0.7 | | 3 | ±0.7 | §§ | | | |
| SVR (dyn s/cm$^5$) | Baseline | 1135 | ±262 | 1052 | ±239 | | 1225 | ±275 | | 0.034 | 0.001 | 0.495 |
| | FU | 1092 | ±246 | 1029 | ±255 | | 1160 | ±239 | | | | |
| LV EDV i (ml/m$^2$) | Baseline | 86 | ±14 | 90 | ±14 | | 82 | ±13 | §§ | 0.014 | <.0001 | 0.027 |
| | FU | 88 | ±14 | 93 | ±15 | ** | 82 | ±13 | §§§ | | | |
| LV ESV i (ml/m$^2$) | Baseline | 30 | ±7 | 33 | ±8 | | 28 | ±6 | §§ | 0.019 | <.0001 | 0.023 |
| | FU | 31 | ±8 | 35 | ±8 | ** | 28 | ±7 | §§§ | | | |
| LV EF | Baseline | 0.65 | ±0.05 | 0.64 | ±0.05 | | 0.66 | ±0.05 | § | 0.432 | 0.001 | 0.254 |
| | FU | 0.64 | ±0.05 | 0.63 | ±0.05 | | 0.66 | ±0.05 | | | | |
| LV mass i (g/m$^2$) | Baseline | 62 | ±12 | 65 | ±12 | | 59 | ±12 | | <.0001 | <.0001 | 0.823 |
| | FU | 65 | ±13 | 68 | ±12 | *** | 62 | ±13 | *** | | | |
| RV EDV i (ml/m$^2$) | Baseline | 88 | ±15 | 92 | ±15 | | 82 | ±13 | | 0.001 | <.0001 | 0.605 |
| | FU | 90 | ±16 | 96 | ±17 | ** | 85 | ±14 | | | | |
| RV ESV i (ml/m$^2$) | Baseline | 35 | ±10 | 39 | ±9 | | 29 | ±8 | | 0.001 | <.0001 | 0.68 |
| | FU | 36 | ±11 | 41 | ±10 | ** | 31 | ±9 | | | | |
| RV EF | Baseline | 0.61 | ±0.06 | 0.58 | ±0.05 | | 0.65 | ±0.07 | §§§ | 0.366 | <.0001 | 0.658 |
| | FU | 0.61 | ±0.05 | 0.57 | ±0.05 | | 0.64 | ±0.07 | | | | |

SBP/DBP: systolic/diastolic blood pressure; cBP: central BP; SAC: systemic arterial compliance; SVR: systemic vascular resistances; LV: left ventricle; EDV: end-diastolic volume; ESV: end-systolic volume. EF: ejection fraction; RV: right ventricle. Data are expressed as mean ±SD. * = p pre vs post <0.05; ** = p pre vs post <0.01; *** = p pre vs post <.0001; § = p U35 vs O35 <0.05; §§ = p U35 vs O35 <0.01; §§§ = p U35 vs O35 <.0001.

### A501: EXERCISE-INDUCED MYOCARDIAL EDEMA IN MASTER TRIATHLETES: INSIGHTS FROM CARDIOVASCULAR MAGNETIC RESONANCE IMAGING

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**Objective.** To assess changes in myocardial structure, function, and tissue composition after strenuous exercise.
**Methods.** Ten master triathletes (age 45 ± 8 years) underwent CMR before and <3 h after a full Ironman triathlon competition (3.8 km swimming, 180 km cycling, and 42.2 km running) completed with a mean time of 12 ± 1 h. Cine balanced steady-state free precession, T2-weighted STIR, tagging and LGE imaging were performed on a 1.5 T MR scan system. The extent of myocardial edema was assessed quantitatively using semi-automated detection, where myocardial regions that had T2 signal intensity (SI) above the threshold of twice the mean SI of skeletal muscle were considered to be edematous, and expressed as the percentage of global left ventricular (LV) mass. Quantitative analysis of myocardial deformation included the assessment of radial, longitudinal, and circumferential peak systolic strain values, rotation and twist of the LV.
**Results.** Compared with baseline, after competition biventricular volumes, ejection fraction and LV mass index remained unchanged (P=NS). Global myocardial edema significantly increased after the competition (3.9 ± 3.8% LV mass pre-exertion vs. 10.5 ± 6% LV mass post-exertion, P=0.004), with relative apical sparing distribution (P<0.001) matched by a post-exercise reduction of radial peak systolic strain values confined to basal segments (P=0.003). Apical rotation and twist significantly increased after the competition (both P<0.05). Four (40%) triathletes were presenting with junctional LGE at the posterior RV insertion point.
**Conclusions.** Strenous exercise in master triathletes is associated with regional increase in myocardial edema and reduction of radial peak systolic strain with a peculiar relative apical sparing pattern.

## ARITMIE – 5
## Sessione Orale

### A502: EFFICACY AND SAFETY OF DIRECT ORAL ANTICOAGULANTS IN PATIENTS WITH ATRIAL FIBRILLATION AND HIGH THROMBOEMBOLIC RISK. A SYSTEMATIC REVIEW.

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**Background.** The aim of the study was to evaluate the efficacy and safety of direct oral anticoagulants (DOACs) in a subgroup of patients with atrial fibrillation (AF), $CHADS_2$ score≥3, advanced age, and heart failure (HF) coming from the main DOACs randomized clinical trials.
**Methods.** We searched MEDLINE, MEDLINE In-Process, and Other Non-Indexed Citations. EMBASE, PubMed, and the Cochrane Central Register of Controlled Trials. English-language articles published from 2002 to March 2019 dealing with DOACs for preventing thrombotic events in AF were considered. We did not conduct any statistical analyses as indirect comparison between DOACs represents hypothesis generators.
**Results.** This systematic review was restricted to the subgroup of patients with $CHADS_2$ score≥3 (n=31,203), elderly (n=24,788), and with HF (n=29,297) derived from the pivotal trials. Risk index (RI) was calculated. The RI for stroke/systemic embolism was similar in all of the patients treated with DOACs or warfarin. The lowest RI was in rivaroxaban patients ($CHADS_2$ score≥3: RI=0.04; elderly: RI=0.09; HF: RI=0.05). The RIs for bleeding were higher in patients treated with dabigatran ($CHADS_2$ score≥3: $RI_{110}$=0.23; elderly: $RI_{110}$=0.22; HF: $RI_{110}$=0.16. $CHADS_2$ score≥3: $RI_{150}$=0.30; elderly: $RI_{150}$=0.24; HF: $RI_{150}$=0.16). The bleeding RIs were higher with apixaban ($CHADS_2$ score≥3: RI=0.23; elderly: RI=0.25; HF: RI=0.14) and dabigatran ($CHADS_2$score≥3: RI=0.28; elderly: RI=0.21; HF: RI=0.19).
**Conclusions.** The use of DOACs is a reasonable alternative to vitamin-K antagonists in AF patients with $CHADS_2$ score≥3, advanced age, and HF. The RI constitutes a useful, additional tool to facilitate clinicians in choosing DOACs or Warfarin in particular category of AF patients.

### A503: CRYPTOGENIC STROKE AND HIDDEN ATRIAL FIBRILLATION: ROLE OF LEFT ATRIAL FUNCTION AND PROLONGED MONITORING WITH INSERTABLE CARDIAC MONITOR

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**Background.** Cryptogenic stroke (CS) is associated with high rate of recurrence and adverse outcome at long-term follow-up, expecially because the unknown etiology is often associated with an uneffective secondary prevention. In such scene, hidden atrial fibrillation (AF) could play an important pathophysiological role.
**Objectives.** The aim of this study was to identify parameters of left atrial size and function that could correlate with the detection of hidden AF, documented at prolonged monitoring using insertable cardiac monitor (ICM) in patients with CS and divided into 2 groups: non-embolic cryptogenic stroke (non-ESUS), embolic cryptogenic stroke (ESUS).
**Methods.** This is a single-center prospective cohort study. Patients with CS based on clinical and radiological findings, according to TOAST's criteria, were enrolled; all of them received an ICM and underwent a

transtoracic echocardiogram with the assessment of left atrial parameters of size and function. All detected AF episodes (≥30 sec) were considered.
**Results.** We enrolled 47 patients (mean age 67.7 ± 11.5 years), 36 ESUS (76.6%) and 11 non-ESUS (23.4%). Prolonged ECG monitoring with ICM showed hidden AF in 14 patients (30%). Mean age was 68.4±12.8 years for AF group and 66.5±11.1 years for no AF group. In CS patients, univariate logistic regression analysis showed a significant association between different echocardiographic parameters of size and left atrial function and FA, particularly E/A ratio (p=0.0046), Left Atrium End Systolic Area (LA ESArea, p=0.0067), Left Ventricular Ejection Fraction % (LVEF%, p=0.038) (Table 1). In the same group, in the multivariate logistic regression model, the echocardiographic parameters E/A ratio (values>1) and LVEF≤62% emerged as independent predictors of FA. In ESUS group, univariate logistic regression analysis showed a significant association between different echocardiographic parameters of size and left atrial function and FA, particularly Pulmonary Vein Ar wave duration (PV Ar duration, p=0.033), E/A ratio (p=0.0044), LVEF % (0.0043), and VTI total atrial filling fraction (AFF, p=0.0011) (Table 2).
**Conclusions.** This study showed that some echocardiographic parameters (LVEF, E/A ratio) are independent predictors of FA in all patients with CS, and different parameters of size and left atrial function are significantly associated with AF in this group of patients. Particularly, in ESUS patients a significant association emerged between different echocardiographic parameters and FA.

| | no FA | | | FA | | | |
|---|---|---|---|---|---|---|---|
| | N | Mean | SD | N | Mean | SD | p-value |
| E/A | 25 | 0,792 | 0,2660 | 11 | 1,127 | 0,3823 | 0,0046 |
| LA D A-P max (mm) | 25 | 34,200 | 4,5461 | 11 | 38,182 | 6,9888 | 0,0483 |
| LA ESArea (cm2) 4c | 25 | 20,528 | 4,2963 | 11 | 25,445 | 5,5637 | 0,0067 |
| LA ESVi 4c (ml/m2) | 25 | 32,920 | 10,4731 | 11 | 42,282 | 13,3189 | 0,0295 |
| LA FE (derivata da LA A) 4c | 25 | 0,300 | 0,07402 | 11 | 0,237 | 0,09951 | 0,0419 |
| LVEF (%) | 25 | 64,360 | 2,9704 | 11 | 59,545 | 6,4088 | 0,0038 |
| TDI a' sett(cm/s) | 25 | 10,173 | 1,5895 | 11 | 8,847 | 1,8173 | 0,0341 |
| VTI totale (AFF) | 25 | 44,483 | 14,0169 | 11 | 35,366 | 8,6850 | 0,0551 |

| | ESUS | | | | | | |
|---|---|---|---|---|---|---|---|
| | no FA | | | FA | | | |
| | N | Mean | SD | N | Mean | SD | p-value |
| Ar durata PV (ms) | 16 | 174,000 | 28,4863 | 8 | 201,125 | 25,3458 | 0,0330 |
| D picco(cm/s) PV | 16 | 44,300 | 10,9613 | 9 | 56,867 | 17,1505 | 0,0374 |
| E/A | 18 | 0,772 | 0,2597 | 10 | 1,160 | 0,3864 | 0,0044 |
| LA D A-P max (mm) | 18 | 33,944 | 4,4520 | 10 | 38,400 | 7,3080 | 0,0543 |
| LA ESArea (cm2) 4c | 18 | 20,222 | 4,4403 | 10 | 25,750 | 5,7672 | 0,0087 |
| LA ESVi 4c (ml/m2) | 18 | 33,033 | 11,2211 | 10 | 43,070 | 13,7663 | 0,0463 |
| LAPEF (derivata da LA V) 4c | 18 | 0,283 | 0,09803 | 10 | 0,194 | 0,1184 | 0,0421 |
| LVEF (%) | 18 | 64,778 | 3,0785 | 10 | 59,100 | 6,5736 | 0,0043 |
| TDI a' sett(cm/s) | 18 | 10,331 | 1,5933 | 10 | 8,542 | 1,5907 | 0,0085 |
| TDI E/e' lat | 18 | 8,328 | 2,3805 | 10 | 11,200 | 4,4726 | 0,0343 |
| VTI totale (AFF) | 18 | 48,942 | 10,8484 | 10 | 34,383 | 8,4848 | 0,0011 |

### A504: EFFECTS OF CORTICOSTEROID THERAPY ON INCIDENCE OF PACEMAKER IMPLANTATION AND CONDUCTION ABNORMALITIES AFTER TRANSFEMORAL AORTIC VALVE IMPLANTATION

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**Introduction.** Transcatheter aortic valve replacement (TAVR) is a therapeutic option for the management of patients with symptomatic severe aortic stenosis who have high or intermediate surgical risk. Conduction abnormalities, especially bundle branch block and high-grade atrioventricular block (HAVB) requiring pacemaker (PPM), are the most common complications after TAVR. They are likely due to the atrioventricular and infranodal tissues local damage as a result of trauma, ischemia, hemorrhage or edema. Corticosteroids have a powerful anti-inflammatory role mediated through receptors that modulate inflammatory gene expression.
**Aims.** In this study we sought to assess whether the anti-inflammatory effect of post - procedural steroid treatment will reduce the incidence of conduction defects following TAVR.
**Materials and methods.** This was a retrospective, single centre, observational study, which included 90 patients undergoing TAVR. 30 were affected by conditions requiring oral corticosteroids after intervention and received two oral doses of prednisone 25 mg for five days after TAVR; the control group included 60 patients who underwent TAVR without corticosteroid therapy. The primary endpoint was implantation of new PPM during admission. The secondary endpoints were onset of new conduction defects, as left bundle brunch block (LBBB), right bundle brunch block (RBBB) and first degree atrioventricular block (AV block).
**Results.** The prednisone group consists of 12 males (40%) and mean age was 81±7 years; heart rate at baseline was 70±12 bpm, PR interval 187±39 milliseconds and QRS 108±24 milliseconds; 2 patients presented first degree AV block (7%), one presented RBBB (3%) and 4 presented LBBB (13%); 11 patients were on therapy with beta-blockers (37%). Similarly, control group consists of 31 males (52%, p=0.6) and a mean age of 81±7 years; heart rate at baseline was 70±18 bpm, PR interval 197±36 milliseconds and QRS 111±27 milliseconds; first degree AV block was present in 14 patients (23%; p=0,09), RBBB in 7 patients (12%; p=0,35); LBBB in 10 patients (17%, p=0,9); 34 patients was on beta-blockers (57%, p=0,12). At the discharge, 4 patients had undergone to PPM implantation in prednisone group and 11 in control group (13% vs 18%; p=0,76). A new first degree AV block occurred in 3 and 4 patients in the two groups respectively (10% vs 7%; p=0,89); a new LBBB in 8 patients in prednisone group (27%) and in 13 patients in control group (22%; p=0,79) and a new RBBB in 1 and 3 patients respectively (3% vs 5%; p=0,86).
**Conclusions.** Corticosteroid therapy does not reduce risk of PPM implantation after TAVR during admission. This question needs further investigation to clarify if an anti-inflammatory therapy can have a role in the prevention of conduction system defects related to TAVR.

### A505: ATRIAL ELECTRO-MECHANICAL INTERVAL IN PATIENTS WITH ARRHYTHMIAS: IS EVERYONE THE SAME?

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**Background.** Atrial electromechanical delay, assessed calculating the PA-TDI interval using tissue Doppler imaging, is a known and promising determinant for atrial fibrillation recurrence prediction after pulmonary vein isolation and electrical cardioversion.
**Objectives.** To determine the relationship between atrial electromechanical delay and the presence of atrial fibrillation.
**Methods.** We prospectively enrolled patients presenting at our Unit in sinus rhythm scheduled for an arrhythmogenic substrate ablation (atrial fibrillation -AF-, supraventricular tachycardia -SVT- and premature ventricular contractions -PVC). Demographic and echocardiographic characteristics were evaluated upon admission. Atrial electromechanical delay was inferred via the PA-TDI interval, obtained by calculating the time difference between the P wave onset and the A' wave peak on TDI recordings.
**Results.** From October 2018 to August 2019, 200 patients (60% male, mean age 58,21 ± 14,26, mean BSA 1,9 ± 0,21 m2, mean BMI 26,42 ± 6,28 kg/m2, mean EF 60,91% ± 5,43%) were admitted to our unit to undergo AF (group 1: n=145; 72,50%), SVT or PVC ablation (group 2: n=55; 27,5%). Compared with the control group (group 2), patients admitted for AF ablation had a larger LA size (group 1 vs group 2: mean LA area 23,21 ± 5,07 vs 16,87 ± 4,01 cm2, p < 0,001; mean indexed LA volume 46,71 ± 20,41 ml vs 32,04 ± 14,7 ml, p<0,001; mean LAD 41,77 ± 5,66 vs 33,84 ± 6,06, p<0,001) and a longer PA-TDI interval (lateral 148,55 ± 28,5 vs 128,57 ± 20,9, p<0,001; medial 125,34 ± 21,02 vs 109,11 ± 21,49, p<0,001; average 141,43 ± 27,58 vs 119,08 ± 18,63, p<0,001).
**Conclusion.** The PA-TDI interval is a non-invasive and easily achievable echocardiographic parameter, which is demonstrated to be prolonged in patients with a history of AF in contrast with patients with other arrhythmias. as expression of atrial conduction heterogeneity.

### A506: THE ELECTOCARDIOGRAPHIC CHANGES ASSOCIATED WITH HYPOTHERMIA: THE OSBORN WAVE.

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A 93-year-old patient came to our observation for general malaise, sensory obnubilation, aphasia and dysphagia. He had arterial hypertension in drug treatment. At the first medical contact he presented hypothermia (body temperature: 28 ° C) and marked bradycardia. The ECG showed a non-evaluable atrial activity (likely atrial paralysis) with the presence of a junctional rhythm at the frequency of 37 bpm. Blood pressure was around 100/60 mmHg with preserved cardiovascular compensation, in the presence of a moderately depressed cardiac function. Furthermore, the presence of a positive deflection in the terminal part of the QRS complex with elevation of the point J, in the lateral precordial derivations V4-V6, and a terminal slowing of the QRS complex in the lower derivations, the so-called “wave of Osborn”, were also observed figure 1.

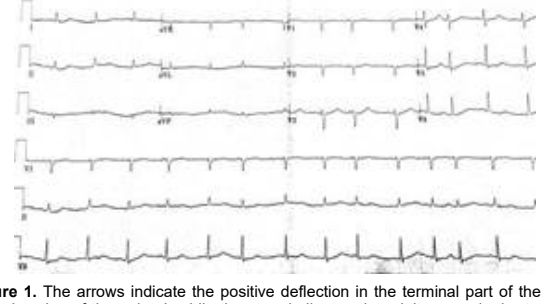

**Figure 1.** The arrows indicate the positive deflection in the terminal part of the QRS with elevation of the point J, while the stars indicate a late delta wave in the terminal part of the QRS complex, both known as “Osborn wave”.

For the reduction of the sensory and of the critical power, the patient was subjected to brain CT scan with finding of a thin hyperdense layer the right and left hemispheric convexity suggestive for subdural hematoma. After adequate warming and supportive therapy, a progressive increase in heart rate was observed with restoration of the sinus rhythm and disappearance of the Osborn wave, figure 2.
The Osborn wave is the most specific electrocardiographic sign of hypothermia.
It consists of an electrocardiographic deflection which is manifested as a late delta wave or as a small R 'wave following the QRS. It is the manifestation on the surface ECG of the electric gradient between a more prominent spike and dome action potential of epicardial cells than that of endocardial cells, an effect that is believed to be linked to a slowing down of the activation kinetics of K + channels Ito compared to calcium channels, associated with low temperature.

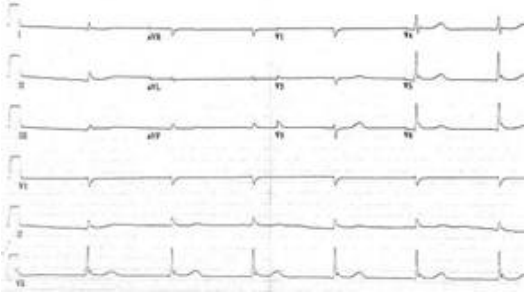

**Figure 2.** ECG showing a sinus rhythm interrupted by supraventricular extrasystoles with an average frequency of 75 bpm. Osborn's wave has disappeared.

### A507: ETNA-AF-EUROPE: FIRST 1-YEAR FOLLOW-UP SNAPSHOT ANALYSIS OF MORE THAN 12,500 AF PATIENTS TREATED WITH EDOXABAN IN ROUTINE CLINICAL PRACTICE

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**Introduction.** Edoxaban has been approved for stroke prevention in patients with atrial fibrillation based on its comparable efficacy and superior safety compared to warfarin in the pivotal ENGAGE AF-TIMI 48 trial. Evidence from real-world studies has demonstrated the safety of different NOACs in routine care; moreover, real-world data are currently emerging for edoxaban and will complement the findings from the randomised trials. ETNA-AF Europe (NCT02944019) was initiated in agreement with the EMA to evaluate benefits and risks of edoxaban treatment in unselected patients in routine clinical practice.
**Methods.** ETNA-AF-Europe is a multinational, multicentre, observational, post-authorisation, safety study conducted in 825 sites in 10 European countries (Austria, Belgium, Germany, Ireland, Italy, The Netherlands, Portugal, Spain, Switzerland and United Kingdom). A total of 13,980 patients were enrolled, and will be followed-up for 4 years. This snapshot analysis includes baseline and first outcome data of 12,574 patients (89.9 % of all enrolled patients) that have completed their first 1-year follow-up visit (mean follow-up: 348 days). The ETNA-AF-Europe 1-year follow-up data are reported here and these data have been compared with data from European countries that participated in the ENGAGE AF-TIMI 48 trial.
**Results.** The average age of patients was 73.6 years, the mean weight was 81 kg. More than 50% of the patients were ≥75 years of age. Frequent comorbidities include hypertension (77%), valvular heart disease (17.9 %), and heart failure (6 %). Most patients (76.6%) received edoxaban 60 mg dose; patients receiving the 30 mg dose (23.4%) were older, had a lower creatinine clearance and had a higher risk for both stroke and bleeding. Baseline characteristics for ETNA-AF Europe and the European cohort of ENGAGE-AF-TIMI 48 were broadly similar. In the ETNA-AF-Europe, patients were older, more frequently female, with lower weight and creatinine clearance. Overall, the incidence of clinical events in ETNA-AF-Europe was low: major bleeding 1.05%/y, intracranial hemorrhage 0.23%/y, any stroke or systemic embolic events 0.82 %/y, all-cause mortality: 3.55 %/y. Rates of intracranial hemorrhage were low irrespective of the edoxaban dose. Lower rates of major bleeding and stroke/SEE were observed in ETNA-AF Europe compared with the European cohort of ENGAGE AF-TIMI-48 (2,12 %/y and 1,56 %/y, respectively); all-cause mortality was slightly higher in patients receiving edoxaban 30 mg dose in ETNA-AF-Europe (7,27 %/y) respect to the European cohort of ENGAGE-AF-TIMI 48 (5,80 %/y), in line with the higher age of this patient group. Cardiovascular mortality was slightly lower in ETNA-AF-Europe compared with the European cohort of ENGAGE-AF-TIMI 48 (1,67 %/y vs 2,46 %/y).
**Conclusions.** We found low bleeding and stroke rates in 12,574 unselected, mainly elderly AF patients treated with edoxaban in routine clinical practice. These findings were consistent across edoxaban doses and reinforce the effectiveness and safety of NOACs such as edoxaban in routine clinical care in Europe. Moreover, these findings confirm the results reported in randomized trials.

## PROCEDURE PERCUTANEE NEGLI ANZIANI: IN BILICO TRA INDICAZIONI CLINICHE E FRAGILITÀ
## Sessione Orale

### A508: MANAGEMENT OF ACUTE CORONARY SYNDROMES IN PATIENTS AGED 80 YEARS AND OLDER: A RETROSPECTIVE COHORT STUDY

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**Introduction.** People aged 80 years or older constitute a rapidly increasing subgroup of patients presenting with acute coronary syndromes (ACS). However, these patients are underrepresented in clinical trials and the benefits of the invasive strategy (coronary angiography and percutaneous coronary intervention, PCI) remains unclear. The aim of the present study was to compare the invasive strategy and the medical therapy alone in this group of patients.
**Methods.** In this retrospective study we enrolled patients aged ≥80 years with a diagnosis of ACS, and grouped them according to the treatment performed, invasive (coronary angiography and PCI) or conservative (optimal medical therapy). Patients were retrospectively followed-up until 1000 days after the discharge. The primary outcome was death from any cause; the secondary outcome was a composite of events (myocardial infarction, stroke, and heart failure-related hospitalization). Sub-analysis according to the revascularization strategy (culprit-only or complete revascularization) was carried out. Finally, in the NSTE-ACS cohort, a Cox proportional hazards model was performed to investigate the association between the survival time and three variables (eGFR, ejection fraction and complete revascularization).
**Results.** We enrolled 170 consecutive patients, 125 in the invasive and 45 in the conservative group. Kaplan–Meier survival curves revealed reduction of all-cause mortality (p=0,0171) but not of combined events (p=0,688) in the invasive group. Patients who underwent culprit-only revascularization showed higher all-cause mortality rate than patients submitted to complete revascularization (p=0,0239). A significant higher rate of major bleeding events was detected in the invasive group (5% vs. <1%; p= 0,0021). No significant increase in the acute kidney injury (AKI) incidence was observed in the invasive group (11% vs. 2%, p=0,4429). Among NSTE-ACS patients, although mortality and composite events at 1000-days of follow-up were not significantly reduced in the invasive group (p=0,4358 and p=0,0663, respectively), a significant reduction of combined events was revealed at 365 days (p=0,0400). The Cox proportional hazards model revealed significative association between eGFR and all cause-mortality in the NSTE-ACS group submitted to PCI (HR: 0,959, p-value= 0,0010).
**Conclusions.** In patients aged ≥80 years with a diagnosis of ACS, the invasive treatment was superior to the medical therapy alone in the reduction of all-cause mortality and the completeness of revascularization significantly improved the overall survival. Minor efficacy of the invasive strategy was observed in the NSTE-ACS patients.. The two strategies did not differ in terms of incidence of AKI, whereas major beeding complications were more common in the invasive group. We also demonstrated that eGFR was associated with the risk of death in the NSTE-ACS group.

### A509: ANGIOPLASTICA CORONARICA PRIMARIA IN PAZIENTI OTTUAGENARI. ESPERIENZA NEL NOSTRO CENTRO

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**Premessa.** Nella vita reale quotidiana l'età media dei pazienti è notevolmente più alta della popolazione dei trials e sempre più sono gli ottuagenari che vengono sottoposti a coronarografia ed angioplastica primaria in corso di infarto con sopraslivellamento del tratto ST rispetto al passato. Gli anziani over 80 anni sono poco rappresentati nei trials: nella vita reale, invece, sono pazienti complessi, con diverse comorbidità anche importanti e pertanto, in molti casi, non vengono sottoposti a procedure invasive.
**Materiali e metodi.** Nel nostro centro abbiamo valutato tutti o pazienti giunti con diagnosi di STEMI (820) dal 01.01.2018 al 31.05.2019, dividendoli in due gruppi: nel primo quelli di età compresa tra 80 e 84 anni (166) e nel secondo quelli da 85 anni in su (94), analizzando caratteristiche generali, procedurali e di outcome.
**Risultati.** Le donne rappresentano la quota maggiore nel secondo gruppo

(55% contro il 42% nel primo gruppo) e per quel che riguarda i fattori di rischio è l'ipertensione arteriosa il fattore più frequentemente rappresentato in entrambi (il 30% circa). Dal punto di vista anatomico, in entrambi i gruppi abbiamo riscontrato circa il 40% di patologia trivasale, con una prevalenza di interessamento del tronco comune maggiore nel gruppo 2, a dimostrazione della maggiore complessità delle lesioni coronariche all'aumentare dell'età. Per quel che riguarda i dati procedurali va sottolineato che l'accesso arterioso nel 95% è stato quello radiale, l'utilizzo degli inibitori GpIIb/IIIa è stato pressochè nullo (un solo caso per gruppo), data la maggiore fragilità dei pazienti ed il conseguente aumentato rischio emorragico. Per quanto concerne la tempistica di accesso al CathLab una volta effettuata la diagnosi di STEMI, non vi è differenza significativa tra under e over 80. Gli endpoint di outcome valutati sono stati la mortalità a 30 giorni ed a 12 mesi, attestandosi entrambe su circa il 20% nel secondo gruppo, circa 3 volte in più dei pz under 85.
**Conclusioni.** L'età avanzata costituisce uno dei fattori più importanti di mortalità, anche per i pazienti sottoposti a procedure interventistiche. La maggiore complessità anatomica, nonché la coesistente fragilità, possono influenzare le strategie procedurali e l'outcome clinico a breve e lungo termine.

### A510: USO DI PRASUGREL A BASSA DOSE VS. CLOPIDOGREL IN PAZIENTI ANZIANI CON SINDROME CORONARICA ACUTA E ANGIOPLASTICA PRIMARIA COMPLESSA: UNA ANALISI A POSTERIORI DELLO STUDIO ELDERLY ACS 2

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**Introduzione.** Il prasugrel si è dimostrato superiore al clopidogrel nelle sindromi coronariche acute (SCA) e dati recenti ne hanno evidenziato il possibile ruolo nel contesto dell'angioplastica percutanea (PCI) complessa. Ciononostante, mancano evidenze che ne supportino l'uso in pazienti con alto rischio di sanguinamento.
**Scopi.** Lo scopo di questa analisi di sottogruppo a posteriori è stato quello di valutare l'impatto della somministrazione di prasugrel in pazienti anziani sottoposti a PCI complessa per SCA. È stato esaminato un endpoint composito di mortalità, infarto miocardico, stroke maggiore e sanguinamento ad 1 anno, ed endpoint secondari di mortalità per tutte le cause e sanguinamento ad 1 anno.
**Metodi.** Nello studio multicentrico Elderly ACS 2, 1.443 pazienti di età > 74 anni sono stati randomizzati a ricevere prasugrel a bassa dose (5 mg) o clopidogrel (75 mg) e sono stati seguiti prospetticamente per 1 anno. La PCI è stata definita complessa se sussisteva una delle seguenti condizioni: ≥3 lesioni trattate, ≥3 stents impiantati, o se è stata trattata una biforcazione, una triforcazione, una occlusione cronica totale o una lesione calcificata in maniera almeno moderata.
**Risultati.** I pazienti che sono andati incontro a PCI complessa (n=607) non sono andati incontro ad un peggior outcome clinic in termini di enpoint primario, se comparati a quelli con PCI non complessa (p=0.21). Inoltre, in questo sottogruppo, non si è osservata alcuna differenza tra pazienti randomizzati a prasugrel vs. clopidogrel in termini di endpoint primario (HR 1.17; CI 0.819-1.67; p=0.39), ne in termini di mortalità per tutte le cause o di sanguinamenti. Inoltre, non si è osservata interazione tra in trattamento con prasugrel e la complessità di PCI (p=0.34).
**Conclusioni.** In pazienti anziani affetti da SCA e trattati con PCI complessa, prasugrel a bassa dose è comparabile a clopidogrel in termini di outcome clinic globale, mortalità e sanguinamenti ad 1 anno.

### A511: HIGH BLEEDING RISK (HBR) STATUS IN ELDERLY PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTION: EVALUATION OF THREE DIFFERENT RISK SCORES

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**Background.** Aging is an emerging global problem. After percutaneous coronary intervention (PCI), elderly people have a higher risk of mortality than the younger counterpart. Bleeding related to antithrombotic therapy and ischemic events associated with disease progression are the main causes. Few data are available on high bleeding risk (HBR) status among elderly patients undergoing PCI.
**Objectives.** The aim of this study was to evaluate the high bleeding risk status among elderly patients undergoing PCI.
**Methods.** Patients aged 75 years or more undergoing PCI with drug-eluting stents at the Federico II University Hospital from March 2013 until April 2019 were included in this study. Three bleeding risk scores (DAPT score, PARIS score and PRECISE-DAPT score) were calculated for each patient.
**Results.** A total of 629 patients (mean age 79.9±4.1 years, 65.3% males) was examined. The proportion of HBR status was 86% according to the DAPT score, 87% according to the PARIS score, and 68% according to the PRECISE-DAPT score. The difference in HBR status was statistically significant between DAPT and PRECISE-DAPT scores (p=0.019) and between PARIS and PRECISE-DAPT scores (p<0.001). HBR status in elderly patients was not associated with aging by using the DAPT score (p=0.60), whereas the probability of HBR increased with age when PARIS and PRECISE-DAPT scores were applied (p<0.001 for both). The discrepancy in HBR status across the three scores was more evident between 75 and 80 years (86%, 59%, and 75% according to DAPT, PARIS and PRECISE-DAPT scores), while patients aged 80 years or more tended to qualify as HBR irrespective from the type of score.
**Conclusions.** HBR status in elderly patients (≥75 years) undergoing PCI is present in about 9 out of 10 patients by using the DAPT and PARIS scores and in about 7 out 10 patients by using the PRECISE-DAPT score.

### A512: PTCA CON DES IN PAZIENTI ANZIANI: OUTCOME A BREVE E LUNGO TERMINE

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**Background.** Negli ultimi decenni si è assistito a un progressivo aumento della percentuale di pazienti (pz) anziani, spesso portatori di molteplici comorbidità, che vengono sottoposti a procedure di rivascolarizzazione miocardica mediante angioplastica coronarica (PTCA). Nella maggior parte di questi pazienti la rivascolarizzazione viene eseguita nell'ambito di sindromi coronariche acute. L'utilizzo nelle procedure di angioplastica coronarica di stent medicati (DES) di ultima generazione ha ulteriormente potenziato la riduzione dell'incidenza di ristenosi e trombosi dello stent rispetto ai DES di prima generazione permettendo anche una riduzione della durata della doppia antiaggregazione orale (DAPT).
**Obiettivi.** Definire l'outcome intraospedaliero e a lungo termine di pz anziani sottoposti a PTCA con utilizzo di DES e verificare l'incidenza di eventi emorragici sia durante la degenza ospedaliera che in corso di follow-up.
**Metodi e popolazione.** La popolazione in studio è costituita da 2098 pz con età maggiore a 75 anni (media 83.2 ± 2.9 aa) sottoposti a PTCA con l'utilizzo di DES. Tutti i pazienti hanno ricevuto DAPT pre procedura con Asa + carico di clopidogrel o di ticagrelor. Gli inibitori della GP2b/3a sono stati utilizzati in casi selezionati intraprocedura. Dopo la procedura tutti i pz sono stati trattati con aspirina (100 mg/die) in aggiunta a clopidrogel (75mg/die) o Ticagrelor per un periodo da 6 a 12 mesi.
**Risultati.** Il 45% dei pz era stata avviato alla rivascolarizzazione nell'ambito di una SCA; i restanti pz era presentavano angina pectoris e/o ischemia miocardica strumentale. Una precedente rivascolarizzazione miocardica era presente nel 37.5%. La coronarografia, eseguita tramite accesso radiale nel 67% dei pz, ha documentato assenza di coronaropatia critica nel 0.5%, malattia monovasale nel 20%, bivasale nel 25% e multivasale nel 45.5%. La procedura di rivascolarizzazione mediante PTCA+DES è stata completa nel 52% dei pz. La maggior parte dei pz non ha avuto complicanze nella fase post-procedurale pre-dimissione (96%). La mortalità totale intraospedaliera è stata del 1.2% con una mortalità per causa cardiaca pari all'1%. L'incidenza di complicanze emorragiche è stata del 0.8% e di insufficienza renale acuta del 2%. Il follow-up è stato effettuato fino ad 1 anno di distanza dalla procedura nel 97% dei pz. La DAPT è stata mantenuta fino ad 1 anno nel 60% dei pz. La mortalità totale è stata del 8.4% con una mortalità cardiaca del 3.6%. Eventi cardiaci maggiori (mortalità cardiaca, infarto miocardico non fatale e angina instabile) si sono verificati nel 13.2% dei pz. Nuove procedure di rivascolarizzazione (TVR o TLR) sono state effettuate nell'8% dei pz. L'incidenza di eventi emorragici è stata globalmente del 6.8% con necessità di trasfusione nel 2.5%.
**Conclusioni.** L'incidenza di complicanze post-procedurali nel corso del ricovero in una popolazione di anziani sottoposti a PTCA+DES è risultata essere molto bassa; anche l'incidenza di eventi cardiaci maggiori a 1 anno di distanza dalla procedura si è mantenuta contenuta con una bassa incidenza di eventi emorragici nonostante la DAPT mantenuta nel maggior parte dei pz per 1 anno. Questi risultati supportano la sicurezza della PTCA con DES in pazienti anziani.

### A513: LONG TERM ANTICOAGULANT THERAPY AND INCIDENCE OF CONTRAST INDUCED NEPHROPATHY IN PATIENTS UNDERGOING PERCUTANEOUS CORONARY INTERVENTION

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**Background.** Contrast-induced nephropathy (CIN) is associated with an impaired outcome in patients undergoing percutaneous coronary intervention (PCI). Recent studies have suggested an association between deterioration of renal function and long-term oral anticoagulant therapy (OAT). The anticoagulation-related nephropathy (ARN) seems to prevail among patients treated with Vitamin K antagonists (VKAs) compared to patients treated with new oral anticoagulants (NOACs). The aim of the study was to investigate whether long- term treatment with VKAs was associated with an increased incidence of CIN compared to NOACs in patients treated with PCI.
**Methods.** This retrospective study enrolled patients on long term OAT (≥12 months) undergoing PCI. Blood samples were drawn before and at 24 and 48 hours after PCI for measurement of serum creatinine, using the post-procedure peak value. All patients received standardized normal saline ≥ 24h after intervention. Primary end-point was incidence of CIN (postintervention increase in serum creatinine ≥0.5mg/dl or >25% from baseline).
**Results.** 112 patients were enrolled, 50 received with VKAs and 62 NOACs. Incidence of CIN was 6.25% (7 patients), 1.26% in NOACs group and 12% in VKAs group (P=0.02). Baseline and post-procedural value of serum creatinine are not significantly different (respectively 1.10±0.28 vs 1.05±0.25 mg/dl, P=0.43 and 1.08±0.25 vs 1.06±0.25 mg/dl, P=0.67). No significant difference was identified in baseline and post- procedural creatinine clearance between two groups (respectively 66.05±23.68 ml/min vs 69.38±24.29 ml/min P=0.47 and 66.91±23.83 vs 69.12±28.49 ml/min, P=0.65). A shorter post-procedural hospital stay was identified in NOACs group (1.52±0.92 vs 2.26±2.68, P=0.045).
**Conclusion.** This study suggests that long-term treatment with VKAs is associated with a higher incidence of CIN compared to NOACs in PCI. These results support use of NOACs in high risk of exposure to contrast based procedure. Further studies are needed to define the pathophysiological pathways underlying this association.

## LA COMPLESSITÀ NELLO SCOMPENSO CARDIACO
## Sessione Orale

### A514: VALUTAZIONE PRELIMINARE DELL'IMPATTO DELLO SCOMPENSO CARDIACO IN TERMINI DI MORTALITÀ A BREVE TERMINE ED IMPATTO ASSISTENZIALENELLA ASL 1 ABRUZZO AVEZZANO - SULMONA- L'AQUILA

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**Introduzione.** Lo scompenso cardiaco cronico (SC) rappresenta una patologia ad elevata incidenza e prevalenza, che determina una significativa mortalità, morbilità e riduzione della qualità di vita, con elevati costi sociali. Lo SC è la seconda causa di ricovero dopo il parto e la fascia di età più colpita è quella dai 75 agli 85 anni. Scopo di questo studio pilota è riassumere i principali aspetti epidemiologici legati allo SC, in particolar modo la mortalità intra ed extra-ospedaliera a un anno dal ricovero.
**Materiali e metodi.** Sono state analizzate le schede di dimissione ospedaliera (SDO), delle strutture pubbliche e private accreditate della ASL 1 Abruzzo, con diagnosi principale (ICD-9 CM) correlata allo SC, negli anni 2016-2017-2018. I pazienti inclusi nello studio sono stati 2.871 (47,5% maschi e 52,5% femmine), con un'età media di 80,3 anni; i ricoveri ordinari analizzati nei 3 anni (n= 3.920) sono stati classificati in *ricovero indice* (primo ricovero) e *ricoveri ripetuti* (successivi ingressi in ospedale per SC). È stata calcolata la mortalità intra-ospedaliera ed extra-ospedaliera a 30 giorni e a un anno dalla dimissione. É stata inoltre osservata la distribuzione dei ricoveri per SC nei reparti di dimissione.
**Risultati.** I ricoveri analizzati sono stati 3.920 di cui 1.492 del 2016, 1.380 del 2017 e 1.048 del 2018. I decessi in ospedale durante un ricovero per SC sono stati 450 nei 3 anni (48% uomini e 52% donne), pari al 15,7% (età media 83,7 anni). I decessi extra-ospedalieri, per la coorte di pazienti con ricoveri 2016 e 2017, sono stati in totale 183; i pazienti morti al di fuori dell'ospedale, entro un anno dalla dimissione per SC sono stati 162 (88,5%), di cui 72 (44,4%) morti in un tempo inferiore o uguale a 30 giorni. I reparti di dimissione maggiormente coinvolti nell'assistenza dei pazienti con SC sono stati: reparto di Cardiologia-UTIC 45,6%, reparto di Medicina Generale 26,7%, reparto di Geriatria 12,6%.
**Conclusioni.** I dati epidemiologici rilevati sono in linea con quelli presenti in letteratura e confermano la necessità di una maggiore integrazione ospedale-territorio, per implementare percorsi diagnostico/terapeutici che coinvolgano sia i Medici di Medicina Generale (MMG) sia gli Specialisti. Attraverso la presa in carico del paziente, la valutazione specialistica degli accertamenti diagnostici, il follow-up sul territorio è prevedibile non solo una riduzione della mortalità a breve termine, ma anche un uso più appropriato dei posti letto per acuti.

### A515: LEPTIN AFFECTS THE INFLAMMATORY RESPONSE AFTER STEMI

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**Background.** Leptin is an adipose tissue-derived hormone primarily involved in the regulation of food intake. Recently, it has been shown that leptin has a much broader role than just regulating body weight and appetite in response to food intake: it has been associated with increased ROS production and inflammation, factors involved in the restoration of an effective myocardial reperfusion after myocardial revascularization.
**Purpose.** We sought to examine the relationship between leptin serum levels, the inflammatory response and effective myocardial reperfusion following ST elevation acute myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (pPCI).
**Methods.** We enrolled 31 non-obese male patients with STEMI. The inflammatory response has been evaluated dosing high sensitivity C-Reactive Protein (hsCRP) and IL6 on serum samples collected before and 6–12–24–36h after pPCI. For each patient we analyzed the peak value. Leptin levels have been measured before and 24h after the reperfusion. All data are expressed as median ($25^{th}$-$75^{th}$ percentiles). Effective myocardial reperfusion has been evaluated considering ST Resolution in each patient. Variables were log-normalized when needed.
**Results.** The mean age of our patients was 65± 12 years, 15 of them had anterior MI. Leptin levels before and after reperfusion were respectively 4633 pg/ml (2558–10390) and 9738 pg/ml (5875-16569). HsCRP peak value was 1.2 (0.7–1.8) mg/dl, IL6 peak value was 9.7 (5.8–17.4) pg/ml. We found a significant linear correlation between baseline leptin levels and both hsCRP and IL6 peak values (respectively, R=0.32 p=0.03 and R=0.4, p=0.03) and between leptin levels 24h after the reperfusion and inflammatory markers peaks (R=0.6 p<0.001 for hsCRP and R=0.7, p=0.003 for IL6). ST resolution occurred less frequently in patients with leptin levels above the median (61% vs 78% p=0.01)
**Conclusion.** To the best of our knowledge this is the first study analyzing leptin levels in the setting of a STEMI. Our findings suggest that leptin serum levels are associated with the inflammatory response during an acute myocardial infarction. The association appears stronger after revascularization of the culprit lesion; patients with higher leptin levels have less effective myocardial reperfusion. Further studies are needed to establish the exact role of leptin in the inflammatory cascade in this clinical scenario and whether levels of this hormone may carry independent prognostic information.

### A516: MICROVASCULAR ANGINA IS ASSOCIATED WITH SYSTEMIC DYSFUNCTION OF PERIPHERAL RESISTANCE ARTERIES

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**Objective.** Microvascular angina (MVA) is characterized by functional and structural alterations of resistance coronary arteries without any significant alterations of epicardial coronary arteries. Whether MVA patients present also dysfunction of peripheral resistance arteries is still a matter of debate. We sought to evaluate whether MVA is associated with parameters of systemic microvascular dysfunction.
**Design and Methods.** Thirteen patients with MVA and 13 healthy control subjects were enrolled in this study. The diagnosis of MVA was based on the presence of typical symptoms of ischemic heart disease, evidence of myocardial ischemia on exercise stress testing and normal epicardial

coronary arteries at angiography. Parameters of peripheral microvascular alterations, arterial stiffness (Pulse Wave Velocity, PWV), and central blood pressure (cBP) and Subendocardial Viability Ratio (SEVR, and index of subendocardial microvascular dysfunction), were evaluated by applanation tonometry.
**Results.** Patients and controls were similar with respect to metabolic parameters, BMI, and renal function. MVA patients were on therapy with beta-blockers (50%), calcium channel blockers (37%), nitrates (12%), renin-angiotensin-blockers (44%), and statins (25%). MVA patients were slightly older than controls (63.6±1.9 vs 53.1± 2.0 years, p<0.05). Albeit in the normal range, peripheral (pSBP) and central (cSBP) systolic BP were significantly higher in MVA patients as compared to controls (pSBP:134.3±2.9 vs 118.5±3.5 mmHg, p<0.002; and cSBP:124.8±2.9 vs 109.7±2.9 mmHg, p<0.001). Diastolic BP was similarly preserved in both groups. SEVR, an index of subendocardial microvascular dysfunction, was lower in MVA patients as compared to controls (139.7±4.1 vs 160.4±8.5 %, p<0.05). Augmentation index (AI), reflected (RPH), and forward (FPH) pulse height, all parameters of peripheral microvascular dysfunction, were also altered in MVA patients as compared to controls (AI:29.0±1.0 vs 19.9±2.4%, p<0.003; RPH:22.3±1.4 vs 15.3±0.9 mmHg, p<0.001; FPH:31.0±1.4 vs 24.2±1.4 mmHg p<0.005). The index of aortic stiffness PWV was similar in both groups (7.20±07 vs 6.6±0.2 m/sec, NS)
**Conclusion.** Patients with MVA on optimal anti-ischemic therapy exhibit alterations of parameters of both subendocardial and peripheral microvascular dysfunction, suggesting that coronary microvascular dysfunction is part of a more generalized disorder also involving peripheral resistance arteries.

### A517: SCREENING FOR CARDIAC AMYLOIDOSIS BY A COMBINATION OF TWO COMMONLY AVAILABLE ECHOCARDIOGRAPHIC VARIABLES: THE AMYLI SCORE

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**Background.** The main echocardiographic feature of the left ventricle (LV) in cardiac amyloidosis (CA) is diastolic dysfunction due to rigid enlarged ventricular wall with no overt LV enlargement (concentric LV pseudohypertrophy). While each of these elements is neither sensitive nor specific, their combination may hold diagnostic significance for CA.
**Methods.** The AMYLI (AMYLoidosis Index) score was defined as a product of E/e' ratio (as a surrogate of LV filling pressure) and relative wall thickness (RWT, as an estimate of concentric LV hypertrophy). This score was evaluated in a population of 316 consecutive patients undergoing specialized evaluation because of clinical, electrocardiographic and echocardiographic features deemed compatible with CA.
**Results.** Patients were aged 78 years (interquartile interval 72-83), and 206 (65%) were men. LV ejection fraction was 55% (46-63%). All patients met the echocardiographic criteria for LV hypertrophy (LV mass indexed ≥115 g/m2 in men, ≥95 g/m2 in women); median LV mass was 144 g/m2 (113-172). CA was ultimately diagnosed in 158 patients (50%: 64 light-chain - AL -amyloidosis, 41%; 94 amyloid transthyretin - ATTR - amyloidosis, 59%). AMYLI score values were 9.58 (5.15-12.82) in the whole cohort, and 11.89 (7.68-14.59) among patients with CA vs. 7.21 (4.20-8.50) among the other patients (p<0.001). The area under the curve (AUC) was 0.77, and the best cut-off was 7.56 (sensitivity 78%, specificity 67%). Patients with an AMYLI score ≥7.56 had a 13-fold higher risk of CA (relative risk - RR 13.4, 95% confidence interval - CI 7.5-24.1). Score values did not differ significantly between AL and ATTR (11.71, 6.51-15.10 vs. 12.03, 7.96-14.57, respectively; p=0.152), although the AMYLI score seemed more predictive of ATTR than AL (AUC 0.798 vs. 0.723). The 7.56 cut-off had 61% sensitivity and 82% specificity for the diagnosis of AL, and 84% sensitivity and 67% specificity for ATTR. The risk of AL increased by almost 3 folds (RR 2.7, 95% CI 1.5-4.7) for an AMYLI score ≥7.56, and the risk of ATTR by almost 7 folds (RR 6.6, 95% CI 3.9-11.3).
**Conclusions.** The AMYLI score, calculated as a product of E/e' ratio and RWT, hold diagnostic significance among patients with suspected CA, with 7.56 as the best cut-off. Score values do not differ significantly between AL and ATTR amyloidosis, but the score and the 7.56 cut-off perform better for ATTR prediction.

### A518: SICUREZZA ED EFFICACIA DELL'UTILIZZO DI EXTENSION DI CATETERE GUIDA IN PROCEDURE DI DENERVAZIONE RENALE ANATOMICAMENTE COMPLESSE

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**Background.** La terapia interventistica dell'ipertensione arteriosa resistente alla terapia farmacologica mediante procedura di denervazione renale percutanea è stata introdotta ormai circa 10 anni fa. Tuttavia, nel 2014 i risultati sostanzialmente neutrali dello studio SYMPLICITY-HTN3 ha fatto scemare l'interesse di molti clinici verso questa procedura. Recentemente, sono stati condotti nuovi studi con nuove tecniche di denervazione e nuovi device, che hanno documentato la superiorità della denervazione rispetto alla terapia farmacologica.
**Materiali e metodi.** Il device utilizzato per l'ablazione a radiofrequenza delle arterie renali è stato modificato passando da un catetere monopolare con curva terminale preformata a un catetere quadripolare con estremità a spirale. Questa innovazione tecnologica ha completamente sovvertito la tecnica ablativa. Con il catetere monopolare si effettuavano numerose erogazioni puntiformi solo nell'arteria renale principale con una rotazione che cercava di ablare più punti della circonferenza endoluminale del vaso. Il catetere quadripolare a spirale (Symplicity Spyral, Medtronic), apponendosi alla superficie interna dell'arteria da ablare, consente di eseguire un'ablazione circonferenziale con una maggiore probabilità di interrompere le fibre nervose. Un'altra innovazione nella tecnica ablativa è quella di denervare anche le arterie renali secondarie, spingendosi fino ai vasi più piccoli di diametro di circa 3 mm, che questo nuovo catetere consente di ablare. A dispetto della ottima performance ablativa, la caratteristica conformazione del catetere riduce la sua trackability all'interno di vasi tortuosi anche a causa dello scarso supporto offerto dal catetere guida.
**Risultati.** Nella casistica del nostro centro di 21 procedure, in un caso non era possibile raggiungere un sito target nonostante l'utilizzo di una guida coronarica supportiva (PowerTurn, Abbott) e abbiamo utilizzato con successo una extension di catetere guida (GuideLiner, Teleflex). Il Guideliner è stato avanzato delicatamente e lentamente nelle ramificazioni tortuose dell'arteria renale, consentendo di portare a destinazione il catetere ablatore. L'utilizzo del GuideLiner ha consentito di raggiungere rami terminali altrimenti non sarebbero stati trattati. Il positivo esito procedurale e il buon outcome a distanza del paziente ci ha convinto dell'utilità dell'extension del catetere guida per avanzare il catetere ablatore in siti altrimenti non aggredibili. La denervazione renale è una procedura black box, che non consente di accertarne il buon esito al termine dell'intervento perchè il risultato è di natura clinica ed emerge a distanza di tempo. Per tale ragione, durante la procedura, è necessaria meticolosità e pazienza, cercando di ablare più siti possibili in modo da aumentare le possibilità di successo a distanza. L'utilizzo off-label dell'extension del catetere guida si è dimostrato, nei 5 pazienti (per 9 procedure ablative, considerando le ablazioni delle arterie controlaterali), un approccio sicuro, efficace e che ha spesso consentito di ridurre i tempi di scopia e il volume di mezzo di contrasto somministrato. Attualmente i 5 pazienti sono in follow up e tutti hanno raggiunto il target terapeutico della procedura di denervazione.
**Conclusioni.** Attualmente in letteratura non sono disponibili dati sui possibili vantaggi dell'utilizzo di una extension del catetere guida e ulteriori studi di saranno necessari per confrontare le probabilità di successo procedurale di un approccio ablativo dei siti "routinariamente" considerati target, con una ablazione estesa anche a rami difficilmente raggiungibili.

### A519: CORRELATION BETWEEN CENTRAL AND PERIPHERAL ARTERIO-VENOUS OXYGEN GRADIENT IN CRONIC HEART FAILURE PATIENTS: POSSIBLE CLINICAL APPLICATIONS

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(a) UNIVERSITÀ DEGLI STUDI DI ROMA "LA SAPIENZA"

**Introduction.** In the clinical practice a very important parameter in the evaluation of the hemodynamic status of the patient is the arteriovenous oxygen difference, or arterio-venous Δ of oxygen (A-VΔO2). Currently it is derived from the venous oxygen saturation, as it is measured in the pulmonary artery blood, and during the right heart catheterization it is used to calculate the cardiac output. Our study was aimed to find in cronic heart failure (CHF) patients the correlation between the central and the peripheral arteriovenous saturations by replacing the pulmonary artery sampling with a peripheral one. Then, it has explored the possibility of using them in the calculation of the cardiac output in a non-invasive way.
**Methods.** 25 patients with diagnosed heart failure and undergoing right cardiac catheterization were enrolled. The central arteriovenous content of oxygen was measured from pulmonary artery sampling, achieved during cardiac catheterization. The peripheral A-VΔO2 was obtained by sampling blood from the brachial vein and from the femoral vein, and by calculating the mean for the venous saturations. Cardiac output was calculated using the Fick equation.
**Results.** As to regard the A-VΔO2, no statistically significant difference has been found between the values calculated by using the pulmonary artery and the femoral vein (p = 0.84). The A-VΔO2 value calculated by using brachial vein saturation (central: 5.25 ± 1.6 *vs* brachial 8.11±5.3, p = 0.032) and by using the mean (p <0.001) is significantly higher. Relatively to the cardiac output, the difference between the values calculated by catheterization and through saturation of the femoral vein is not statistically significant (p = 0.48), showing a significant linear correlation. The difference between the central flow and that one calculated at the brachial vein is statistically significant (p = 0.02).
**Conclusions.** The difference between the central A-VΔO2 and the peripheral one was statistically not significant when using the femoral

vein. Such results seem to indicate the possibility of resorting to the femoral vein sampling procedure to obtain in a non-invasive way a haemodynamic evaluation parameter in patients with chronic heart failure.

## ARITMIE – 6
## Sessione Orale

### A520: A TELEMONITORING SERVICE APPROVED BY THE MINISTRY OF HEALTH FOR A LARGE-SCALE SCREENING OF SILENT AND SYMPTOMATIC ATRIAL FIBRILLATION

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**Introduction.** Despite good progress in the management of patients with atrial fibrillation (AF), this disease is one of the major cause of stroke, heart failure, sudden death and cardiovascular (CV) morbidity. Screening for silent AF is recommended in high risk population, especially in elderly, but often it is not applied for the absence of medical prescriptions or long waiting times

**Hypothesis.** To evaluate the effectiveness of a remote monitoring through ECG Holter and 12-lead ECG for the screening of AF.

**Methods.** According to a Ministerial Decree, from 2010 authorized pharmacies may provide specialist outpatient care services. Health Telematic Network, in collaboration with our Cardiology University Department and Federfarma (National Association of Pharmacists), has installed in 4,008 authorized pharmacies across the Country a telematic network connected to a single Telemedicine platform where cardiologists were available for tele-consulting. In order to identify silent or symptomatic AF, 12-lead ECG and ECG Holter monitoring were performed in patients with episodes of palpitation, syncope or pre-syncope or with a history of AF.

**Results.** In 2017 and 2018 a total of 31,156 ECG Holter monitoring were performed (46% male, mean age 61 years). Among these records, 2390 (8%) showed paroxysmal or persistent AF (53% male, mean age 77±10 years). The lenght of AF episodes was greater of 6 minutes in 14% cases and mean VR was greater of 90 bpm in 406 patients (17%). History of AF was not previously known in 669 pts (28%). None of this subgroup of patients and only 18% of pts with known paroxysmal AF were taking anticoagulant therapy. In the same period 196,349 ECG were performed (mean age 78 years); 831 records showed unknown AF (5%): 356 (43%) high VR AF, 385 (46%) medium VR AF and 90 (11%) low VR AF. All the patients with unknown AF episodes or with high VR AF episodes were referred to their General Practitioner or Cardiologist for urgent evaluation and therapeutic management.

**Conclusions.** Our telematic network, in which health care services can be provided timely by authorized pharmacies across all the Country, promoted early diagnosis and treatment of AF, resulting in a likely positive impact on related CV events.

### A521: PROGNOSTIC ROLE OF ATRIAL HIGH RATE EPISODES IN PATIENTS WITH PACEMAKER: IS ORAL ANTICOAGULANT THERAPY ALWAYS MANDATORY?

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**Background.** Subclinical atrial fibrillation is playing an emerging role in assessment of cardiovascular and cerebrovascular risk of patients with cardiac implantable electronic devices (CIED). The MOST and the ASSERT study first tried to understand the predictive role of atrial high rate episodes (AHRE) in patients with cerebrovascular events but, despite the presence of many data, it is not already clear if and when anticoagulant therapy is required in such subjects. The aim of our study is to evaluate clinical and prognostic impact of AHREs in terms of stroke, mortality and MACE in a population with CIEDs to better understand if oral anticoagulant therapy (OAT) is always mandatory in these cases.

**Materials and methods.** We evaluated 1683 patients with pacemaker, implanted since 2004 at our cardiac pacing laboratory. We divided our population into three arms so composed: patients with permanent atrial fibrillation; patients with AHRE and patients without AHRE at follow-up. Patients were annually followed with outpatient visits and OAT was prescribed when necessary, according to European Guidelines, based on CHA2DS2VASc and HAS-BLED values.

**Results.** Four hundred and twenty-two patients had permanent atrial fibrillation at the time of implantation. During follow-up (mean duration 4 years) 1343 AHRE episodes were recorded in 342 patients. The remaining 919 patients did not present any episode of AHRE. The outcome occurred in 113 patients while 57 suffered a stroke/TIA episode. Forty-nine patients, on the contrary, presented an acute myocardial infarction during the observation period. On univariate analysis, the presence of AHRE was correlated with the percentage of atrial stimulation (p=0.02), virtual CHA2DS2VASc (p<0.001) and sick sinus syndrome as pacing indication (p=0.02). Kaplan Mayer curves showed that patients with AHRE had a survival rate similar to patients with permanent AF (Figure 1). Patients without AHRE had a better prognosis than other two arms (overall p value <0.001). The stroke incidence in patients with AHRE was lower than in patients with permanent or clinical AF during follow-up (Figure 2). In the specific setting of patients with AHRE and stroke, there wasn't any statistically significant difference between patients who practiced OAT and those who did not take any anticoagulant therapy (Figure 3).

**Conclusion.** AHREs have a significant impact on mortality in patients with PM. These episodes seems to represent a "marker of disease" more than primary cause of cerebrovascular events, considering that anticoagulant therapy does not impact on the onset of these adverse events. Moreover we believe that identification of AHRE at follow up provides useful information for identification of patients at greater risk of adverse events and therefore should be taken always into consideration, regardless of OAT.

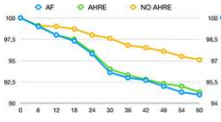

Figure 1

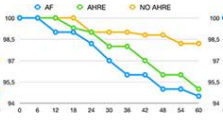

Figure 2

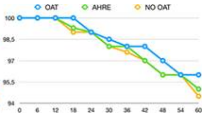

Figure 3

### A522: NUMBER OF RECONNECTED PULMONARY VEINS: AN UNDERSTIMATED PREDICTOR OF ATRIAL FIBRILLATION RECURRENCE AFTER SECOND CATHETER ABLATION

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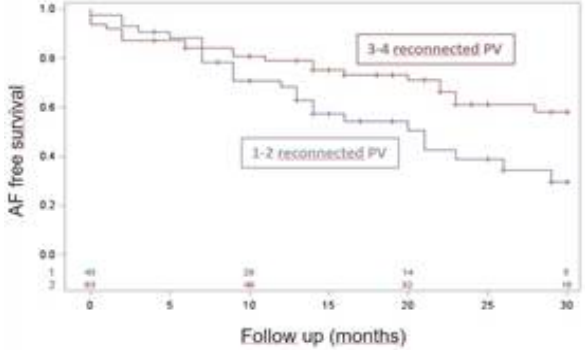
**Background.** The most common finding during left atrial mapping in redo atrial fibrillation (AF) ablation is pulmonary vein (PV) reconnection. Weather to just re-isolate PVs or to create additional lesions is left to operator decision. Left atrial lines and substrate modification might have pro-arrhythmic effect. These ablative measures should be limited to selected patients showing substantial electrical/anatomical remodelling. Specific technologies, such as cardiac magnetic resonance, are needed to characterize these pathological aspects; but they are costly, time-demanding and not widely available in daily clinical practice.

**Purpose.** The aim of this three years retrospective single center study is to define long term follow up after first PV re-isolation and to better understand the influence of simple electrophysiological variables on AF recurrences.

**Methods.** We considered 122 paroxysmal AF patients (83% male; 58.1±10.8 years) undergoing first re-isolation of reconnected PVs.

**Results.** All patients showed at least one PV reconnected. They were divided into two groups: Group A (48 pts) with 1 or 2 PV reconnection and Group B (74 pts) with 3 or 4 PV reconnection. At a mean follow up of 20.4 months, 26 patients (54.1%) experienced recurrence in Group A and 22 patients (29.7%) in Group B. Higher recurrence rate was observed in group A, as depicted in Kaplan-Meier figure (log-Rank 0.022, figure).




**Conclusion.** In patients undergoing first redo ablation of AF, a lower number of reconnected PV predicts a worse clinical outcome of simple PV re-isolation. In this situation, additional substrate modification is probably needed at the time of a second procedure to achieve a better outcome.

### A523: ATRIAL FIBRILLATION AND SINGLE CHAMBER ICDS: IMPLICATIONS OF ATRIAL SIGNAL AVAILABILITY

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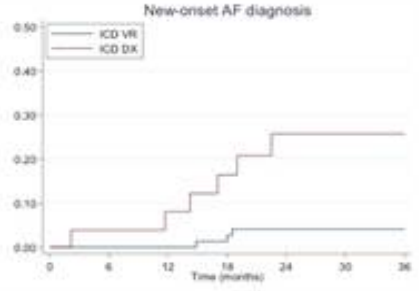
**Introduction.** Actual incidence of atrial fibrillation (AF) in single chamber ICD recipients is unknown. 50% of implanted ICDs are single chamber devices. Considering the population characteristics that include ischemic heart disease, hypertension, age and other comorbidities, the incidence of new-onset AF is estimated around 15-20%. Without atrial sensing, single chamber ICD is unable to detect atrial arrhythmias.

**Aim.** To determine the number of a first "actionable" AT/AF (defined as AF on 12-lead ECG or AHRE episodes determining a clinical decision) in newly implanted single chamber ICDs and to compare the AF detection rates between patients implanted with DX vs VR ICD in routine clinical follow-up.

**Methods.** Between 2014 and 2015 consecutive patients were randomized 1:3 to receive a single chamber ICD (DX or VR ICD) and followed-up to detect atrial arrhythmias. The DX group was implanted with a Biotronik DX ICD which had a single coil ventricular lead with a floating atrial dipole capable of atrial sensing with a dedicated algorithm for AF diagnosis. The VR group consisted of standard single chamber ICDs implants from 3 others manufacturers with a VT monitoring zone set at a 130 bpm to provide the possibility for indirect AF detection. All AF episodes were validated with an ECG or IEGM by a clinician.

**Results.** A total of 165 patients implanted with a single chamber ICD (median age 63 [48-72] years, male 79%, primary prevention 80%, ischemic 53%, no difference in baseline characteristics between groups) were followed-up for a median period of 847 [666-1030] days. 40 patients (24%) had a Biotronik DX. New-onset AF was detected in 10 patients: 6/40 in the DX group (26,9%), 4/125 in the remainder VR ICDs (4,3%; p<0.0001). At 36 months 5 patients were on oral anticoagulation for stroke prevention due to newly-diagnosed AF (15% of DX group vs 4% of VR group (p=0.033).




**Conclusions.** Results shows a significantly lower AF detection rates in single chamber VR ICD as compared with a DX group. AF detection rates in the DX group is similar to a dual chamber device actionable AF incidence. The capacity to detect atrial signal in single chamber ICD recipients can prevent underdiagnosis and undertreatment with potentially negative effect on patients' outcomes.

### A524: PRESCRIPTION PATTERN AMONG ONCOLOGIC PATIENTS WITH NON-VALVULAR ATRIAL FIBRILLATION

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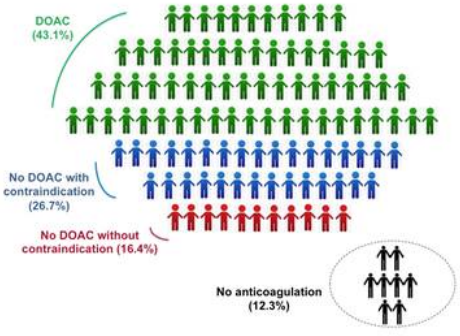
**Background.** Direct oral direct anticoagulants (DOACs) are the standard of care for the prophylaxis of non-valvular atrial fibrillation (NVAF)-related cardioembolism, but their use in oncological patients has been limited so far, with a significant proportion still receiving vitamin K antagonists (VKA) or low molecular weight heparin (LMWH).

**Methods.** By retrospectively reviewing the records of 3,197 subjects evaluated in a dedicated cardio-oncology outpatient unit between January 2017 and July 2019, we selected those presenting at the first visit with NVAF not triggered by surgical procedures, $CHA_2DS_2$-VASc ≥1 for men and ≥2 for women, cancer on active treatment, and no concomitant intracardiac thrombus. The following were considered as contraindications to DOACs: severe chronic kidney disease (CKD, estimated glomerular filtration rate <30 mL/m/1.73m$^2$); anti-neoplastic therapy unknown or with potential moderate-to-severe adverse interactions; cirrhosis or liver metastases. Clinical characteristics of patients appropriately on DOACs (group 1), on VKA or LMWH with at least 1 contraindication to DOACs (group 2), and on VKA or LMWH despite not having contraindications to DOACs (group 3) were compared by chi-square or ANOVA, as appropriate.

**Results.** One-hundred ninety five of 3,197 (6.1%) patients met the inclusion criteria. Eighty-seven (44.6%) were in group 1, 52 (26.7%) in group 2 (16 on VKA and 36 on LMWH), and 32 (16.4%) in group 3 (8 on VKA and 24 on LMWH) (Figure). Finally, 24 (12.3%) did not receive anticoagulation for various reasons: spontaneous bleeding (5), anaemia and/or thrombocytopenia (5), frailty (4), $CHA_2DS_2$-VASc 1 (3), pharmacological interactions (1), and single, short episode of paroxysmal NVAF (1); in 5 patients the lack of anticoagulation was not clearly motivated. The only significant baseline differences between the 3 groups were serum creatinine concentration (1±0.3 vs. 1.4±0.8 vs. 1±0.3 mg/dL, respectively, P=0.001) and renin-angiotensin system inhibitor use (61% vs. 44% vs. 34%, P=0.001). Of note, only 3% of subjects in group 1 received an inappropriate DOAC dose, while LMWH was under-dosed for 25% of patients in group 2 and 50% of patients in group 3.

**Conclusions.** In a dedicated cardio-oncology unit, DOACs and VKA are most often appropriately prescribed to cancer patients with NVAF. However, there is residual use of LMWH, not infrequently at non-anticoagulant dosage. This is a non-evidence based common practice in clinical oncology that clearly represents room for improvement.




### A525: CLINICAL ASSESSMENT OF KIDNEY FUNCTION ACCORDING TO DIFFERENT EQUATIONS IN A COHORT OF PATIENTS ADMITTED IN A CARDIOLOGY UNIT AND IMPACT OF OUTCOMES

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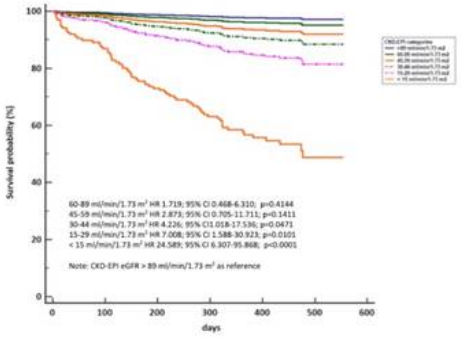
**Background.** For the evaluation and management of chronic kidney disease (CKD), the CKD-EPI equation is currently recommended. However other equations are commonly used in clinical practice.

**Aim.** To assess the concordance between CKD-EPI and other five equations for estimating GFR (eGFR) and to compare these formulas in terms of outcome prediction.

**Methods.** We retrospectively analyzed demographics, historical and clinical variables in a large cohort of patients consecutively admitted to our Cardiology Unit. At discharge serum creatinine eGFR was estimated according to 6 formulas: Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI),Cockroft-Gault (CG), CG adjusted for body surface area (CG-BSA), Modification of Diet in Renal Disease (MDRD), Berlin Initiative Study (BIS-1), and Full Age Spectrum (FAS).

**Results.** Between January and October 2016, 806 consecutive patients, median age 71 years, 510 (63.3%) males, electively or acutely admitted in our division and discharged alive, were enrolled. Overall substantial agreement was found between CKD-EPI, considered as reference, and CG-BSA, MDRD, BIS-1, FAS (Cohen's weighted K test 0.660; 0.758; 0.659; 0.667 respectively). In younger subjects (age <65 yrs) CKD-EPI and MDRD showed an almost perfect agreement (K=0,884), while in elderly (age ≥ 85 yrs) the agreement between CKD-EPI and all the other formulas was lower, with the best performance found for BIS-1 (K=0.586). In the overall group CG and CKD-EPI had the lower concordance of attribution. Overall mortality [median follow up 407 days (interquartile

range 284-473)] was 8%. The figure shows Kaplan Meier curves for all cause mortality according to eGFR class (CKD-EPI). Multivariable Cox regression analysis showed that survival was significantly worse for lower CKD-EPI eGFR values [eGFR < 60 ml/min/1.73m2HR 1.196; 95% confidence interval (95%CI) 1.011-1.415; p=0.037]. Patients with eGFR < 15 ml/min/1.73m2had 24 fold increased risk in mortality compared to patients with eGFR ≥ 90 ml/min/1.73m2 (HR=24.589; 95% C.I.= 6.307-95.868, p<0.0001). The discriminant capability of death prediction was tested with receiver operating characteristics curves and the best result was found for BIS-1 (AUC 0.782; p vs CKD-EPI 0.0013) and FAS (0.776; p vs CKD-EPI 0.0353), while the worst was for MDRD (AUC 0.750; p vs CKD-EPI 0.0052).




**Conclusion.** In an unselected cohort of patients admitted in a cardiology ward, the concordance between CKD-EPI and the other eGFR equations significantly decreases with age. In the elderly BIS-1 equation shows the higher agreement with CKD-EPI. Mortality rates were higher for lower eGFR. The best discriminant capability for death prediction according to eGFR equation was found for BIS-1 and FAS equations.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 4
## Sessione Orale

### A526: CLINICAL PHENOTYPE OF PATIENTS WITH ARRHYTHMOGENIC CARDIOMYPATHY CARRYING A MUTATION ON TITIN GENE

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**Introduction.** Arrhythmogenic cardiomyopathy (AC) is an inherited heart muscle disease characterized by a progressive myocytes loss followed by fibrous or fibro-fatty tissue replacement. The disease has been proved to be genetically determined with autosomal-dominant inheritance. Several disease genes, mainly encoding for desmosomal proteins have been identified so far and in approximately half of cases genetic analysis allowed to identify a mutation in a known AC gene. In addition, others non-desmosomal genes linked to AC phenotype have been reported. Among these, mutations of Titin (TTN) gene, already involved in dilated cardiomyopathy, have been reported. The aim of the present study is to evaluate the clinical and instrumental features of subjects affected by AC and carrying mutations of TTN gene.
**Methods.** Patients were diagnosed with AC according to the 2010 Task Force criteria. For each patient we evaluated family history of sudden cardiac death and/or AC, arrhythmic symptoms, 12-lead baseline ECG, signal-averaged ECG, 24 hours Holter ECG, 2D-echocardiogram, cardiac magnetic resonance CMR) and genetic test. Moreover, data were compared to ta group of AC subjects carrying desmosomal gene mutations.
**Results.** Study population included 33 pts carrying TTN mutations (TTN+) and 23 pts carrying of mutations in desmosomal genes (TTN-). The majority of pts were males (64%), and median age at diagnosis was 41 years. All subjects were assessed according to the 2010 Task Force Criteria with a certain (87%), borderline (6%) or possible diagnosis (8%). Patients TTN+ resulted to be younger at the time of diagnosis compared to TTN- group even if a statistically significant association was not found (39,2 yrs vs 44 yrs, p=0.09). The comparison between TTN+ and TTN- subjects using 2D-echocardiogram did not show significant differences regarding right ventricular (RV) and left ventricular (LV) function and kinetic. CMR evaluation did show a significant difference in RV dimension (mean 103,2 ml/mq in patients TTN-; mean 115,1 ml/mq in patients TTN+, p=NS) and function evaluated with EF (mean 47,5 in patients TTN-; mean 43,3 in patients TTN+, p=NS). Moreover, TTN+ group showed a significant biventricular involvement (57% vs 30%, p=0,001) and a higher incidence of heart failure episodes compared to TTN- patients (0 vs 8, p= 0,002).
**Conclusions.** Comparison of anamnestic, clinical data of AC patients TTN+ and TTN- did not demonstrate the presence of statistically significant differences as far as morphological and functional alterations. However, TTN+ seem to show more frequently a biventricular involvement and a worse clinical outcome regarding heart failure.

### A527: CHROMOGRANIN-A SERUM LEVELS IN PATIENTS WITH TAKOTSUBO SYNDROME VERSUS ACUTE CORONARY SYNDROME.

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**Background.** Sympathetic hyperactivity and catecholamines surge represent one of the leading mechanisms of Takotsubo syndrome (TTS). Chromogranin-A (CgA) is a secretagogous protein co-released with catecholamines and may show an imbalance in neuro-hormonal system.
**Aim.** To evaluate whether levels of CgA, may represent a diagnostic marker in TTS.
**Methods.** From November 2016 to August 2019, CgA levels were prospectively collected from 12 consecutive women with TTS and matched with an equivalent number of patients with anterior STEMI. Blood samples were obtained within the first 24 hours from admission. Clinical and laboratory parameters were recorded.
**Results.** No differences in terms of age, gender, CV risk factor and admission left ventricle EF were present among the study populations. However, serum levels of CgA were lower in patients with TTS (3.5 ± 2.9 nMol/l, n.v. <3) when compared to patients with STEMI (7.2 ± 5.9, p <0.04). Although not statistically different, troponin I levels were slightly higher in patients with STEMI (25±10 vs 5±4 pg/ml, p=0.12), meanwhile no differences concerning admission serum levels of NTproBNP and creatinine were found. In-hospital death and complications did not differ among TTS and STEMI patients (16%vs9% p=0.6, 25% vs 44% p=0.32)
**Conclusion.** Systemic CgA levels are lower in TTS rather than in anterior STEMI and may probably suggest the prevalence of a primary intracardiac release of catecholamines in TTS. It is a pilot study, therefore the potential use of CgA as diagnostic marker requires confirmation in larger multi-center cohorts.

### A528: UN COMUNE CASO DI DISPNEA IN UNA DIAGNOSI POCO COMUNE

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**Introduzione.** La dispnea rappresenta uno dei più comuni sintomi osservati dal medico e ancora oggi rappresenta una sfida per il medico. Può derivare da numerose condizioni patologiche, dalle più lievi a quelle più gravi. Le cause possono essere cardiogene, polmonari o disordini metabolici ed ematologici.
**Materiali e metodi.** Uomo di 59 anni, si presenta alla nostra osservazione per dispnea, calo ponderale e astenia da circa 4 mesi. In anamnesi: Beta talassemia minor e Ipertensione Arteriosa. All'esame obiettivo: soffio sistolico mitralico ed epatomegalia. Gli esami ematochimici evidenziavano: anemia ipocromica/microcitica, e ipogammaglobulinemia e lieve incremento della Beta-2 microglobulina, creatinina 0.66mg/dl All'ECG: deviazione assiale sinistra e blocco atrioventricolare di primo grado. All'Ecocardiogramma: ipertrofia concentrica del Vsx (SIV 15mm-PP 13mm) presentanti ecostruttura disomogenea. Funzione sistolica globale conservata FE 60% S pattern diastolico restrittivo, ingrandimento biatriale, ispessimento dei lembi mitralici e tricuspidalici. Nel sospetto di cardiopatia da d'accumulo venivano eseguiti dosaggio di Troponina Ths 0.028ng/ml e NT-proBNP 898pg/ml, catene K urinarie 115mg/ml, IgK e IGλ sieriche (nella norma) ed RMN Cuore: ipertrofia settale anteriore e parete inferiore. Nelle sequenze T2 pesate: aree di iperintensità come da edema. Nelle sequenze tardive T1 pesate dopo somministrazione di gadolinio: aree di iperintensità a livello della parete inferoposteriore basale, setto apicale intramiocardico e sfumata immagine a doppio binario. Pattern da verosimile amiloidosi cardiaca. Veniva effettuata biopsia del grasso periombelicale che confermava la presenza di depositi di amiloide ed esecuzione di biopsia osteomidollare (BOM) che evidenziava plasmocitosi midollare.
**Risultati.** Veniva posta diagnosi di Smoldering MM complicato da amiloidosi cardiaca da catene leggere k. Attualmente il paziente è in trattamento chemioterapico ed in follow-up per la patologia.
**Discussione e conclusioni.** L'amiloidosi cardiaca comprende un gruppo eterogeneo di patologie caratterizzate da deposito di proteine e

progressivo danno d'organo. La maggior parte di esse sono causate dal deposito di catene leggere (AL) o di transtiretina nelle sue diverse forme :wilde type o senile, con numerose differenze in termini di tempi di modalità insorgenza e mortalità. Infatti nelle forme AL si assiste ad una rapida progressione con prognosi infausta, le forme (ATTRwt) invece sono croniche con una sintomatologia più sfumata e con un decorso meno aggressivo. Il caso clinico presentato conferma come l'uso razionale di diverse tecniche di imaging sia cruciali per il riconoscimento dei segni che possono indicare deposito di amiloide (ingrandimento atriale, ipertrofia Vsx, iperecogenicità delle pareti, pattern restrittivo, ispessimento dei lembi delle valvole AV) e per la stadiazione.. Fondamentale è contesttualizzare un sintomo molto comune come la dispnea in un quadro ecocardiografico di scompenso cardiaco ad FE preservata. Ad oggi queste tecniche vantano alte sensibilità e specificità. Nel caso in esame, non c'era alcun segno suggestivo di amiloidosi (bassi voltaggi all'ECG), l'ecocardiografia ha rappresentato la pietra miliare dell'iter diagnostico.

### A529: CARDIOMIOPATIA DILATATIVA ARITMOGENA: PREVALENZA, CARATTERIZZAZIONE CLINICA E GENETICA

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**Background.** La cardiomiopatia dilatativa aritmogena (AR-DCM) sta emergendo come una nuova entità nosologica, tuttavia la prevalenza e la caratterizzazione di questa patologia risultano tutt'ora sconosciute.
**Scopo.** Lo scopo dello studio è stato di fornire un'approfondita caratterizzazione della patologia, sia clinico-strumentale che genetica, a partenza da una vasta coorte di pazienti con DCM.
**Metodi.** Sono stati arruolati 461 pazienti (età media 44 anni, 73% maschi, frazione d'eiezione [LVEF] 32%) con diagnosi di DCM. Tutti i pazienti sono stati genotipizzati con tecnica Next Generation Sequencing. Il fenotipo AR-DCM è stato identificato, secondo la letteratura, dalla positività ad uno dei seguenti criteri: storia di sincope verosimilmente cardiogena, documentazione all'Holter ECG di 24 ore di ≥1 tachicardia ventricolare non sostenuta o ≥1000 extrasistoli ventricolari premature o ≥50 coppie, o esperienza di morte cardiaca improvvisa (SCD) o aritmia ventricolare minacciosa per la vita (MVA), in pazienti in classe NYHA stabile I-III. Abbiamo successivamente diviso i pazienti con AR-DCM in early AR-DCM e late AR-DCM in base al fatto che ci fosse evidenza dei criteri diagnostici rispettivamente prima e dopo 12 mesi dall'arruolamento. I pazienti con genotipo positivo per varianti patogene o probabilmente patogene sono stati suddivisi in base ai seguenti cluster genetici funzionali: *TTN*tv, *LMNA* A/C, citoscheletro, desmosomi, sarcomero, *FLNC*, canali ionici, altri.
**Risultati.** 364 pazienti (78%) è risultato positivo per il fenotipo AR-DCM (57% early AR-DCM, 22% late AR-DCM). Non risultavano esserci differenze significative nei tre gruppi per quanto riguarda l'età e il sesso maschile. Il blocco di branca sinistra (40%, 26% e 38% in non AR-DCM, early AR-DCM e late AR-DCM rispettivamente, p globale= 0.009), il diametro tele diastolico del ventricolo sinistro (61 mm, 66 mm e 64 mm in non AR-DCM, early AR-DCM e late AR-DCM rispettivamente, p globale=0,00017) a la LVEF (36%, 30% e 34% in non AR-DCM, early AR-DCM e late AR-DCM rispettivamente, p globale=0,00043) erano significativamente differenti tra early AR-DCM e non AR-DCM e tra early AR-DCM e late AR-DCM, mentre non erano significativamente differenti tra non AR-DCM e late AR-DCM. Riguardo alla genotipizzazione, 240 (52%) pazienti avevano un genotipo positivo, 188 (78%) erano AR-DCM (136 [56%] early AR-DCM e 52 [22%] late AR-DCM). Allo stesso modo, i fenotipi early e late AR-DCM si presentavano nel 56% e 22% dei 221 pazienti genotipo-negativi**.** Le mutazioni della TTN erano prevalenti (29%, 31%, 28% delle early AR-DCM, late AR-DCM e non-AR-DCM con genotipo positivo rispettivamente, p=0.94). All'interno dei 240 pazienti con genotipo positivo, 64 (27%) hanno sperimentato SCD/MVA (38% e 25% delle early AR-DCM e late AR-DCM rispettivamente, p globale <0.11). Le mutazioni dei geni desmosomiali, *FLNC* e *LMNA* caratterizzavano rispettivamente il 24%, 12% e 12% delle early AR-DCM che avevano sperimentato SCD/MVA, mentre erano assenti nelle late AR-DCM. Al contrario, le mutazioni dei geni sarcomerici erano presenti nel 8% delle early AR-DCM vs. 46% delle late AR-DCM con genotipo positivo che sviluppavano SCD/MVA (p<0.01).
**Conclusioni.** Il fenotipo AR-DCM, in particolare l'early AR-DCM, rappresentava la maggioranza dei pazienti con DCM.
Il fenotipo dei pazienti con early AR-DCM dimostrava un ventricolo sinistro più rimodellato rispetto sia alle non AR-DCM sia alle late AR-DCM, che tra loro sono invece grossolanamente simili. Nei pazienti con early AR-DCM, quasi il 50% delle SCD/MVA avveniva in pazienti con mutazioni di geni desmosomiali, *FLNC* e *LMNA*. Al contrario, mutazioni dei geni del sarcomero erano presenti in quasi il 40% delle SCD/MVA delle late AR-DCM.

### A530: CARDIOLOGICAL INVOLVEMENT IN LAMIN A/C DISEASE: A MULTICENTRE EXPERIENCE

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**Background.** Alterations of lamin A/C, codified by the LMNA gene account for rare genetic diseases, with a wide phenotypic heterogeneity. As for heart involvement, the mutation of the LMNA gene is associated with a high incidence of atrial and ventricular arrhythmias (VA), atrioventricular (AV) conduction disturbances, and structural abnormalities with or without concomitant involvement of the musculoskeletal system. Although the prognosis is unfavourable, current recommendations on patient treatment and management are based on experts' opinions only.
**Aim.** A) Analyse the natural history of the; B) evaluate the incidence of adverse events over a long-term follow-up; C) identify clinical and instrumental variables useful to reasonably predict the worst clinical course.
**Methods.** Multicentre prospective study of 54 patients with LMNA-gene mutation, followed by AOU Città della Salute e della Scienza Hospital of Turin and by Sant'Orsola-Malpighi General Hospital of Bologna from 1/1/2001 to 5/2019.
**Results.** The mean age of the patients at the first clinical manifestation was 35 years. 61% of patients were implanted with a cardiovascular implantable electronic device (CIED); 76% with ICDs and 24% PM. 7% patients died at follow-up, with 2 cardiovascular deaths. Moreover, 15 (28%) patients were hospitalized for heart failure (HF); 17% underwent heart transplantation; 30% suffered sustained malignant VA (VT and/or VF); 17% had appropriate ICD shocks. Type-2 second-degree AV block was the main negative prognostic predictor of malignant VA and appropriate ICD shocks (Hazard Ratio (HR)= 3.6, P-value 0.006). Moreover, supraventricular tachycardia turned out to be a negative prognostic factor for end stage hypokinetic biventricular dilated cardiomyopathy (HR 1.3, P-value 0.018).
**Conclusions.** The prognosis of cardiac involvement in patients with LMNA-gene mutation is negative. Periodic follow-up by cardiologists with specific knowledge in this disease is required and, when necessary, the ICD has to be preferred over the pacemaker. The negative prognostic factors, when present, in these patients may suggest ICD implantation at an early stage of LV dysfunction compared to the generally recommended thresholds of low ejection fraction as indicated in HF or post-MI patients.

### A531: L'IPERTENSIONE POLMONARE IN UN CASO DI PERICARDITE COSTRITTIVA: INTRUSA O PROTAGONISTA?

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La pericardite costrittiva è un'entità nosologica caratterizzata da alterato riempimento diastolico dei ventricoli, dovuto a malattia pericardica. L'alterazione organica, caratterizzante la patologia, è un ispessimento diffuso o localizzato dei foglietti pericardici, con adesioni e calcificazioni degli stessi. In letteratura sono stati descritti casi di ispessimento pericardico localizzato o spessori pericardici normali, con una comprovata emodinamica di costrizione cardiaca globale. Questo rimanda al concetto di malattia organica e funzionale del pericardio che rende la diagnosi, alcune volte, una vera sfida per il clinico. Nel caso da noi descritto, a complicare le valutazioni, ha fatto capolino l'ipertensione polmonare.
Si tratta di un operaio di 62 anni che giungeva alla nostra attenzione a causa di dispnea per sforzi minimi, con un obiettività da scompenso cardiaco destro severo. Aveva una lunga storia di accessi al pronto soccorso e ricoveri per multiple comorbilità, che rimandavano alcune all'aumentato rischio di ipertensione polmonare (broncopneumopatia cronica enfisematosa, fibrosi polmonare, sierologia positiva per Lupus Eritematoso Sistemico), altre erano compatibili con una quadro di pericardite costrittiva nel contesto di una patologia sistemica (versamenti pericardici e pleurici recidivanti). I suoi esami ematochimici mostravano solo un modico rialzo del pro-Brain Natriuretic Peptide (pro-BNP) rispetto al quadro clinico conclamato e severo di scompenso cardiaco destro, dato compatibile, secondo la letteratura, con pericardite costrittiva. L'ecocardiogramma 2D color Doppler avvalorava entrambe le ipotesi diagnostiche, da un lato confermando una probabilità intermedia di

ipertensione polmonare, dall'altro mostrando un ispessimento paraventricolare e retroatriale destro che apparentemente condizionava il movimento della parete libera del ventricolo destro, marcate variazioni respiratorie del riempimento diastolico biventricolare e delle vene epatiche, anomalo spostamento del setto interventricolare durante gli atti respiratori. La pietra miliare è stata il cateterismo cardiaco destro, che dopo un'attenta analisi dei dati disponibili, ha indirizzato verso una diagnosi di pericardite focale costrittiva con prevalente impegno del cuore destro e ipertensione polmonare post-capillare di grado moderato.
Il suddetto caso ci ha confermato che una strategia diagnostica integrata e individualizzata risulta dirimente, specie se l'iter terapeutico successivo è opposto, medico o chirugico. Nessun elemento diagnostico da solo ci avrebbe portato ad una risposta definitiva, ma piuttosto abbiamo raccolto indizi fino a scovare il colpevole di uno scompenso cardiaco severo. In casi come questo, inoltre, la definizione di secondarietà dell'ipertensione polmonare, nel quadro che si era prospettato, è risultata tutt'altro che scontata.

## PROCEDURE CORONARICHE COMPLESSE
## Sessione Orale

### A532: ANGIOPLASTICA CON STENT MEDICATO SU TRONCO COMUNE NEI PAZIENTI ANZIANI: OUTCOME A BREVE E LUNGO TERMINE

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**Premessa.** Negli ultimi decenni si è assistito a un progressivo aumento della percentuale di pazienti (pz) anziani, spesso portatori di molteplici comorbidità, che vengono sottoposti a procedure di rivascolarizzazione miocardica mediante angioplastica coronarica (PTCA). In questi paziente è frequente l'interessamento del tronco comune. Obiettivo dello studio è definire l'outcome a lungo termine di pz anziani sottoposti a PTCA+DES su TC.

**Materiali e metodi.** La popolazione è costituita da 230 pz con età maggiore a 80 anni (media 84±2.9 aa) sottoposti a PTCA su TC. Tutti i pazienti hanno ricevuto DAPT pre-procedura con Asa + carico di clopidogrel o di ticagrelor. Gli inibitori della GP2b/3a sono stati utilizzati in casi selezionati intraprocedura. Dopo la procedura tutti i pz sono stati trattati con aspirina in aggiunta a clopidrogel o Ticagrelor per un periodo da 6 a 12 mesi.

**Risultati.** La maggior parte dei pz era stata avviata alla rivascolarizzazione nell'ambito di una SCA (54%); il restante 46% dei pz presentava angina pectoris e/o ischemia miocardica strumentale. Una precedente rivascolarizzazione miocardica era presente nel 42% dei pz. La coronarografia ha documentato malattia multivasale (TC + altri rami coronarici) nel 80% dei pz. La procedura è stata eseguita da accesso radiale nel 61% dei pz. La patologia del TC coinvolgeva la biforcazione nel 47% dei pz. Nel gruppo di pazienti in cui si è reso necessario trattare la biforcazione TC-IVA-CX nel 48% dei casi è stato eseguito provisional stent. In tutti i pazienti è stato eseguito Kissing-ballon finale. L'incidenza di complicanze intraprocedurali è stata molto bassa: in 3 pazienti si è registrata FV che è stata risolta con DC-shock e in 3 pz una trombosi dello stent che si risolta con infusione di bolo di aggrastat; nessun paziente è deceduto durante la procedura. L'incidenza globale di complicanze emorragiche è stata del 2.2% con necessità di trasfusione del 2%. La DAPT è stata proseguita per 1 anno nel 79.9% dei pz. Il follow-up è stato effettuato in tutti i pz fino ad 1 anno di distanza dalla procedura. La mortalità totale è stata del 12.6% con una mortalità cardiaca del 5.6%. Eventi cardiaci maggiori si sono verificati nel 15.2% dei pz. Nuove procedure di rivascolarizzazione (TLR o TVR) sono state effettuate in 29 pz (12.6%). L'incidenza di eventi emorragici è stata globalmente del 10% con un solo paziente che ha presentato un sanguinamento maggiore. Quando l'incidenza di eventi in corso di follow-up è stata analizzata in relazione con il coinvolgimento o no della biforcazione è stata documentata una significativa maggior incidenza di eventi cardiaci maggiori nei pz in cui era stata trattata la biforcazione (27% vs 4%, p=0.00000); la maggior differenza consisteva in una maggior incidenza di infarto e trombosi dello stent (infarto: 12% vs 2.4%, p=0.004; trombosi: 8.3% vs 0.8%, p=0.005). L'incidenza di mortalità cardiaca è risultata invece non significativamente differente tra i 2 gruppi di pz (8% verso 3.2%%, p=0.09).

**Conclusioni.** L'incidenza di eventi cardiaci maggiori in una popolazione di anziani sottoposti a PTCA con impianto di DES su TC è risultata globalmente contenuta con una bassa incidenza di eventi emorragici nonostante la DAPT mantenuta nel maggior parte dei pz per 1 anno. Nei pazienti in cui la patologia del tronco coinvolgeva la biforcazione l'incidenza di MACE e in particolare di infarto e trombosi dello stent è risultata significativamente più alta senza però portare ad un incremento significativo della mortalità per causa cardiaca. Questi risultati supportano la sicurezza della PTCA su TC anche in pazienti anziani.

### A533: COMPLEX CORONARY ARTERIES-GIANT CORONARY SINUS FISTULAS: A CASE OF A RARE FISTULOUS COMMUNICATION SUCCESSFULLY TREATED WITH PERCUTANEOUS TECHNIQUE

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**Introduction.** Coronary artery fistula (CAF) is a rare anomaly of the coronary artery and represents a connection between a coronary artery and one of the cardiac chambers or other vascular structures. The reported incidence of CAF is 0.002% in the general population and 0.4% of all cardiac malformations. Only 7% of CAF maybe drain into coronary sinus (CS). Both right coronary artery (RCA) and left coronary artery are involved in 5% of cases. We present the case of a patient with RCA to CS fistula and circumflex artery (CA) to CS fistula in association with giant CS successfully treated with percutaneous technique.

**Case report.** A 69-year-old man was evaluated for fatigue, dyspnea and pedal edema. He had an history of arterial hypertension and a previous diagnosis of atrial septal defect (ASD). Physical examination revealed a continuous cardiac murmur. Echocardiography showed a giant CS (8 x 9.5 cm); the origin of a dilated and tortuous RCA was visualized from the right sinus of Valsalva. Color-Doppler showed a turbulent flow from the RCA into the giant CS and an increased and high-speed flow into the right atrium from the CS. The shunt visualized between CS and right atrium was probably interpreted as an ASD in a previous examination. Cardiac Magnetic Resonance (CMR) and Cardiac Computed Tomography (CT) releaved a dilated RCA- giant CS fistula and a small CA-CS fistula. Angiography revealed a markedly dilated and tortuous RCA-giant CS fistula and another communication between the CA at its medium tract and the CS. A right heart catheterization revealed right atrium mean pressure of 20 mmHg and PA wedge pressure of 13 mmHg. A left to right shunt was detected (superior vena cava oxygen saturation: 64%, right atrial oxygen saturation: 84%, right ventricle oxygen saturation: 84%). Qp/Qs ratio was 2.46, cardiac output was 3.74 L/min (2.07L/min/m2). Despite giant RCA didn't show any collateral vessels, balloon occlusion of RCA-CS fistula resulted in acute ischemia in RCA territory with transitory ECG ST elevation and inferior wall akinesia. The patient underwent percutaneous closure of the RCA-CS fistula with Amplatzer device (Figure 1). After establishing two arterio-venous loop, one by anterograde crossing from the RCA of the fistula and another via femoral vein, by retrograde approach; a AGA 7F delivery sheath (AGADS) was introduced through the femoral vein, and a 18 X 14 mm AmplatzerTM Vascular Plug II (AVP, AGA Medical Corporation, Golden Valley, MN, USA) was released in the RCA-CS fistula. The final result showed a marked reduction of contrast inflow from RCA to CS and the last angiography allowed the visualization of posterior descending artery (Figure 1), never seen before in previous angiographies. There were no major complications during the procedure. A trivial residual shunt between CS and right atrium was noted immediately after AVP release, whit no periprocedural complications.

**Discussion.** In our patient, the presence of a congenital fistula between the RCA and CS has led to severe dilatation of the CS. Identification of the dominant pathology proved vital in determining the correct management for this patient. The presence of a fistula between the extremely dilated and tortuous RCA and the CS and another fistula between the dilated circumflex artery and the CS in association with aneurysmal dilatation of the CS in our adult patient is a rare anomaly. In symptomatic patients, fistulas are repaired by surgery or percutaneous technique, since spontaneous closure is rare. Our patient remained asymptomatic for a long time. Early percutaneous intervention prevented complications.

**Conclusion.** Currently, percutaneous management of CAFs provides a high degree of procedural success with a very low risk of serious complications. Device selection and delivery technique should be based on the anatomic and morphologic characteristics of the fistula. Although surgical ligation has previously been the standard treatment for CAF,

specialized techniques, equipment and newer devices have made the percutaneous approach a safe and effective first-line treatment modality in most patients with suitable anatomy, with good follow-up results. In our opinion, with the advent of new devices and equipment, outcomes of the percutaneous approach will be improved, and most of the CAFs are amenable to percutaneous closure.

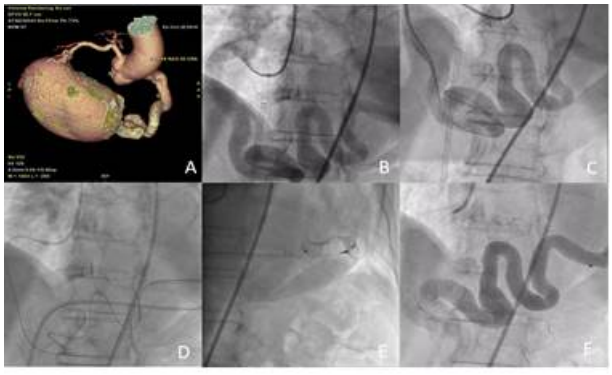


**Figure 1.** The dilated RCA-giant CS fistula (A). We created a circuit and we implanted a vascular plug 18 mm x 14 mm (B-E). The final result showed a marked reduction of contrast inflow from RCA to CS and the last angiography allowed the visualization of posterior descending artery (F).

### A534: LA RICANALIZZAZIONE DELLE OCCLUSIONI CORONARICHE CRONICHE TOTALI IN TRE OSPEDALI TOSCANI. CONSIDERAZIONI A SEGUITO DI UNO STUDIO SU 180 PAZIENTI IN UN PERIODO DI 18 MESI.

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**Background.** Le CTO rimangono una sfida difficile per la cardiologia interventistica e i pazienti portatori di questo tipo di lesione sono spesso indirizzati alla terapia medica o sottoposti a CABG. Scopi: creare un database locale per consentire subito un confronto con i risultati europei e, in futuro, con i risultati ottenuti degli stessi centri negli anni a venire.
**Metodi.** 180 pazienti provenienti da 3 ospedali sono stati tabulati secondo il database dell'EuroCTO Club, raccogliendo dati anagrafici, clinici, relativi all'anatomia della lesione, alla procedura e al follow up breve degli eventi nel primo post intervento.
**Risultati.** 5,2% di tutte le 3488 procedure di angioplastica coronarica eseguite nel periodo corrispondente. Angina stabile 38%, angina instabile 15%, asintomatici per angina 47%. FE>50% nel 68%, 50%<FE<35% nel 25%, FE<35% nel 17%. IVA e CD 37%, CX 18,5%, SB 7,5%. JCTO medio 1,35. 68,5% di successi, 63% in anterogrado e 5,5% in retrogrado. Approccio anterogrado con escalation delle guide utilizzato nel 40% delle procedure. Complicanze in sala nel 2,7% dei casi. Eventi al followup breve: ematoma all'accesso(20) o retroperitoneale (1), anemizzazione richiedente trasfusione (4), pseudoaneurisma (2) o dissezione(1) all'accesso, versamento pericardico (2), CIN (2), stroke (1), ed edema polmonare acuto (1).
**Discussione.** Ancora solo una minoranza dei pazienti con CTO ha avuto la possibilità di ricevere un tentativo di ricanalizzazione percutanea, visto che la prevalenza nei pazienti con almeno una lesione critica è del 20-30% e aumenta con l'età.Questo studio retrospettivo conferma un alto tasso di successo e una bassa incidenza di complicanze, risultati che possono essere raggiunti da operatori dedicati con un'adeguata selezione delle lesioni, nonostante la mancanza di disponibilità di parte del materiale dedicato richiesto (es. StingRay per tecniche di dissezione e rientro, la cui assenza giustifica il gran numero di tecniche true to true).Il tasso di complicanze rimane basso e simile all'incidenza estremamente bassa nelle grandi serie di PCI in pazienti affetti da angina stabile. La predittività di successo effettiva del JCTOscore rimane discutibile.
**Conclusioni.** Tramite operatori dedicati, con un'adeguata selezione delle lesioni, workshop in cui si discuterà l'approccio per ricanalizzare le lesioni più complesse e con la disponibilità di tutti i materiali dedicati, si potranno ottenere risultati sempre migliori che potranno essere comparati alle procedure qui raccolte.

### A535: IMPACT OF STENT THICKNESS ON CLINICAL OUTCOMES IN LEFT MAIN AND NON-LEFT MAIN BIFURCATION: A RAIN SUB-STUDY (VERY THIN STENTS FOR PATIENTS WITH LEFT MAIN OR BIFURCATION IN REAL LIFE)

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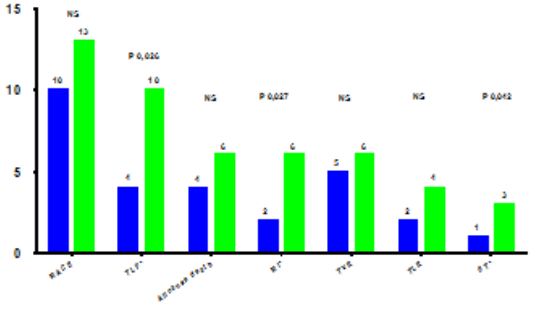
**Introduction**. Clinical impact of stent strut thickness in coronary bifurcation lesions in small vessels has not been already assessed in a real-world population.
**Methods.** All patients enrolled in the "VeRy Thin Stents for Patients with Left mAIn or bifurcatioN in Real Life" (the RAIN study), undergoing PCI on a vessel with a diameter ≤ 2.5 mm were divided into 2 groups according to stent strut thickness: 74 µm vs 80 µm. TLF (defined as a composite of myocardial infarction and target lesion revascularization) was the primary end point, while MACE (a composite of death, MI, TLR) was the secondary one, along with stent thrombosis (ST).
**Results.** A total of 506 patients were retrospectively evaluated for this analysis; 206 patients received a 74 µm strut stent, while 300 were implanted with an 80 µm stent. Overall mean age was 69, mainly men (70.2%) and Acute Coronary Syndrome (ACS) was the admission diagnosis in 55.1% of the cases. After a 12 (9-16) month follow-up, TLF was lower in the 74 µm group (4.3% vs 9.8%, p = 0,026), while MACE occurred in 11.8% of enrolled patients, with no statistical difference between the 2 groups (9.7% vs 13.3%, p = 0,070). A lower incidence of ST was also seen in thinner stents (1.0% vs 3.0%, p=0.042). At multivariate analysis, glomerular filtration rate (GFR) <60 ml/min/mq increased the risk of TLF while thinner strut (74 µm) was an independent protective factor (HR 0.51, CI 0.17-0.85, p <0.005).




Incidence of adverse outcomes according to struts: 74 µm (blue) and 80 µm (green). (p<0.05)

**Conclusion.** In this real-world population, coronary bifurcations in small vessels treated with very-thin stents (74 µm) were exposed to lower rates of target lesion failure, myocardial infarctions and stent thrombosis compared to those treated with 80 µm strut stents.

### A536: QUANDO L'IMAGING CORONARICO ASSUME UN RUOLO DECISIVO NELLA STRATEGIA PROCEDURALE IN CORSO DI STEMI CON ANATOMIA COMPLESSA

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La dissezione coronarica spontanea rappresenta una importante causa di sindrome coronarica acuta e di morte cardiaca, soprattutto nelle giovani donne ed in persone con meno fattori di rischio cardiovascolare.
Il caso che presentiamo riguarda una donna LMR di anni 53 con anamnesi positiva per familiarità per cardiopatia ischemica, ipertensione arteriosa, utilizzo pregresso prolungato di estroprogestinici e fibromialgia, viene trasportata dal 118 con diagnosi di STEMI anteriore, a 3 ore circa dall'inizio della sintomatologia tipica presso il PS della nostra AO. Ha praticato in ambulanza ASA 250 mg ev e carico di Ticagrelor 180 mg.
All'arrivo in ospedale, l'ECG mette in evidenza sopraslivellamento del tratto ST da V2 a V5, con presenza all'esame ecocardiografico di acinesia dell'apice, con spessori conservati e conservata funzione di pompa del ventricolo sinistro.
Viene indirizzata direttamente all'esecuzione in urgenza di esame coronarografico; all'esame angiografico risulta una dissezione dell'arteria discendente anteriore medio-distale, per la quale si decide di non procedere ad angioplastica, dati la normalizzazione dell'ecg, la stabilità clinica ed emodinamica, così come indicato dalle linee guida

internazionali. Nei giorni successivi la paziente ricoverata in UTIC resta stabile, asintomatica per angor, proseguendo la doppia antiaggregazione e la terapia anti-ischemica. Alla stabilizzazione dell'evento acuto, la paziente viene trasferita dalla UTIC al reparto subintensivo, dove in seconda giornata presenta nuovo episodio di angor con sopraslivellamento del tratto ST in campo anteriore ed ST sopraslivellato di circa 1 mm in DII DIII ed aVF.
Si decide quindi di sottoporre nuovamente la paziente ad esame coronarografico, che conferma la dissezione al tratto distale dell'IVA, e mette alla luce una disomogeneità al tratto distale del tronco comune con interessamento del ramo circonflesso fino al tratto medio. Per meglio definire la situazione coronarica, si esegue IVUS per meglio valutare la lesione del tronco comune, verso il ramo circonflesso e verso l'arteria interventricolare anteriore, riscontrando presenza di importante ematoma intramurale limitante flusso in alcuni segmenti coronarici.
Si effettua, dunque, angioplastica di biforcazione con switch da accesso radiale 6F a femorale 7F, impiantando stent medicato TC-IVA-ramo diagonale e tre stent medicati in overlap dall'ostio (TAP technique) al tratto medio-distale del ramo circonflesso, ottimizzando il risultato con kissing balloon finale.
Inoltre data l'occlusione dell'IVA, si impiantato tre stent medicati in overlap (reverse TAP con ramo diagonale con kissing balloon finale) e si effettua POBA con pallone di piccole dimensioni del tratto distale.
La paziente viene dimessa dopo ulteriori 5 giorni dalla procedura di rivascolarizzazione e viene programmato nuovo accesso a 5 mesi per controllo coronarografico, che dimostra la pervietà degli stent precedentemente impiantati in TC-IVA-D1-Cx, ma evidenzia un importante decorso intramiocardico, con la presenza di un bridge non visibile durante le procedure eseguite in acuto, verosimilmente alla base della dissezione coronarica.

### A537: IMPACT OF STRUCTURAL FEATURES OF VERY THIN STENTS IMPLANTED IN UNPROTECTED LEFT MAIN OR CORONARY BIFURCATIONS ON CLINICAL OUTCOMES

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**Introduction.** The clinical impact of structural features of very thin coronary stents implanted on unprotected left main (ULM) or coronary bifurcation is still unsettled.
**Methods.** All consecutive patients enrolled in the RAIN (veRy thin stents for patients with left mAIn or bifurcatioN in real life) registry were included. The following stent structural features were studied: antiproliferative drugs (everolimus vs. sirolimus vs. zotarolimus), strut material (platinum chromium vs. cobalt chromium), polymer (bioresorbable vs. durable), number of crowns (<8 vs. ≥8) and number of connectors (<3 vs. ≥3). For small diameter stents (≤2.5 mm), struct thickness (74 vs. 80-81 μm) was also tested. Target lesion failure (TLF), a composite of target lesion revascularization and stent thrombosis was the primary endpoint. Its components and major adverse cardiovascular events (MACE, a composite of death, myocardial infarction and TLR), were the secondary endpoints. Multivariable analysis was performed with Cox regression models.
**Results.** Out of 2707 patients, 110 (4.1%) experienced a TLF event after a median 16- month (12-18) follow-up. After adjustment for confounders, ≥3 connectors (adj-HR 0.62, 95% CI 0.39-0.99, p=0.04) reduced risk of TLF, driven by the subset of patients treated with ≥2.5 mm diameter (HR 0.54, 95% CI 0.32-0.93, p=0.02). Among stents with <2.5 mm diameter, lower struct thickness reduced TLF occurrence (adj-HR 0.17, 95% CI 0.03-0.84), translating into improved MACE rate (adj-HR 0.44, 95% CI 0.21-0.94). Conversely, no independent relationship of polymer type, number of crowns and the specific limus-family eluted drug with outcomes was found.
**Conclusion.** Among a range of contemporary very thin stent models, a higher number of connectors and reduced strut thickness improved device-related outcomes, in the investigated high-risk procedural setting.

## MALATTIE CARDIOVASCOLARI NELLA DONNA
## Sessione Orale

### A538: UNIVENTRICULAR HEART WITH FONTAN CIRCULATION AND PREGNANCY

Laura Orrù (a), Assunta Merola (a), Monica Urru (a), Ramona Stara (a), Federica Scano (a), Enrica Marini (a), Michela Congia (a), Andrea Marini (a), Alessandra Cadoni (a), Donatella Manca (a), Sabrina Montis (a), Roberto Tumbarello (a)
(a) PEDIATRIC CARDIOLOGY AND CONGENITAL HEART DISEASES SAINT MICHAEL HOSPITAL BROTZU CAGLIARI

Women with congenital heart defects, thanks to diagnostic and therapeutic advances can reach fertile age and have a pregnancy: someone with a cardiovascular risk comparable to the general population, others with serious sequelae at high risk of maternal-fetal complications.
Patients with univentricular heart and Fontan circulation are included in the World Health Organization (WHO) pregnancy risk class III, having a significant increase in the risk of maternal morbidity and mortality. In these women, in fact, the atrium and the single ventricle have limited ability to adapt to haemodynamic changes, leading to the worsening of a possible cyanosis, acute heart failure and thromboembolism.
**Case report.** S.P., affected by tricuspid atresia, underwent surgical palliation at 11 years old through Fontan procedure with a fenestrated extra-cardiac conduit. A few years later the fenestration was closed with a percutaneous device.
She attended our outpatient clinic according to a regular six-months follow-up. At 20 years old the cardiac magnetic resonance (MRI) showed an ejection fraction (EF) of 67% and normally functioning Fontan circuit. Dynamic 24 hours ECG showed frequent ventricular ectopic beats, sometimes in short non-sustained runs (max 9 beats), hence Bisoprolol was prescribed.
At 19 years old she had unplanned pregnancy interrupted with miscarriage at 10$^{th}$ week. At 26 years old she had a new unplanned pregnancy and came to our attention at week 6$^{th}$. The medical therapy included acetylsalicylic acid, an ace-inhibitor (ACE-I) and Bisoprolol. The ACE-I was immediately discontinued and Bisoprolol was replaced with Metoprolol. The echocardiography showed a single left ventricle with EF of 60% and normal diastolic function, a rudimental right ventricle and a large interventricular septal defect, a mild mitral regurgitation and a normally functioning Fontan circuit.
During pregnancy the patient underwent clinical and echocardiographic monitoring every 2-3 weeks, monthly dynamic ECG and fetal echocardiography with evidence of clinical and instrumental stability: fetal growth charts were at low limits but constant in progression.

Even without contraindications for the vaginal delivery, after multidisciplinary discussion and considering the patient's desire, a caesarean section was planned for the 39$^{th}$ week and was performed without complications. The patient was monitored in ICU for 24 hours after delivery, there were no arrhythmic events. A slow hydration was started to maintain the cardiac output. The patient was always in good clinical and hemodynamic compensation. The echocardiographic check after delivery was stable.
The management of pregnancy in women with complex congenital heart defetcs must be multidisciplinary to minimize maternal risks and ensure fetal well-being. The complexity of some cardiac defects requires the collaboration between pediatric cardiologists, gynecologists, obstetricians, psychologists, geneticists, cardiac surgeons and anesthesiologists in all the phases from conception to childbirth.

### A539: MANAGEMENT OF PREGNANCY AND DELIVERY IN WOMEN WITH HEART DISEASES: A SINGLE CENTRE EXPERIENCE

Elettra Pomiato (a), Maria Antonia Prioli (a), Giovanni Zanconato (b), Costanza Muraro (b), Valentina Benetti (a), Stefania Milesi (d), Giulia Poretti (c), Mara Pilati (a), Camilla Sandrini (a), Flavio Ribichini (a)
(a) DIVISION OF CARDIOLOGY, AOUI VERONA, UNIVERSITY OF VERONA, VERONA, ITALY; (b) DIVISION OF OBSTETRICS AND GYNECOLOGY, AOUI VERONA, UNIVERSITY OF VERONA, VERONA, ITALY; (c) DIVISION OF CARDIAC SURGERY, AOUI VERONA, UNIVERSITY OF VERONA, VERONA, ITALY; (d) DIVISION OF ANESTHESIA AND INTENSIVE CARE, AOUI VERONA, VERONA, ITALY

**Background.** Pregnancy in women with congenital heart disease is becoming nowadays more frequent, but many concerns still remain about safety of the pregnancy for the mother and her baby.

**Material and methods.** We collected grown-up congenital heart disease women who had experienced one or more pregnancies, followed or referred at our Center between 2004 and 2018. Different pregnancies in the same woman were treated as independent events. The population was divided according to mWHO classification. We analyzed outcome of pregnancy, cardiovascular complications of the mother during it, time and mode of delivery, obstetric events and offspring outcome.

**Results and discussion.** 178 pregnancies occurred in 104 women at our GUCH-Unit. Mean age at delivery was 32 years. In 94 (90.4%) women the defect was discovered before pregnancy, in 10 women (9.6%) it was discovered during (5; 4.8%) or after (5; 4.8%) the pregnancy. Baseline mWHO Class was I in 58 (32.6%) pregnancies, II in 43 (24.2%) pregnancies, II-III in 60 (33.7%), III in 17 (9.5%) pregnancies. Cardiovascular maternal adverse events, obstetric events, rate of C-section, mean duration of pregnancy, offspring complications for each mWHO Class are resumed in Table 1. On the basis of the raising of cardiac complications according to mWHO Class, we divided the pregnancies in 2 subgroups: Group 1 encompassed mWHO I and II; Group 2 comprehended mWHO II-III and III. OR with confidence interval at 95% of cardiovascular maternal adverse events, obstetric events, rate of C-section, offspring complications are shown in Table 2. In our population the raise of mWHO Class matched with statistically significant raise of cardiovascular events and of C-sections. Abortions, obstetric and offspring complications were more frequent in more elevated mWHO Classes but the difference was not statistically significant.

**Conclusion.** Pregnancy in women with congenital heart disease is possible and is generally well tolerated for both the mother and the baby, but a clear pre-conceptional counselling before gestation and regular multidisciplinary risk-assessments during pregnancy are essential.

Table 1

| | CV N (%) | OBS N (%) | ABORTIONS N (%) | C-SECTION N (%) | DURATION (g.w.) M (SD) | OFFSPRING N (%) | BABY WEIGHT (g) M (SD) |
|---|---|---|---|---|---|---|---|
| mWHO I (58) | 8 (5,3) | 1 (0,7) | 5 (2,8) | 18 (11,8) | 39 (2,6) | 16 (10,5) | 3206 (472) |
| mWHO II (43) | 14 (9,2) | 1 (0,7) | 7 (3,9) | 15 (9,9) | 38 (1,6) | 14 (9,2) | 2965 (549) |
| mWHO II-III (60) | 20 (13,2) | 3 (2) | 11 (6,1) | 33 (21,7) | 38 (2) | 23 (15,1) | 2977 (587) |
| mWHO III (17) | 9 (5,9) | 2 (1,3) | 3 (1,7) | 12 (7,9) | 36 (2) | 7 (4,6) | 2423 (540) |
| p | < 0,01 | 0,22 | 0,47 | < 0,01 | - | 0,29 | - |

Table 2

| | CV | OBS | ABORTIONS | C-SECTION | OFFSPRING |
|---|---|---|---|---|---|
| OR (GROUP 2 VS GROUP 1) | 2,6 | 3,75 | 1,64 | 4,24 | 1,79 |
| CI95% | 1,30-5,18 | 0,70-19,98 | 0,71-3,80 | 2,11-8,50 | 0,92-3,46 |

Legend: CI95% = confidence interval at 95%; CV = cardiovascular maternal events; g = gram; g.w. = gestational week; GROUP 1 = mWHO I and II; GROUP 2 = mWHO II-III and III. M = mean; N = number of subjects; OBS: obstetrical complications; OFFSPRING: fetal and neonatal adverse events; OR = odds-ratio; SD = standard deviation

### A540: LEFT BUNDLE BRANCH BLOCK AND LEFT VENTRICULAR DYSFUNCTION AS AN EXPRESSION OF COMPLEX CORONARY ANOMALY IN A YOUNG WOMAN: A MULTIMODALITY IMAGING APPROACH

Andrea Bernardini (a), Giulia Pontecorboli (b), Eg Milano (d), Nicole Ceschia (a), Nazario Carrabba (b), Manlio Acquafresca (c), Renato Valenti (b), Niccolò Marchionni (b), Rossella Marcucci (a), Carlo Di Mario (b)
(a) UNIVERSITY OF FLORENCE, ITALY; (b) CARDIOVASCULAR AND THORACIC DEPARTMENT, UNIVERSITY HOSPITAL CAREGGI, FLORENCE, ITALY; (c) RADIOLOGY DEPARTMENT, UNIVERSITY HOSPITAL CAREGGI, FLORENCE; (d) UCL INSTITUTE OF CARDIOVASCULAR SCIENCE, LONDON, UK

**Clinical presentation.** A 34 year old female patient was referred to our hospital after a cardiology screening visit before sport activity, where the EKG showed an incomplete Left Bundle Branch Block (LBBB). She was a moderate smoker, without familiar history of cardiovascular disease, asymptomatic for angina and palpitation but she reported in the previous two years asthenia and dyspnea on exertion (NYHA II). Transthoracic echocardiography revealed a slightly dilated left ventricle (end-diastolic diameter 56 mm), mild LV systolic impairment (EF 50%) with a LBBB-related septal dyssynchrony and a moderate mitral regurgitation (MR). As the patient reported an episode of fever and sore throat two months before, the suspicion of myocarditis was raised. Cardiac Magnetic Resonance (CMR) was requested for further assessment.

**Diagnostic techniques and their most important findings.** CMR cine images showed LV dilatation, mild LV systolic impairment (EF 51%), thinning and ipokinesia of the LV anterior wall; T2-weighted images did not show myocardial edema; sub-endocardial late gadolinium enhancement (LGE) was detected in the LV anterior, lateral and septal walls, involving the anterior papillary muscle; CMR confirmed the prolapse of the posterior mitral leaflet associated to moderate MR. Furthermore, the CMR examination revealed an ectasia of the right coronary artery (RCA) with collateral branches for the left anterior descending artery (LAD). As a consequence, we decided to perform a Coronary Computed Tomography Angiography (CCTA), which showed the origin of LCA from the pulmonary artery trunk. Therefore, a diagnosis of Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA) was made; the ectatic RCA (max diameter of 8mm) gave epicardial and septal collateral branches to the LAD. A surgical correction of the coronary anomaly was planned and executed using a median sternotomy approach: the ostium of the LCA was closed and on-pump coronary artery bypass grafting with a Left Internal Mammary Artery graft to LAD was performed. Postoperative course was uneventful; pre-discharge echocardiography showed a moderate pericardial effusion not hemodynamically relevant, substantially unchanged LV systolic function and a reduced mitral regurgitation, assessed of mild degree. Of note, the incomplete LBBB disappeared on the EKG. At 12-month follow up, the patient was asymptomatic, with good functional status (NYHA I). A repeated CMR showed substantially unchanged findings, with persistence of mild systolic impairment (EF 48%), ipokinesia of the LV anterior wall, sub-endocardial LGE of the LV anterior, lateral and septal walls, and a persistently reduced MR, assessed of mild degree.

**Conclusions.** Cardiology screening before sport activities can unmask high-risk conditions for sudden cardiac death as ALCAPA. A multimodality advanced cardiovascular imaging approach appears to be the best strategy to identify high-risk features of coronary artery anomaly.

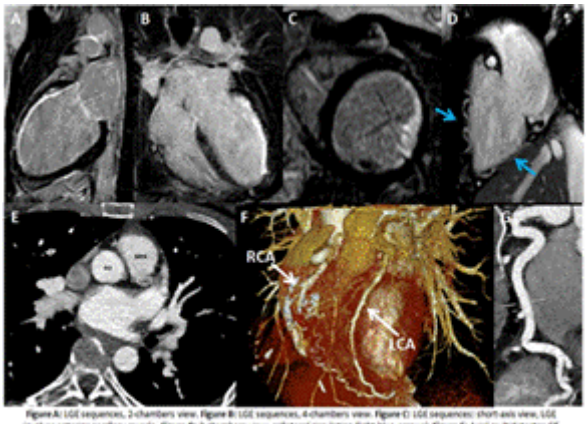


Figure A: LGE sequences, 2-chambers view. Figure B: LGE sequences, 4-chambers view. Figure C: LGE sequences: short-axis view, LGE involves anterior papillary muscle. Figure D: 2-chambers view, collateral circulation (light blue arrows). Figure E: Axial multidetector CT angiogram shows the origin of the left coronary artery form the main pulmonary artery (MPA). Figure F: 3-D rendering of multidetector CT angiogram wich shows the origin of the right coronary artery (RCA) and the left coronary artery (LCA). Figure G: CT image of a dilated RCA.

### A541: RIGHT VENTRICULAR AND LEFT ATRIAL FUNCTION AND DIMENSIONS IN UNCOMPLICATED TWIN PREGNANCIES: A SPECKLE TRACKING ANALYSIS

Edoardo Sciatti (a), Rossana Orabona (b), Federico Prefumo (b), Enrico Vizzardi (a), Ivano Bonadei (a), Andrea Dell'aquila (a), Marco Metra (a), Antonio Pinna (c), Rino Bellocco (c, d), Tiziana Frusca (b, e)
(a) DEPARTMENT OF CARDIOLOGY AND CARDIOVASCULAR DISEASES, UNIVERSITY OF BRESCIA, ITALY; (b) DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, UNIVERSITY OF BRESCIA, ITALY; (c) DEPARTMENT OF STATISTICS AND QUANTITATIVE METHODS, UNIVERSITY OF MILANO-BICOCCA, MILAN, ITALY; (d) DEPARTMENT OF MEDICAL EPIDEMIOLOGY AND BIOSTATISTICS, KAROLINSKA INSTITUTET, STOCKHOLM, SWEDEN; (e) DEPARTMENT OF OBSTETRICS AND GYNECOLOGY, UNIVERSITY OF PARMA, ITALY

**Objectives.** During pregnancy profound hemodynamic changes occur. There is scarce information available about maternal right ventricular and left atrial dimensions and function during twin pregnancies The aim of this study is to investigate longitudinal changes in maternal right ventricular (RV) and left atrial (LA) dimensions and function in a series of women carrying uncomplicated twin pregnancies, compared to singleton ones, and whether they depend on twin pregnancy and/or weeks' gestation.

**Methods.** In this prospective longitudinal study, women with uncomplicated twin pregnancies underwent transthoracic echocardiography at first (T1), second (T2) and third trimesters (T3). The findings were compared to those of women with uneventful singleton pregnancies. RV systolic and diastolic function parameters were assessed by means of traditional echocardiography and tissue Doppler imaging. LA dimensions were calculated. Speckle-tracking imaging was applied to evaluate RV global longitudinal 2D strain and LA 2D strain at LV end-systole ($LA_S$) and at atrial contraction ($LA_A$).

**Results.** 30 women with twin gestations and 30 controls during their singleton uneventful pregnancies were obtained for analysis. FAC, TAPSE and sPAP were similar between the two groups. In singletons, TAPSE and basal IVA had a significant trend to increase from T1 to T3. E, A, E/A, DT, E/E', MPI and IVCT were almost stable during gestation, both in twin and in singleton pregnancies. E' increased and A' decrease significantly from T1 to T3 in the two groups. IVRT had a significant trend to decrease in twins. LA dimensions significantly increased from T1 to T3

in both groups. RV longitudinal 2D strain and LA strains did not varied during twin or singleton pregnancies except for $LA_A$ at T1 which is greater among twins.
**Conclusions.** In twins, right ventricle and left atrium don't seem to undergo more significant changes than in singletons, being characterized by similar RV systolic and diastolic function, LA dimensions and strains. Basal IVA seems to depend on twin pregnancy and weeks' gestation.

### A542: ARTERIAL STIFFNESS ASSESSED BY GLOBAL PULSE WAVE VELOCITY IN POSTMENOPAUSAL WOMEN AFFECTED BY HYPERTENSION AND/OR METABOLIC SYNDROME

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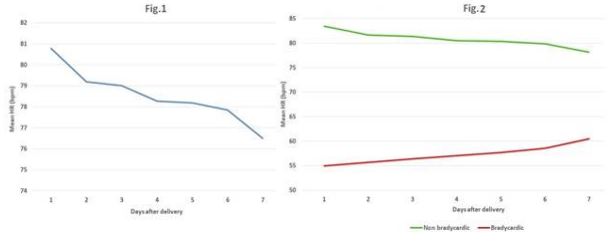
(a) ASL BR, CARDIOLOGY EQUIPE, BRINDISI DISTRICT, BRINDISI; (b) SECTION OF CARDIOVASCULAR DISEASE, DETO, BARI UNIVERSITY, BARI

**Objectives.** The aim of our study is to assess the prevalence of arterial stiffness, a parameter recommended by ESC Hypertension Guidelines since 2007, but still underused, in a population of hypertensive postmenopausal women, with and without metabolic syndrome (MetS), with and without cardiac organ damage, to identify subject with high cardiovascular risk.
**Methods.** We enrolled 5.827 consecutive patients, 5170 were hypertensive (88.7%) and 657 (11.3%) were affected by metabolic syndrome (MetS) a cluster of risk factors associated with increased cardiovascular morbidity and mortality. Diagnosis of hypertension was made according to 2018 European Guidelines for the treatment of high blood pressure and diagnosis of MetS was done according to the National Cholesterol Education Program Adult Treatment Panel III. Exclusion criteria were ventricular ejection fraction < 45%, coronary, valvular and pericardial disease. All patients were aged 35 to 75 years, data on age, sex, blood pressure and blood test results were collected at baseline, arterial stiffness, assessed by global aortic PWV(gPWV) was measured by PWVg obtained by pulsed Doppler, at the left ventricular outflow tract (LVOT) and at the right common femoral artery.
**Results.** Among 5170 hypertensive women 3148 were affected by hypertensive cardiomyopathy (60.9%), 2022 were not (39.1%), gPWV was increased on 212 (4.1%), 149 were affected by hypertensive cardiomyopathy (70.3%), 63 were not (29.7%). Chi-squared 7.5, Odds ratio 1.5, c.i.95%, p<0.006. Among 657 women with MetS 284 were affected by metabolic cardiomyopathy (43.2%), 373 were not (56.8%), gPWV was increased on 77 (11.7%), 58 were affected by metabolic cardiomyopathy (75.3%), 19 were not (24.7%). Chi-squared 36.6, Odds ratio 4.8, c.i.95%, p<0.0000. The prevalence of increased gPWV was statistically significant higher among all women affected by MetS than all women affected by hypertension, Chi-squared 71.8, Odds ratio 3.1, c.i.95%, p<0.0000.
**Discussion and conclusion.** Arterial stiffness assessed by gPWV is an important tool to early identify women prone to organ damage, so with worst prognosis. In our study we find an greater prevalence of increased gPWV among women affected by hypertensive or metabolic cardiomyopathy than women affect by only hypertension or metabolic syndrome respectively. Furthermore there is greater prevalence of increased gPWV among women affected by metabolic syndrome than hypertensive women. Arterial stiffness assessment need to be performed in all postmenopausal hypertensive women as recommended by current ESC hypertension guidelines.

### A543: EVALUATION OF MATERNAL HEART RATE DURING THE FIRST WEEK POSTPARTUM WITH WEARABLE DEVICE

Elisa Gherbesi (a), Mattia Squillace (a), Cecilia Gobbi (a), Marco Schiavone (a), Giovanni Malanchini (a), Benedetta Castelli (a), Roberta Famiani (a), Dauphine Zippo (a), Manuela Wally Ossola (a), Carla Bonanomi (a), Federico Lombardi (a)
(a) UNIVERSITÀ DEGLI STUDI DI MILANO

**Background.** Throughout pregnancy and puerperium significant cardiovascular changes occur. Maternal heart rate (HR) increases from the first to the third trimester of pregnancy, with a further increase during labor. Changes in the postpartum period are less well defined, in particular, the phenomenon of postpartum maternal bradycardia (PMB).
**Purpose.** To describe the distribution of HR in the first week postpartum, the incidence of PMB and to investigate the relationship between PMB and other maternal factors.
**Methods.** Women who gave their informed consent during a clinical evaluation in the third trimester of pregnancy, and delivered at our Institution between 01/01/2018 and 30/09/2018, were included. Within 12 hours from delivery, a wrist-worn tracker with a light-emitting diode (FitBit Alta HR) was applied and then removed one week postpartum. Data were extracted as 5 minutes recordings, each showing a mean HR. Only day-time recordings were considered. PMB occurred when the ratio bradycardia recordings (mean HR<60 bpm)/all recordings was >0.6. SPSS was used for the statistical analysis.
**Results.** 252 women were included (age 35.3±5 years, BMI 23.3±5 kg/m2). 63% of women underwent caesarean section. Mean HR on day 1 after delivery was 80.7±11 bpm and then progressively decreased, with a mean HR on day 7 of 76.5±12 bpm (figure 1). 24 women developed PMB, with an incidence of 9.5%. The trend of HR in bradycardic women was opposite to that of non-bradycardic women, with an increase from day 1 (55±7 bpm) to day 7 (60.5±9 bpm) (figure 2). Device recordings during the first two days were compared with manual recordings and data agreed. No bradycardic woman experienced syncope or pre-syncope or required treatment. PMB showed a positive correlation with caesarean section vs. vaginal delivery (p<0.01) and maternal age (p<0.05). No correlation was found with BMI and postpartum haemoglobin.




**Conclusion.** In our population the incidence of PMB identified with wearable device was 9.5% and was associated with caesarean section and maternal age. Considering that HR returned within normal limits 7 days after delivery and no woman was symptomatic, our study suggest that PMB could be considered a benign entity.

## BIOLOGIA CELLULARE E MOLECOLARE IN CARDIOLOGIA
## Sessione Orale

### A544: EFFECTS OF PRESSURE OVERLOAD BY TRANSVERSE AORTIC COSTRICTION ON GUT MICROBIOTA COMPOSITION

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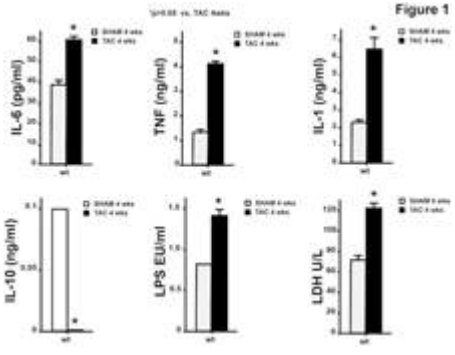
**Introduction.** Recent studies have shown that gut microbiota plays a critical role in the pathophysiology of cardiovascular disease. Changes in the composition of gut microbiota associated with specific diseases can have impact on host and disease progression.
**Purpose.** The purpose of study is to highlight the complex interplay between microbiota, their metabolites, and the development and progression of pathological hypertrophy induced by pressure overload.
**Methods.** In order to do so, pathological hypertrophy was induced by transverse aortic constriction (TAC) in mice. Sham-operated (SHAM) mice were used as controls. Before the surgery, after one-week (1wk) and four-weeks (4wks) TAC or the SHAM operation, all mice have been anesthetized, cardiac function analyzed, and a library of feces sample were generated. Microbial DNA was extracted from feces sample. Gut microbiota has been evaluated through high-resolution sequencing by Illumina Mi-Seq analysis. Bioinformatic analyses were carried out to identify intestinal populations. Circulating levels of Interleukin-6 (IL-6), Tumor Necrosis Factor-alpha (TNF-alpha), Interleukin-10 (IL-10), Lypopolisaccaride (LPS) and Lactic Dehydrogenase (LDH) were measured using commercially available ELISA kits.
**Results.** Compared to SHAM, TAC mice showed a marked increase in LV mass and a significant reduction in LV function, as shown by increased LV weight to body weight (BW) ratio (LVW/BW), and decreased percent fractional shortening (FS%). One week (1w) and four weeks (4w) after TAC, mice displayed significant changes of fecal microbiota composition compared to SHAM. Actinobacteria, Bacteroidetes, Firmicutes and Proteobacteria were the most abundant bacterial phyla



detected in both groups. Pressure overload induced a significant increase in Actinobacteria Phylum after 1 wk and 4 wks and significant increase TM7 Phylum after 1wk. Significant differences in fecal microbiota composition at genus level for Bifidobacterium, Latobacillus, Turicibacter, and Oscillospira after 1 wk and 4wks compared to basal condition (SHAM) were also observed. Compared to SHAM, 4wk TAC mice showed significant increases of circulating pro-inflammation cytokines IL-6, TNF-alpha, IL-1, LPS and LDH and a significant decrease of the anti-inflammation cytokine IL-10 (Figure 1).
**Conclusions.** This work demonstrates that profound changes in gut microbiota occur in response to pressure overload induced by transverse aortic constriction. These modifications might be involved in the development of pathological hypertrophy and progression towards heart failure.

### A545: EMPAGLIFLOZIN REDUCES SENESCENCE OF CARDIAC STROMAL CELLLS IN HIGH-GLUCOSE CULTURE CONDITIONS

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(a) INSTITUTE OF CARDIOLOGY, UNIVERSITY OF PISA, PISA, ITALY; (b) CENTER OF AGING SCIENCES AND TRANSLATIONAL MEDICINE - CESI MET, "G. D'ANNUNZIO" UNIVERSITY, CHIETI-PESCARA, CHIETI, ITALY

**Background.** Empagliflozin (E), a sodium-glucose co-transporter type 2 (SLGT2) inhibitor, reduces heart failure (HF) and sudden cardiac death in diabetic patients, but underlying mechanisms for these effects remain elusive. Cardiac stromal cells (CSC) are a heterogeneous cell population with supportive and paracrine functions. The cross-talk between cardiomyocytes and CSC plays a critical role in maintaining normal cardiac function. This can be hampered by the senescence of CSC due to metabolic and biophysical insults, such as in the presence of high glucose and related hyperosmolar stress, which can compromise cardiac function, favoring HF.
**Hypothesis and aims.** We hypothesized that E could counteract CSC senescence in diabetic-like culture conditions, which could positively influence cardiac function in patients with diabetic cardiomyopathy.
**Methods.** CSC were isolated from murine hearts biopsies through the cardiosphere (CSp) formation technique, and incubated for 48 hours with 5.5 mmol/L glucose (normoglycemia, basal), high glucose (12-5 and 30.5 mmol/L, HG) or a hyperosmolar control (mannitol 7.0 and 25 mmol/L, HM) in the presence or absence of E (100 nmol/L). The senescent CSC status in the presence or absence of HG and HM was verified by β-gal staining.
**Results.** At baseline and in HG/HM culture conditions CSC expressed SGLT1 and SGLT2 at immunoblotting. Compared to incubations with normal glucose, incubations with HG and HM reduced CSp yield from cardiac biopsies and significantly increased the β-gal-positive CSC (Figure 1). This was accompanied by a downregulation of the phosphorylated levels of the pro-survival marker AKT, while increasing the phosphorylated levels of pro-inflammatory and pro-apoptotic p38 MAPK. Pre-incubation with E effectively attenuated the effects of HG but not HM on CSp yield and CSC senescence (Figure 1), and attenuated the effects of HG and HM on the expression of pAKT and P-p38.
**Conclusions.** E counteracts the pro-senescent effect of HG on CSC by increasing CSp yield and inducing a peculiar gene expression program, leading to pro-survival molecular signatures. These direct pleiotropic effects may help explaining E unexpected benefits on cardiac function in patients with diabetes, as observed in the EMPA-REG trial.

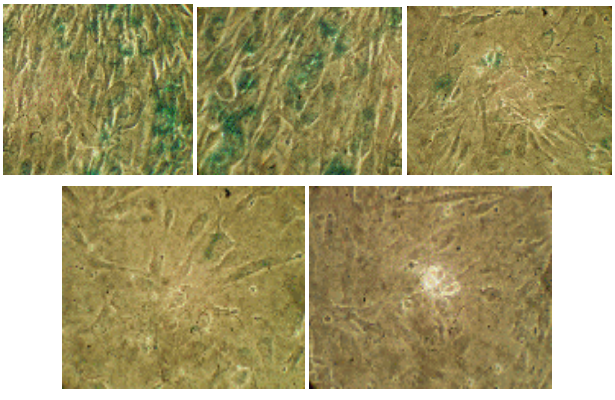

**Figure 1.** β-gal staining of cardiac stromal cells under normal glucose (NG), high glucose (HG) and high mannitol (HM) in the presence or absence of Empagliflozin (E).

### A546: MYOCARDIAL TISSUE AND CIRCULATING MICRORNAS TO RECOGNIZE ARRHYTHMOGENIC CARDIOMYOPATHY PHENOTYPIC COMPLEXITY

Maria Bueno Marinas (a), Rudy Celeghin (a), Marco Cason (a), Riccardo Bariani (a), Anna Chiara Frigo (a), Barbara Bauce (a), Gaetano Thiene (a), Cristina Basso (a), Kalliopi Pilichou (a)
(a) DIP. SCIENZE CARDIO-TORACO-VASCOLARI E SANITÀ PUBBLICA, UNIVERSITÀ DI PADOVA

**Background.** Arrhythmogenic cardiomyopathy (AC) is a rare inherited cardiac disease with 50% of patients harbouring single or compound heterozygous mutations in genes encoding mostly for desmosomal proteins. Low and age-dependent penetrance of pathogenic mutations as well as phenotypic and genetic heterogeneity are making diagnosis challenging. MicroRNAs have emerged as promising, non-invasive biomarkers, but their role in disease onset and progression remains still unclear.
**Methods.** The study cohort includes 76 AC probands, 17 asymptomatic genotype-positive AC family members (gen+phen-), 28 healthy controls and 40 probands affected by other inherited cardiomyopathies (dilated – DCM, hypertrophic – HCM). MiRNA profiling was carried out in parallel on the right myocardial tissue of AC heart-transplanted patients and on the blood sample of AC patients fulfilling Task Force Criteria. Heart-tissue and blood samples common findings were investigated in a larger cohort of 60 gen+ and gen- AC patients; 20 healthy subjects; 17 gen+phen- AC family members and 40 HCM and DCM index patients. ROC curve and multiple logistic regression analysis were used for the statistical study.
**Results.** Heart tissue and blood profiling showed in common 10 differentially expressed (DE) miRNAs. Among which miR-122-5p, miR-133-3p, miR-133b, miR-182-5p and miR-183-5p were found DE significantly on the entire AC cohort with 96.67% sensibility and 100% specificity (AUC 0.995). This 6-miRNA set was tested also on HCM and DCM probands and gen+phen- family members showing its discriminatory power in identifying AC patients compared to these groups (AUC – 0.804, 0.917, 0.0.825). *In silico* analysis predicted this 6-miRNA panel to target AC-related signalling pathways (Adherens junction, Hippo and TGFβ signalling pathways).
**Conclusions.** An altered miRNA expression profile was found both in myocardial heart-tissue and blood samples of AC probands, suggesting that changes on heart-tissue may be reflected on the bloodstream by release/absorption of these small regulatory molecules. This unique 6-miRNA panel exhibited a great discriminatory diagnostic power for AC patients and showed a direct link to AC-related signalling pathways.

### A547: MECHANICAL LOADING REGULATES CARDIOMYOCYTES PROLIFERATION IN ENGINEERED HEART TISSUES

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**Introduction.** Mammal cardiomyocytes (CMs) lose their proliferative capacity early after birth acquiring an adult phenotype characterized by an organized sarcomeric structure, among others features. Neonatal hearts are subjected to a sudden increase in mechanical loading that may contribute to switch mammal CMs phenotype from neonatal proliferative to adult postmitotic.
**Hypothesis.** This study will test the hypothesis that variations of mechanical loading may regulate proliferation and maturation of cardiomyocytes in an engineered heart tissue model (EHT).
**Methods.** EHT were generated using neonatal rat heart cells and subjected to a 48h pulse of BrdU between 48 hours and 28 days post-casting, a window that corresponds to EHTs maturation. Mechanical unloading was performed by reducing the distance between the silicon posts that anchor the extremities of EHTs while the afterload was increased by changing Young's module of posts with metal braces.
**Results.** After an initial increase in the percentage of $BrdU^+$ CMs early after EHT casting, similarly to what is observed in mouse neonatal hearts, CM DNA synthesis progressively decreased becoming negligible at day 28. Interestingly, the decrease of $BrdU^+$ CMs was accompanied by a progressive increase of binucleated cardiomyocytes. The increase of binucleated CMs corresponds to the beginning of a coherent and spontaneous contractile activity of EHTs that occurs around day 13, suggesting that the increasing force of contraction required may represent the trigger to switch from a pro-proliferative state to a mature phenotype. In line with our hypothesis, mechanical unloading of developed EHTs significantly increased the percentage of $EdU^+$ mononucleated CM (2,6% ± 0.94% vs. 5,2% ± 0,2%) while an increase in afterload produced a higher degree of sarcomeric organization and a reduction of proliferating CMs (1,8% ± 0,5%).
**Conclusions.** Our data indicate that EHTs may represent a valuable model to study post-natal cardiac biology and support the hypothesis that indicate mechanical loading as a master regulator of cardiomyocytes proliferation and maturation. Ongoing experiments are aimed at identifying the mechanisms that regulate this process.

### A548: DANNO DA ISCHEMIA E RIPERFUSIONE: MODULAZIONE DEL DANNO CON TICAGRELOR E INIBITORE SPECIFICO DELL'INFLAMMASOMA NLRP3

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**Introduzione.** Gli antagonisti del recettore P2Y12, incluso il Ticagrelor, sono abitualmente somministrati in pazienti con sindromi coronariche acute. È noto dalla letteratura che l'inibizione del recettore P2Y12 è in grado di esercitare un'azione protettiva contro il danno da ischemia riperfusione (I/R) attraverso un meccanismo mediato dalle piastrine. Recentemente, il nostro gruppo ha dimostrato il ruolo chiave della via dell'inflammasoma NLRP3 nel danno da I/R.
In questo studio abbiamo voluto verificare se l'inibizione selettiva dell'inflammasoma NLRP3, mediante INF4E, eserciti degli effetti additivi sulla protezione miocardica indotta dall'antagonista del recettore P2Y12 Ticagrelor.
**Materiali e metodi.** Il Ticagrelor (150 mg $kg^{-1}$) è stato somministrato per via orale in ratti Wistar maschi per tre giorni consecutivi. Al termine del trattamento, i cuori sono stati isolati e sottoposti a un protocollo di I/R (30min/60min). Nei cuori di animali pretrattati o meno con Ticagrelor, l'inibitore selettivo dell'inflammasoma NLRP3, INF4E (50 μM) è stato infuso prima dell'I/R. Un altro protocollo comparativa prevedeva il trattamento di cuori isolati trattati *ex vivo* sia con il solo Ticagrelor (3.70 μM prima dell'ischemia) che in co-infusione con INF4E e successivamente sottoposti a I/R.
Al termine della riperfusione, è stata valutata l'area d'infarto (IS) mediante la tecnica del nitro-blu-tetrazolio. L'IS è stata espressa in percentuale rispetto della massa totale ventricolare sinistra (LVM). I campioni di ventricolo sinistro dei gruppi sperimentali sono stati utilizzati per le successive analisi di western blotting al fine di andare ad indagare il coinvolgimento delle chinasi della protezione e dei componenti del NLRP3.
**Risultati.** Il trattamento *in vivo* con Ticagrelor ha ridotto significativamente l'IS (49±3% LVM, p<0.05 controllo I/R) rispetto al gruppo I/R di controllo (65±3% LVM). Allo stesso modo, la somministrazione acuta *ex-vivo* di INF4E ha comportato una significativa riduzione della IS (42±6% LVM, p<0.05 controllo I/R). La somministrazione *ex-vivo* del Ticagrelor non ha ridotto l'IS mentre la co-infusione con INF4E ha determinato una riduzione significativa (p<0.05 Ticagrelor *ex vivo*) della sua estensione. Dati preliminari hanno mostrato che non si osservano effetti sinergici quando il Ticagrelor viene co-somministrato con INF4E prima dell'induzione dell'ischemia, infatti il gruppo Ticagrelor *in vivo*+INF4E presenta un effetto cardioprotettivo additivo ma non statisticamente significativo.
Analisi preliminari di biologia molecolare dimostrano che i trattamenti del Ticagrelor *in vivo* e dell'inibitore INF4E aumentano l'attivazione delle chinasi della via RISK e mentre riducono l'espressione di componenti dell'NLRP3 quali caspasi1 e formazione stessa del complesso NLRP3.
**Conclusioni.** L'inibitore NLRP3 è protettivo quando somministrato in cuori isolati, suggerendo che l'inflammasoma si trova principalmente nel tessuto cardiaco anche in assenza della componente ematica. Al contrario, Ticagrelor induce cardioprotezione quando somministrato *in vivo*, indicando che il suo meccanismo non è a livello cardiaco ma all'interno della componente ematica, come riportato anche in letteratura. Tuttavia, la co-infusione dei due inibitori ha dimostrato al momento un effetto sicuramente cardioprotettivo ma non sinergico.

### A549: CARDIAC MIR-124 REGULATES MITOCHONDRIAL FITNESS AND INTRACELLULAR CALCIUM LEAK IN HEART FAILURE

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Substantial evidence implies that microRNAs (miRNAs) play a pivotal role in cardiovascular disease and heart failure (HF). Intracellular calcium leak via type 2 ryanodine receptor (RyR2) is a well-known feature of HF. However, the exact functional contribution of miRNAs to the regulation of intracellular calcium leak in HF has not been established.
Our hypothesis is that specific miRNAs can modulate the expression of proteins involved in the regulation of intracellular calcium leak via RyR2 in HF. To test this hypothesis, we measured circulating and tissue levels of a panel of miRNAs identified via bioinformatic approaches in mice undergoing coronary artery ligation or sham surgery and we tested both *in vivo* and *ex vivo* (in primary isolated adult cardiomyocytes), the miRNA-mediated regulation of intracellular calcium leak via RyR2.
Through computational analysis we identified several miRNAs targeting RyR2 and its regulatory subunits. In our *in vivo* experiments, we observed a significant upregulation of both circulating and cardiac miR-124-3p in HF mice compared to sham littermates. Combining bioinformatic evaluations and biological validations via luciferase assays, we demonstrated that miR-124-3p specifically targets FK-506 binding protein 12.6 (FKBP12.6), a fundamental stabilizer of RyR2 channel, which reduces intracellular calcium leak. Importantly, cardiac and circulating levels of miR-124-3p were inversely associated with myocardial function (assessed via both echocardiography and hemodynamic studies), and directly correlated with intracellular calcium leak measured in isolated cardiomyocytes (calcium sparks). Strikingly, the specific inhibition of miR-124-3p rescued the intracellular calcium leak observed in HF, reduced mitochondrial calcium overload, attenuated mitochondrial dysfunction/dysmorphology and oxidative stress, and ameliorated contractility.
Taken together, our data indicate for the first time that miR-124 is a crucial regulator of FKBP12.6, leading to a destabilization of RyR2 and subsequent intracellular calcium leak in post-ischemic HF. Of note, the increased intracellular calcium leak via RyR2 triggered mitochondrial calcium overload and mitochondrial dysfunction in HF, and these features were rescued by inhibition of miR-124-3p. These findings are highly relevant also in the clinical scenario since miR-124-3p has been recently associated - albeit the underlying molecular mechanisms have not been defined - with a significantly increased risk of cardiovascular disease and with poor outcome in patients admitted to cardiac intensive care.

## VALUTAZIONE FUNZIONALE DELLA STENOSI CORONARICA
## Sessione Orale

### A550: QFR PREDICTS THE INCIDENCE OF ADVERSE EVENTS DURING LONG-TERM FOLLOW-UP IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY FOR SUSPECTED CHRONIC CORONARY ARTERY DISEASE. FEASIBILITY AND REPRODUCIBILITY OF THE METHOD

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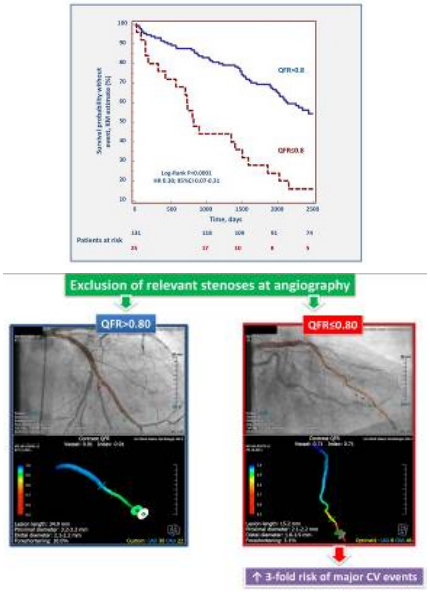
**Background.** Quantitative flow ratio (QFR) allows calculating fractional flow reserve from coronary angiography without need of an intracoronary wire. We set out to evaluate feasibility and reproducibility of post-hoc QFR measurements and their prognostic predictive power during long-term follow-up.
**Methods and results.** QFR could be measured in 71% of the left anterior descending (LAD) coronaries, 72% of the circumflex (LCX) coronaries, and 61% of the right (RCA) coronaries, for a total of 156 patients without angiographic significant stenosis underwent coronary angiography for clinical reasons. Three certified investigators independently analyzed each vessel. The coefficients of variation were 2.1% for RCA and LCX, and 2.8% for the LAD (quartile coefficients of dispersion respectively 1.5, 1.4, and 1.3). A QFR value ≤0.80 was recorded in 25 patients (74% of the cases LAD). A total of 86 major adverse cardiac (death, myocardial infarction or revascularization) and cerebrovascular events were observed at a median follow-up of 2334 [1846-2580] days in 76 patients. In Cox regression analysis, the presence of QFR≤0.80 in at least one of the three vessels was the strongest predictor of events (HR 3.14, 95%CI 1.78-5.54, p =0.0001). This association was maintained in several sensitivity analyses.



**Conclusions.** The reproducibility of QFR measurements is acceptable, even when the analysis is performed post-hoc. A pathological QFR is not rare in patients with intermediate stenosis which were judged not relevant at angiography. QFR measurements are potent predictors of incident events during long-term follow-up.

### A551: IMPACT OF AGE ON THE FUNCTIONAL EVALUATION OF INTERMEDIATE CORONARY STENOSES WITH INSTANTANEOUS WAVE-FREE RATIO (IFR) AND FRACTIONAL FLOW RESERVE (FFR)

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**Introduction.** Functional assessment of coronary stenoses has become a central concept for the guidance of percutaneous coronary interventions. However, the optimal strategy for assessing the ischemic significance of intermediate coronary stenoses is still debated, with adenosine-induced Fractional flow reserve (FFR) and instantaneous wave-free ratio (iFR) representing the most applied techniques. Recent concerns have been raised on the potential role of age in conditioning the coronary flow and vasodilatory response, therefore potentially affecting the measurement of FFR and iFR and leading to the underestimation of severe coronary lesions. However, few studieshave assessed so far the impact of advanced age on the measurement of FFR and iFR, that was therefore the aim of our study.
**Methods.** We included patients undergoing coronary angiography and FFR assessment for intermediate (40 to 70%) coronary lesions. FFR measurement was performed by pressure-recording guidewire (Prime Wire, Volcano Imaging System Philips Healthcare, USA), after induction of hyperemia with intracoronary boli of adenosine (from 60 to 1440 µg, with dose doubling at each step). iFR was automaticallycalculated at the core laboratory using the manufacturers' dedicated software.
**Results.** We included 148 patients undergoing FFR measurement of 166 coronary lesions. Among them, 45.3% were aged ≥ 70 years. Elderly patients were more often females (p=0.04), with higher rates of renal failure (p<0.001) and use of calcium channel blockers (p=0.03) and lower active smokers (p=0.006) body weight (p=0.02) triglycerides and hemoglobin (p=0.005). Angiographic features of target lesions were comparable but for a higher minimal lumen diameter (MLD) in patients ≥ 70 years (p=0.03). We observed a linear relationship between iFR and FFR (baseline and after hyperemic stimulation with adenosine), that was maintained in both patients < and ≥ 70 years of age. A total of 33 lesions displayed a positive iFR with no difference according to age (17.3% vs 22%, p=0.56) while FFR < 0.80 was observed in 37 lesions (23.4%) with a non-significantly lower rate in advanced age (17.1% vs 34.8%, p=0.02). In fact, the values of iFR were not related with age, whereas the FFR values were higher among elderly patients, with a linear relationship between FFR and age being confirmed with increasing dosing of adenosine boli.
Our results were confirmed after correction for baseline differences and when considering separately patients according to MLD.
**Conclusions.** In patients undergoing functional assessment of intermediate coronary stenoses, the good correlation between iFR and FFR was not affected by age. However, the rate of significant coronary lesions detected by iFR was significantly lower than with FFR, especially among younger patients. Advanced age was associated with a reduced vasodilatory response to adenosine and higher FFR values, whereas affecting to a lesser extent the measurement of iFR. Future large scale studies are certainly needed to define whether iFR should be preferred above FFR in elderly patients and to define its prognostic role in this special higher risk subset of patients.

### A552: CORONARY ARTERY BYPASS GRAFTING OR FFR-GUIDED PCI IN DIABETIC PATIENTS WITH MULTIVESSEL DISEASE

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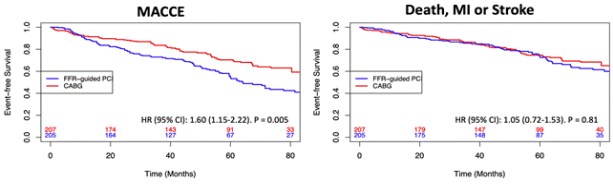
**Background.** In diabetic patients with multivessel coronary disease (MVD), coronary artery bypass grafting (CABG) has shown long-term benefits over percutaneous coronary revascularization (PCI). Nevertheless, the impact of fractional flow reserve (FFR)-guided PCI on clinical outcomes has never been investigated in these patients.
We aimed to evaluate long-term clinical outcomes of diabetic patients with MVD treated with FFR-guided PCI compared to CABG.
**Methods**. From 2010 to 2018, 4622 diabetic patients undergoing coronary angiography in our center were screened for inclusion. The inclusion criterion was presence of at least two-vessels CAD defined as with DS ≥ 50%, in which at least 1 intermediate stenosis (DS 30-70%) was treated or deferred according to FFR. To account for confounders, we compared outcomes through inverse probability of treatment weighting (IPTW). The primary endpoint was major adverse cardiovascular and cerebrovascular events (MACCE), defined as all-cause death, spontaneous MI, revascularization and stroke.
**Results.** A total of 418 patients were included in the analysis. Among them, 209 patients underwent CABG and 209 FFR-guided PCI.
Clinical follow-up was obtained in 99% of the patients at a median follow-up of 5 years. The incidence of MACCE was higher in the FFR-guided PCI vs. the CABG group (44.5% vs. 31.9%. HR [95% CI] 1.60 [1.15-2.22]; p = 0.005). No difference was found in the composite of all-cause death, MI or stroke (28.8% vs. 27.5%. HR [95% CI] 1.05 [0.72-1.53]; p = 0.81). Revascularization was more frequent with FFR-guided PCI vs. CABG (24.9% vs. 8.2%. HR [95% CI] 3.51 [1.93-6.40]; p < 0.001).
**Conclusions.** In diabetic patients with MVD, CABG was associated with a lower rate of revascularization. No difference between CABG and FFR-guided PCI was observed in all-cause death, spontaneous MI, or stroke at 5-year follow-up.




### A553: VALORE PROGNOSTICO DELL'ANALISI QFR APPLICATA DOPO EFFICACE ANGIOPLASTICA CORONARICA: LO STUDIO INTERNAZIONALE MULTICENTRICO HAWKEYE

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**Obiettivo.** Investigare il potenziale ruolo dell'analisi QFR (Quantitative Flow Ratio) dopo l'angioplastica coronarica come predittore di eventi in pazienti sottoposti ad efficace rivascolarizzazione percutanea.
**Background.** Il ruolo prognostico dell'analisi QFR eseguita immediatamente dopo l'angioplastica coronarica non è ancora stato indagato prospettivamente.
**Metodi.** Erano arruolabili nello studio pazienti sottoposti a rivascolarizzazione coronarica mediante angioplastica e posizionamento di stent. Al termine della procedura venivano acquisite le due proiezioni angiografiche necessarie all'esecuzione dell'analisi QFR e le analisi venivano successivamente eseguite offline da un core-lab indipendente. L'endopoint primario scelto nello studio è rappresentato da un endpoint composito orientato al vaso (vessel-oriented composite endpoint - VOCE) comprendente la morte cardiovascolare correlata al vaso, l'infarto miocardico correlato al vaso e la rivascolarizzazione del vaso target guidata dall'ischemia.
**Risultati.** Sono stati analizzati 751 vasi in 602 pazienti. Il valore mediano della QFR post-angioplastica è stato 0.97 [0.92-0.99]. Lesioni localizzate sull'arteria discendente anteriore, il SYNTAX score basale, la lunghezza della lesione e il diametro della stenosi post-angioplastica sono stati individuate come predittori di bassi valori di QFR post-angioplastica. Al follow-up sono stati evidenziati 77 eventi in 53 (7%) vasi trattati. I valori di QFR post-angioplastica erano significativamente più inferiori nei vasi in cui si sono verificati gli endpoint rispetto agli altri vasi (0.88 [0.81-0.99 vs. 0.97 [0.93-0.99], p<0.001, rispettivamente). Mediante la curva ROC è stato individuato il miglior cut-off di QFR post angioplastica come ≤0.89 (AUC 0.77, 95%CI 0.74-0.80, p<0.001). Dopo correzione di eventuali fattori confondenti, tale valore è stato associato ad un aumento di 3 volte del rischio di VOCE (HR 2.91, 95%CI 1.63-5.19, p<0.001).
**Conclusioni.** Bassi valori di QFR dopo efficace rivascolarizzazione percutanea predicono successivi eventi avversi.

### A554: INSTANTANEOUS WAVE-FREE RATIO (IFR) VERSUS NON-INVASIVE STRESS IMAGING TO DETECT MYOCARDIAL ISCHAEMIA

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(a) AZIENDA OSPEDALIERO-UNIVERSITARIA PISANA, U.O. EMODINAMICA; (b) AZIENDA OSPEDALIERO-UNIVERSITARIA PISANA

**Objectives.** This study evaluates the correlation between myocardial ischemia detected by non-invasive stress imaging (stress echocardiography and/or myocardial perfusion scintigraphy) and instantaneous wave-free ratio (iFR) values in patients with chronic coronary syndrome (CCS) or low-risk acute coronary syndrome without ST segment elevation (NSTEAC).
**Background.** New guidelines underline the importance of non-invasive stress imaging for the diagnosis, risk stratification and to guide coronary revascularization. However, non-invasive stress imaging can underestimate the number of ischemic territories in patient with

multivessel disease. Furthermore, in real life, a significant number of patients with suspect CAD gets to cath-lab without a non invasive stress test. Fractional flow reserve (FFR) is an accurate and specific index to detect the hemodynamic significance of intermediate stenosis, but adenosine can be contraindicated or give collateral effects. Instantaneous wave-Free Ratio (iFR) is a new invasive method to evaluate hemodynamic impact of the coronary stenosis without the use of adenosine. We hypothesized that iFR can help the operator to better characterize the functional importance of the stenosis and then guide the revascularization.
**Methods.** In 71 patients (52 males, 19 females, mean age 68,4 ± 8 years) with suspected CCS or NSTEAC with almost a non-invasive stress imaging (exercise, dobutamine or dypiridamole stress echocardiography and/ dypiridamole or excercise myocardial perfusion scintigraphy) underwent coronary angiography. For intermediate stenosis (40%-90%) iFR was performed. For stenosis > 90% iFR was considered <0,89.
**Results.** 121 vessels were studied: iFR was <0,89 in 63 vessels (52%). IN 72 (59,5%) cases the stenosis was between 50% and 75%, while in 54 (44,6%) cases stenosis was >75%. At angiography, 3 (4%) patients had no stenosis, 25 (35%) had one-vessel disease, 26 (37%) had two-vessel disease and 17 (24%) had three vessel disease. According to stress imaging results, 10 (14%) were negative, 48 (68%) had one territory, 13 (18%) had two territories and no patients had 3 territories disease. With iFR, 27 (38%) patient had no significant stenosis, 23 (32,4%) had one vessel disease, 10 (14,1%) had two vessel disease and 11 (15,4%) had three vessel disease. Relation between iFR and ischemic territories were evaluated for each vessel. Concordance between iFR and stress test was seen in 68 (56%) territories of the 121 analyzed: in 38 (31,5%) positive concordance, while in 25 (20,7%) negative concordance was found. In 28 (23,1) cases iFR was negative while non ischemic stress imaging was positive and in 25 (20,7%) cases iFR was positive while stress test imaging negative. There was poor concordance between the two methods to detect myocardial ischemia, especially in patients with multivessel disease (k = 0,121).
**Conclusions.** Especially in patients with multivessel disease, iFR and non-invasive stress imaging have poor concordance. iFR can help to better estimate the functional importance of intermediate coronary stenosis and, then, guide myocardial revascularization on a per-vessel analysis.

### A555: IMPACT OF AGEING ON THE HYPEREMIC EFFECT OF ADENOSINE FOR THE ASSESSMENT OF THE FRACTIONAL FLOW RESERVE (FFR)

Rocco Gioscia (b), Monica Verdoia (a, b), Matteo Nardin (b, c), Federica Negro (b), Francesco Tonon (b), Iacopo Casella (b), Marco Marcolongo (a), Giuseppe De Luca (b)
(a) DIVISION OF CARDIOLOGY "OSPEDALE DEGLI INFERMI", ASL BIELLA, ITALY; (b) DIVISION OF CARDIOLOGY, AZIENDA OSPEDALIERA-UNIVERSITARIA "MAGGIORE DELLA CARITÀ", EASTERN PIEDMONT UNIVERSITY, NOVARA, ITALY; (c) INTERNAL MEDICINE, ASST SPEDALI CIVILI, UNIVERSITY OF BRESCIA, BRESCIA, ITALY

**Introduction.** Functional assessment of coronary stenoses is crucial for determining the correct therapeutic strategy. Age-related modifications in cardiovascular function could alter the functional significance of an intermediate coronary lesion. Aim of the present study is to investigate the impact of age on fractional flow reserve (FFR) measurements in patients with intermediate coronary artery disease.
**Methods.** We included patients, undergoing coronary angiography at our Division of Cardiology from June 2008 to February 2019 for elective indication or acute coronary syndrome and receiving fractional flow reserve assessment for intermediate coronary stenosis (angiographic 40 to 70% stenosis). FFR measurement was performed by pressure-recording guidewire (Prime Wire, Volcano Imaging System Philips Healthcare, USA), after induction of hyperemia with intracoronary bolus of adenosine (from 60 to 1440µg, with dose doubling at each step).
**Results**. We included in our study 276 patients, undergoing FFR evaluation on 314 lesions, that were divided according to age (< or ≥ 70 years). Among them we observed significant differences in terms of weight ($p < 0.001$), hypertension ($p = 0.03$), active smokers ($p < 0.001$), diabetes mellitus ($p = 0.01$), renal failure ($p < 0.001$), ca-antagonists ($p < 0.001$), diuretics ($p = 0.002$), hemoglobin ($p < 0.001$), platelet count ($p = 0.03$), HDL-Cholesterol ($p = 0.017$), triglycerides ($p = 0.007$), diastolic blood pressure ($p < 0.001$), heart rate ($p = 0.009$). We found higher FFR values and lower delta FFR and time to recovery in patients with age $\geq$ 70 years old, that were significantly different depending on the age at all the different therapeutic steps. However, the percentage of positive FFRs was only slightly lower in advanced age.
**Conclusions.** Our study is one of the first cohorts of patients where we investigated the impact of age on the measurement of FFR. Patients with age > 70 years old with intermediate CAD are more likely to have higher FFR values and lower duration of hyperemia after adenosine bolus, as compared with younger patients.

## IMAGING - 4
## Sessione Orale

### A556: UN RARO CASO DI DISFUNZIONE DI BIOPROTESI TRICUSPIDALICA: APPROCCIO DIAGNOSTICO E TERAPEUTICO

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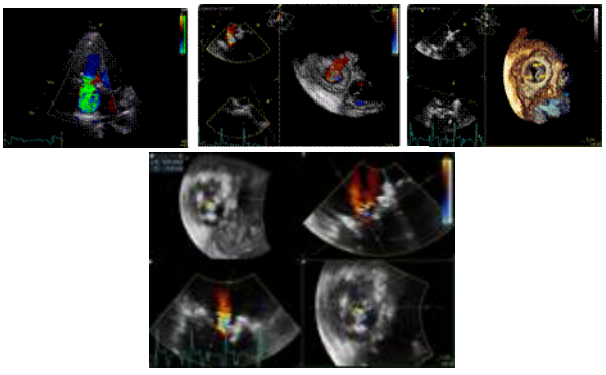
**Introduzione.** Il trattamento chirurgico delle malattie della valvola tricuspide consiste nella maggior parte dei casi in interventi di tipo riparativo ed è spesso associato alla correzione di valvulopatie delle sezioni sinistre. La sostituzione della valvola tricuspide isolata per malattia primitiva è rara ed i dati relativi alla frequenza di disfunzione nel follow-up sono pochi. I meccanismi alla base della disfunzione di bioprotesi consistono solitamente nella degenerazione delle cuspidi associata a formazione di panno, di trombi e/o vegetazioni che compromettono il loro normale funzionamento. Il caso clinico che riportiamo è quello di una disfunzione di bioprotesi tricuspidalica con insufficienza valvolare severa verificatasi a distanza di circa un anno e mezzo dal suo impianto.
**Caso clinico.** Una giovane donna di 29 anni, ex tossicodipendente, è giunta alla nostra osservazione per comparsa da circa un mese di dispnea da sforzo. La paziente, circa 18 mesi prima, era stata sottoposta a sostituzione valvolare con bioprotesi (Edwards Perimount n° 27) per insufficienza tricuspidalica severa da endocardite batterica. L'intervento era stato complicato da sviluppo di blocco atrio-ventricolare avanzato per cui era stato impiantato un pacemaker epicardico. Il controllo ecocardiografico pre-dimissione, in tale occasione, aveva mostrato una bioprotesi normofunzionante. Al momento della nostra valutazione si riscontravano parametri vitali nella norma, assenza di segni clinici di congestione polmonare e sistemica; i recenti esami ematobiochimici (comprensivi di indici di flogosi) portati in visione erano normali e l'ECG risultava invariato rispetto ai precedenti (ritmo indotto da PMK). La paziente inoltre riferiva di non aver avuto recenti episodi influenzali né febbrili e confermava di non aver più fatto uso di sostanze stupefacenti. L'ecocardiogramma transtoracico rilevava una bioprotesi tricuspidalica con conservata mobilità della cuspide settale ma grave compromissione delle escursioni sisto-diastoliche delle altre due cuspidi, con incremento dei gradienti diastolici atrio-ventricolari (gradiente medio 9 mmHg) ed evidenza al color-Doppler di insufficienza di grado severo costituita da un jet prevalente intraprotesico e da un sospetto jet periprotesico settale. Il ventricolo destro è risultato dilatato ma con conservata contrattilità globale (FAC 54%). La stima della pressione arteriosa sistolica polmonare ed i restanti reperti ecocardiografici sono risultati nei limiti della norma. Veniva dunque posta diagnosi di disfunzione della bioprotesi tricuspidalica con insufficienza intraprotesica di grado severo e sospetto di iniziale distacco dell'anello. Per una migliore definizione anatomica della disfunzione protesica si è proceduto ad eseguire ecocardiogramma transesofageo 2-3D che ha mostrato un anello protesico ben deterso, privo di distacchi, cuspidi ispessite con marcata ipomobilità della cuspide anteriore e posteriore responsabile di mancata coaptazione sistolica, conseguente insufficienza intraprotesica di grado severo (EROA 3D 0,6 cmq e vena contracta 9 mm) ed una significativa riduzione dell'area di apertura pari a 1,2 cmq. L'esame ci ha infine permesso di escludere la presenza di eventuali immagini riferibili a vegetazioni e/o fenomeni trombotici. Inoltre, per la persistenza di dispnea associata a riscontro di saturimetria dell'ossigeno ai limiti bassi della norma è stata eseguita angio-TC del torace risultata positiva per embolia polmonare di un ramo distale dell'arteria polmonare destra. Nel sospetto di disfunzione protesica su base trombotica è stata intrapresa terapia anticoagulante orale con inibitore del fattore Xa della coagulazione ed è stato programmato stretto follow-up clinico ed ecocardiografico. Al primo controllo eseguito circa un mese dopo l'inizio del trattamento con NAO, l'ecocardiogramma transtoracico ha mostrato una lieve riduzione sia del gradiente medio transprotesico (7 mmHg) che del rigurgito tricuspidalico mentre la paziente riferiva un miglioramento della dispnea.
**Discussione.** Abbiamo descritto un caso di disfunzione di bioprotesi tricuspidalica verificatasi circa 18 mesi dopo l'intervento sostitutivo. Al momento della nostra valutazione abbiamo riscontrato una grave riduzione della mobilità sisto-diastolica delle cuspidi anteriore e posteriore con insufficienza intraprotesica di grado severo associata a stenosi lieve. L'ecocardiogramma transesofageo 2-3D ci ha permesso una migliore definizione anatomica della valvulopatia e soprattutto le elaborazioni tridimensionali sono risultate particolarmente utili per una migliore visualizzazione della protesi destra che, per sede e orientamento spaziale, non sempre risulta perfettamente esplorabile allo studio transesofageo bidimensionale. Il quadro clinico ed ecocardiografico è risultato a nostro avviso compatibile con degenerazione protesica secondaria a formazione di panno fibroso eccedente associato a trombosi, ipotesi che, seppur in assenza di visualizzazione diretta di trombi, è suffragata dal riscontro di diffuso ispessimento delle cuspidi

protesiche, dai reperti dell'angio-TC toracica e dall'iniziale miglioramento dei parametri strumentali e clinici rilevato al primo controllo eseguito dopo l'inizio della terapia antico agulante orale.



### A557: RELATIONSHIP BETWEEN AORTIC DISTENSIBILITY AND AORTIC REGURGITATION ASSESSED BY CMR IN BICUSPID VALVE PATIENTS

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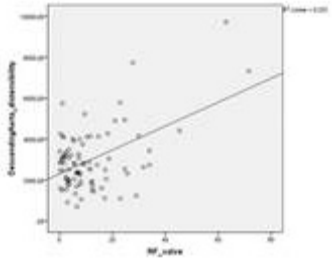
**Background.** The severity of aortic regurgitation can be evaluated with cardiac magnetic resonance (CMR) through calculation of regurgitant fraction (RF) in phase contrast sequences acquired at the aortic root (as close as possible to the aortic valve). However, the impact of aortic distensibility in this evaluation remains unkown.

**Purpose.** The aim of the study was to evaluate the relation between aortic distensibility and RF valve in bicuspid aortic valve patients.

**Methods.** We enrolled bicuspid aortic valve patients without significant aortic stenosis (maximum velocity <2.5 m/s) and connective tissue disease. All patients underwent a CMR study with phase contrast sequences for evaluation of regurgitant fraction at the level of the aortic valve. Aortic regurgitation was considered as mild, moderate or severe depending on RF value (mild <15%; moderate 15-30%; severe >30%). Furthermore we used cine-sequences of aortic root, ascending and proximal descending aorta to estimate aortic diameters and distensibilities, using Art Fun software. Distensibility was calculated as (change in aortic area between systole and diastole/diastolic area)/brachial pulse pressure.

**Results.** A total of 98 bicuspid aortic valve patients were included (30% female, 49.7±14.5 years). 75 (76,5%) AR was mild, 17 (17,4%) moderate and 6 (6,1%) severe. RF valve was significantly correlated with aortic root diameter (r= 0.430 y p<0.001) and aortic distensibility at the level of the ascending (r = 0.273 p =0.016) and descending aorta (r = 0.502 and p< 0.001). Aortic distensibility was positively correlated with RFvalve even after adjustment for aortic diameter (p = 0.002 and p <0.001 respectively). (Table) (IMG).

| AR Severity | mild | moderate | severe |
|---|---|---|---|
| Descending aorta distensibility (mean ± std. deviation) | 2693,68 ±997,5 | 3285,8 ±1952,7 | 5042,99 ±2873,44 |



**Conclusions.** In our study, aortic regurgitation in bicuspid valve patients, evaluated by CMR using RF valve, is related to aortic distensibility. Thus, aortic distensibility should be included in the evaluation of aortic regurgitation by CMR as additional parameter. However, longitudinal studies are needed to evaluate the impact of including aortic distensibility in the evaluation of AR severity by CMR.

### A558: CORONARY INFLAMMATION BY CT PREI-CORONARY FAT ATTENUATION IN MINOCA AND TAKO-TSUBO SYNDROME

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**Background.** Peri-coronary fat attenuation index (pFAI) has emerged as a clinical marker of coronary inflammation, which is measurable from standard coronary CT angiography (CCTA). It compares well with gold-standard methods for the assessment of coronary inflammation and can predict future cardiovascular events. pFAI could prove invaluable to differentiate an inflammatory from non-inflammatory coronary artery status, helping unravel the mechanisms subtending an event classified as myocardial infarction with nonobstructive coronary arteries (MINOCA) or Tako-Tsubo syndrome (TTs).

**Methods and Results.** Patients admitted with MINOCA and TTs diagnosis between 2011 and 2018, who had both CCTA and CMR performed during or shortly after the acute phase, were selected and pFAI measured in their index CCTA; pFAI was also measured in a control subjects who had CCTA for atypical chest pain work-up, no obstructive coronary artery disease found in their CCTA and no cardiac events at a minimum 2-year follow-up. In the n=106 MINOCA/TTs patients selected, mean pFAI averaged for the 3 coronary arteries was -68.37±8.29 vs -78.03±6.20 in the n=106 controls (p<0.0001) and the statistical difference was confirmed also when comparing mean pFAI in each single coronary artery between MINOCA/TTs and controls (p<0.0001). Non-obstructive coronary plaques at CCTA, and high-risk plaques in particular, were also more frequently found (p<0.01) in the MINOCA/TTs group compared with controls.

**Conclusions.** In MINOCA and TTs patients, CCTA is not only able to detect otherwise angiographically invisible atherosclerotic plaques, but its diagnostic yield can be further expanded using the simple off-line measurement of pFAI for the characterization of peri-coronary fat tissue; in MINOCA/TTs mean pFAI clearly demonstrates higher values in comparison with controls, a finding which has been previously associated with coronary artery inflammation. We speculate that this newly-available diagnostic tool in the future may help select patients for new therapies, for example therapies targeting coronary inflammation.

### A559: LEFT ATRIAL REMODELING AFTER MITRACLIP IMPLANTATION

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**Objective.** Changes in left atrial (LA) size and function are associated with major adverse cardiovascular outcomes such as atrial fibrillation, heart failure, stroke, and death. Reverse LA remodelling occurs after successful surgical mitral valve repair and also after transcatheter interventions for severe MR. Changes in LA volumes after MV repair have reported in several studies. However, LA data are limited in the setting of transcatheter repair.

**Materials an methods.** From November 2016 to July 2018, clinical and echocardiographic data of 30 patients with mitral regurgitation who underwent Mitraclip implantation in our division were evaluated for LA function: LA global longitudinal strain (LA GLS); LAESV (Left atrial end-systolic volume), LAEDV (Left atrial end-diastolic volume); LA emptying Fraction at baseline, at 1 month, at 6 months and 1 year of follow up were assessed. The variation of continuous variables was evaluated using a student T test for paired data or the Wilcoxon matched-pair signed rank test when appropriate. The categorical variables between two groups were evaluated using the chi-square test (¬χ2). P values <0.05 were considered significant.

**Results.** The etiology of the mitral regurgitation was primary in 30% and secondary in 70% of the included patients. The MR degree was 3+ in 10 % of patients and 4+ in 90%. When compared to baseline at 6 months and 1 year a statistically significant reduction was observed for both LAESV (*p* 0.007 and 0.001) and LAEDV (*p* 0.018 and 0.003). When compared at 1 year, a significant improvement was observed for LA GLS (*p* 0.03). Finally, we did not find significant differences in LA emptying fraction at different time point analyzed.

**Conclusions.** A successful MitraClip procedure can reverse the process of LA remodeling within 12 months, and this can be detected by Two-dimensional speckle tracking echocardiography (2D STE) through an improvement in LA reservoir function. These data generate the hypothesis that the GLS, compared to conventional echocardiographic parameters, represents an advanced method that quantify atrial function in Mitraclip implanted patients.

### A560: UN COMMENSALE CHE PUÒ DIVENTARE FATALE

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**Introduzione.** I pazienti con protesi valvolari o con difetti riparati con materiale protesico sono considerati ad alto rischio per endocardite infettiva (EI), da linee guida devono effettuare terapia antibiotica profilattica, prima di procedure che comportano la manipolazione del tessuto gengivale o della regione periapicale dei denti.
**Metodi.** Donna di 57 anni, caucasica, eseguiva ecocardiogramma per dispnea ingravescente. Due settimane prima, eseguiva estrazione dentale, ma presentava febbre, assumeva cefalosporina. All'ecocardiogramma si evidenziava verosimile distacco di bioprotesi con insufficienza valvolare moderata-severo da leak periprotesico (antero-mediale) ed era quindi ospedalizzata. Si eseguiva ETE, che confermava la disfunzione valvolare e nel sospetto di EI iniziava terapia empirica con Vancomicina e Ceftriaxone. Viste le emocolture positive per *Streptococcus sanguinis,* si modificava terapia antibiotica con aggiunta di Gentamicina, al posto di Vancomicina. Nonostante ciò, persisteva lo stato febbrile e presentava episodio di insufficienza renale acuta, veniva rimodulata terapia antibiotica (sospeso Ceftriaxone, ridotta Gentamicina, introdotta Daptomicina). Ai controlli ecocardiografici successivi si evidenziava un peggioramento del rigurgito mitralico, riduzione degli indici di funzionalità sistolica ventricolare sinistra (Fe da 50-55 a 45% S), incremento dello spazio ecoprivo in sede antero-mediale, nel sospetto di ascesso periprotesico si eseguiva FDG-PET/CT, con evidenza di captazione a livello dell'aorta ascendente al versante interno a ridosso della protesi. Dopo consulto cardiochirurgico, visto l'elevato rischio operatorio (paziente sottoposta ad un primo intervento nel 1987 per malattia reumatica aortica con impianto di protesi meccanica e nel 2016 a reintervento per disfunzione protesica con impianto di protesi biologica Edward Sapien 26 mm), si decideva di eseguire angioTC, con evidenza di leak paraprotesico e probabile ascesso vicino all'auricola destra e lesione ischemico/embolico della milza.
**Risultati.** All'ispezione chirurgica si evidenziava area ascessuale extra-aortica in comunicazione con l'interno del vaso tramite fistola di circa 1 cm tra ostio coronarico sx e dx, si procedeva pertanto a tentativo di ricostruzione della radice aortica con impianto di root aortico Freestyle, chiusura della cavità ascessuale con doppio patch in pericardio eterologo e riparazione della valvola mitralica per insufficienza severa. il decorso postoperatorio è stato complicato da shock settico non responsivo a inotropi e vasoattivi che ha portato all'exitus.
**Conclusioni.** Streptococcus sanguinis, batterio Gram-positivo, è presente nel microbiota del cavo orale precisamente nella placca dentale. È un batterio opportunista, con capacità di formare biofilm, è agente eziologico delle EI in portatori di protesi cardiache. Dunque il razionale della profilassi antibiotica dell'EI, sviluppatosi sulla base di studi osservazionali è quello di prevenire l'insorgenza di batteriemia transitoria dopo una procedura invasiva e la conseguente adesione di microrganismi alla superficie endocardica, soprattutto nei pazienti ad alto rischio (protesi valvolari o difetti valvolari, pregressa EI, cardiopatie congenite). Rimane centrale l'importanza della gestione delle complicanze relate all'EI, come lo shock settico. Le nuove linee guida impongono un tempestivo supporto con fluidi, tenendo conto dei parametri vitali del paziente, soprattutto della pressione arteriosa.

### A561: EARLY EFFECTS OF CPAP ON ELASTIC AORTIC PROPERTIES

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**Objectives.** Arterial stiffness is related to arterial health status and premature CAD. Its assessment has shown to improve prediction of cardiovascular risk, in addiction to conventional risk factors. Obstructive sleep apnoea-hypopnea syndrome (OSAHS) is a clinical disorder that consists in repetitive episodes of partial and complete obstruction of upper airway during sleep. This pathology increases cardiovascular morbidity and mortality, because it causes temporary elevations in blood pressure, in association with blood oxygen desaturation, arousal and sympathetic activation; furthermore systemic hypoxemia determines oxidative stress and systemic inflammation, which may affect myocardial function. Continuous positive airway pressure (CPAP) is the gold standard treatment for OSAHS. The aim of this study is to investigate the effect of CPAP in patients with OSAHS, but without other cardiovascular risk factor, on elastic properties of ascending aorta, detected by echocardiography.
**Methods.** We evaluated consecutively 100 patients with OSAHS; only 10 of them were without any other cardiovascular risk factor. All of them had preserved ejection fraction on echocardiography. They underwent a transthoracic echocardiography to measure aortic diameters at four levels (sinuses of Valsalva, sino-tubular junction, tubular tract and aortic arch), aortic elastic properties with M-mode imaging, 3 cm above the aortic valve and according to accepted formulas (compliance, distensibility, stiffness index, Peterson's elastic modulus, pulse wave velocity, M-mode strain), tissue Doppler imaging (TDI) to calculate diastolic (E' and A') and systolic (S') velocities, and tissue strain, before and after CPAP treatment.
**Results.** Mean age of patients was 65 ± 8.9 years old, 50% of them where men. The analysis of collected data shows a global improvement of arterial stiffness: after the treatment with CPAP there was a reduction in strain and a trend in augmentation of aortic compliance and distensibility (Table 1).
**Conclusions.** Treatment with CPAP acutely ameliorates arterial stiffness in patients affected by OSAHS.

| Variable | Mean T1 ± SD | Mean T2 ± SD | p-value |
|---|---|---|---|
| Compliance (cm/mmHg) | 0.36 ± 0.21 | 0.45 ± 0.37 | 0.47 |
| Distensibility (10−7 Pa−1) | 152.19 ± 89.85 | 190.93 ± 168.45 | 0.43 |
| Stiffness index | 3.70 ± 0.55 | 3.95 ± 1.71 | 0.52 |
| MM Strain (%) | 4.64 ± 2.84 | 6.36 ± 6.12 | 0.27 |
| PEM (Pa) | 175.96 ± 97.35 | 516.54 ± 847.33 | 0.19 |
| PWV (M/S) | 18.17 ± 5.38 | 19.73 ± 11.73 | 0.60 |
| E' | 5.73 ± 2.48 | 7.29 ± 1.99 | **0.023** |
| A' | 7.09 ± 2.21 | 5.60 ± 1.04 | **0.015** |
| S' | 6.40 ± 1.23 | 7.03 ± 1.13 | **0.007** |
| Tissue strain (%) | -14.24 ± 4.44 | -17.30 ± 4.13 | **0.01** |

## QUANDO IL GIOCO SI FA DURO... CTO ED ANEURISMI CORONARICI
## Sessione Orale

### A562: GIANT CIRCUMFLEX CORONARY ARTERY ANEURYSM TEN YEARS AFTER A BENTALL PROCEDURE

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**Introduction.** Coronary artery aneurysm (CAAs) is defined as a coronary artery dilation exceeding the diameter of normal adjacent segments or the diameter of the largest coronary artery by 1.5 times. The incidence of CAAs varies from 0.3% to 5.3%. Giant coronary aneurysm refers to an aneurysm with a diameter larger than 20 mm and are extremely rare (the incidence of giant CAAs is as low as 0.02%).
**Case report.** A 67-year-old male patient presented to our E.D. with chest pain and dyspnoea. He had a history of hypertension, diabetes, obesity, and dyslipidemia; he had undergone a Bentall procedure for aortic root aneurysm with composite valve graft at the age of 57 years. The coronary angiogram showed an almost normal coronary arteries. During the TRIAGE procedure the 12-lead ECG revealed an infero-posterior STEMI. The patient was immediately brought to our cat lab to receive a coronary angiography that showed an ectatic right coronary artery completely occluded at its middle tract; a primary angioplasty was made on the occluded vessel with optimal success.Thecoronary angiogram also showed a giant aneurysm of the left circumflex coronary artery at its proximal and middle tract, which was oval shaped and almost 40 mm x 60 mm in diameter. Considering the high surgical risk, due to the recent ACS and to the general condition of the patient, we decided not to perform a surgical correction of the aneurysm, managing conservatively with a regular follow up. A coronary computed 3D tomography was also performed to precisely observe the size and the structure of the aneurysm and the relationship with the surrounding structures.The patient was dismissed after a few days with a medical therapy based on Aspirin 100 mg, Clopidogrel 75 mg and oral anticoagulation (Warfarin). After a one year follow up his angiographic condition was remaining stable.
**Discussion and conclusion.** A diagnosis of CAAs is usually very rare and occasional, often made through coronary angiography as an incidental findings (1-4.9% of all coronary angiogram and 1.4% of autopsies) Giant CAAs are even rarer. Atherosclerosis is the main cause of CAAs involving more than 50% of the cases in adults; Kawasaky disease is the second common cause of CAAs in adults, but typically affects children. Inflammatory arterial diseases (like polyarteritis nodosa or Takayasu arteritis), connective tissue disorders, hereditary collagen defects (Marfan or Ehler-Danlos syndrome) or percutaneous coronary intervention, are others possible causes of CAAs. Our case is the first case described in medical literature of aneurismatic evolution of coronaries ten years after a Bentall procedure in a patient with a previous normal coronary angiogram. The patient didn't have a history of Kawasaky disease or inflammatory or connective tissue disorder disease. The natural history and the treatment of giant CAAs still remain unclear;

even if there aren't specific guidelines, surgical repair should be the right strategy, when feasible. However most patients are asymptomatic and if no complications occur (like rupture, progressive enlargement, mechanical interference or compression of surrounding structures) conservative treatments with a regular follow up may be taken into consideration. A non-invasive method, such as a coronary computed tomography, gives us optimal chances to follow the patient and the CAAs evolution with a noninvasive approach, even if the coronary angiography still remains the most recommended procedure.

### A563: STENOSI CORONARICHE CALCIFICHE: DAL ROTABLATOR ALLO SHOCKWAVE

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Le lesioni coronariche calcifiche sono da sempre state una sfida per il cardiologo interventista. Questo caso clinico è caratterizzato dall'utilizzo, in due procedure successive, dell'aterectomia rotazionale e della litotripsia. Un uomo di 67 anni, iperteso, dislipidemico, con insufficienza renale cronica IV stadio, sintomatico per dispnea ingravescente, è giunto alla nostra attenzione per infarto miocardico acuto NSTEMI, complicato da edema polmonare acuto, refrattario alla terapia farmacologica. La coronarografia eseguita in emergenza ha mostrato una malattia ostruttiva critica trivascolare con interessamento del tronco comune; stenosi calcifiche multiple della discendente anteriore; stenosi subocclusiva della circonflessa che si estende al primo grosso ramo marginale ottuso; stenosi significative multiple della coronaria destra. Per dare supporto emodinamico, è stato posizionato un contropulsatore aortico tipo 1:1. La persistenza di un grave stato di insufficienza respiratoria, nonostante l'intubazione oro-tracheale, ha fatto sì che la procedura di rivascolarizzazione coronarica venisse rinviata, in attesa di un miglioramento delle condizioni cliniche. Il giorno successivo è stata eseguita PCI della coronaria sinistra, con aterectomia rotazionale della discendente anteriore, predilatazione della stessa e della circonflessa ed impianto di quattro stent medicati: due in discendente anteriore e tronco comune (con tecnica DK crush) e due dall'ostio della circonflessa verso il marginale ottuso. È stata eseguita anche PCI della coronaria destra con PTCA ed impianto di due stent medicati in overlapping dall'ostio al tratto medio. Ottenuto un buon risultato angiografico finale, data la stabilità emodinamica di fine procedura (PA 145/90 mmHg) è stato rimosso il contropulsatore aortico ed il paziente è stato successivamente dimesso con indicazione ad un periodo di riabilitazione. Circa 8 mesi dopo, un ecocardiogramma ha evidenziato una severa disfunzione ventricolare sinistra ed un brusco calo della LVEF (25%) rispetto al precedente controllo, nonostante una terapia medica ottimale. La coronarografia ha evidenziato una restenosi intrastent all'ostio della circonflessa e buona pervietà degli altri stent precedentemente impiantati. Previo posizionamento per via transfemorale destra del contropulsatore aortico, è stata eseguita PCI della circonflessa. Il difficile wiring della lesione è stato possibile solo con guida Fielder XT –R ed è stato possibile attraversare le maglie dello stent solo con pallone NIC NANO 0,85 mm. Sono state eseguite quindi dilatazioni multiple con palloni di diametro crescente. Data l'elevata componente calcifica della lesione e l'incompleta espansione dello stent all'ostio della circonflessa -verificata con l'insufficiente espansione di un pallone non compliante- è stata eseguita litotripsia intracoronarica della biforcazione con pallone Shockwave erogando 60 impulsi verso la circonflessa e 20 verso la discendente anteriore. A questo punto è stato possibile il trattamento della circonflessa con pallone medicato, ottenendo un buon risultato finale.
Le lesioni coronariche calcifiche non sono più un ostacolo all'angioplastica coronarica, e le strategie di trattamento sono in continua evoluzione: se l'aterectomia rotazionale permette di trattare lesioni calcifiche che sarebbero altrimenti difficilmente crossabili o dilatabili, la litotripsia permette invece il trattamento di calcificazioni concentriche e profonde, difficilmente modificabili dall'aterectomia rotazionale e che in ultima analisi possono causare sottoespansione o malappasizione di stent e quindi restenosi.

### A564: INTRAVASCULAR LITHOTRIPSY: A NOVEL TREATMENT OF CALCIFIC CORONARY ARTERY STENOSIS

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**Background.** Heavily calcified coronary lesions still represent a challenge for coronary angioplasty, with greater risk of immediate complications and late failure due to stent under-expansion and malapposition.
**Aims.** The aim of this study was to evaluate efficacy and safety of intravascular lithotripsy (IVL) in patients undergoing complex percutaneous coronary intervention (PCI) of calcific stenosis.
**Methods and results.** Twenty-nine patients with 31 moderate-severe calcified stenosis were treated with IVL between November 2017 and May 2019, at Careggi University Hospital of Florence. All the procedures were guided by intravascular imaging, IntraVascular UltraSound (IVUS) and Optical Coherence Tomography (OCT). After optimization a satisfactory lumen enlargement (acute gain 1.28 ± 0.46 mm) was observed with good stent expansion (residual area stenosis >20% in 2 lesions, 6.5%). Peri-procedural complications were limited to 1 dissection at the distal edge requiring an additional stenting and 3 peri-procedural myocardial infarctions. There were no in-hospital coronary perforations, no pericardial effusions, no stent failure or thrombosis, no deaths. Clinical outcome was evaluated at 30-days and no rehospitalization for cardiac events occurred (no stent thrombosis, no target vessel revascularization or target lesion revascularization, no myocardial infarction.) Our population was also divided into 2 subgroups depending on the calcium arc measured with intravascular imaging techniques: 20 lesions showed a calcium arc >180° (250° on average) and 11 lesions ≤180° (140° on average). The following stent performance indexes were assessed: minimal lumen area (MLA), residual area stenosis (RAS), incomplete strut apposition (ISA), eccentricity index, symmetry index, strut fracture, and edge dissection. The presence of concentric calcific stenosis was not associated with a higher level of incomplete strut apposition and there were no significative differences in the eccentricity and symmetry index.
**Conclusions.** Heavily calcified coronary lesions will be a growing issue. an approach characterized by multimodality imaging techniques and use of dedicated devices is the keystone to improve patients outcome. Despite the small sample size and short follow-up that could represent a limitation of this study, we can confirm the safety and efficacy of IVL to achieve optimal acute results with PCI of complex calcific coronary stenosis.

### A565: CLINICAL, ANATOMIC AND PROCEDURAL DETERMINANTS OF MID-TERM OUTCOMES AFTER PERCUTANEOUS INTERVENTIONS IN CORONARY BIFURCATIONS

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**Background.** The optimal treatment for lesions located at coronary bifurcations is still debated, as it is associated with worse outcomes compared to the treatment of non-bifurcation lesions. In addition, it is unclear whether the clinical outcomes of percutaneous coronary interventions (PCI) of bifurcations can be modulated by the selection of the stent platform, the deployment strategy and the duration of dual antiplatelet therapy (DAPT).
**Objectives.** To identify the main clinical, anatomic and procedural determinants of mid-term outcomes in patients with a diagnosis of stable coronary artery disease (SCAD) or acute coronary syndrome (ACS) undergoing PCI in bifurcations.
**Methods.** Data were collected on consecutive patients who underwent PCI with drug-eluting stents (DES) on a coronary bifurcation between January 2012 and December 2014 at 17 major coronary intervention centers in Europe and abroad, with the endorsement of the EuroBifurcation Club. The primary endpoint of the study was the cumulative occurrence of Major Adverse Cardiac Events (MACE), defined as a composite of cardiac death, nonfatal myocardial infarction (MI, excluding periprocedural) and definite/probable stent thrombosis (ST) during the follow-up; the secondary endpoints were the single occurrence of death, MI, stent thrombosis and target vessel revascularization (TVR).
**Results.** 5,036 patients were treated on a coronary bifurcation; follow-up at a median 18 months (IQR 11-28) was available for 4,506 patients

(89%). MACE occurred in 395 patients (8.8%): cardiac death in 152 (3.4%), MI in 156 (3.5%) and ST in 110 cases (2.4%). TVR was performed in 262 patients (5.8%). At univariate analysis, prior bypass grafting (P<0.001), left main disease (P<0.05), calcified lesions (P<0.001), SYNTAX score >32 (P<0.05), double stenting (P<0.05), total stent length ≥23 mm (P<0.001) and use of glycoprotein IIb/IIIa (P<0.01) were associated with MACE. At multivariable Cox regression, left ventricular ejection fraction (LVEF) ≤30% (5.18 hazard ratio [HR]; 95% confidence interval [CI] 3.77-7.09, P<0.001), bail-out stenting (beyond a planned strategy of either single or double stenting) (2.21 HR; 95% CI 1.52-3.20, P<0.001), admission for an ACS (1.89 HR; 95% CI 1.51-3.17, P<0.001), age >66 years (1.63 HR; 95% CI 1.29-2.08, P<0.001), multivessel disease (1.58 HR; 95% CI 1.21-2.04; P<0.001) and diabetes (1.46 HR; 95% CI 1.16-1.82, P<0.001) were independently associated with MACE. Sensitivity analysis identified premature DAPT discontinuation before 6 months in patients with SCAD and 12 months in patients with ACS and side branch (SB) lesion length ≥9 mm, more than the sole involvement of both main vessel and SB, as additional independent predictors of MACE.
**Conclusions.** In patients undergoing PCI of a coronary bifurcation, clinical variables, such as older age, diabetes, clinical presentation with an ACS and reduced LVEF are independently associated with MACE. Moreover, multivessel disease, length of the SB lesion, "bail-out" placement of stent beyond planning and premature discontinuation of DAPT are independently associated with adverse events. These findings highlight the importance of a carefully planned PCI strategy in coronary bifurcations and of an adequate adherence to medications with a close clinical follow-up to improve the clinical outcomes in these patients.

### A566: LONG TERM CLINICAL EFFECT OF RECANALIZATION OF CHRONIC CORONARY TOTAL OCCLUSIONS IN PATIENTS WITH LEFT VENTRICULAR SYSTOLIC DYSFUNCTION

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**Background.** Patient selection for percutaneous CTO revascularization according to contemporary knowledge is not yet standardized. In particular, data on outcomes in patients with left ventricular (LV) systolic dysfunction undergoing percutaneous coronary intervention for CTO are scarce. The aim of the present analysis is to to evaluate the impact on long-term cardiac survival and major adverse cardiac events (MACE) in patients with LV systolic dysfunction after CTO attempt.
**Methods.** From a total of consecutive 2421 CTO, 436 patients with at least one CTO and ejection fraction (EF) ≤45%, who were referred for coronary angiography between January 1998 and September 2014, were selected. Patients with successful recanalization of the target CTO were assigned to CTO-R group and those with failed or not attempted recanalization to the CTO-NR group. The primary endpoints include rates of major adverse cardiac events (MACE) (all-cause death, cardiac death or myocardial infarction [MI]), cardiac and total mortality.
**Results.** Out of 436 CTO patients with reduced EF, 228 (52.3%) were successfully recanalized and 208 patients (47.7%) were not, either due to CTO-PCI failure (n=106, 24.3%) or because CTO-PCI was not attempted (n=102, 23.4%). At long-term follow-up, CTO-NR patients had significantly higher rate of overall (p=0.021) and cardiac mortality (p=0.035) compared to those successfully revascularized.
**Conclusions.** In patients with systolic LV dysfunction (EF≤45%), CTO revascularization was associated with significant lower rate of total and cardiac mortality compared to those with non revascularized CTO.

### A567: CORONARY ARTERY ECTASIA AND THE CHALLENGING ANTI-THROMBOTIC THERAPY IN SECONDARY PREVENTION: A CASE REPORT

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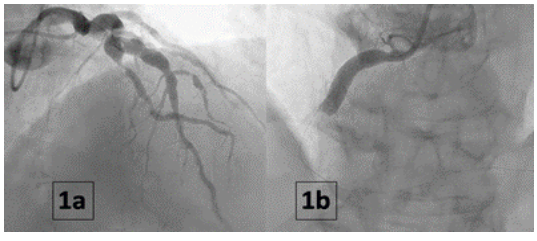
**Introduction.** Coronary artery ectasia (CAE) is a cardiovascular disorder (incidence ranges from 0.3% to 5.0%) frequently associated with coronary artery disease (CAD) and with potential intrinsic higher thrombotic risk. Acute coronary syndrome (ACS) is the initial presentation in 30-50% of cases. Appropriate anti-thrombotic treatment in CAE after ACS remains controversial due to the lack of evidence. Here we present a clinical case exemplifying this therapeutic challenge.
**Case presentation.** A 66-year old man, smoker of 20 cigarettes/die with hypertension and a history of abdominal aortic aneurism repair, presented to our emergency department complaining oppressive thoracic pain started 10 hours before (partial benefit after auto-administration of Nimesulide), with evidence at the 12-lead ECG of ST-elevation in inferior leads. The coronary angiography documented diffuse CAE, with a critical lesion of the distal Cx and a thrombotic occlusion of the medium tract of RCA with collateral circulation supplement (Fig. 1a-1b). The patient (pt) underwent an ineffective attempt of thrombus aspiration and multiple balloon dilatations, with final TIMI 0-1. The procedure was followed by Tirofiban and UFH infusion for 48 hours and a subsequent angiographic control, with evidence of persistence of organized thrombotic occlusion of RCA. Considering the clinical stability (no more episodes of angina, absence of arrhythmic events and heamodynamical stability) and the angiographic evidence of interarterial coronary anastomosis from LAD, it was collegially decided not to treat RCA. Contextually, the patient underwent percutaneous coronary intervention (PCI) + 2 drug eluting stents (DES) on distal tract of Cx. At Cardiac ultrasound LVEF 50%, inferior and posterior-basal akinesia. Mild dilation of the RV, TAPSE 14 mm. Mild MR and TR. The patient was discharged in DAPT with ASA 100 mg/die plus Prasugrel 10 mg/die. 3 months later, the pt presented again to our emergency department for recurrence of oppressive thoracic pain; at the 12-lead ECG evidence of ST-elevation in inferior and right leads. At the coronary angiography, evidence of new significant stenosis of the medium tract of LAD with thrombotic material and unmodified angiographic anatomy of the other coronary arteries. During aspiration of thrombotic material, complete LAD occlusion occurred, treated with PCI + 3 DES. Considering the high atherothrombotic burden in presence of diffuse CAE, it was decided to discharge the patient with an anticoagulant oral therapy (Warfarin) plus DAPT (ASA + Clopidogrel), with reevaluation in outpatient clinic in 6 months.




**Conclusion.** In the presented case, we observed the suboptimal efficacy of DAPT in the secondary prevention of thrombotic events in a patient with CAE. We decided to adopt a triple antithrombotic therapy, as suggested by some reviews based on retrospective data. Nevertheless, further prospective data are necessary to prove the efficacy and safety of this approach.

## LE EVIDENZE CLINICHE: DAL CASO EMBLEMATICO ALLA MEDICINA PERSONALIZZATA
## Sessione Orale

### A568: THROMBUS IN TRANSIT ACROSS A PATENT FORAMEN OVALE IN THE CONTEXT OF A MASSIVE PULMONARY EMBOLISM AT INTERMEDIATE-HIGH MORTALITY RISK NOT RESPONSIVE TO UFH THERAPY: A CASE REPORT.

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**Case description.** A 52-year-old man was admitted to the emergency department with a two-week history of dyspnea and cough. Previously he had been in good health and had not undergone recent surgeries. The patient suffered from visceral obesity and obstructive apneas. The respiratory rate on admission was 24 beats/min and blood pressure 120/80 mmHg, respiratory rate was 33 breaths/min, and oxygen saturation was 93%.
He was apyretic. The physical examination was notable only for diffusely reduced breath sounds mostly at the left apex. The white cells blood count showed a stable leukocytosis with neutrophilia without fever. Other remarkable values were: D-dimer 18000 ng/ml, fibrinogen 545 mg/dl and troponin I value149 ng/L (reference ≤ 12 ng/L). The electrocardiogram showed sinus tachycardia with signs of overload of the right ventricle with inverted T waves in right precordial leads. At blood-gas analysis, there was a hypoxic and hypocapnic respiratory failure. Computed tomography showed a thrombus in both the right and left pulmonary arteries. In the left lung apex, there was a parenchymal thickening attributed to pneumonia. At the trans-thoracic (TT)-echocardiogram there was a moderate dilatation of the right sections and a hypokinetic right ventricle with positive McConnell sign and mild tricuspid insufficiency. In the right atrium, there was an elongated formation of tissue consistency with a probable departure from the interatrial septum. There was a D-shaped left ventricle. As soon as the diagnosis of pulmonary embolism at intermediate-high risk, complicated with thrombus in transit was made, intravenous UFH therapy was started. Serum oncology tests were negative. The screening for thrombophilia was negative. There was a left, deep popliteal and twin veins thrombosis. The trans-esophageal echocardiogram showed a mobile thrombotic mass inserted into the

patent oval foramen (PFO) protruding into both the left and right atrium. At seriated TT-echocardiographic controls, despite the intravenous UFH therapy, the size of thrombotic formation remained stable and the right sections severely dilated. So, the clinical case was referred to the cardiac surgeon who performed surgical embolectomy and the PFO closure. The postoperative course was complicated at first by a severe hypotension refractory to medical therapy, and then by a cardiac tamponade that was resolved with a new cardiac surgery intervention in emergency. In the following five days clinical conditions worsened for pneumonia caused by a multi-resistant Pseudomonas Aeruginosa and subsequent sepsis. The patients developed a multi-organ failure and died.

**Discussion.** An intracardiac thrombus traversing a PFO is a very infrequent but potentially catastrophic complication of thromboembolic disease. The presence of "emboli-in-transit" in the context of a massive pulmonary embolism is extremely rare but life-threatening, it ranges from 4 to 20% despite a PFO is relatively common with a prevalence of 27% in normal adults. The mortality rate of thrombus in transit condition is estimated at 18%. Therapeutic options include thrombolysis, surgical embolectomy, and anticoagulation alone. Since none of them was significantly associated with a reduction in mortality alone, there is no agreement in the optimal management. The review of the literature produced little and inconclusive evidence to support one or another treatment, so we used intravenous UFH therapy because our patient was hemodynamically stable and at intermediate-high risk.

### A569: DURATA E POSOLOGIA OTTIMALI DELLA TERAPIA CON DOACS NEL TROMBOEMBOLISMO VENOSO. STUDIO PILOTA, RETROSPETTIVO DI COORTE

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**Introduzione.** La malattia tromboembolica venosa (TEV), che comprende la trombosi venosa profonda (TVP) e l'embolia polmonare (EP) è una patologia frequente, ad alta mortalità e morbilità. La terapia del TEV viene distinta in tre fasi: una fase acuta relativa ai primi 5-7 giorni dell'evento, una fase di "lungo termine" (dal 5^ al 90^ giorno) ed una fase definita "estesa" di profilassi secondaria che di fatto parte al momento della visita di valutazione di fine terapia antitrombotica (3^-6^ mese). Le modalità di terapia della fase estesa in termini di durata ottimale ed intensità rimangono incerti. L'avvento della terapia con gli inibitori diretti del fattore X e II (DOACs) ha ulteriormente messo in discussione l'approccio alla fase estesa di "profilassi secondaria".

**Obiettivo.** Dimostrare l'efficacia e la sicurezza di un protocollo operativo standardizzato nel determinare la durata e la posologia del trattamento anticoagulante nei singoli pazienti con TEV sulla base della stratificazione dei pazienti secondo un giudizio clinico centrato sul rapporto rischio trombotico/rischio emorragico.

**Materiali e metodi.** Studio retrospettivo, monocentrico. Sono stati considerati eligibili pazienti affetti da TEV valutati presso la SOC di Medicina Cardiovascolare dal Gennaio 2002 al giugno 2017. Criterio di esclusione maggiore: neoplasia attiva. I pazienti sono stati distinti in due coorti: gruppo A pazienti in cui la decisione a proseguire o meno la terapia con DOACs è stata modulata sulla base di una tabella comprendente quattro gradi di rischio di recidiva (basso, moderato, alto e altissimo) e tre gradi di rischio emorragico (basso, moderato, alto). Gruppo B appartenente a gruppo di controllo storico (pazienti arruolati presso il centro di Reggio Emilia negli studi Prolong I, Prolong II, Dulcis e Morgagni) in cui i pazienti a rischio moderato o moderato-alto hanno continuato o meno la terapia con antagonisti della vitamina K (AVK) sulla base dei valori di D-dimero. L' esito principale composito dello studio è costituito dagli eventi tromboembolici venosi recidivi sintomatici o fatali e dagli eventi emorragici maggiori o fatali avvenuti nel periodo compreso fra la visita di fine terapia ed la visita di follow-up del 1^ anno. *Analisi statistica:* le differenze fra le caratteristiche basali dei pazienti sono state valutate con il test chi-quadrato con la correzione di Yates per le variabili categoriali e il t-test o il test di Mann-Whitney per le variabili continue, quando appropriato. Le curve Kaplan-Meyer sono state tracciate per stimare l'incidenza cumulativa del TEV a ricorrente sintomatico e dei sanguinamenti maggiori.

**Risultati.** Sono stati valutati dal Gennaio 2002 al Dicembre 2017 180 pazienti nel gruppo A e 180 pazienti nel gruppo B con TEV e durata minima di TAO/DOACs di tre mesi. Età media 69 anni nel gruppo A e 68 anni nel gruppo B. Maggiormente rappresentate le EP nel gruppo A (25.5%) vs gruppo B (11.7%), p < 0.001. L' estensione della terapia anticoagulante oltre i 12 mesi si è avuta nel 68,9% dei pazienti del gruppo A (90% a posologia ridotta) e nel 51,7% nel gruppo B (p < 0.05). Nei pazienti del 1^ gruppo si sono verificati 2 episodi di TEV (1.1%) entrambi TVP in pazienti in cui era stata sospesa la terapia. Nei pazienti di gruppo B si sono verificati 14 episodi di TEV (7.8%), 12 TVP (6.7% e 2 EP (1.1%). Tutti gli eventi si sono verificati nel gruppo in cui era stata sospesa la terapia. 2 pazienti (1.1%) hanno presentato complicanze emorragiche maggiori nel gruppo A (1 su 9 pazienti in terapia standard = 11.1% e 1 su 115 pazienti in terapia dosaggio ridotte = 0.9%). Nei pazienti del gruppo B si sono verificati 2 (1.1%) episodi di emorragia maggiore entrambi in pazienti che avevano proseguito la terapia con AVK. Pertanto l'esito beneficio netto è a vantaggio del gruppo A (HR = 0.24; IC% 0.17-0.46, p < 0.001).

**Conclusioni.** i dati dello studio pilota orientano verso la possibilità di identificare in modo semplice e su base clinica, al momento della visita di fine terapia un gruppo di pazienti (circa il 35%) in cui si può sospendere la terapia esponendoli a rischio di recidiva del 3.5% e parimenti proseguire la terapia in circa il 65% dei pazienti (di cui 90% con posologie ridotte di farmaco) esponendoli ad un rischio di EM di 1.6% con risultati di real life che in sostanza si allineano ai dati degli studi Amplify Extension (con Apixaban) e Einstein Choice (con Rivaroxaban).

### A570: POCKET HEMATOMA AFTER PACEMAKER/IMPLANTABLE CARDIOVERTER DEFIBRILLATOR SURGERY ACCORDING TO DIFFERENT ANTITHROMBOTIC REGIMENS: A SINGLE CENTRE STUDY

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**Introduction.** Pocket hematoma is a common complication after pacemaker (PMK) or implantable cardioverter defibrillator (ICD) surgery (Chauhan et Al). In this clinical setting anticoagulant and antiplatelet therapy are associated with an increased risk of hemorrhagic complications, but data are sparse. We examined the impact of antiplatelet therapy and anticoagulation with vitamin K antagonists (VKA) or heparin on the risk of pocket hematoma.

**Materials and method.** Between august 2017 and june 2019, a total of 639 devices were implanted or replaced at our centre. Predictors of hematoma occurrence were determined by multivariate regression analysis. We used a specific definition of pocket hematoma: a) any palpable swelling in the pocket area requiring an unscheduled visit or prolonged hospitalization > 24 h or re-hospitalization for hematoma, b) interruption of antithrombotics, c) reoperation, d) hemoglobin drop > 2 g/dl or blood transfusion. The above criteria were assessed during hospitalization and up to 10 days after discharge.

**Results.** The incidence of pocket hematoma was 7.5%. Among 639 pts including in the study 33,5% (214 pts) didn' t take any antithrombotic therapy, 40,2 % (257 pts) were on single antiplatelet therapy (SAPT), 8,8 % (56 pts) were on dual antiplatelet therapy, 11,1 % (71 pts) were on uninterrupted VKA (mean INR 2). Heparin bridging was administered in 6.4% (41 pts). Ejection fraction (43 ±13 %) and hemoglobin value before implantation (12,3 ±2,6 g/dL) in patients who developed hematoma were significantly lower compared with whose without hematoma. Patients with hematoma had a higher prevalence of congestive heart failure, ischemic cardiomyopathy and intake antithrombotic therapy. After adjusting for confounding factors with multivariate logistic regression only the use of dual antiplatelet therapy (OR 5,9 95% CI 1,5-21 p=0,008) and the bridging with enoxaparin (OR 5,6 95% CI 1,4-22 p=0,013) increased the risk of pocket hematoma. Single antiplatelet therapy (OR 2,6 95% CI 0,8-8,4 p=ns) and uninterrupted VKA (OR 0,9 95% CI 0,7-11 p=ns) did not increased the risk of pocket hematoma compared to no antithrombotic therapy. Pulse generator change and new device implant/upgrading (OR 1,8 95% CI 0,6-5,2 p=ns) carried the same haemorrhagic risk.

| | Pocket Haematoma | | P value |
|---|---|---|---|
| | no | yes | |
| Age (y) | 77±11 | 76±12 | ns |
| EF (%) | 48±12 | 42±13 | <0,05* |
| SAPT (%) | 40.5 | 40.4 | ns |
| DAPT (%) | 7.7 | 21.32 | <0,05* |
| VKA (%) | 11 | 14.9 | ns |
| Heparin bridging (%) | 5,8 | 14.9 | <0,05* |
| Any antithrombotic (%) | 65 | 91.5 | <0,05* |
| CHA2DS2VASc ≥2 (%) | 91.7 | 97.9 | ns |
| Congestive heart failure (%) | 24.9 | 48.9 | <0,05* |
| Ischemic cardiomyopathy (%) | 27.4 | 46.8 | <0,05* |
| eGFR < 30 ml/min | 8.7 | 15.6 | ns |

**Conclusion.** The use of DAPT or bridging with enoxaparin are highly predictive for the occurrence of perioperative pocket hematoma in patients scheduled for pmk/icd surgery. In contrast, single antiplatelet therapy and uninterrupted VKA did not increase the risk of hematoma.

### A571: EFFECTS OF PCSK9 INHIBITORS ON CAROTID ATHEROSCLEROSIS

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**Background.** According to Fourier and Odissey trials, proprotein convertase subtilisin/Kexin type 9 (PCSK9) inhibitors, reduce LDL-C in statin-ezetimibe treated patients and improve outcomes of myocardial infarction and stroke. The GLAGOV clinical trial demonstrated that Evolocumab in patients treated with statin therapy had a favourable effect on the progression of coronary atherosclerosis as measured by IVUS reducing LDL-C levels, PAV (percentage atheroma volume) and normalized TAV (Total Atheroma Volume). However, the effects of PCSK9 inhibitors on carotid plaques have not yet been evaluated.
**Objective.** To determine the effects of PCSK9 inhibition with evolocumab and alirocumab on the progression of carotid atherosclerosis in statin-ezetimibe-treated patients. The primary endpoint was the change in mean common carotid intima-media thickness (CIMT). Secondary endpoints were: evaluation of the echogenicity variation of carotid artery plaques according to Johnson classification; evaluation of reduction of LDL-C; adverse events to the therapy.
**Material and methods.** We enrolled 46 patients from the outpatient clinics dedicated to dyslipidemias and ischemic cardiomyopathy. Patients were aged more than 18 years, with CIMT>1.1 mm, affected by Heterozygous Familial Hypercholesterolemia (HeFH) with LDL-cholesterol values > 70 mg/dL in secondary prevention or > 130 mg/dL in primary prevention or affected by non-Familiar Dyslipidemia or Mixed Dyslipidemia in secondary prevention with LDL-cholesterol levels> 100 mg/dL. All patients were on maximum tolerated statin dosage and ezetimibe and treated by evolocumab or alirocumab. Supra-aortic trunks echo-color-Doppler was performed before starting the therapy (time 0), after 6 months and then after 12 months of therapy. Measurement of CIMT was performed on the far wall of the common carotid artery in the centimetre preceding the flow divider. For each carotid plaques PSV (Peak Systolic Velocity), EDV (End Diastolic Velocity) and ICA / CCA PSV ratio were measured. The morphology of the plaques was evaluated and classified, according to the Johnson Criteria. All statistical analyses were performed using the IBM SPSS Statistics 25 software.
**Results.** We observed after 6 months a reduction of right mean CIMT of -0.09 (p=0,000 vs. baseline) and of -0,14 of left CIMT (p=0,008 vs. baseline); the reduction was for right CIMT after 12 months of - 0.16 (p=0,006 vs 6 months) and for left CIMT of -0.15 (p= 0,005 vs 6 months). Between 0 time and 12 months of treatment we observed a reduction of -0,16 (p=0,05) for right CIMT and of -0,18 (p=0,004) for left CIMT. LDL-C levels were reduced from 134 ± 35,73 mg/dL at baseline to 65,61 ± 41,43 mg/dL after 6 months (p=0,000) and to 51,50 ± 18,67 mg/dL after 12 months (p=0,000).Moreover, we observed a progressive "remodeling" of the plaques, modifying from a soft/dense composition to a predominantly fibro-calcific composition (p=0,000 for 0 vs.12 months). No adverse events were observed during the entire follow-up.
**Conclusions.** This is the first study showing that the inhibitors of PCSK9, can decrease or even reverse the progression of carotid atherosclerosis, reducing the intima-media thickness, the lipid content of atheromatous plaques leading to a reduction of clinical adverse events.

### A572: MOLECULAR CHARACTERIZATION OF CARDIOMYOPATHIES: ROLE OF NEXT GENERATION SEQUENCING

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Nowadays, molecular diagnosis is performed using next-generation sequencing (NGS) that allows several genes to be sequenced simultaneously, reducing costs and times. The development of this technical advantage allows the study of cardiomyopathies (1) and cases of sudden death (2) into specialized cardiology centers (3). The main difficulty of the data obtained by NGS is the attribution of pathogenicity of the variants; despite the use of different genetic databases, many mutations remain of uncertain significance. In our study, we aimed to evaluate the molecular characterization by NGS of clinical cases evaluated by outpatient clinic for "Eredo-familial Cardiomyopathies" at our hospital.
One hundred eighty-nine Southern Italian subjects were examined, distributed as follows: 64 (32%) with hypertrophic cardiomyopathy (HCM), 34 (18%) with canalopathies, 28 (15%) with dilated cardiomyopathy (DCM), 18 (10%) with arrhythmogenic cardiomyopathy (ARVC), 12 (6%) with mild phenotypes and 32 (17%) without clinical manifestation. Using NGS, screening of 75 genes associated with cardiomyopathies and sudden death was performed, leading to the identification of 105 (56%) cases with a possible genetic cause.
We identified 94 variants, classified according to the American College of Medical Genetics and Genomics (ACMG) guidelines (4) in pathogenetics (18 variants), probably pathogenetic (21 variants) and of uncertain significance (55 variants).We found two or more genes mutated in 14 (7.4%) patients. Furthermore, we identified new possible digenic forms (eg MYBPC3 / MYPN) responsible to complex phenotypes (DCM / HCM), 7 new pathogenetic variants and an interesting mutational hot-spot in patients with HCM (MYBPC3).
The results of the present study confirm the importance of using NGS methods as an integral part of cardiological screening extended to patients, asymptomatic subjects and family members. Moreover, these approaches are indispensable for the identification of new causative variants in pathologies characterized by high genetic heterogeneity such as cardiomyopathies.

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### A573: PERFORMANCE OF A DEEP LEARNING ALGORITHM FOR THE EVALUATION OF CADRADS CLASSIFICATION WITH CCTA

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**Aim.** To develop a deep convolutional neural network (CNN) to classify coronary computed tomography angiography (CCTA) in the correct Coronary Artery Disease Reporting and Data System (CAD-RADS) category.
**Materials and methods.** Two hundred eighty eight patients who underwent clinically indicated CCTA were included in this single-center retrospective study. The CCTAs were stratified by CAD-RADS scores by expert readers and considered as reference standard. Fifty patients for each class of CAD-RADS from 0 to 4 and 38 patients for CADRADS 5 were included in the analysis. A deep CNN was designed and tested on the CCTA dataset and compared to on-site reading. The deep CNN analyzed the diagnostic accuracy of the following three Models based on CADRADS classification: Model A (CADRADS 0 vs CADRADS 1-2 vs CADRADS 3,4,5), Model 1 (CADRADS 0 vs CADRADS>0), Model 2 (CADRADS 0-2 vs CADRADS 3-5). Time of analysis for both physicians and CNN were recorded.
**Results.** Model A showed a sensitivity, specificity, negative predictive value, positive predictive value and accuracy of 47%, 74%, 77%, 46% and 60%, respectively. Model 1 showed a sensitivity, specificity, negative predictive value, positive predictive value and accuracy of 66%, 91%, 92%, 63%, 86%, 89%, respectively. Conversely Model 2 demonstrated the following sensitivity, specificity, negative predictive value, positive predictive value and accuracy: 82%, 58%, 74%, 69%, 71%, 78%, respectively. Time of analysis was significantly lower using CNN as compared to on-site reading (530.5±179.1vs104.3±1.4 seconds, p:0.01)
**Conclusions.** Deep CNN yielded accurate automated classification of patients with CAD-RADS.

## GENETICA E CARDIOLOGIA MOLECOLARE
## Sessione Orale

### A574: LESSON FROM A LMNA-ASSOCIATED CARDIOMYOPATHY: FROM PATHOGENIC MECHANISMS TO PHARMACOLOGICAL TARGETS

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Mutations in the LMNA gene, which encodes A-type nuclear Lamins, are among the most frequent genetic cause of Arrhythmogenic Cardiomyopathies with conduction defects, often leading to sudden death (SD).

So far the only effective treatment consists of the implantable cardioverter defibrillator (ICD) to prevent SD. In this scenario, the dissection of the pathogenic mechanisms triggered by LMNA mutations may reveal new pharmacological targets for the managements of these cardiomyopathies.

We identified a novel LMNA nonsense mutation (Q517X) in an Italian family co-segregating with a clinical history of Sick Sinus-Node Syndrome (SSS) as onset of the pathology. Thereafter a permanent Atrial Fibrillation (AF) became the main clinical feature of the mutant carriers. Later on a DCM with left ventricular dysfunction leaded to a sever heart insufficiency.

Aim of this study is to gain insights into the unknown pathogenic mechanism triggered by the expression of Q517X at cellular level.

We functionally characterized the mutant variant LMNA Q517X in murine atrial cardiomyocytes, which acquired the ability to beat spontaneously once in culture, thus representing a unique model for studying the pathophysiology of atrial automaticity.

Studying the Action Potential (AP) propagation by patch clamp experiments, we found a significant prolongation of both Action Potential duration (APD) and AP Cycle length in LMNA Q517X-expressing cardiomyocytes. Moreover, the expression of LMNA Q517X mutant conferred a proarrhythmic activity to the cardiomyocytes, which showed after depolarization (AD) events during the AP firing, never observed in LMNA WT-expressing cardiomyocytes.

These electrical features, such as APD prolongation together with AD events, may trigger AF in humans. Indeed, we have been able to reproduce the clinical phenotype at single cell level upon Q517X expression in atrial cardiomyocytes. Of note, we identify a defect in calcium release from the Sarcoplasmatic Reticulum (SR) through the Ryanodine Receptors (RyRs) as the molecular pathway involved in the AD events in Q517X-expressing cardiomyocytes.

So far, these results suggest the RyRs as potential pharmacological targets for this LMNA associated cardiomyopathy.

### A575: RECLASSIFICATION OF VARIANTS OF UNCERTAIN SIGNIFICANCE IN INHERITED ARRHYTHMOGENIC DISEASES: A PILOT STUDY

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**Background.** Identification of variants of uncertain significance (VUSs) poses relevant challenges for counseling and managing patients. They have an unknown impact on health, making the genetic tests clinically irrelevant. Recent studies demonstrate that a routine reclassification analysis enables to reclassify from 20% to 80% of this type of variants, improving risk stratification.

**Aim.** We aimed at investigating whether in the context of inherited cardiac conditions, a review of the updated literature, including functional data, allele frequency and segregation analysis may help in the variant reclassification.

**Methods.** Retrospective review of all VUS in genes associated with hereditary arrhythmogenic diseases, identified in our cardiogenetic clinic between 2016 and 2018

**Results.** Thirty-one VUSs were identified in 26 cases with a confirmed or suspected diagnosis of inherited arrhythmogenic diseases (Long QT syndrome, Brugada syndrome, Arrhythmogenic Cardiomyopathy, Hypertrophic Cardiomyopathy). Twentyfour variants were identified in well-defined causative genes (*SCN5A*, *KCNQ1*, *KCNH2, KCNE1, DSP, DSG2, MYH7, TPM1, TNNI3, TNNT2, CACNA1C, MYL3*) while the remaining 23% were in genes, *ANK2* and *AKAP9*, with limited evidence to support their disease causation. Preliminary results of the reclassification analysis showed that two variants were downgraded to likely benign according to the BS1 criterion (allele frequency) and 4 variants were upgraded to likely pathogenic applying the new gene-specific guidelines for *MYH7*, and including new segregation data. Moreover, further studies to assess cosegregation in other variants are still ongoing.

**Conclusion.** On the basis of our experience, 25% of variants of uncertain significance in well-defined causative genes identified in patients with a confirmed or suspected diagnosis of inherited arrhythmogenic diseases were reclassified. These findings suggest that reinterpretation of genomic test results should be performed routinely in all diagnostic lab.

### A576: ATAXIA TELANGIECTASIA MUTATED (ATM) PROTEIN KINASE REGULATES CARDIAC METABOLISM AND REMODELING

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**Introduction**. Pressure overload-induced cardiac hypertrophy is associated with increased reactive oxygen species (ROS). Excessive ROS generation can induce DNA damage and activate the protein kinase Ataxia-Telangiectasia Mutated (ATM), that is well known to play a significant role in response to double stranded DNA breaks. Recently, it has become apparent that ATM is also involved in a large number of processes, some of which contribute to metabolic and cardiovascular complications. The role of ATM in the heart is currently poorly understood.

**Purpose.** Here we hypothesized that ATM might play crucial roles in the maintenance of cardiomyocyte homeostasis and in the development of cardiac dysfunction in response to pressure overload.

**Methods.** To test this, wild type (*wt*) and *Atm* homozygous mutated mice ($Atm^{-/-}$) underwent transverse aortic constriction (TAC). Sham-operated mice (SHAM) of the two genotypes were used as controls. After one week (1wk), TAC mice were anesthetized, cardiac function and morphometry were analyzed and gene expression reprogramming, cardiac histology, mitochondrial morphology and metabolic pathways were assayed in explanted hearts of all genotypes. Targeted metabolomic analyses were performed to assess free carnitine and acylcarnitines, pyruvate and lactate levels in the serum and in heart tissues using LC-MS/MS or GC/MS.

**Results.** No differences in cardiac function were observed among SHAM mice of two different genotypes. However, compared to *wt* SHAM, $Atm^{-/-}$ SHAM mice displayed a significant increase in cardiomyocytes cross sectional area (CSA), up-regulation of fetal genes β-MHC, ANP, BNP and down-regulation of SERCA. After 1wk TAC, cardiac function was significantly decreased in $Atm^{-/-}$ mice compared to *wt*, and while *wt* mice exhibited a significant increase in CSA and fetal gene expression reprogramming, no significant differences in these parameters were found between SHAM and TAC $Atm^{-/-}$ mice. No significant differences in interstitial fibrosis and apoptosis were found. In sham and TAC heart, mitochondria displayed normal shape and size. Under SHAM conditions, $Atm^{-/-}$ hearts were characterized by a metabolic switch from fatty acids to glucose utilization for energy production, changes in acylcarnitines (AC), lactate and pyruvate levels and glycolytic enzymes without any further changes after TAC, consistent with aerobic glycolysis.

**Conclusions.** These results demonstrate that ATM regulates gene expression, cardiomyocyte hypertrophy and cardiac responses to pressure overload, modulating cardiac metabolism and function. Under conditions of pressure overload, *Atm* deletion influences myocardial energy metabolism, resulting in alteration in the supply of substrates to the heart and the profile of intracellular substrate utilization. Thus, ATM might represent a novel important player in the development of cardiac dysfunction and a novel therapeutic target.

### A577: ROLE OF P66SHC IN ALDOSTERONE INDUCED ENDOTHELIAL DYSFUNCTION AND VASCULAR REMODELING

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**Objective.** Recent evidences suggest that aldosterone may induce the activation of p66shc in vascular smooth muscle cells and may induce increased oxidative stress in part through the promotion of the interaction between NOX-1 and p66shc. This in vivo study sought to investigate whether aldosterone may induce functional and structural alterations in part through p66shc-dependent manner.

**Methods.** $P66shc^{-/-}$mice (14-18 weeks, 6 per group) and age-matched wild type (WT) control mice were treated or not with aldosterone (300 µg/kg/day) for 4 weeks. Systolic blood pressure (SBP) was measured by tail-cuff method. Endothelium-dependent and independent relaxations were assessed by concentration-response curves to acetylcholine (1nM to 100 µM) ± L-NAME (100 µM) and sodium nitroprusside (SNP) (10 nM to 1 mM) respectively, in mesenteric arteries pre-contracted with norepinephrine (10 µM). Media-to-lumen ratio (M/L) and cross sectional

area (CSA) were evaluated on pressurized preparations. Reactive oxygen species (ROS) production in aorta was evaluated by DHE staining. The expression in aorta of P66Shc and NOX-1 was evaluated by immunoblotting.
**Results.** SBP was similar in WT and p66shc$^{-/-}$ mice before treatment and was significantly increased after 4 weeks of treatment with aldosterone in both WT (192.3±4.522 vs 103.3±2.996; p<0.05) and p66shc$^{-/-}$ mice (176.8±5.313 vs 105.3±1.542; p<0.05). However the increased SBP was significantly blunted in p66shc$^{-/-}$ mice treated with aldosterone as compared to WT treated with aldosterone (176.8±5.313 vs 192.3±4.522, p<0.05). Acetylcholine-induced vasodilation was similar in WT and p66shc$^{-/-}$ mice and was significantly reduced only in WT after adosterone treatment. Acetylcholine induced relaxation was blunted by L-NAME in all the groups although at less extent in WT treated with aldosterone. Endothelium-independent vasodilation was similarly preserved in all the groups. M/L ratio was similar in both WT and p66shc$^{-/-}$ before treatment and was significantly increased by aldosterone only in WT group (p<0.001). CSA was similar in all the groups. ROS production in aorta was similar in WT and p66shc$^{-/-}$ mice before treatment and was increased by aldosterone only in WT mice but not in p66shc$^{-/-}$. NOX-1 expression was similar in mice before treatment and was significantly increased (~ 4 folds) only in WT. P66Shc was increased by aldosterone in WT.
**Conclusions.** Aldosterone induced endothelial dysfunction and vascular remodeling only in WT but not in p66shc$^{-/-}$ mice independently of blood pressure. These effects were in part due to increased NOX-1 functional expression and ROS production in WT. Thus p66shc protein may be involved in the mechanisms of endothelial dysfunction and vascular remodeling induced by aldosterone in the cardiovascular system.

### A578: ANALISI DELLO SPLICING ALTERNATIVO IN PBMC DI PAZIENTI CON MALATTIA CORONARICA: IDENTIFICAZIONE DI NUOVI BIOMARCATORI MOLECOLARI PER LA STRATIFICAZIONE DEL RISCHIO

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La malattia coronarica (CAD), principale causa di morte in tutto il mondo, è una malattia complessa alla cui patogenesi concorrono sia fattori ambientali che genetici. Sebbene siano stati identificati molti dei fattori correlati allo sviluppo della CAD, non è ancora possibile prevederne il rischio; pertanto, l'identificazione di nuovi biomarcatori è cruciale sia da un punto di vista clinico che terapeutico.
Tra i fattori genetici di rischio, il ruolo dello splicing alternativo, che produce diverse isoforme di RNA messaggero (mRNA) a partire da un singolo trascritto primario, non è stato ancora molto studiato nella CAD. Lo splicing alternativo risulta essere un evento cruciale che governa complessi processi biologici attivi durante lo sviluppo cardiaco sia in condizioni fisiologiche che patologiche. La flessibilità del meccanismo di splicing alternativo ha chiaramente rappresentato un'importante risorsa genomica durante l'evoluzione, ma può anche essere considerato un fattore di rischio, in quanto è ormai noto che una grande percentuale di malattie umane siano causate da difetti dello splicing.
Al fine di indagare il ruolo dello splicing alternativo nella CAD, abbiamo eseguito uno studio di sequenziamento dell'RNA, estratto dalle cellule mononucleate del sangue periferico (*PBMC*) di quattro pazienti, selezionati in base all'età e alle loro condizioni mediche. I risultati del sequenziamento sono stati confrontati tra il gruppo CAD, ovvero pazienti con malattia coronarica, ma senza una storia clinica di infarto acuto del miocardio, e il gruppo CTR, cioè pazienti con arterie coronariche sane clinicamente testate. Considerando un valore di *Splicing-Index p-value* (SI)≤0.05 e di *Splicing-Index Fold-Change* (SI-FC)≥±1.5, sono stati osservati 113 diversi eventi di splicing alternativo, tra cui ritenzione dell'introne, esoni mutuamente esclusivi, sito donatore al 5' alternativo, sito accettore al 3' alternativo, esoni cassetta facoltativi, salto di un esone (*exon skipping*), collegati a 86 geni differenti. Un'analisi dettagliata di tali eventi è stata condotta utilizzando il *software* EASANA® (http://www.genosplice.com/) che mostra il livello di espressione dell'esone o introne coinvolto nell'evento di splicing alternativo sia nel gruppo dei CAD che nel gruppo dei CTR. Abbiamo quindi identificato 11 eventi di splicing alternativo diversamente regolati nei due gruppi di pazienti. Questi eventi sono: 27% eventi di esoni cassetta facoltativi; 27% eventi di esoni mutuamente esclusivi; 46% eventi sconosciuti e sono riconducibili a 11 geni (*CFAP44, PLCB2, PDPR, RECK, VTI1A, CD58, MIR4469 // RNF170, PTER, GPATCH2L, CLEC12A, BLNK*).
I risultati di questo studio pilota ci riportano quindi un limitato gruppo di eventi di splicing alternativo coinvolgenti alcuni geni, che possono essere valutati sia come nuovi biomarcatori molecolari per la stratificazione del rischio nella malattia coronarica sia come possibili target terapeutici.

### A579: IL TRASFERIMENTO DI UNA SINGOLA VARIANTE GENICA ASSOCIATA ALLA LONGEVITÀ "LAV-BPIFB4" PROTEGGE DALL'ATEROSCLEROSI MEDIANTE UN MECCANISMO CXCR4-DIPENDENTE

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L'aterosclerosi, una malattia multifattoriale influenzata da fattori genetici e ambientali, rappresenta una delle principali cause di morte nella società industrializzata. Poiché si tratta di una malattia che progredisce lentamente, è fondamentale trovare nuovi trattamenti in grado di arrestare la progressione della placca e lo stato pro-infiammatorio. L'obiettivo di questo studio è stato quello di investigare gli effetti terapeutici della variante associata alla longevità (LAV) -BPIFB4 sul processo aterogenico. Topi ApoE knockout alimentati con una dieta ricca di grassi sono stati trattati mediante iniezione di un vettore adenovirale codificante la proteina LAV e la proteina WT-BPIFB4 o il vettore vuoto (AAV-GFP). Gli endpoint primari dello studio sono stati: (i) valutare la reattività vascolare e (ii) la gravità della malattia aterosclerotica, mediante imaging, istologia ed analisi ultrastrutturale. Inoltre, è stata valutata la capacità della proteina LAV di influenzare il fenotipo mono/macrofagico dei topi aterosclerotici e dei pazienti verso un fenotipo anti-infiammatorio. I nostri risultati hanno dimostrato la capacità del LAV di ripristinare la funzione endoteliale delle arterie mesenterica e femorale dai topi ApoE -/-; tale effetto era attenuato dal pretrattamento con AMD3100, un inibitore della chemochina CXCR4. Topi trattati con LAV-BPIFB4 mostravano inoltre un aumento dei livelli circolanti di interleuchine antinfiammatorie quali IL-23 e IL-27.
Lo studio delle arterie disfunzionanti espiantate da pazienti aterosclerotici dimostravano che il trattamento con la proteina ricombinante LAV era in grado di migliorare la funzione endoteliale e di ripristinare la fosforilazione dell'enzima eNOS. L'analisi dei livelli plasmatici della proteina BPIFB4 in pazienti provenienti da 2 gruppi di studio indipendenti evidenziavano l'associazione tra i ridotti livelli di BPIFB4 plasmatico con stenosi carotidea patologica (> 25%) e intima media thickness (IMT) >2 mm.
In conclusione, la capacità del LAV di ridurre il processo aterogenico e migliorare la funzione vascolare attraverso un meccanismo CXCR4-dipendente, apre nuove prospettive terapeutiche per la prevenzione e la cura delle malattie cardiovascolari.

## ARITMIE – 7
## Sessione Orale

### A580: PRIMARY PREVENTION: LEFT ATRIAL PREDICTIVE ROLE AND ICD SHOCKS IN IDIOPATHIC AND ISCHEMIC CARDIOMYOPATHY

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**Introduction.** Left atrial size is a known marker of cardiomyopathy severity. Left atrial volume index (LAVI) is a predictor of heart failure and mortality, irrespective of left ventricular (LV) systolic function. This could be explained by LA impact of in LV filling pressure, stiffness and myocardial stretch. In literature, data on the atrial role on predicting ventricular arrhythmias are lacking, especially in the implantable cardioverter defibrillator (ICD) carrier patients. Thus, we investigated the potential role of LAVI in predicting a higher incidence of ventricular arrhythmias treated by appropriate ICD shocks and therapies (shock and/or ATP) in primary prevention patients with idiopathic dilated cardiomyopathy (IDC) or coronary artery disease (CAD). Secondary endpoint was the association between LAVI, inappropriate shock and atrial fibrillation.
**Methods.** We included consecutive patients underwent ICD implantation for primary prevention between January 2010 and December 2016 in our center with CAD or IDC. Appropriate and inappropriate shocks and therapies (shock and/or ATP) incidences were assessed. Baseline demographic, clinical characteristics and six-monthly follow-up data were collected.
**Results.** A total of 352 patients (63% CAD; 37% IDC, 18% female, average age of 65 ± 10 years) were included in this study. During a mean follow-up of 48 ± 23 months, appropriate therapies occurred in 24% of the total population, appropriate shocks in 14.2% and inappropriate in 7.9%. Regarding the impact of atrial size, data were accurately recorded in 187 patients. Baseline characteristics did not significantly differ from those of the total population. Severe left atrial dilatation was defined as LAVI ≥48 ml/m$^2$ (57%; CAD vs IDC p = 0.52). Similar mean value of ejection fraction

(27±5.6) and the same rate of atrial fibrillation history (28%; p= 0,99) between severe LA dilatation (SLAD) group and non-severely LA dilatation (NSLAD) group. Appropriate therapy incidence was 28% in SLAD group, while 14% in NSLAD. A statistically significant association between LAVI and appropriate therapies was found (HR 2.19, 95% CI 1.07–4.5; p = 0.02). Similarly, appropriate shocks (21% in SLAD group vs 9%; HR 2.76, 95% CI 1.2-6.8; p = 0.03). Regarding the secondary endpoint, the incidence of inappropriate shocks was statistically similar between groups (p=0.28). History of atrial fibrillation was a predictive factor of inappropriate shocks (H.R. 2.7, 95% CI 1.14–6.47, p = 0.038). LAVI was correlated with atrial fibrillation: 63% of patients with LAVI > 48 ml/m$^2$; 84% of patient with LAVI ≤48 ml/m).

**Conclusion.** The present study highlights the role of left atrial dilatation in primary prevention ICD carriers. LAVI is a predictive factor for higher incidence of appropriate therapies possibly due to its impact on LV filling pressure and stiffness. As far as we know, our study improves upon literature results by enrolling more patients with a longer follow-up period. Therefore, in patients with the same ejection fraction, severe left atrial dilatation could be considered an additional predictive factor to confirm ICD primary prevention implantation in CAD and IDC patients, without being discouraged by the risk of inappropriate shocks in the absence of atrial fibrillation.

## A581: INTER-OBSERVER AND INTRA-OBSERVER AGREEMENT IN DIAGNOSIS OF TYPE 2 BRUGADA PATTERN

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**Introduction.** Brugada syndrome (BrS) is a disorder characterized by increased risk of sudden death associated with definite ECG abnormalities (J wave, elevated ST segment) confined to the right precordial leads (V1 to V3), in the absence of structural heart disease. While type 1 BP diagnosis is often simple, differentiation of Type 2 BP from incomplete right bundle branch block (IRBBB) can be insidious. The aim of our study was to assess inter-observer and intra-observer agreement in the diagnosis of type 2 BP in a cohort of cardiologists with different skills.

**Methods.** We proposed these 14 ECGs to 42 partecipants belonging to Italian centers: 14 arrhythmologists, 14 general cardiologists and 14 electrophysiology (EP) fellows. Every ECG was showed with the standard 12 leads, accompanied by V1 and V2 recorded at the 3$^{rd}$ or 2$^{nd}$ intercostal spaces or both. Evaluators were asked to determine whether each ECG was a Type 2 BP, so needing further assessment with Class I drug test, or an IRBBB (no further assessment needed). No clinical data about the patient were revealed to the participants, to avoid any suggestions. The same 14 ECGs, with a different order, were proposed fifteen days later to the same cohort to assess intra-observer variability. *Statistical analysis.* Inter-observer results were calculated using a Fleiss K. Intra-observer results were calculated using Cohen's K. The strength of agreement was categorized according to Landis and Koch. A K value <0.00 was rated poor; 0.00-0.20, slight; 0.21-0.40, fair; 0.41-0.60, moderate; 0.61- 0.80, substantial; and 0.81-1.00, almost perfect.

**Results.** In all three groups k value was <0.20 assessing only a slight agreement between partecipants of any categories. Agreement between diagnosis of the first and the second round of the survey, respectively for 5 arrhythmologists, 5 general cardiologists and 5 EP fellows, was calculated. Totally, a wide variability in k values was found in all groups. Arrhythmologists showed an intra-observer agreement ranging from fair to almost perfect. It seems slight better than general cardiologists and EP fellows, showing widest variability, from poor to moderate for general cardiologists and from poor to almost perfect for EP fellows.

**Discussion.** Data demonstrated poor reliability of diagnosis of type 2 BP in a cohort of cardiologists with different skills. Nowadays, diagnosis of type 1 BP, although rare, is relatively simple and within the reach of all cardiologists. On the other hand, Cardiologists with different experience are daily facing the question Type 2 BP versus IRBBB in ECGs recorded for preoperative or sports screening. Our study demonstrated, for the first time, a wide inter-observer variability in the diagnosis of type 2 BP in categories of cardiologists with different abilities. Even arrhythmologists showed low agreement. Considering 5 operators per class, intra-observer agreement is fair to moderate overall with a slight superiority of arrhythmologists.

**Conclusion.** Reproducibility of type 2 Brugada Pattern diagnostic criteria is low, even among experts. These findings raises serious questions about basic screening, not counting the influence of clinical factors in the diagnosis. An initial selection bias may influence data in literature also in terms of risk of arrhythmic events. The extension of the pharmacological test to all patients with a positive terminal wave in V1 V2 turns out to be not feasible in clinical practice and above all not consistent. Thus, new diagnostic criteria with validated reproducibility are probably needed.

## A582: EPIDEMIOLOGIC ANALYSIS IN PATIENTS WITH PERSISTENT ATRIAL FIBRILLATION AND SPONTANEOUS RESTORATION TO SINUS RHYTHM: A SINGLE CENTER EVALUATION.

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**Background.** Atrial fibrillation (AF) is the most commonly encountered supraventricular arrhythmia in an elderly population representing one of the leading causes for stroke, heart failure and all-cause mortality in the world. Historically, electrical cardioversion (EC) has been regarded as a safe and effective procedure in sinus rhythm (SR) restoration in AF patients, especially when AF onset is clearly assessed. Conversely, in the absence of hemodynamic compromise and when AF duration may not be clearly evaluated, a 3-week anticoagulation regimen is mandatory or a trans-esophageal echo (TEE) strategy may be considered, if available. Notwithstanding, in this clinical scenario, some patients may present with spontaneous conversion to SR as assessed during ECG screening before EC.

**Aim.** The aim of this study was to assess the prevalence of spontaneous restoration to SR in patients with history of persistent AF scheduled for EC. Moreover, specific clinical features have been evaluated in this group of patients.

**Methods.** From April 2017 to June 2019, 260 consecutive patients (164 M) with persistent AF undergoing a scheduled EC procedure have been considered. Before EC, a 12-lead ECG has been performed for each patient and the spontaneous restoration to SR has been evaluated in the whole number of patients. Nevertheless, clinical data were available for 78 patients only (56 M, mean age 69 ± 12 years) and were considered as follows: age, sex, antiarrhythmic drugs, anticoagulant drugs, prevalence of chronic kidney disease, mean CHA2DS2VASc score, left ventricular ejection fraction (>50%), and left atrial enlargement (indexed volume> 34ml / m2). Moreover these clinical data were compared in patients with spontaneous SR restoration to the ones with persistent AF before scheduled EC.

**Results.** Spontaneous restoration to SR was found in 65 out of 260 patients (25%). Where clinical data were available, 21 patients out of 78 (27%, mean age 73 ± 7 years) showed spontaneous restoration to SR. In this latter group of 21 patients, the vast majority were older and with a higher CHA2DS2VASc score. As shown in Table 1, comparing all the other clinical data in patients w/wo spontaneous restoration to SR, no statistical significance has been found.

| | Spont. SR | EC | p value |
|---|---|---|---|
| Age | 73.4 ±7.4 | 67.6 ±13 | 0.015 |
| Sex (M) | 57% | 79% | 0.09 |
| NOACs/NVKAs | NOACs 47% | NOACs 76% | 0.035 |
| Antiarrhythmic drugs | 40% AMIOD. | 40% AMIOD. | 0.89 |
| Mean CHA2DS2-VASc Score | 3.2 +/- 1.3 | 2.3 +/- 1.5 | 0,02 |
| FEVS > 50% | 18 (85%) | 47 (93%) | 0.3 |
| LA enlargement (vol. > 34ml/m$^2$) | 18 (85%) | 46 (79%) | 0.75 |
| CKD | 14 (67%) | 40 (69%) | 0.94 |

Spontaneous restoration to SR occurs in a non negligible rate of patients (25%) with a history of persistent AF undergoing a scheduled EC. The very preliminary data of our study showed a trend towards a greater probability of spontaneous conversion to SR in patients with higher CHA2DS-VASc in an older population. To confirm these data further studies are required, increasing the number of patients considered.

## A583: A NOVEL SCORE USING LEFT ATRIAL VOLUME INDEX, GENDER, AND AGE TO PREDICT THE PRESENCE OF LOW VOLTAGE ZONES IN PATIENTS WITH ATRIAL FIBRILLATION: THE ZENTRALKLINIK BAD BERKA AND UNIVERSITY OF L'AQUILA (ZAQ) SCORE

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**Background.** Pulmonary vein isolation (PVI) is the most effective therapy for patients (pts) with paroxysmal atrial fibrillation (AF). However, in pts with advanced structural atrial changes (both paroxysmal and persistent AF), substrate modification may be required although the ideal ablation strategy is still debated. Therefore, it would be helpful to assess the presence of substrate in the left atrium (LA) before the ablation. We hypothesized that indexed LA volume (LAVI) is (1) associated with the

presence of low voltage zones (LVZ) identified by EVM in the left atrium and (2) helpful in developing a score that predicts the need for additional substrate modification during ablation.
**Methods.** We defined the cut-off value of LAVI and age which had the best accuracy to detect LVZ in receiver operating characteristic curve (ROC). Clinical predictors for the presence of LVZ were identified with regression analysis. These parameters were used to build a risk score (ZAQ Score: female gender, age≥65 years and LAVI≥57ml/m$^2$). The risk score was subsequently validated in our institution.
**Results.** 374 patients (age 63 [56-70] years, 149 female, 152 persistent AF, Echo LA diameter 40 [37-43] mm, CT LA volume 115 [95-138] ml and CT LAVI 57 [48-68] ml/m$^2$. In the derivation cohort, the ZAQ score correctly identified the 75 pts with LVZ (AUC 0.81; 95% CI 0.76-0.86; p<.001). In the validation cohort, the predictive value of the ZAQ score was confirmed (AUC 0.786; 95% CI 0.700-0.827; p<.001).
**Conclusions.** The ZAQ score is able to identify pts with and without LVZ and may be helpful in planning the ablation strategy (i.e. Cryo balloon PVI vs RF PVI + substrate modification).

### A584: CORONARY ATHEROSCLEROTIC DISEASE AS ADDITIONAL RISK FACTOR TO MODIFY HCM RISK-SCD SCORE

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**Background.** Hypertrophic cardiomyopathy (HCM) is the most common genetic cardiovascular disease, characterized by a very heterogeneous clinical presentation with arrhythmic sudden death, and progressive heart failure. Myocardial ischemia is related to structural abnormalities of the vessels itself, to their intramural route, both associated with mismatch of myocardial oxygen supply; nevertheless, currently available reports show that up to 20% of patients with HCM have coronary artery disease (CAD) as coexistent risk factor. Nowadays, there is a gap in literature about the outcome of coronary artery disease in HCM patients; moreover, it is not known to what extent coronary artery disease can increase the risk of arrhythmias (either brady- or tachy-arrhythmias) and therefore have an impact on the risk score of HCM patients.
**Methods.** Our inherited arrhythmia clinics to date recruited 34 patients diagnosed with HCM. HCM Risk-SCD was calculated according to parameters indicated by current guidelines. Devices for cardiac rhythm management (implantable cardioverter/defibrillator, ICD; subcutaneous-ICD, S-ICD; pacemaker, PMK) were implanted when needed. The cohort presented with 14 patients with concomitant CAD requiring coronary angiography; such subgroup was investigated for the occurrence of arrhythmic burden.
**Results.** ICDs implanted were higher in HCM patients with concomitant CAD. HCM-CAD patients displayed a significantly higher HCM Risk-SCD Score compared to HCM and no CAD (5.9±1.8 vs. 4.8±1.3, p<0.05). Occurrence of genetic mutations, on the contrary, was observed only in noCAD hypertrophic subjects (TNNI3, JUP, MYBPC3). In order to assess the arrhythmic burden, HCM-CAD patients were divided into 3 subgroups: a) device-treated cases (N=4); b) standard medical therapy and arrhythmias (N=3); c) no device and no arrhythmias (N=7). Interestingly, the observed arrhythmias at follow-up included advanced atrio-ventricular blocks, atrial fibrillation and intraventricular conduction disturbances. During a mean follow-up of 4±3 years, cardiovascular mortality was 7.14%. Univariate and multivariate analyses revealed that an intermediate/high HCM Risk-SCD in patients with HCM and concomitant coronary artery disease could be identified as an effective cut-off point which evaluates the higher arrhythmic burden.
**Conclusions.** We found that patients with HCM and concomitant epicardial coronary atherosclerotic disease have certainly a worse outcome due to cardiac arrhythmias. The current score does not take into account the important role of coronary artery disease that can impact on the prognosis in HCM.

### A585: SHORT TERM IMPACT OF BILATERAL CARDIAC SYMPATHETIC DENERVATION FOR VENTRICULAR ARRHYTHMIAS ON CARDIAC FUNCTION

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**Background.** Bilateral Cardiac Sympathetic Denervation (BCSD) has been recently proposed for the treatment of refractory ventricular arrhythmias (VAs) in patients with structural heart disease (SHD). No major safety concerns have been reported so far; yet, the short-term impact of BCSD on cardiac function is poorly characterized.
**Aim.** to assess short-term echocardiographic changes after BCSD in patients with SHD.
**Methods.** Patients with SHD undergoing BCSD for VAs were studied. Transthoracic echocardiographic assessment was performed within 48 hours before and 7 days after BCSD. Pre and post procedural data were compared with Wilcoxon test.
**Results.** 13 patients (85% male, 54 ±16 years, 69% with non-ischemic cardiomyopathy) underwent thoracoscopic BCSD at one center between 2016 and 2019. Mean LVEF at BCSD was 31±13%, 54% had mitral regurgitation (MR) ≥ moderate, 92% had an ICD, 31% a CRT-D, 69% presented with NYHA class ≥ 2. Indication for BCSD was elective in 54%, urgent in 31% and emergent (cardiac arrest) in 15%. Most (77%) required intraprocedural inotropic drugs infusion (dobutamine ± noradrenaline) starting from the induction of general anesthesia, but none had subsequent hemodynamic deterioration during single lung ventilation and/or sympathetic chain removal. Surgery was successful in all patients, with no major procedure-related complications. One patient died 12 days after BCSD because of septic shock. The remaining patients were all alive at last follow up (median 10 months, freedom from ICD shock 62%). Ongoing drugs at echocardiographic assessments were similar. No significant differences were observed in biventricular dimensions, traditional markers of systolic function (LVEF, TAPSE, FAC) and diastolic function (Deceleration time, E/A, E/e'), degree of MR and arterial pulmonary pressure indices. Additionally, 7 patients had available data on myocardial strain. Both left ventricular (LV) and right ventricular (RV) global longitudinal strain (GLS) were not significantly affected by BCSD [Figure 1a and 1b, respectively].

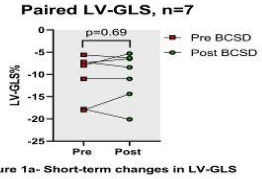

Figure 1a- Short-term changes in LV-GLS

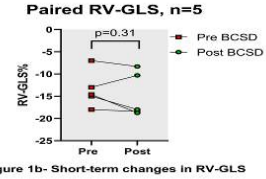

Figure 1b- Short-term changes in RV-GLS

**Conclusion.** This is the first report about the short-term impact of bilateral cardiac sympathetic denervation (BCSD) on cardiac function in patients with systolic heart failure. Our case series, the largest reported in Europe, suggests that BCSD, despite almost completely depriving the heart of its extrinsic sympathetic innervation, has no detrimental effects on cardiac function at rest. Additionally, no major complications occurred, and long-term freedom from ICD shocks was remarkable. These data reinforce the strong rationale for BCSD, performed in expert centers, in the management of patients with cardiomyopathy and drug/ablation refractory ventricular arrhythmias.

## ARITMIE – 8
## Sessione Orale

### A586: AXILLARY VEIN ACCESS USING FLUOROSCOPIC LANDMARKS OR ULTRASOUND-GUIDED FOR PERMANENT PACEMAKER AND IMPLANTABLE CARDIOVERTER DEFIBRILLATOR IMPLANTATION: THIS IS THE DILEMMA

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**Introduction.** Axillary vein access (AVA) using fluoroscopic landmarks is an effective approach for permanent pacemaker (PM) and implantable cardioverter defibrillator (ICD) implantation, and offers the potential to avoid complications usually observed with traditional subclavian vein approach. However, this approach may result in a higher radiation exposure for physician and patient. Recent results demonstrated that ultrasound-guided axillary access (UAA) is a safe and effective alternative technique to conventional subclavian access for device lead insertion. Studies comparing UAA and AVA using fluoroscopic landmarks are lacking.
**Aim.** To compare the safety, efficacy and radiation exposure data of the UAA approach to the AVA using fluoroscopic landmarks.
**Methods.** This randomized comparative study included 70 patients [60 % male with a median age 78 years, (IQR 70.2 -85 years)] referred for PM or

ICD implantation between May 2019 and August 2019. Patients with cardiac resynchronization therapy indication were excluded. Clinical, lead/device characteristics and radiation exposure data [including median effective fluoroscopy time (sec.), pedal fluoroscopy time (sec.) and median dose-area product (DAP,Gy-cm$^2$)] were compared.
**Results.** 28 patients underwent the UAA and 42 patients underwent the AVA using fluoroscopic landmarks. The total implanted leads were 102 including 70 right ventricular leads and 32 right atrial leads. UAA was successful obtained in 27 (96 %) patients. In these cases AVA was obtained by using fluoroscopic landmarks. Median effective fluoroscopy time, pedal fluoroscopy time and median DAP were statistically significant shorter for UAA compared with AVA using fluoroscopic landmarks (7,00 sec vs 21,00 sec p<0.001; 103.00 sec vs 264.00 sec p<0.001; 2.72 Gy-cm$^2$ vs 9.89 Gy-cm$^2$ p < 0.001 respectively). There were no significant differences between the two groups in median implant procedure time [UAA 50 min (IQR 40 min – 67.5 min) vs AVA using fluoroscopic landmarks 60 min (IQR 50 min - 70 min); p=0.16)]. No complications were observed among the two different approaches.
**Conclusions.** Our preliminary results demonstrated that AVA ultrasound-guided is a safe and effective approach for PM and ICD implantation and offers the possibility to decrease the risk of radiation.

### A587: WHAT ABOUT QUALITY OF LIFE IN ATRIAL FIBRILLATION PATIENTS ?

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**Background.** Patients with atrial fibrillation (AF) may experience an impairment in quality of life (QoL) and therefore, QoL represents an important therapeutic goal in patients'management, as well as a topic of great interest given the lack of information in this field.
**Aim.** To evaluate QoL through a specific questionnaire to better define the factors that can impact on patient's life.
**Methods.** Consecutive AF in- and out-patients presenting to our Cardiology Division between February 1st 2016 to June 30th 2017 were requested to complete a QoL questionnaire, after delivery of a written informed consent. Patients were enrolled in the study if: i) age > 18 years; ii) diagnostic ECG of AF has been made within one year before the date of screening. Actual presence of AF at the time of enrollment was not requested and AF not necessarily was the cause of admission. Patients with atrial flutter as the only arrhythmia documented were excluded. Clinical data, ECG tracings, echocardiogram reports and results of blood samples were collected. QoL and symptoms were evaluated by the administration of specific questionnaires (5Q-5L) at baseline, based on a scoring system (the lower the score, the better the status). Furthermore, we made the sum of the score and subdivided the cohort in 2 groups according to the median of the score related to AF status questionnaire (AFS).
**Results.** Within the original cohort of 431 patients, 328 patients completed the questionnaire, mean age 72±11, 197 (60.1%) males, mean $CHA_2VA_2Sc$ score 3.39 ±1.82, mean HASBLED score 1.40±0.97, were enrolled. Ninety-three (28.4%) patients were not receiving anticoagulation, while 78 (23.8%) were on warfarin, 127 (38.7%) on a direct oral anticoagulant (DOAC) and 30 (9.1%) on heparin. The median value of AFS was 7. No significant differences were found in perception of well-being among different patterns of AF (total score for AFS for paroxysmal AF 8.93±5.97 vs persistent AF 8.57±5.88 vs permanent AF 8.40±7.18 vs first detected AF 6.44±5.22; p=0.189) but the ability to deal with usual activities was more affected in permanent AF (paroxysmal AF 1.55 ±1.41 vs persistent AF 1.27 ± 1.42 vs permanent AF 1.82±1.5 vs first detected AF 1.16 ± 1.4; p=0.007). Intolerance to drugs was worse for paroxysmal and persistent form (paroxysmal AF 0.43 ± 1.09 vs persistent AF 0.45 ± 1.07 vs permanent AF 0.15 ± 0.64 vs first detected AF 0.08 ± 0.4; p=0.011). Patients with a worse QoL (AFS ≥ 7, overall 158= 48.2%) were mostly females (83,52.9%)(OR 2.97; 95%CI 1.88-4.70; p<0.001), mean age 72±13. Use of warfarin was associated with AFS ≥ 7 (OR 1.77: 95%CI 1.06-2.97; p=0.030) while the same association was not found for DOAC therapy (OR 1.043; 95%CI 0.669-1.627; p=0.852). The items of the QoL questionnaire more affected by VKA therapy were mobility restriction (no/slight 49 [20.4%] vs moderate/severe 29 [33%] OR 1.92; 95%CI 1.11-3.30; p=0.018) and limitation in usual activities (no/slight 49 [20.1%] vs moderate/severe 29 [34.5%] OR 2.10; 95%CI 1.21-3.63; p=0.007). At multivariable logistic regression female sex (OR 3.84; 95%CI 2.19-6.72; p< 0.001) and prior use of antiarrhythmic drugs (OR 2.77, 95%CI 1.01-7.65; p=0.049) were independent predictors of AFS ≥ 7, while VKA use failed to reach statistical significance.
**Conclusions.** AF patterns affected QoL only in specific items regarding attendance of daily activities and intolerance to drugs. The type of anticoagulant has a role in worsening QoL but the independent predictors of a worse QoL were female sex ad use of antiarrhythmic drugs.

### A588: AMIODARONE THERAPY FOR ICD INTERVENTION PREVENTION. AN OBSERVATIONAL SINGLE CENTER COHORT STUDY

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Mattia Peyracchia (a), Massimo Magnano (a), Davide Castagno (a),
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**Introduction and aim.** Medicine evolution, particularly in the Cardiology field, bring us longer survivals to acute coronary syndrome and cardiovascular diseases. Nonetheless, the other face of the medal is the increasing number of patients suffering from Heart Failure (HF) in its broad spectrum of manifestations, from acute HF to life-threatening arrhythmias. Implantable Cardioverter Defibrillators (ICDs) represent a clear answer to the latter clinical problem. However, even an appropriate ICD intervention has a huge impact on patients' life. For this reason, in our paper, we tried to assess whether Amiodarone could reduce ICD appropriate interventions.
**Methods.** This work represents an observational study of a cohort of consecutive patients from a single institution. The study was carried out according to the latest international guidelines and to the Declaration of Helsinki. We screened 4157 implantation procedures performed in our centre, identifying 637 consecutive patients who received an ICD in primary or secondary prevention, considering the period 2010-2016. Other inclusion criteria were: clinical follow-up at least every 6 months, assessing symptoms, recent medical history, medications and technical functioning of the device. Considering pre-implantation clinical and psychological screening and the prognosis evaluation, no exclusion criteria was applied. For patients who underwent heart transplantation, the follow-up was closed on that date. Clinical decision to prescribe or not amiodarone, was not influenced by the authors and was leaved to single physician choice. Every patient was on optimal medical therapy (OMT). Every ICD intervention was assessed through direct ICD interrogation, excluding those not confirmable. In every case, an experienced electrophysiologist was consulted for independent adjudication. Statistical analysis was performed applying SPSS 24.0. Continuous variables were compared with t-test. Categorical data were tested with chi-square test.
**Results.** 521 patients matched the inclusion criteria and were enrolled. The major indication for ICD implantation was Ischemic Heart Disease (276 patients, 53%), followed by non-ischemic Dilated Cardiomyopathy (DCM) (156 patients, 30%). 405 patients received ICD for primary prevention (Ip), while 116 for secondary prevention (IIp). Mean Left Ventricular Ejection Fraction (LVEF) was 27% (+/- 6%) in Ip and 38% (+/- 12.8%) in IIp. No statistically significant differences resulted between Ip and IIp considering QRS width and medical therapy. 19% of Ip and 41% of IIp were on amiodarone (A). After a mean follow-up of 67 months, in Ip patients, there were no differences in the rate of appropriate shock (15.3% A vs 13.7% nA, p= 0.699) and ATP intervention (16% A vs 15.2% nA, p=0.965). These results were also confirmed for IIp patients (Shock 15.9% A vs 18% nA, p=0.541; ATP 16% A vs 15.2% nA, p=0.231).
**Conclusion.** In our study, amiodarone did not show a significant reduction of ICD intervention in primary and secondary prevention ICD patients. The observational nature of our work is an intrinsic limit of these findings and further randomized clinical trial are needed to confirm our results.

### A589: BRUGADA SYNDROME: A PECULIAR CASE OF LATE DIAGNOSIS IN A PATIENT WITH RESUSCITATED CARDIAC ARREST

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Vincenzo Ezio Santobuono (a), Riccardo Memeo (a),
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Brugada syndrome is an inherited disorder characterized by increased risk of ventricular fibrillation and sudden cardiac death in patients with structurally normal heart. Diagnosis is based on a peculiar electrocardiographic pattern consisting of coved type ST-segment elevation ≥ 2 mm followed by a negative T-wave in one or more precordial leads from V1 to V3 positioned in the second, third, or fourth intercostal space (type 1 Brugada ECG pattern), occurring either spontaneously or after provocative drug test with intravenous administration of sodium channel blockers (typically ajmaline or flecainide).
A 22 year-old man, during a football game, had a cardiac arrest due to ventricular fibrillation effectively interrupted by one external DC shock. The patient had no familial history of sudden cardiac death and no other cardiovascular risk factors. On hospital admission, ECG showed sinus rhythm and no evidence of cardiac ischemia or channelopathy. Coronary angiography and laboratory tests were normal. Transthoracic echocardiography showed a mild mitral prolapse and no other structural abnormalities. Twenty-four hour Holter monitoring with 12 leads failed to show ventricular arrhythmias, but revealed isolated supraventricular

premature beats; the QT interval was normal. During a treadmill test, supraventricular premature beats and one supraventricular tachycardia episode were recorded. Cardiac magnetic resonance imaging showed no heart abnormalities, and no late gadolinium enhancement was present. A flecainide challenge (2 mg/kg i.v. over 10 min), with the right precordial leads positioned on the second, third, and fourth intercostal spaces did not reveal a type 1 Brugada ECG pattern. Genetic screening using a custom panel containing 47 genes associated with cardiomyopathies as well as to channelopathies was performed. Because of the resuscitated cardiac arrest with documented ventricular fibrillation, a subcutaneous implantable cardioverter defibrillator (S-ICD) was implanted. The patient was discharged diagnosed with idiopathic ventricular fibrillation and he received beta-blocker therapy. Two months later, S-ICD home monitoring system showed atrial flutter. Therefore, anticoagulant therapy was started and three weeks later, electrical cardioversion was successfully performed. A heterozygous variant of uncertain significance in the *SCN5A* gene was identified. Subsequently, ECG revealed a spontaneous occurrence of the type 1 Brugada pattern. Ajmaline test (0.7 mg/kg i.v.) was performed with positive result. Quinidine was prescribed at daily dose of 825 mg. S-ICD home monitoring system later revealed recurrence of the atrial flutter and atrial flutter ablation was performed. This clinical case shows that a negative flecainide challenge does not rule out Brugada syndrome even if the patient was resuscitated from cardiac arrest and that a spontaneous and intermittent type 1 Brugada ECG pattern suggests performing a long-term follow-up with repeated ECGs. The combination of a negative basal ECG and a negative flecainide test with the right precordial leads positioned in the second, third, and fourth intercostal spaces could lead to missing the diagnosis of Brugada syndrome, a crucial step for both patient management and family screening. In conclusion, a negative flecainide test after resuscitated cardiac arrest is not sufficient to exclude Brugada syndrome, and close long-term follow-up with repeated ECGs is necessary to detect the spontaneous type 1 Brugada ECG pattern. Moreover, an ajmaline challenge could be the test of choice in patients with suspected Brugada syndrome.

## A590: PREVENTING SUDDEN CARDIAC DEATH (SCD) WITH SUBCUTANEOUS ICD (S-ICD): A SINGLE-CENTER EXPERIENCE.

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**Introduction.** Despite the evolution of transvenous implantable cardioverter defibrillator (ICD) during the last 30 years, associated short- and long-term risks (e.g. surgical complications, lead malfunctions and infections) remain unacceptably high. In the attempt to overcome such limitations, subcutaneous implantable cardioverter defibrillator (s-ICD) became available for clinical use since 2009 providing a valuable alternative to transvenous ICDs in patients without pacing needs.
**Aim.** To study the efficacy and safety of s-ICD in real world cohort of patients consecutively implanted at a single high-volume Institution.
**Results.** 62 patients (female=8, 12.9%) underwent s-ICDs implantation between 2014 and 2019. Mean age at implant was 53 yrs (±14yrs) and primary prevention of SCD was the main indication (40 patients, 64.5%). Underlying aetiology of cardiac disease was mostly ischemic (27 patients, 43.5%) followed by non-ischaemic cardiomyopathy (17 patients, 27.4%). Patients with channelopathies and genetic cardiac disease were implanted less frequently (e.g. Brugada syndrome in 7 [11.3%] patients, hypertrophic cardiomyopathy in 3 [4.8%] patients) Idiopathic ventricular fibrillation was the indication to s-ICD implantation in 4 patients (6.5%). In 6 patients, a permanent transvenous device was already in place and required extraction and replacement with a s-ICD for infective causes in 4 cases (6.4%). Mean left ventricular ejection fraction (LVEF) at the time of implant was moderately reduced (LVEF=38±15%). Background medical therapy was overall well balanced (beta-blockers, ACE-I/ARB, MRA used respectively in 80.9%, 67.7% and 53.2% of patients). During defibrillation threshold test, sinus rhythm was successfully restored after first shock in all but three cases in which the opposite polarity defibrillation was used. Overall, mean time to sinus rhythm restoration was 16 seconds (±4 seconds). In two patients (3.2%) induction test was not performed based on clinical decision (i.e. intraventricular thrombus, recent ab-ingestis pneumonia), while in 9 (14.5%) patients the standard protocol did not induce sustained arrhythmias. At median follow-up of 12 months [25°-75° IQR, 3 months-27 months], 8 (9.6%) patients received an appropriate shock (6 for sustained VT, 2 for VF) with 100% restoration of sinus rhythm after single shock whereas 3 (4.8%) patients underwent inappropriate shocks (two caused by myopotentials oversensing). During follow-up, two patients died (one for cardiovascular cause – pump failure), while 19 were admitted for cardiovascular causes (mainly for hearth failure decompensation). Only 4 patients (6.4%) suffered from minor complications linked to s-ICD implant: one subxiphoid keloid (surgically treated), one iatrogenic lead damage during cardiac surgery (requiring new lead implantation), one lead dislodgement (surgically treated) and one mild hematoma (treated conservatively). Duration of s-ICD implantation became significantly shorter with time (mean procedural time during the first three years = 102 minutes vs. mean procedural time during the second three years = 82 minutes) and preference for inframuscular instead of subcutaneous implantation was observed.
**Conclusions.** Based on our experience, the use of s-ICD for SCD prevention (both in primary and secondary setting) is effective, with very low complication rates at medium term follow-up. The implantation learning curve is relatively steep: short procedural times, minimal surgical incisions, excellent cosmetic results are achievable after a limited number of procedures.

## A591: COEXISTENCE OF TYPICAL ATRIAL FLUTTER AND FOCAL ATRIAL TACHYCARDIA IN A POSTSURGICAL PATIENT FOR TETRALOGY OF FALLOT

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**Initial presentation.** A 51-year-old woman presented to the Emergency Department with dyspnea and peripheral edema. Her medical history was notable for surgically repaired Tetralogy of Fallot with residual pulmonary stenosis and for hypothyroidism after thyroidectomy. Supraventricular and ventricular ectopic beats were observed in the past. The first 12 lead-ECG showed very fast atrial arrhythmia with right bundle branch block and left anterior hemiblock and non-discernible P waves. Adequate medical therapy was started.
**Diagnosis and management**. In the Cardiology ward, upon improvement her clinical conditions, the surface ECG showed clearly a counter clockwise typical atrial flutter (Figure 1). Transthoracic echocardiography showed left ventricle ejection fraction of 50%, right ventricular hypokinesia (TAPSE of 11 mm), paradox movement of the septum, moderate to severe tricuspid regurgitation, right atrial enlargement (area 35cm$^2$), pulmonary valve stenosis with a mean gradient of 25 mmHg**,** mild mitral insufficiency, and no residual shunt across the ventricular septal patch. It was then decided to perform an electrophysiology procedure, which confirmed the presence of an isthmus-dependent typical atrial flutter with a longer cycle length of 370 ms with diffuse scar in the right atrium as grey areas in the electroanatomic map (Figure 2). Interestingly, during this macro-re-entrant arrhythmia, the higher region of the lateral right atrium activated earlier than the activation consistent with the atrial flutter circuit, producing a small area of relatively early activation (black arrow in Figure 2) that, however, did not modified substantially the course of the re-entry circuit around the tricuspid annulus (white arrows in Figure 2). Ablation initially reversed the right atrial activation, which became consistent with a clockwise typical atrial flutter and, upon block of the cavo-tricuspid isthmus conduction, eventually transformed the arrhythmia in a focal form with a cycle length of 360 ms (Figure 3). This originated in the same site where a relatively early activation was noted before (black arrow in Figure 3), confirming that this arrhythmia was present also before during typical atrial flutter. Adjunctive focal ablation in the earliest activated site suppressed also this arrhythmia and restored stable sinus rhythm. The procedure was without complications and sinus rhythm persisted in the subsequent follow-up.
**Conclusions.** This case shows how, in a postsurgical patient with a congenital heart disease, a macro-re-entrant form of atrial tachycardia may coexist simultaneously with a focal one originating a peculiar activation pattern. Ablation may suppress these complex arrhythmias if correctly diagnosed by electroanatomic mapping and accurately targeted by ablation.

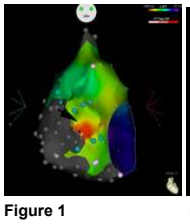
Figure 1

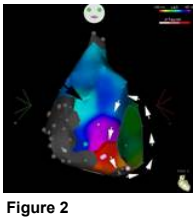
Figure 2

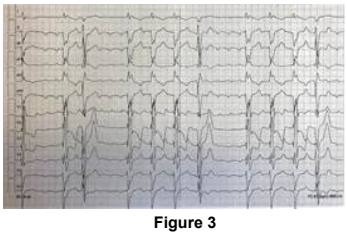
Figure 3

## VALVULOPATIE – 2
## Sessione Orale

### A592: PRE-OPERATIVE GROWTH DIFFERENTIATION FACTOR-15 (GDF-15) LEVELS IN AORTIC VALVE STENOSIS: ROLE AS POTENTIAL BIO-HUMORAL LINK BETWEEN REMODELING AND FRAILTY

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**Background.** Aortic valve stenosis (AVS) is the most frequent surgical indication to valve replacement in Western countries. Transcatheter aortic valve implantation (TAVI) has emerged as a treatment of AVS in patients at high and intermediate surgical risk. In the preoperative risk assessment, frailty tests have been recently introduced in the pivotal randomized clinical trials on percutaneous devices, and allow for a more comprehensive patient characterization and stratification. Growth differentiation factor 15 (GDF-15) is a stress-responsive member of the transforming growth factor β cytokine superfamily, and may play a role in the pathophysiology of left ventricular remodeling.

**Objective.** To evaluate pre-operative GDF-15 levels in patients candidate to aortic valve replacement, to test its association with frailty, echocardiographic parameters, and its predictive power in terms of reverse remodeling.

**Methods and Results.** Sixty-two patients (79.3±7.8 yrs; 34, 54.8% Female) with severe aortic valve stenosis and preserved ejection fraction (60.2±10.2%), undergoing Transcatheter Aortic Valve Implantation (31, 50% TAVI) were prospectively included and followed-up for one year. Frailty was assessed using the Katz score. We evaluated pre-operative GDF-15 and NT-pro-BNP levels (Roche Diagnostics), together with a complete echocardiographic examination. Patients addressed to TAVI were older, with a higher Euroscore II (p<0.0001). GDF-15 levels correlated with left atrial volume (r 0.33; p=0.01) and NT-pro-BNP levels (r=0.65; p<0.0001). We found an inverse relationship with estimated glomerular filtration rate (eGFR, r=-0.4; p=0.006) and ejection fraction (r=-0.3; p=0.04). Patients with an indication to TAVI had higher plasma levels of GDF-15 (p<0.0001) than in the age-matched surgical population. The Katz score showed a low frailty in the vast majority of TAVI candidates (5 and 6; 8, 25.8% and 15, 48.3% patients, respectively), with a low prevalence of higher frailty grades (3 and 4; 3, 9.6% and 5, 16.1% patients, respectively). We found a trend, at the verge of statistical significance, in the distribution of GDF-15 according to the Katz Score, with higher levels reported for higher frailty grades (p=0.06). At the one year follow-up, baseline GDF-15 levels were independent predictors of left ventricular mass reduction, respective to aortic valve and peak trans-valvular velocity reduction ($R^2$0.24; r =-0.38; p=0.016).

**Conclusion.** GDF-15 levels reflect a load of increased comorbidities (worse systolic function; increased end-diastolic pressure; impaired renal function) in patients with aortic valve stenosis. This may be further linked with higher frailty grades in patients candidate to TAVI.

### A593: L'IMPATTO CLINICO DI VALVULOPATIE SIGNIFICATIVE IN PAZIENTI ANZIANI CON SINDROME CORONARICA ACUTA

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(a) DIVISION OF CARDIOLOGY, FONDAZIONE IRCCS POLICLINICO SAN MATTEO, PAVIA, ITALY; (b) DIVISION OF CARDIOLOGY, OSPEDALE ALESSANDRO MANZONI, LECCO, ITALY; (c) FIRST DIVISION OF CARDIOLOGY, NIGUARDA CA' GRANDA HOSPITAL, MILAN, ITALY; (d) DIVISION OF CARDIOLOGY, SANTA MARIA NUOVA HOSPITAL, REGGIO EMILIA, ITALY; (e) DIVISION OF CARDIOLOGY, INFERMI HOSPITAL OF RIMINI, RIMINI, ITALY; (f) DIVISION OF CARDIOLOGY, AO OSPEDALE TREVIGLIO, TREVIGLIO, ITALY; (g) IRCCS MULTIMEDICA OF MILAN, MILAN, ITALY

**Introduzione.** I pazienti anziani con syndrome coronarica acuta (SCA) sono raramente inclusi in trial clinici e per questo non sono disponibili dati robusti circa l'impatto a medio termine di valvulopatie significative in questa popolazione.

**Scopo.** Il nostro obiettivo è stato quello di valutare l'impatto dell'insufficienza mitralica (IM) moderata o severa, della stenosi aortica (SA) moderata o severa, o entrambe, su un endpoint primario ad 1 anno, in pazienti con SCA inclusi nel trial Elderly ACS 2. L'endpoint era un composito di: morte per tutte le cause, infarto miocardico, stroke maggiore o riospedalizzazione per eventi cardiovascolari o sanguinamento.

**Metodi.** Nel trial multicentrico Elderly II ACS Study, 1.443 pazienti con età > 74 y e trattati con angioplastica primaria (PCI) per SCA sono stati randomizzati ad assumere prasugrel (5 mg) o clopidogrel (75 mg), e sono stati seguiti prospetticamente per 1 anno. Tra questi, 1.102 soggetti hanno effettuato un ecocardiogramma pre-dimissione e sono stati inclusi in questa analisi a posteriori.

**Risultati.** L'analisi di sopravvivenza ha dimostrato che pazienti con IM moderato o severa, SA moderato o severa, o entrambe avevano un outcome peggiore in termini di endpoint primario (p<0.001), se comparati con i pazienti senza valvulopatia residua. Una regressione multivariate secondo Cox ha rivelato che la presenza di IM moderato o severa, SA moderato o severa o entrambe erano predittori indipendenti di endpoint primario (rispettivamente: HR 1,84; HR 2,8; HR 2;9 e p<0.001; p=0.004; p=0.01), in maniera indipendente da: età, sesso, funzione ventricolare sinistra, diabete mellito, storia di neoplasia e numero totale di vasi malati.

**Conclusioni.** L'insufficienza mitralica moderato o severa e la SA moderato o severa rappresentano un significativo predittore di prognosi ad 1 anno in pazienti anziani ospedalizzati per sindromi coronariche acute, anche dopo aver svolto una PCI e quando altri fattori prognostici sono stati presi in considerazione. Dunque, questi pazienti dovrebbero essere adeguatamente indagate al momento della ospedalizzazione per la presenza di valvulopatie significative, e per l'eventuale necessità di correzione chirurgica o percutanea delle stesse.

### A594: PREVALENCE OF GERD IN A FEMALE POPULATION AFFECTED BY MITRAL VALVE PROLAPSE

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**Introduction.** Mitral valve prolapse (MVP) is a common valvular disease in women, it causes chest pain and palpitation and can be associated with anxiety. It sometime is an expression of structural or functional abnormality of the heart, it can be also associated with several conditions including gastro-esophageal reflux disease (GERD). This association is challenging clinical problem in clinical practice, it requires targeted diagnostic assessment to identify the underlying causes of the symptoms because treatment needs to be tailored according to the causes themselves to resolve the symptoms. Our study aim is to assess the prevalence of GERD in a female population affected by MVP and if there is any correlation between the two conditions.

**Patients and Methods.** echocardiograpic evaluation was performed in order to test the presence of MVP according to ACC criteria. 289 consecutive MVP women, symptomatic for chest pain and palpitation were included. A control group (CG) of 250 consecutive women without MVP, symptomatic for chest pain and palpitation was constituted. Diagnosis of GERD was made according to 2013 American College of Gastrotology (ACG) diagnostic criteria, women affected by thyroid disorders, all heart disease, including mitral disease with moderate or severe mitral regurgitation, gastrointestinal diseases assessed by gastroscopy were excluded.

**Results.** 31 (11%) women were affected by GERD among 289 women with MVP, 11 (4.4%) women were affected by GERD among 250 women on CG, Chi-squared 8.1, Odds ratio 2.7, c.i.95%, p<0.0044.

**Discussion and conclusions.** GERD is relatively common in women with MVP. Moreover, women with MVP have the chance of about three times more to be prone to GERD, the two conditions are correlated in a statistically high significant way. GERD assessment might be added to the routine follow-up strategies in PM women in order to adapt medical therapy, improving symptoms relief to guarantee a better quality of life.

### A595: GLI "OSTACOLI DEL CUORE": STENOSI POLMONARE SEVERA SECONDARIA A COMPRESSIONE ESTRINSECA DA LINFOMA MEDIASTINICO

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**Introduzione.** La stenosi polmonare non congenita è una patologia poco descritta in letteratura che ancor più raramente è conseguenza di una compressione estrinseca. Presentiamo un caso di stenosi polmonare severa secondaria a compressione dell'anulus valvolare e del primo tratto di arteria polmonare da parte di un linfoma mediastinico.

**Caso clinico.** Una donna di 36 anni giungeva presso il Nostro Ambulatorio di Cardioncologia per una valutazione preliminare all'avvio di chemioterapia: le era stato recentemente diagnosticato un linfoma diffuso a grandi cellule B primitivo del mediastino in stadio IIb. La PET di due mesi prima descriveva un conglomerato adenopatico captante tracciante, esteso dalla regione sovraclaveare sinistra al mediastino anteriore, superiore e medio fino alla parete toracica sinistra e l'ilo polmonare superiore sinistro in assenza di un interessamento cardiaco. La paziente riferiva soltanto brevi e saltuari episodi di cardiopalmo serotino. All'esame obiettivo si riscontrava un soffio sistolico 3/6 rude, senza altri reperti di

nota. L'elettrocardiogramma evidenziava una tachicardia sinusale, non alterazioni di rilievo. L'ecocardiogramma invece mostrava sezioni destre di normali dimensioni e funzione ed una stenosi della valvola polmonare di grado severo (Gradiente massimo 90 mmHg) che risultava tuttavia anatomicamente normale; l'anulus valvolare e il primo tratto dell'arteria polmonare apparivano di dimensioni ridotte per compressione estrinseca da parte di una verosimile massa che improntava le stesse (vedi figura); erano inoltre evidenti una insufficienza tricuspidalica di grado moderato con PAPs aumentate e iniziale pletora cavale, le camere sinistre erano normali; era inoltre presente una lieve falda di versamento pericardico ubiquitario di massimo 15 mm, non emodinamicamente significativa. Si avviava quindi celermente chemioterapia con schema R-CHOP, comprendente anche antracicline e corticosteroidi. Al successivo controllo ecocardiografico, dopo solo un primo ciclo, si osservava già una riduzione dei gradienti transvalvolari e delle pressioni in ventricolo destro dovuti verosimilmente ad una riduzione della compressione da parte della massa estrinseca.

**Conclusioni.** L'ecocardiogramma è uno strumento fondamentale per la valutazione clinica dei pazienti oncologici sia per fornire un parere di idoneità all'avvio di chemioterapia sia per verificare eventuali complicanze cardiache legate alla neoplasia o alla chemioterapia. In questo caso grazie a tale strumento abbiamo potuto evidenziare un coinvolgimento cardiaco, raro ma significativo, dovuto alla neoplasia stessa in una paziente paucisintomatica dal punto di vista cardiologico.

### A596: LEFT ATRIAL VOLUME INDEX IS THE BEST PREDICTOR OF POSTCAPILLARY PULMONARY ARTERIAL HYPERTENSION IN PATIENTS WITH PURE MITRAL VALVE STENOSIS

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**Background.** Mitral stenosis (MS) is characterized by a reduced mitral valve area (MVA) and an increased transmitral pressure gradient, with direct consequences on left atrial (LA) remodelling and pulmonary arterial systolic pressure (PASP). Post-capillary pulmonary arterial hypertension (PAH) has a main impact on the outcome in patients with MS.
**Purpose.** To evaluate determinants of post-capillary PAH in patients with pure MS by using a combined approach of standard and advanced echocardiography.
**Methods.** From January 2018 to January 2019, 52 consecutive patients with MS were enrolled. Concomitant hemodynamically significant valve heart disease, primary PAH, coronary artery and congenital heart diseases, primary cardiomyopathies, prosthetic valves and permanent/persistent atrial fibrillation were exclusion criteria. Twenty-three "pure" MS were selected (age: 63.9±11.6 years, F/M= 17/6). Twenty-three healthy controls, matched by age and sex, were recruited as the control group. All participants underwent a complete echocardiographic examination, including determination of left ventricular ejection fraction (LVEF), speckle tracking derived global longitudinal strain (GLS, in absolute values), LA volume index (LAVi) and PASP. MS severity was assessed by continuous wave Doppler derived mean transmitral pressure gradient (MPG), pressure half time (PHT) and functional mitral valve area (MVA). Data were analysed offline by a dedicated workstation.
**Results.** No significant difference of body mass index, systolic and diastolic blood pressure was found between the two groups, while heart rate was higher in MR ($p<0.0001$). In the pooled MS population, MPG was 5.7±2.4 mmHg, PHT 127.7±26.9 msec and MVA 1.76±0.36 $cm^2$. Twelve patients (52.1%) had mild MS, 10 (43.5%) moderate MS and one (4.3%) severe MS. Patients with MS had larger LA volumes (LAVi = 45.0±12.7 vs. 28.3±7.3 $ml/m^2$, $p<0.0001$), higher PASP (36.4±8.9 vs. 30.4±6.7 mmHg, $p<0.01$), lower LVEF (58.5±6.1 vs. 66.0±3.5%. $p<0.0001$) and lower GLS (18.8±4.6 vs. 21.7±2.5%, $p<0.01$) than the healthy controls. By analyzing the MS group, LAVi had a significant univariate relation with MPG degree ($r=0.69$, $p<0.002$). PASP correlated with LAVi ($r=0.60$, $p=0.003$) and MPG ($r=0.51$, $p<0.01$) but not with PHT ($r=0.28$, $p=0.54$) and functional MVA ($r=-0.31$, $p=0.33$). By a multiple linear regression, including heart rate, MPG, LVEF and GLS as potential determinants, LAVi (standardized beta coefficient =0.65, p=<0.02) and GLS (beta =-0.62, p=0.03) were both independently associated with PASP degree, whereas the association of MPG and PASP was not significant (cumulative $R^2=0.47$, SEE=5.9 mmHg, $p<0.01$) in the MS group.
**Conclusions.** In patients with pure MS, by using a multi-parametric echocardiographic approach, LA dilation appears to be the best predictor of post-capillary PAH, independent on the magnitude of LV systolic function and valvular disease severity. Particular care should be devoted to determine LA size in this clinical setting.

### A597: ABNORMAL PAPILLARY MUSCLES SIGNAL ON CINE MRI AS A TYPICAL FEATURE OF MITRAL VALVE PROLAPSE

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**Background.** Papillary muscles (PMs) are variably involved in the pathophysiology of mitral valve prolapse (MVP), with recent evidence of potential prognostic implications. Aim of the present study was to use cardiac magnetic resonance imaging (MRI) to describe a typical feature of MVP on cine images, represented by abnormal PM signal compared to left ventricular (LV) parietal myocardium.
**Methods.** We retrospectively, enrolled consecutive patients with MVP (n = 47) evaluated by cardiac MRI. For comparisons, additional groups including healthy volunteers, patients with moderate-to-severe mitral regurgitation (MR) from mechanism other than MVP and with hypertrophic cardiomyopathy (HCM) were also considered. PM signal was visually assessed and signal intensity (SI) of the antero-lateral and postero-medial PMs were indexed for that of LV parietal myocardium to obtain the anterior papillary signal (APS) ratio and posterior papillary signal (PPS) ratio.
**Results.** On both visual and quantitative evaluations, a significantly lower PM signal compared to LV parietal myocardium was observed in the MVP group only (figure 1). Reduced APS ratio and PPS ratio showed high diagnostic specificity (97% for both) in identifying patients with MVP. Abnormal PM signal did not correlate with presence of LV late gadolinium enhancement (LGE) or previous significant arrhythmias.
**Conclusions.** Images from cine cardiac MRI reveal that patients with MVP typically show a reduced PM signal ("darker appearance") as compared to LV parietal myocardium. The described imaging findings are not clearly related to MRI demonstration of myocardial fibrosis and occurrence of complex ventricular arrhythmias.

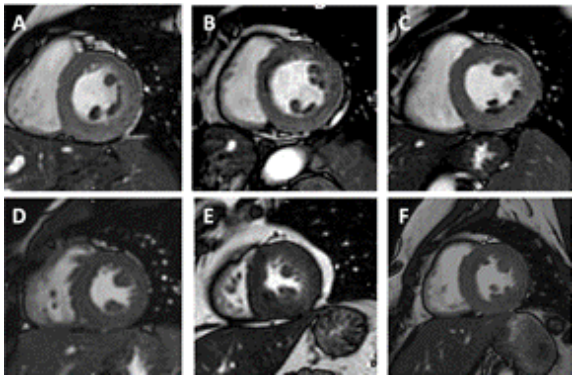


**Figure 1.** Examples of end-systolic short-axis cine images with clearly lower papillary muscle signal intensity as compared to parietal left ventricular myocardium in MVP patients (A-B-C), but not in HV(D), HCM (E) and MR (F).

## STRATEGIE ANTITROMBOTICHE NELLA MALATTIA CORONARICA
## Sessione Orale

### A598: TICAGRELOR POLVERIZZATO UPSTREAM NELLO STEMI: RISULTATI PRELIMINARI DEL PISTOIA STUDY

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**Background.** Nei pazienti con infarto miocardico acuto con ST-sopralivellato (STEMI), l'effetto antiaggregante indotto dalle tienopiridine

orali risulta ritardato, con conseguente incremento del rischio di complicanze trombotiche precoci al momento della PCI primaria (P-PCI). La somministrazione di un carico (DC) di ticagrelor al momento della diagnosi di STEMI (upstream), si è dimostrata in grado di ridurre l'incidenza di trombosi precoce di stent, senza tuttavia significativi benefici clinici rispetto alla somministrazione al momento della P-PCI. Altri dati indicano come la biodisponibilità del ticagrelor possa essere incrementata dalla sua somministrazione in forma "polverizzata". L'insieme di queste osservazioni ha costituito il razionale del PISTOIA STUDY, che si è posto l'obiettivo di valutare l'efficacia in termini di precocità dell'inibizione piastrinica e di miglioramento degli indici di riperfusione miocardica, di una strategia terapeutica comprendente la somministrazione di ticagrelor polverizzato, unitamente ad acido acetilsalicilico (ASA) ed eparina, al momento della diagnosi domiciliare di STEMI da parte del personale del 118.

**Metodi.** Il PISTOIA STUDY, attualmente in corso, è uno studio, monocentrico, osservazionale, prospettico, che prevede l'arruolamento di 50 pazienti con STEMI sottoposti a P-PCI. Il protocollo contempla la somministrazione, al momento della diagnosi sul territorio, di una DC di ticagrelor in forma polverizzata (180 mg per os), unitamente ad ASA (300 mg ev) ed eparina non frazionata (70 U/Kg ev). L'uso di morfina è scoraggiato. Le analisi farmacodinamiche sono effettuate su prelievi ematici ottenuti al momento della diagnosi (T0), all'inizio della P-PCI (T1) e a due ore dall'arruolamento (T2). Il grado d'inibizione piastrinica viene valutato come $P2Y_{12}$ reaction units (PRU) mediante sistema VerifyNow. L'endpoint primario è il grado di inibizione piastrinica della popolazione in studio tra T0 e T1, e rispetto ad una popolazione di controllo costituita da una serie storica, sottoposta a trattamento farmacologico tradizionale in sala di emodinamica. Endpoint surrogati sono alcuni indici di riperfusione miocardica: risoluzione del sopralivellamento-ST, flusso TIMI e TIMI frame-count del vaso colpevole.

**Risultati.** I dati preliminari sui 30 pazienti ad oggi arruolati, mostrano come una DC di ticagrelor polverizzato upstream, determini una significativa inibizione piastrinica al momento della P-PCI (PRU-T0 265±60 vs PRU-T1 168±86, p<0.001). Rispetto ai soggetti di controllo, è stata osservata una significativa riduzione del PRU sia al momento della P-PCI (168±86 vs 292±35, p<0.001) che a due ore dall'arruolamento (80±79 vs 140±119, p=0.046). Il flusso TIMI all'arrivo in sala è risultato ≥1 nel 63.3% dei casi vs 36.4% dei soggetti di controllo (p<0.05). Un flusso TIMI III è stato documentato nel 33.3% dei casi vs 4.5% dei controlli (P<0.05). Il successo procedurale è stato del 100% in entrambi i gruppi.

**Conclusioni.** I dati preliminari del PISTOIA STUDY dimostrano come una strategia di somministrazione precoce di ticagrelor polverizzato, aspirina ed eparina, si associ ad una più precoce inibizione piastrinica rispetto all'assunzione del farmaco in forma intera al momento della procedura di P-PCI, mostrando un trend positivo anche per quanto riguarda gli indici di riperfusione miocardica.

### A599: TICAGRELOR 60 MG IN THE REAL WORLD SETTING: SAFETY AND EFFECTIVENESS

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The PEGASUS TIMI-54 study aimed to assess the potential benefit of dual antiplatelet therapy (DAPT) beyond 12 months from a myocardial infarction (MI). Data show that in patients with MI, more than 1 year after the acute event, treatment with ticagrelor 60 mg and aspirin resulted in a significant reduction in the risk of cardiovascular death, MI or stroke but was associated with an increased risk of major bleeding.

This study aims to evaluate the characteristics of the population treated with ticagrelor 60 mg in a real-world patient setting and to assess the indications for treatment (according to National regulations), comparing the population with the patients enrolled in the PEGASUS TIMI 54 study.

Consecutive patients have been enrolled in our clinics, candidates to continue the DAPT beyond the year of therapy. The DAPT was prolonged according to the prescription criteria of ticagrelor 60 mg in Italy. Patients who had at least one of the following criteria were enrolled: age>65 years; diabetes; Chronic Kidney Failure (eGFR<60ml/min); multiple events; multivessel disease.

Furthermore, patients are subjected to a follow-up that assessed the onset of: new MI, bleeding of which: major and minor bleeding, stroke, dyspnea

From January 2018 to June 2019 40 patients were enrolled. The mean age was 62.5±8 years. 35 patients underwent revascularization with PCI (87.5%). Patients with previous MI were 39 (97.5%), 11 patients were over 65 years of age (27.5%), 29 patients had multivessel disease (72.5%) and 5 patients had eGFR<60ml/min (12.5%). The follow-up was carried out on 30 patients, with an average observation time of 24 months: 2 patients had a new cardiovascular event; 3 patients showed bleeding, among which none defined as major bleeding; 2 patients reported episodes of dyspnea concerning the drug.

Our Real-Life experience shows that our sample has a risk profile similar to the population enrolled in the PEGASUS study. The most widely used criterion of prescription is related to patients with multivessel disease. The follow-up showed good adherence to the therapy, detecting the presence of minor bleedings and the low incidence of cases of dyspnea that confirm the safety of the therapy. Additional real-world data, based on larger samples and longer observation times, is needed to confirm the effectiveness and safety of DAPT with aspirin and Ticagrelor 60 mg.

### A600: IMPACT OF HIGH BLEEDING RISK (HBR) FEATURES ON ANTITHROMBOTIC MANAGEMENT AND LONG-TERM OUTCOMES IN PATIENTS WITH ACUTE CORONARY SYNDROME: DATA FROM THE MULTICENTER START-ANTIPLATELET REGISTRY

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**Background.** The identification of patients at high bleeding risk (HBR) and their antithrombotic management after an acute coronary syndrome (ACS) remain urgent and challenging open issues in contemporary practice. We sought to investigate the antithrombotic strategies used in and the long-term ischemic and bleeding outcomes of patients with ACS fulfilling HBR criteria who were enrolled in the prospective multicenter START-ANTIPLATELET registry.

**Methods.** The START-ANTIPLATELET is a prospective, multicenter, real-world registry (branch of the START registry, NCT02219984) enrolling consecutive ACS patients. For the present analysis, 1,209 patients were stratified as HBR (n=553), if fulfilling clinical and/or biochemical HBR criteria – including advanced age, indication to oral anticoagulants, history of bleeding, history of stroke, known anemia, severe chronic kidney disease, low platelet count, and/or PRECISE-DAPT score ≥25 – or non-HBR (n=656) patients. Antithrombotic regimen – either drugs type, dose, and duration – was systematically recorded, also collecting any regimen modifications at follow-up. The primary endpoint was the net adverse clinical endpoints (NACE) rate, defined as a composite of all-cause death, myocardial infarction, stroke, coronary revascularization, and major bleeding. The secondary endpoints were individual components of NACE.

**Results.** Among the pre-specified criteria, HBR patients were more frequently identified by advanced age (79% of patients), PRECISE DAPT ≥25 (69% of patients), and use of oral anticoagulants (20.5% of patients). The coexistence of more than 1 HBR criteria per patient was frequent (79% of HBR patients fulfilling at least 2 criteria). Compared with patients without any criteria, those with 1 or more HBR criteria were more frequently treated with clopidogrel (17.5% vs. 50.9%, respectively; p<0.001), and less frequently treated with ticagrelor (55.9% vs. 42.8%, respectively; p<0.001), prasugrel (18.9% vs. 6.3%, respectively, p<0.001), and/or DAPT regimen (96.5% vs. 89.5%, respectively; p<0.001). HBR patients had worse outcomes, owing to higher death and bleeding risk. NACE occurred in 17.2% of the HBR and 8.7% of the non-HBR patients (hazard ratio [HR] 2.015; 95% confidence interval [CI] 1.450-2.799; p<0.001), driven by lower rate of all-cause death (12.1% vs. 2.6%; HR 4.726; 95%; CI 2.774-8.051; p<0.001) and major bleeding (3.1% vs. 1.1%; HR 2.998; 95% CI 1.243-7.230; p=0.015) in the HBR group, whereas ischemic events did not differ between groups.

**Conclusions.** Among patients with ACS, those with HBR features are common in clinical practice, and less frequently treated with potent P2Y12 inhibitors and/or DAPT as compared with those without. HBR patients experienced a worse long-term outcome compared with non-HBR patients, mainly driven by a higher risk of death and major bleeding.

### A601: MODULAZIONE RECIPROCA DEL LINC-223 E DEL SUO LIGANDO MIR-125A IN FUNZIONE DELLA TERAPIA ANTIPIASTRINICA

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**Introduzione.** La cardiopatia ischemica è responsabile del 12% della mortalità globale, in Italia. Ogni anno, oltre 135.000 individui sono colpiti da una sindrome coronarica acuta, che risulta fatale in 45.000 casi. I

lincRNAs sono un gruppo emergente di long non-coding RNA trascritti da regioni intergeniche. Ad oggi migliaia di lincRNAs sono stati scoperti, della maggior parte dei quali non si conosce la funzione. È stato dimostrato che variazioni nei livelli d'espressione di queste molecole possono essere coinvolte nello sviluppo di molte patologie umane. Il linc-223 è un lincRNA che deriva dal medesimo trascritto primario del mir-223, tra i maggiormente espressi nelle piastrine. È stato recentemente descritto che il linc-223 lega il miR 125-5p presente nei monociti, ostacolandone la funzione oncogena. Al contrario, in alcune forme di Leucemia Mieloide Acuta si osserva una riduzione dei livelli di linc-223 con conseguente alterazione della sua funzione anti-oncogena.
**Scopo.** Valutare le modifiche nei livelli di specifici microRNAs piastrinici in relazione allafunzionalità piastrinica e al trattamento antipiastrinico
**Metodi.** L'RNA totale è stato estratto mediante il kit miRVANA. L'RNA esogeno C. Elegans-39 (5nM) è stato aggiunto quale controllo metodologico. La misurazione dei miRNAs a del lncRNAs è stata effettuata mediante Real Time RT-PCR quantitativa.
**Risultati.** Abbiamo osservato una significative riduzione dei livelli di linc-223 ($p<0.05$) con corrispondente incremento dei livelli del miR-125a-5p ($p<0.05$) dopo l'instaurazione di una terapia antipiastrinica in pazienti che non assumevano farmaci antitrombotici inizialmente. Inoltre, il passaggio da un regime di doppia terapia antipiastrinica (DAPT) con clopidogrel ad un regime DAPT più intenso con ticagrelor determinava un'ulteriore riduzione di linc-223 ($p<0.05$), accompagnata da un ulteriore significativo incremento di miR-125a-5p ($p<0.05$).
**Conclusioni.** Abbiamo osservato come l'avvio e l'intensificazione della terapia antipiastrinica si associ ad un decremento di linc-223 ed incremento dei livelli di miR-125a-5p, suo ligando. La determinazione dei livelli di espressione di linc-223 e miR-125a-5p apre la strada ad un loro utilizzo come biomarcatori della funzione piastrinica, rappresentando inoltre nuovi potenziali bersagli terapeutici.

### A602: UNFRACTIONATED HEPARIN ASSOCIATED WITH PRE-TREATMENT BASED ON DUAL ANTIPLATELET THERAPY PROMOTES CORONARY REPERFUSION BEFORE PRIMARY PERCUTANEOUS CORONARY INTERVENTION IN STEMI PATIENTS

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**Objectives.** The aim of our study was to evaluate whether pre-treatment with dual antiplatelet therapy (DAPT) and unfractionated heparin is efficacy and improves coronary reperfusion and short-term clinical outcomes.
**Background.** Treatment with unfractionated heparin and dual antiplatelet therapy is recommended in STEMI guidelines to facilitate reperfusion results and improve ischemic outcomes. However, it is unclear what is the best timing to administer the antiplatelet and anticoagulation therapy.
**Methods.** We studied 420 patients with diagnosis of STEMI and transported by EMS to our hospital in order to undergo the pPCI between 1st January 2009 and 31st March 2019. Patients were divided into three groups based on the pre-treatment they received: Group 1, 106 patients who did not receive any pre-treatment before their arrival in the cath lab; Group 2, 160 patients who received a pre-treatment with DAPT only; Group 3, 154 patients who received as pre-treatment DAPT and intravenous bolus of unfractionated heparin. Pre-pPCI Thrombolysis In Myocardial Infarction (TIMI) flow grade in the infarct-related artery (IRA) and in-hospital mortality were used as outcomes to determine the efficacy and the optimal timing of pre-treatment.
**Results.** We observed a progressive increase in the percentage of pre-treatment with both DAPT and DAPT plus heparin over the years (DAPT 3.3% in 2008 vs. 42.9% in 2019 and DAPT + Heparin 2.6% in 2008 vs 57.1 in 2019, p = 0.0001). Initial TIMI flow grade in the IRA was significantly different between the three groups: TIMI 0 or 1 flow was significantly more frequent in the group 1 (91.5%) and group 2 (90%) compared to the group 3 (80.5%, p=0.0012). Patients in group 1 had a greater intracoronary thrombus and more frequently received a Glycoprotein IIb / IIIa inhibitors than the other two groups (23.6% vs 15% vs 13.6%; p= 0.086). PrePCI TIMI flow improved with longer pre-treatment intervals and also dividing patients based on the different precoronary timing the percentage of greater vessel patency is higher in group 3 than group 2 or 1 (59.1% vs 22% vs 18.2%; p= 0.02). At the multivariate logistic regression analysis the only independent predictor of patent vessel at the time of coronary angiography was pre-treatment with DAPT and DAPT + heparin (OR 1.53, IC 1.03-2.33, p = 0.04). In-hospital mortality rate was significantly higher in the no pre-treated group than others (p = 0.046)
**Conclusions.** Unfractionated heparin in addition to DAPT has an additive effect on vessel patency. DAPT and heparin pre-treatment were independently associated with a lower risk of total vessel occlusion before pPCI. Our results support the practice of pre-treatment with DAPT and DAPT plus unfractionated heparin in the pre-hospital phase of the management of STEMI patients.

### A603: TIPOLOGIA DI INFARTO MIOCARDICO ACUTO CON SOPRASLIVELLAMENTO DEL TRATTO ST E FIBRILLAZIONE ATRIALE DI NUOVA INSORGENZA: CARATTERISTICHE CLINICHE E PROGNOSTICHE

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**Obiettivi.** Nonostante l'uso crescente di strategie di rivascolarizzazione precoce, la fibrillazione atriale di nuova insorgenza (NOAF) rappresenta ancora una complicanza relativamente frequente nel contesto dell'infarto miocardico acuto, soprattutto con elevazione del tratto ST (STEMI). Nonostante sia associata a complicanze intraospedaliere maggiori e ad un peggioramento dell'outcome a lungo termine, pochi sono i dati relativi alle caratteristiche ed alla prognosi della NOAF in relazione alla coronaria culprit ed alla sede coinvolta dallo STEMI. Scopo del nostro lavoro è stato identificare, tramite la revisione della nostra casistica di SCA-STEMI dal 2017 in poi, le differenze tra pazienti con o senza insorgenza di NOAF in relazione alla coronaria coinvolta e alla sede dell'infarto miocardico acuto.
**Materiali e metodi.** Nel gruppo 1 sono stati inclusi pazienti con STEMI anteriore ed arteria discendente anteriore culprit (40 soggetti, età media 66±13 anni), mentre nel gruppo 2 sono stati inclusi pazienti con STEMI inferiore ed arteria coronarica destra culprit (32 soggetti, età media 63±11 anni). Dell'intera popolazione in esame sono state analizzate le caratteristiche cliniche (CHA2DS2-VASc, GRACE score, classe di Killip), elettrocardiografiche, ecocardiografiche, angiografiche (lesione culprit e malattia dei rami atriali), emodinamiche, di laboratorio (hs-TnT, proteina C reattiva) e in particolar modo l'eventuale NOAF con giorno di insorgenza e durata. L'outcome clinico nella fase acuta è stato valutato tramite mortalità per cause cardiovascolari ed incidenza di eventi avversi maggiori (MACE), intesi come shock cardiogeno, fibrillazione ventricolare, tachicardia ventricolare e edema polmonare acuto.
**Risultati.** L'incidenza di NOAF, la malattia dei rami atriali (ABD), il picco di hs-TnT e di proteina C reattiva (PCR) tra i due gruppi risultavano simili, ma il gruppo 1 mostrava in maniera significativa valori di GRACE score, classe Killip, CHA2DS2-VASc più alti, frazione d'eiezione (FE) ed outcome (MACE e mortalità) peggiori. Dell'intera popolazione, i pazienti con NOAF (n=13) presentavano un aumento significativo di: picco di PCR, ABD, indici di gravità clinica (GRACE score e classe killip), MACE e mortalità. Inoltre, analizzando i pazienti con o senza NOAF all'interno del gruppo 1, i primi confermavano di avere una più alta ABD (p=0,00) e maggiori indici di gravità clinica, anche se non statisticamente significativi (GRACE score p=0,07; Killip p=0,1; LAVi p=0,08), una minore FE (p=0,08) ed un aumento dei MACE (p=0,07) con mortalità significativamente più elevata (p=0,01). Questi dati, invece, non venivano confermati nel gruppo 2, all'interno del quale i pazienti con NOAF mostravano una maggior presenza significativa solo di ABD (p=0,01), e simili indici di gravità clinica (GRACE score, classe Killip, FE e LAVi), con lieve aumento dei MACE (p=0,34) e nessun decesso. Inoltre, è stata osservata una più precoce insorgenza di NOAF nel gruppo 2 (p=0,07).
**Conclusione.** i risultati del nostro studio evidenziano come i meccanismi patogenetici alla base dell'insorgenza della NOAF possano variare in base al tipo di STEMI. La NOAF negli STEMI inferiore sembra insorgere più precocemente ed essere collegata maggiormente all'ischemia atriale, mentre negli STEMI anteriori sembra essere più tardiva ed associarsi più alla gravità delle caratteristiche cliniche del paziente e ad una peggior prognosi, con differenze non sempre statisticamente significative data l'ancora ridotta numerosità campionaria.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 5
## Sessione Orale

### A604: ATYPICAL CHEST PAIN IN A YOUNG ATHLETE

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**Case description.** We present the case of a 20 years-old soccer player (male), without any CV risk factor or familiar history of cardiac disease, no drug/alcohol abuse, no recent foreign travels. In August/September 2017 and 2018 he experienced sporadic, transient episodes of chest pain during physical activity. Hence, he underwent stress-ECG and stress-echocardiography, both positive for myocardial ischemia on effort. Coronary computed tomography angiography (CCTA) showed 3-vessel coronary artery disease (CAD), diffuse thickening of arterial walls, with critical stenosis of all 3 vessels; incidental finding of escavated lesion of the right lung in communication with main bronchus was also found. No medical therapy had been prescribed yet.

The patient was admitted to our department for coronary angiography, which confirmed CCTA findings. Basal echocardiography was normal.
Suspecting vasculitis, the patient underwent total-body magnetic resonance angiography, which revealed involvement of left common carotid artery wall, without critical lumen stenosis, descending aorta and celiac trunk. All lesions were hyperintense on STIR sequences (active inflammation). The patient also underwent total-body 18-FDG positron emission tomography, which revealed hypermetabolic enhancement from those lesions and from the escavated lung lesion.
All findings supported the diagnosis of Takayasu arteritis, a large-vessel granulomatous vasculitis, more common in young or middle-aged women (F:M 9:1) with coronary involvement in 10-15% of patients. Specific steroid therapy was initiated. Anti-TNF drugs should be considered according to clinical presentation and follow-up; nonetheless, our patient had positive Quantiferon TB test, therefore the latter drugs are contra-indicated, and TB-specific antibiotic treatment was prescribed.
For CAD management, percutaneous approaches should not be considered as first-line strategies, since high rates of restenosis (up to 65%) are reported; coronary artery bypass grafting (CABG) could be technically feasible, but rate of restenosis or graft failure is high (up to 30%), especially when surgery is performed on active inflammatory stage. Moreover, some coronary lesions may regress after medical therapy of vasculitis. Hence, we indicated re-evaluation for CABG candidacy after a course of steroid therapy (prednisone) and TB-specific therapy. At 6-month follow-up, the patient is asymptomatic and is gradually de-escalating steroid therapy.
**Discussion.** Large-vessel vasculitis is a rare disease, diagnosis is usually tricky, and most patients receive a diagnosis after months or years of disease; furthermore, coronary involvement in large-vessel vasculitis is particularly rare and poses several therapeutic challenges. For many of these conditions, however, it is possible to prescribe a specific therapy (including new-generation disease-modifying drugs, e.g. anti-TNF drugs). Takayasu arteritis has indication for those therapies in acute phase, before organ and vascular permanent damage. Our patient had untreated tubercular infection, hence these drugs were contra-indicated and steroid therapy was performed. After a course of vasculitis-specific therapy, we plan to reassess coronary involvement (active inflammation and critical stenoses) and re-assess our patient indication for myocardial revascularization (i.e., CABG).

### A605: INCIDENCE, DETERMINANTS AND PROGNOSTIC RELEVANCE OF DYSPNEA AT ADMISSION IN PATIENTS WITH TAKOTSUBO SYNDROME: RESULTS FROM THE INTERNATIONAL MULTICENTER GEIST REGISTRY

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**Background.** Despite substantial recovery of the cardiac function after the acute phase, short- and long-term mortality in takotsubo syndrome (TTS) is not trivial, whereas prognostic insights are still not fully elucidated. Aim of the present study is to investigate prognostic relevance of dyspnea at presentation in patients with TTS.
**Methods.** We analyzed data from 1071 TTS patients (median age 72 years, 90% female) enrolled in the international multicenter GEIST registry. Patients were dichotomized according to the presence or absence of dyspnea at hospital admission. Primary endpoint included occurrence of in-hospital complications as a composite of pulmonary edema, cardiogenic shock and death. Secondary end-point included long-term all-cause mortality.
**Results.** Overall, 316 (30%) patients presented dyspnea at hospital admission. Diabetes, lower left ventricular ejection fraction and presence of pulmonary disease or atrial fibrillation were independently associated to dyspnea. In-hospital pulmonary edema, cardiogenic shock and death (17% vs 3%, p<0.001; 12% vs 7%, p=0.009; 5% vs 2%, p=0.004 respectively) and long-term overall mortality (22% vs 11%, p<0.001) occurred more frequently in patients with dyspnea than in those without. At multivariate analysis, dyspnea at presentation remained independently associated to both primary [odds ratio 2.98 (95% confidence interval (CI): 1.95–4.59, p<0.001] and secondary end-points [hazard ratio 2.03 (95% CI: 1.37–2.99), p<0.001].
**Conclusions.** Dyspnea at presentation is common in TTS and independently associated to in-hospital complications and worse long-term prognosis. Symptoms assessment could represent a valuable tool to integrate risk-stratification models for TTS patients.

### A606: CARDIAC INVOLVEMENT IN CHURG STRAUSS SYNDROME: AN UPDATE ON CARDIOLOGICAL MANIFESTATIONS

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**Background.** Eosinophilic granulomatosis with polyangiitis (EGPA) is characterized by asthma, nasal polyposis, rhinosinusitis, peripheral eosinophilia with organ infiltration, and necrotizing vasculitis. Churg-Strauss syndrome (CSS) is a rare systemic disease. Only a few cardiological based studies have been conducted for this rare disease. The aims of this study were to investigate, in a cohort of CSS patients, the prevalence and clinical impact of cardiac involvement, to describe findings of cardiac evaluation, find factors associated with cardiac involvement in order to give an update on the cardiological manifestations.
**Methods.** This is a single-centre study (University of Florence). We prospectively enrolled 52 CCS patients and a complete cardiological assessment was proposed to each. Churg Straus cardiac involvement (CCI) was defined by the presence of at least one of these criteria: 1) pericarditis 2) myocarditis, 3) regional or global wall motion abnormalities, not explained by coronary artery disease, 4) intraventricular thrombus formation, 5) coronary artery vasculitis, 6) Prinzmetal's angina, 7) advanced AV block in pts aged<65 yo. Cardiac evaluation included clinical evaluation, ECG, 24-hour Holter registration, Tn and Nt-pro-BNP blood test, echocardiography, strain echo. Cardiac magnetic resonance (CMR) was performed.
**Results.** Pts with CCI had higher eosinophilic peak than pts with no CCI (8000 (5000-11400) vs 3000 (1700-7760) p=0.0172). Echocardiography revealed prevalence of cardiac abnormalities in 15 pts ((28.8%), 9 were classified as CCI (69% of CCI pts) and 6 (15%) as no CCI. Cardiological symptoms were developed during CCS history in 11 (85%) CCI pts at the time of cardiological involvement, 2 (15%) CCI pts did not develop symptoms and CCI was discovered during cardiological screening. ECG abnormalities in 22 pts (CCI pts 11 (84,6%) vs no CCI pts 11 (28,2%) P=0.0007), Ecg abnormalities could identify CSS cardiac involvement with 84.6% sensitivity, 71.8% specificity. Holter NSVT (CCI pts 3 (50%) vs no CCI pts 1 (4%) P=0.0181), NTproBNP value (u.l.n. 300 ng/L (CCI pts 210.7(175.0-484.8) vs, no CCI pts 147.3 (63.00-203.5) P=0.0336), or Tn (CCI pts 9.000 (6.000-11.25), no CCI pts 10.00 (6.300-22.50)P=0.3202). In CCI pts: myocarditis was present in 6 (46%) pts, pericarditis in 2 (15%) pts, coronary arteritis in 1 (7%) pt, Prinzmetal's angina in 1 pt (7%), 2 pts with intraventricular thrombosis, 1 pt with WMAs without CCI symptoms. CCI pt, compared to no CCI had enlarged LVEDV/BSA (62.5 ± 4.9 vs 52.2 ± 1.5 ml/$m^2$, p-value= 0.0116), lower left ventricular ejection fraction (57.8 ± 2.5 vs 66.03 ± 0.8, p-value 0.0002) and Global Longitudinal Strain (-15.91 ± 1.1 vs -21.16 ± 0.4, p< 0.0001), WMAs were present in 9 (17.3%) pts (8 (61.5%)vs 1 (2.6%), p-value < 0.0001), the most commonly involved segments were the inferior and apical segments, and in 5 (38.5%) cases of CCI pts showed apical aneurism. CMR was performed in 7 pts; CMR was able to identify 2 apical aneurisms and 2 left ventricular apical thrombus.
**Conclusions.** Patients with EGPA in clinical remission showed a high incidence of cardiac involvement. Markedly increased eosinophil relates to CCI. Pericarditis and myocarditis are the most common forms of cardiac involvement. There is a propensity of apical involvement in WMA and the tendency to develop apical aneurysm. CMR enables detection of LGE, although in our pts repeatedly segmental akinesia-dyskinesia was not related to LGE presence.

### A607: CARDIOPATIA ARITMOGENA NELLA DONNA: PECULIARITÀ FENOTIPICHE E GESTIONE DELLA GRAVIDANZA.

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**Background.** Il rischio cardiovascolare nelle donne gravide affette da Cardiomiopatia Aritmogena (AC), inteso in termini di aggravamento della patologia materna e di compromissione della gravidanza, è un problema di interesse clinico tutt'ora aperto. I pochi dati disponibili sembrano indicare che nelle pazienti in buon compenso emodinamico la gravidanza sia in genere ben tollerata. Tuttavia, la mancanza di un'adeguata casistica rende difficile formulare indicazioni precise per la gestione di tali pazienti. Scopo dello studio è valutare l'outcome delle pazienti gravide affette da AC e determinare l'eventuale presenza di una relazione tra gravidanza e progressione della malattia stessa.

**Materiale e metodi.** Il nostro è uno studio retrospettivo che ha analizzato 89 pazienti con diagnosi di AC, definita secondo i criteri della Task Force 2010, di cui 29 nullipare e 60 che avevano affrontato almeno una gravidanza, in follow-up ambulatoriale presso il centro di Cardiopatie Aritmiche del Policlinico Universitario di Padova. Le pazienti sono state valutate mediante ECG a 12 derivazioni, ricerca dei potenziali tardivi tramite SAECG, ECG sec.Holter delle 24 ore, ecocardiografia, risonanza magnetica cardiaca e test genetico.
**Risultati.** Dal confronto tra pazienti gravide e non gravide sono emerse alcune differenze statisticamente significative. Le anomalie elettrocardiografiche di depolarizzazione e ripolarizzazione sono risultate più diffuse tra le gravide (p< 0,001 e 0,05). Inoltre all'indagine ecocardiografica la frazione di accorciamento del ventricolo destro risultava significativamente più bassa nelle gravide (34.2 ± 7.7 vs 38. 8 ± 9,5, p <0,04). L'area telediastolica del ventricolo destro (ATD) nelle gravide risultava essere maggiore, seppur non significativamente, nelle gravide, presentando invece una differenza significativa tra pluripare e primipare (23.3 ± 6.2ml/cmq vs 14.6± 5.4 ml/cmq, p<0,002). Un certo grado di instabilità elettrica, quantizzata all'ECG Holter come BEV>500/24h o tachiacardia ventricolare non sostenuta, è stata rilevata nell'81% delle gravide contro il 61% delle nullipare (p<0.03). Non abbiamo registrato eventi maggiori quali sincope o arresto cardiaco durante le gravidanze.
**Conclusioni.** I nostri dati mostrano come la mortalità non è aumentata nelle pazienti gravide affette da AC; tuttavia una seconda gravidanza sembra determinare un peggioramento delle condizioni in termini di aritmie e alterazioni strutturali. Rimane fondamentale un councelling multidisciplinare assieme ad una corretta stratificazione del rischio aritmico al fine di intraprendere una gestione ed un follow-up ottimali.

### A608: DIFFERENCES IN CIRCULATING CARDIAC BIOMARKERS BETWEEN IMMUNOGLOBULIN LIGHT-CHAIN AND TRANSTHYRETIN CARDIAC AMYLOIDOSIS

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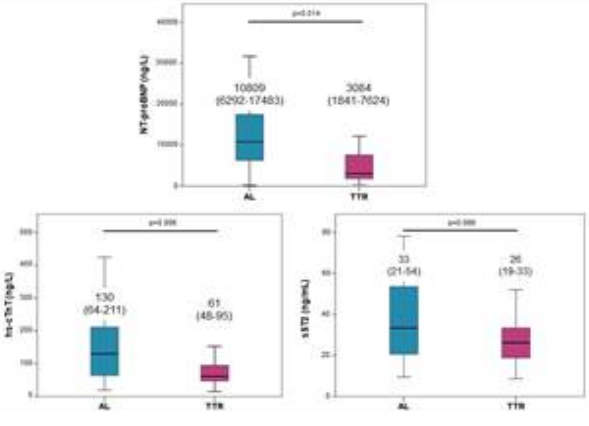
**Background.** Cardiac amyloidosis is caused by progressive accumulation of a misfolded protein, mostly represented by immunoglobulin light chains (AL) or transthyretin (TTR). AL amyloidosis is characterized by a much more rapid progression and worse outcome, possibly due to a greater cytotoxic effect of AL fibrils. This mechanism may impact on circulating levels of biomarkers reflecting myocardial damage (B-type natriuretic peptides and cardiac troponins), or inflammation and tissue remodeling (soluble suppression of tumorigenicity-2, sST2).
**Purpose.** We aimed to assess circulating levels of N-terminal fragment of proBNP (NT-proBNP), high-sensitivity cardiac troponin T (hs-cTnT), and sST2 in a cohort of patients with established diagnosis of cardiac AL or TTR amyloidosis.
**Methods.** 86 patients with cardiac AL (n=25, 29%) or TTR amyloidosis (n=61, 71%) underwent an echocardiographic and biohumoral characterization, including NT-proBNP, hs-cTnT and sST2 assays.
**Results.** Patients with AL amyloidosis were younger (70±9 vs. 80±7 years) and showed a lower left ventricular mass (302±83 vs. 349±88 g, p=0.028) and septal thickness (17±3 vs. 18±3 mm, p=0.029) compared to TTR; glomerular filtration rate was similar between groups (59±34 vs. 56±23 mL/min/1.73 m2, p=0.622). Circulating levels of NT-proBNP (10,809 [interquartile interval; IQI 6,292-17,483] vs. 3,084 [1,841-7,624] ng/L, p=0.014) and hs-cTnT (30 [64-211] vs. 61 [48-95] ng/L, p=0.006) were higher in AL amyloidosis; sST2 was also higher in AL compared to TTR amyloidosis, although not reaching statistical significance (33 [21-54] vs. 26 [19-33] ng/mL, p=0.086) (Figure). More prominent differences were found when biomarker levels were normalized for left ventricular mass: NT-proBNP 33.9 [20.4-53.8] vs. 9.9 [5.8-23.5] ng/L/g, p=0.002; hs-cTnT 0.48 ng/L/g [0.25-0.71] vs. 0.19 [0.14-0.26], p=0.001; sST2 0.10 [0.07-0.14] vs. 0.07 [0.06-0.11] ng/mL/g, p=0.029.
**Conclusions.** Despite a lower degree of pseudohypertrophy, circulating levels of cardiac biomarkers are higher in AL than TTR amyloidosis, possibly reflecting a greater toxic effects of AL fibrils on cardiomyocytes.




### A609: SPATIAL QT DISPERSION IN PATIENTS WITH TAKOTSUBO SYNDROME: CHARACTERISTICS AND CLINICAL CORRELATES

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**Background.** Takotsubo syndrome (TTS) often presents with peculiar evolution of electrocardiographic repolarization abnormalities. The aim of the present study was to evaluate, in a cohort of patients with TTS, the QT and Tpeak-Tend intervals as well as their dispersion in relation to in-hospital course.
**Methods.** The study population included 48 patients with TTS (mean age 72 years, 94% females) from a multicentric and prospective registry. Electrocardiograms of every patients have been obtained at hospital admission, at hospital discharge and at 2 months follow-up evaluation. The following electrocardiographic parameters have been evaluated: RR interval, QRS duration, QTe (from the beginning of the QRS to the end of the T-wave), QTp (from the beginning of the QRS and peak of the T-wave), Tp-e (QTe – QTp). Spatial dispersion of these intervals has been obtained as difference between the maximum and the minimum value of these variables. The end-point of the study has been the occurrence of complicated in-hospital course (composite of acute pulmonary edema, cardiogenic shock, left ventricular thrombus occurence).
**Results.** A total of 8 patients (16.6%) experienced complicated in-hospital course. These patients presented higher QT and Tp-e intervals at admission as compared to those not reaching the end-point. The following decrease in these values was more accentuated during in-hospital course (p<0.0001) than after discharge (p<0.05). The dispersion of repolarization parameters was higher among those with complicated in-hospital course (Disp QT-c: 121± 33 vs 93± 37 msec, p=0.05; Disp Tp-e-c: 102±30 vs 73.2±28 msec, p=0.01). A greater QT dispersion correlated with longer in-hospital stay (Disp Tp-e-c: r = 0.3, p= 0.03) e (Tp-e-c: r = -0.33, p=0.03; Disp Tp-e-c: r = -0.32, p= 0.03).
**Conclusions.** Ventricular repolarization in the acute and subacute phase of TTS presents a significative evolution. A higher repolarization dispersion is evocative of a more severe clinical picture in the acute phase and of a slower recovery of normal systolic ventricular function.

## EMERGENZE CARDIOLOGICHE
## Sessione Orale

### A610: SHOCK CARDIOGENO: EVERY MINUTE COUNTS

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(a) POLICLINICO TOR VERGATA

**Introduzione.** Lo shock cardiogeno è una sindrome acuta e progressiva causata dall'improvvisa incapacità della pompa cardiaca a garantire un adeguato output, tale da determinare ipoperfusione tissutale. Se non adeguatamente trattato lo shock cardiogeno è rapidamente fatale con una mortalità tra il 50-80%.
**Obiettivo.** Il nostro studio, retrospettivo osservazionale, ha valutato i fattori prognostici di sopravvivenza nei pazienti giunti presso il nostro centro con sindrome coronarica acuta complicata da shock cardiogeno. Abbiamo inoltre valutato l'impatto del tempo precoronarico sulla mortalità intra-ospedaliera e sulla durata della degenza ospedaliera.
**Materiali e metodi.** Sono stati valutati 92 pazienti con sindrome coronarica acuta (SCA) complicata da shock cardiogeno (CS) all'esordio(*early onset CS*) o successivamente al ricovero (*late onset CS*) nel periodo di tempo compreso tra Gennaio 2012 e Maggio 2019.I pazienti sono stati analizzati complessivamente e successivamente suddivisi in 2 gruppi, sulla base dei tempi precoronarici e della loro provenienza: Gruppo A: 48 pazienti trasferiti dal centro Spoke con DIDO (door in door out) ≤ 40 min (9/48 Gruppo A1) o DIDO > 40 min (39/48

gruppo A2). Gruppo B: 44 pazienti afferiti direttamente al *centro Hub* con tempo *Door To Balloon (DtB)* ≤ 30 min (19/44 Gruppo B1) o > 30 min (25/44 Gruppo B2).
**Risultati.** La mortalità intraospedaliera del gruppo A1 è stata del 44,4%, con una degenza media in UTIC di 7,1 ± 3,6 giorni, con una degenza totale media di 10,2 ± 4,7 giorni. La mortalità intraospedaliera del gruppo A2 è stata del 20,51 %, con una degenza media in UTIC di 7,54 ± 6,8 giorni, con una degenza totale media di 12,9 ± 10,6 giorni. La mortalità intraospedaliera del gruppo B1 è stata del 15,18 %, con una degenza media in UTIC di 7,46 ± 5,7 giorni, con una degenza totale media di 11,69 ± 8,6 giorni. La mortalità intraospedaliera del gruppo B2 è stata del 36%, con una degenza media in UTIC di 8,13 ± 3,6 giorni, con una degenza totale media di 16,1 ± 20,5 giorni.
**Discussione.** Da un'analisi dei risultati è possibile notare come la degenza media intraospedaliera risulti sufficientemente omogenea nei diversi gruppi. La mortalità intraospedaliera risulta significativamente ridotta nei pazienti del gruppo B1 (centro Hub con un DTB ≤ a 30 min). Abbiamo inoltre dimostrato una differenza nella mortalità intraospedaliera nel confronto tra pazienti con DIDO ≤ 40 min (Gruppo A1) o DIDO > 40 min (gruppo A2). È quindi possibile ipotizzare come la possibilità del paziente con shock cardiogeno di essere sottoposto quanto prima ad una procedura di rivascolarizzazione sia il fattore più influente sulla sopravvivenza.

### A611: TRATTAMENTO CON ECMO DI SHOCK CARDIOGENO DA OCCLUSIONE DEL TRONCO COMUNE COMPLICATO DA SHOCK SETTICO

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Lo shock cardiogeno (SC) è una sindrome clinica acuta e progressiva causata dall'improvvisa incapacità della pompa cardiaca a garantire un adeguato output, determinando una severa ipoperfusione tissutale. La definizione di shock cardiogeno richiede la presenza dei seguenti parametri emodinamici: ipotensione persistente (pressione arteriosa sistolica < 90 mmHg), severa riduzione dell'indice cardiaco (<1,8 L/min/m2), elevate pressioni di riempimento (pressione atriale destra o sinistra >20 mmHg; pressione telediastolica del ventricolo sinistro >18 mmHg), aumento delle resistenze vascolari sistemiche (>2100 dyne s cm5) e contrazione della diuresi (<20 ml/h).
Lo shock cardiogeno come complicanza dell'infarto miocardico acuto è gravato da altissima mortalità, che oscilla tra il 50% e l'80% dei casi. Nel caso di shock cardiogeno causato da patologia ostruttiva critica del tronco comune (TC) della coronaria sinistra, la mortalità raggiunge il 90%.
Presentiamo il caso di un paziente di 55 anni, fumatore, senza precedenti cardiologici, che giungeva alla nostra attenzione per intenso malessere e dolore toracico. All'ingresso in PS l'ECG documentava STEMI antero-laterale; successivamente si riscontrava FV recidivante, trattata con DC-shock. Si eseguiva pertanto coronarografia in urgenza in SC, documentante occlusione del TC, trattata con PPCI ed impianto di due stent medicati su tronco comune-discendente anteriore (DA), si eseguiva inoltre T-stenting sull'arteria circonflessa (Cx). Si otteneva il ripristino di flusso TIMI 2 su DA e TIMI 3 su Cx. Al termine della procedura, per la persistenza dello SC, si posizionava contropulsatore aortico (IABP) e si procedeva ad intubazione oro-tracheale. Il paziente veniva ricoverato in terapia intensiva cardiologica per uno stretto monitoraggio clinico-strumentale. In seconda giornata, il quadro clinico evolveva in shock settico, con evidenza di bassa portata, oligoanuria e valori di mioglobina indosabili (>12.000 ng/ml). Si trattava pertanto il paziente con terapia antibiotica, farmaci inotropi a dosaggio massimale ed emodiafiltrazione veno-venosa continua (CVVHD). In terza giornata, si evidenziava severa ipotensione (PA 50/30 mmHg) nonostante una terapia inotropa massimale; si procedeva pertanto a posizionamento di ECMO (Extracorporeal Membrane Oxygenation) al letto del paziente in emergenza, mantenendo in sede l'IABP. L'ECMO, macchina cuore-polmoni modificata a flusso continuo, ha garantito il mantenimento di una buona portata e la ripresa della diuresi. In seguito al miglioramento del quadro clinico generale e della funzione sistolica globale del ventricolo sinistro all'ecocardiografia (aumento della FE dal 15% all'ingresso al 30% dopo posizionamento dell'ECMO), l'ECMO è stato rimosso dopo 9 giorni per iniziale ischemia dell'arto inferiore. Il paziente è deceduto dopo un mese dallo STEMI per infezione da germi multi-drug resistant.
Le sindromi coronariche acute (SCA) causate da ostruzione critica del TC sono un evento drammatico, che spesso non raggiunge l'attenzione del medico a causa dell'elevatissima mortalità extra-ospedaliera, soprattutto in caso di associato shock cardiogeno. In questi casi, l'ECMO può essere determinante per garantire un'adeguata perfusione degli organi vitali, fungendo da short term LVAD. Una delle peculiarità di questo dispositivo è che in centri ad alto volume può essere posizionato direttamente al letto del paziente, anche in concomitanza con l'IABP, come supporto temporaneo in attesa del miglioramento della funzione ventricolare sinistra.

### A612: PROGNOSTIC SIGNIFICANCE OF A NEW ECHOCARDIOGRAPHIC RIGHT VENTRICULAR FUNCTION INDEX IN ACUTE HEART FAILURE

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**Objective.** Sparse and contradictory data are available on the prognostic role of an early echocardiographic examination in patients with acute decompensated heart failure (ADHF).
We planned a prospective study to illustrate which early echocardiographic parameter would be better related to prognosis in such patients.
**Methods.** In a consecutive series of ADHF patients with either reduced (HFrEF, n=209) or preserved (HFpEF, n=172) left ventricular ejection fraction (LVEF), a complete echocardiographic examination was performed within 12 hours of admission. End-point of the study was death or re-hospitalization at 6 months from hospital discharge.
**Results.** After 6 months from discharge, 73 died and 96 were re-hospitalized for cardiovascular causes. At multivariable analysis a right ventricular diameter (RVEDD) >40 mm (p=0.02), a TAPSE <19 mm (p=0.004) and an inferior vena cava diameter >22 mm (p=0.02) were associated with 6-months events. LVEF and LV diastolic function were not predictive of events. Pulmonary artery systolic pressure (PASP) >45 mmHg and TAPSE/PASP <0.425 were associated with prognosis at univariate but not at multivariable analysis. Conversely, the TAPSE/RVEDD ratio (dichotomized at its median value of 0.461) was an independent predictor of outcome at multivariable analysis (p<0.001).
**Conclusions.** In patients hospitalized for ADHF, early echocardiographic identification of right ventricular dilatation and dysfunction predicts a poor outcome better than left ventricular systolic and/or diastolic dysfunction.

### A613: SNEAKY AND FATAL PRESENTATION OF A SYSTEMIC DISEASE

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**Case report.** *Past history.* Male, 71 years old. Arterial hypertension, type 2 diabetes mellitus, hepatic steatosis. Monoclonal gammopathy of undetermined significance and urinary Bence Jones protein in follow-up. In 2017 underwent coronary angiography (three vessels coronary artery disease not involving the left main artery) and subsequent coronary artery bypass surgery. Echocardiogram showed hypertensive cardiopathy. Few months later, onset of pain in the right hypochondrium; CT-scan showed gallbladder stone and hepatic abscess, subjected to surgical drainage. During hospitalization, asymptomatic cardiac troponin elevation. Echocardiogram: reduced left ventricle (LV) ejection fraction (EF 47%) with kinetics abnormalities. On coronary angiography: functional occlusion of LIMA graft and occlusion of the venous graft for the marginal branch; a direct stenting of the third tract of left anterior descending artery (LAD) was performed. *Recent history.* In March 2018 worsening dyspnea, transitory chest pain and pitting legs edema. Sudden acute pain at the right hypochondrium with thoracic irradiation, with rest dyspnea; in the ED, diagnosis of acute pulmonary edema. ECG: diffuse ST-segment depression and ST elevation in aVR lead. Bed-side cardiac echography: severe depression of LV EF with diffuse ipokinesia and focal anterior ipo-akinesia; right ventricle mildly dysfunctional. High dose of diuretic therapy was administered. Urgent coronary angiography was performed: as only finding, angiographic minus in the left main artery involving LAD and circumflex ostium, probably due to endo-coronary thrombus. For hemodynamic instability, dobutamine infusion was started and intra-aortic balloon pump was positioned. In Our Cardiological Intensive Care Unit, heparin and diuretic infusion associated with non-invasive ventilation administration were started. Abdomen echography and surgery evaluation were performed with diagnosis of concomitant acute cholecystitis. Antibiotic therapy with ciprofloxacin and tigecycline was prescribed. Mild renal impairment, elevation of hepatic functional indices, mild persistent anemia and persistent troponin were founded. Few days later: new coronary angiography with intra-vascular ultrasound with no evidence of intra-coronary thrombus or left main lesions, patient refused myocardial biopsy. Afterwards, severe hypotension requiring inotropic and vasopressor therapy; because of worsening of right hypochondrium acute pain, percutaneous cholecystostomy was performed. Patient, however, developed septic and cardiogenic refractory shock with sensorium obnubilation and oligo-anuria despite maximal therapy. We proceeded to orotracheal intubation. Despite this, he died ten days after hospitalization. *Autoptic data*: systemic amyloidosis in MGUS with cardiac, pulmonary, renal, hepatic and gastroenteric involvement.
**Discussion.** This clinical case highlights the possibility of a tricky and devious presentation of systemic amyloidosis; only few case reports have described cholecystitis as first manifestation of systemic amyloidosis. It is

also substantial to analyze the acute onset of heart failure due to severe systolic impairment, possibly due to ischemic disease but also, as showed during the autopsy, due to infiltrative cardiomyopathy; could it represent a very rapid disease progression or, alternatively, a misdiagnosed long history of amyloidotic disease? We would also like to discuss the importance of autoptic diagnosis in tricky ad unclear clinical cases.

### A614: SPECKLE TRACKING TO GUIDE VA ECMO WEANING PROCEDURE, PROVISIONAL RESULTS OF A PILOT STUDY

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**Introduction.** Veno-arterial extracorporeal membrane oxygenation (VA ECMO) is a mechanical support device (MCS) which can hemodynamically support patients in cardiogenic shock. VA ECMO can be used as a bridge to cardiac transplantation (HTX), to a ventricular assist device (VAD), or to recovery. Weaning from VA ECMO is defined as the device removal after a careful evaluation of the response of the cardiovascular system to the gradual reduction of VA ECMO flow. Even following a successful VA ECMO weaning many patients subsequently die or relapse prior to hospital discharge. To date few published studies have assessed echocardiographic predictors of successful weaning from VA ECMO. At present, there is no universally agreed set of criteria that can be used to deem a patient ready to discontinue VA ECMO support. The parameters generally used to guide the weaning procedure are: velocity time integral of the left ventricle outflow tract (LVOT VTI), ejection fraction (EF) and Mean Arterial Pressure (MAP). Speckle tracking is an imaging technique which allows a quantitative evaluation of global and regional myocardial function. The purpose of this study is to assess whether measurements obtained through speckle tracking cam give additional information in identifying patients who develop adverse outcomes post successful weaning from VA ECMO. Adverse outcomes are defined as death for cardiovascular reasons, necessity of new MCS, new hospitalisation for decompensated heart failure.
**Methods.** Prospective observational non-blinded pilot study. All the patients admitted to our hospital on VA ECMO support are screened. If the patients are judged candidates for VA ECMO weaning, they are recruited. Exclusion criteria are: poor quality of the echocardiographic images, presence of IMPELLA support, atrial fibrillation, VA ECMO support post- HTX, decision for VAD or HTX within 30 days. During the VA ECMO weaning procedure, a transoesophageal echocardiogram is performed. A mid-oesophageal 4 chamber view and a transgastric view at the level of papillary muscles are recorded together with LVOT VTI, heart rate, MAP and the inotropes and vasopressors used at each stage of VA ECMO flow reduction. After VA ECMO removal the patients are followed up. A speckle tracking analysis is performed on the recorded images.
**Results.** Over the last 10 month 52 patients have been screened. 21 patients were recruited and 6 dropped out. Among the recruited patients, 1 died for non-cardiovascular reasons and 1 has not concluded 1 month follow up yet. 7 patients were supported by peripheral VA ECMO, 8 patients by central VA ECMO. 2 patients experienced a cardiovascular outcome. The circumferential strain and the EF are significantly impaired in the patients experiencing the outcome of interest compared the other patients (median of circumferential strain -5.62; -14.20 respectively, p Value 0.0299; median EF 23.43%; 47.0%, p Value 0.0299). These 2 groups of patients are not different in terms of cardiac index, right ventricle free wall longitudinal strain, left ventricle longitudinal strain, stroke volume index.
**Conclusions.** According to our provisional results, EF and circumferential strain appeared to be the most reliable parameters to judge whether a patient can be safely weaned from VA ECMO support. An in increase in the sample size is mandatory to prove the validity of our current results, hopefully it will be achieved in the next few years.

### A615: INCIDENZA ED IMPATTO DELLE COMPLICANZE CORRELATE AD UTILIZZO DI IMPELLA: UN SOTTOSTUDIO DEL REGISTRO IMP IT

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**Introduzione.** Il supporto meccanico del circolo con Impella è in grande aumento sia per il trattamento dello shock cardiogeno (CS) che nelle procedure di angioplastica coronarica ad alto rischio (HR-PCI).
Scopo del presente studio è valutare l'incidenza delle complicanze correlate al dispositivo (Device Related Complications – DRC) e valutare l'impatto delle medesime sulla mortalità ad un anno.
**Materiali e metodi.** Lo studio IMP-IT è un registro nazionale multicentrico che ha arruolato tutti i pazienti trattati con Impella 2.5, Impella CP, Impella 5.0 and Impella RP, sia per CS che per HR-PCI, in 17 centri italiani dal 2004 al giugno 2018. Le DRC sono state definite come un endpoint composito di: sanguinamento correlato all'accesso vascolare, emolisi, ischemia dell'arto, necessità di rivascolarizzazione endovascolare dell'arto, danno dell'aorta, perforazione del ventricolo sx.
**Risultati.** Sono stati inclusi nello studio un totale di 406 pazienti: 229 per CS (56.4%) e 177 per HR-PCI (43.6%). L'incidenza complessiva di DRC è risultata 37.1% nel gruppo CS e 10.7% nel gruppo HR-PCI. Il sanguinamento correlato all'accesso vascolare è occorso nel 10.9% dei CS e nel 7.9% delle HR-PCI, l'emolisi è occorsa nel 20.5% dei CS e nello 0.5% delle HR-PCI; l'ischemia dell'arto è avvenuta nel 12.6% dei CS e nel 2.8%_delle HR-PCI; la rivascolarizzazione endovascolare dell'arto si è resa necessaria nel 6.9% dei CS e nel 2.8% delle HR-PCI. Sono stati documentati un caso di danno dell'aorta ed un caso di perforazione del ventricolo sx nel gruppo CS. I più forti predittori indipendenti di DRC sono risultati essere lo shock cardiogeno alla presentazione (OR 4.96, p <0.0001) e la malattia vascolare periferica (OR 2.22, p = 0.045). La mortalità ad un anno nella corte di pazienti con CS risulta essere il 61.3% nei pazienti che hanno presentato DRC contro il 54.3% dei pazienti che non hanno presentato questa complicanza. Se all'analisi univariata sembra esserci una correlazione tra DRC e mortalità ad un anno (HR 1.60, 95% CI: 1.14-2.26), tale associazione non è stata confermata in un modello multivariato HR 0.87, 95% CI: 0.57-1.32).
**Conclusioni.** Nel registro nazionale multicentrico IMP-IT, l'incidenza di complicanze correlate al dispositivo (DRC) appare elevata nella popolazione di pazienti trattata per shock cardiogeno, in gran parte dovuta ad incidenza non trascurabile di emolisi; al contrario l'incidenza di DRC nella popolazione di HR-PCI appare relativamente bassa. Il predittore principale di DRC risulta lo shock cardiogeno alla presentazione. Tali complicanze non sembrano tuttavia impattare in maniera indipendente sulla sopravvivenza ad un anno.

## ARITMIE – 9
## Sessione Orale

### A616: FEASIBILITY AND OUTCOMES OF MICRA PACEMAKER IMPLANT IN THE ELDERLY

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**Objectives.** Rates of cardiac pacemaker implantation rise with age and populations worldwide are ageing. Meanwhile, elderly patients may be at great risk of complications, as pneumothorax, lead perforation, or pocket dehiscence. The use of leadless pacing systems (Micra Transcatheter Pacing System, M-TPS) could overcome peri- and post-procedural complications related to the presence of transvenous leads and the post-operative recovery, being a favorable option in elderly patients. The study aimed to investigate feasibility and outcomes of M-TPS implant in a specific patient population, like the elderly, which represent a challenge for conventional cardiac pacing.
**Methods.** Between May 2014 and July 2019, 109 patients (83 males, 76.15%, mean age 77.71 ± 9.68) underwent M-TPS implantation in our Center, targeting a non-apical site of delivery when feasible. A subgroup of 46 patients (34 males, 73.91%) were 80 years old or older. All patients fulfilled standard criteria for pacemaker implantation with specific indication to receive VVI pacing. Study population was divided into two groups according to age (group 1 < 79 years vs group 2 ≥80 years). The outcome evaluation included electrical performance (capture threshold, pacing impedance, R wave amplitude) before hospital discharge and then followed at 1, 6, and 12 months and then annually. Major complications were defined as life-threatening events, required surgical intervention or any event causing significant hemodynamic instability or resulting in death.

**Results.** In 46/109 cases (34 males, 73.91%) M-TPS was implanted in patients 80 years old or older. There were no statistically significant differences between groups for demographics characteristics, except for age, and PM implant indications. The implant procedure was successful and no vascular complication occurred. No device-related events were registered during follow-up. In particular, no device infection and/or malfunction were reported. Patients were followed-up for an average of 18 months (median 12 months). No differences were observed between groups in procedure duration, single device delivery (group 1 vs group 2: 57.38% vs 69.05%, p=0.27), fluoroscopy time (group 1 vs group 2: 12.98 ± 8.24 vs 13.53 ± 8.43 minutes, p=0.65), electrical performance at implant (group 1 vs group 2: pacing threshold 0.57 ± 0.39 V/0.24 ms vs 0.57 ± 0.33 V/0.24 ms, p=0.70; impedance 714.03 ± 169.91 Ohm vs 723.78 ± 28 Ohm, p=0.99; R wave amplitude 9.88 ± 4.42 mV vs 9.73 ± 4.68 mV, p=0.68) and at 12 month F-U (group 1 vs group 2: pacing threshold 0.59 ± 0.37 V/0.24 ms vs 0.54 ± 0.24 V/0.24 ms, p=0.85; impedance 575.52 ± 115.06 Ohm vs 599.09 ± 86.13 Ohm, p=0.42; R wave amplitude 12.62 ± 5.18 mV vs 11.62 ± 5.04 mV, p=0.51).
**Conclusions.** The demand for cardiac pacing is strongly related to ageing, driving the clinical practice to look for the best solution for a considered fragile patient population. MTP-S implant is an effective and safe procedure in elderly patients, with similar electrical performance and outcome compared with younger patients at mid-term follow-up.

## A617: MANAGEMENT OF ANTICOAGULATION PROTOCOLS FOR CARDIAC IMPLANTABLE ELECTRIC DEVICES

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**Background.** The management of anticoagulation during a cardiac implantable electric devices (CIED) procedure can present challenges for electrophysiologists. Bleeding complications can significantly increase the risk for pocket hematomas, extended hospital stays, and elevated overall costs. The traditional approach has been interrupted oral anticoagulation therapy (OAC) for the procedure, and unfractionated heparin (UFH) or enoxaparin as a bridge until therapeutic OAC is reestablished, which has been associated with significant hematoma formation and infection. The current standard-of-care is to perform pulse generator replacements on fully anticoagulated patients. For CIED, uninterrupted warfarin therapy is superior to interrupted warfarin with heparin bridging with regard to bleeding complications. Many patients requiring pacemaker (PM) or implantable cardioverter-defibrillator (ICD) surgery are taking direct oral anticoagulants (DOAC). Management of pre-procedural anticoagulation is challenging in patients undergoing cardiac device insertion, particularly ICDs. Bleeding and pocket hematoma formation is a significant complication that can increase risk of infection and hospitalization. Although uninterrupted DOAC has been associated with less bleeding, the optimal management of DOAC prior to PM and ICD implantation is uncertain. For patients at high risk for thromboembolic events, guidelines recommend bridging therapy with heparin; however, case series suggest that it may be safe to perform surgery without interrupting DOAC treatment.
**Methods.** We randomly assigned patients with an annual risk of thromboembolic events of 5% or more to continued DOAC treatment or to bridging therapy with heparin. The primary outcome was clinically significant device-pocket hematoma, which was defined as device-pocket hematoma that necessitated prolonged hospitalization, interruption of anticoagulation therapy, or further surgery (e.g., hematoma evacuation). The DOAC and heparin treatments are monitored using the Trothrombine time (PT), Partial Thromboplastine time (APTT) and International Normalized Ratio (INR).
**Results.** The data and safety monitoring board recommended termination of the trial after the second prespecified interim analysis. Clinically significant device-pocket hematoma occurred in 3 of 53 patients (1.59%) in the continued-DOAC group, as compared with 7 of 58 (4.06%) in the heparin-bridging group (relative risk, 0.19; 95% confidence interval, 0.10 to 0.36; P<0.001). Major surgical and thromboembolic complications were rare and did not differ significantly between the study groups.
**Conclusions.** In our experience as compared with bridging therapy with heparin, a strategy of continued DOAC treatment at the time of PM or ICD surgery markedly reduced the incidence of clinically significant device-pocket hematoma. At present, reports of DOAC safety and efficacy for CIED are limited to case–control and cohort studies; therefore, randomized and controlled studies are needed in this area. DOAC use during CIED procedures is expected to expand as data from randomized studies emerge.

## A618: LEFT DOMINANT ARRHYTMOGENIC CARDIOMYOPATHY: CLINICAL PRESENTATION, DIAGNOSTIC WORK UP AND CONSISTENCY OF CURRENT DIAGNOSTIC CRITERIA

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**Background.** Left-dominant arrhythmogenic cardiomyopathy (LDAC) is considered a new subtype of the classical right-dominant disease. Clinical presentation is unspecific and often confused with other disease involving left ventricle. The diagnostic criteria for right ventricle arrhythmogenic cardiomyopathy were revisited by Marcus et al. in 2010 and have improved the diagnostic sensitivity and specificity but did not include the left-dominant subtype which remains an underrated disease.
**Purpose.** Our study describes a population of patient suspected and finally diagnosed with LDAC, at our institution. We also show the typical work-up including symptoms and family history evaluation as well as diagnostic tools.
**Methods.** Patients with uncertain diagnosis but high clinical suspicion of arrhythmogenic cardiomyopathy underwent specific examinations and tests including cardiac magnetic resonance for both morphofunctional study and tissue characterization; electro-anatomic voltage mapping (EVM) for detecting decreased electrical activity and endomyocardial biopsy guided by voltage mapping that accurately detects fibro-fatty substrate involvement.
**Results.** Arrhytmogenic cardiomyopathy was diagnosed in 93 patients, 19 (20.4%) of them presented LDAC. 68.4% presented unspecific ECG abnormalities. Only 3 patients experienced a sustained ventricular arrhythmia with right bundle brunch block morphology whereas other 6 had frequent ventricular ectopic beats of the same morphology. Echocardiography examination was nearly normal in the majority of patients. Late gadolinium enhancement at cardiac magnetic resonance revealed left ventricular fibro-fatty scarring in 100% of cases. EVM was performed in 18 patients (in 38.9% of right ventricle, 33.3% of left ventricle, 27.8% of both ventricles) and detected areas of decreased electrical activity in 11 patients. Thirteen patients underwent endomyocardial biopsy (in 11 cases EVM- guided) which in 69.2% revealed fibro-fatty infiltration. 11 patients were evaluated with genetic analysis and 54.5% of them had causative mutations of desmosomal genes. Finally, only 4 (21%) patients would have LDAC diagnosed according to the existing criteria and in all these cases specific genetic tests and endomyocardial biopsy had to be used to reach the diagnosis.
**Conclusion.** LDAC is an underestimed pathology which require a specific work-up and probably a revision of diagnostic criteria for arrhythmogenic cardiomyopathy.

## A619: ARRHYTHMIA OCCURRENCE IN A REAL LIFE POPULATION OF SINGLE CHAMBER ICD RECIPIENTS: THE IMPORTANCE OF ATP CAPABILITY

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**Aim.** To investigate the occurrence of Ventricular Tachycardia (VT) and Fibrillation (VF) in a contemporary cohort of single Chamber ICD recipients, programmed with long detection times and arrhythmia discriminators.
**Methods.** All patients had a VT zone as 350 ms and a VF zone as 280 ms programmed, with a detection duration > 20 seconds and >8 seconds respectively for VT and VF. Anti-tachycardia pacing (ATP) was available in both zones.
**Results.** A total of 165 patients (median age 63 [48-72] years, male 79%) implanted with a single chamber ICD were followed for a median period of 847 [666-1030] days. VT/VF detection occurred more frequently in ischemic and in secondary prevention patients in a fast VT range (>188 bpm), who also had less inappropriate arrhythmia detections and fewer inappropriate ICD therapy delivery. With contemporary technology, 9% of patients receive inappropriate therapy, and only 3% of episodes are inappropriately treated.

| | Total | ICM | NICM | Primary prevention | Secondary prevention |
|---|---|---|---|---|---|
| **Per-patient** | | | | | |
| n | 165 | 88 | 77 | 133 | 32 |
| Appropriate VT/VF detections | 44 (27%) | 31 (35%) | 13 (17%) | 30 (22%) | 14 (44%) |
| ICD therapy | 49 (30%) | 34 (39%) | 15 (19%) | 37 (28%) | 12 (37%) |
| Shock | 34 (21%) | 27 (31%) | 7 (9%) | 24 (18%) | 10 (31%) |
| ATP | 44 (27%) | 29 (33%) | 15 (19%) | 33 (25%) | 11 (34%) |
| Inappropriate therapy | 15 (9%) | 6 (7%) | 9 (12%) | 13 (10%) | 2 (6%) |
| All-cause mortality | 13 (8%) | 9 (10%) | 4 (5%) | 9 (7%) | 4 (12%) |
| **Per-episode** | | | | | |
| n | 847 | 438 | 409 | 418 | 429 |
| Appropriate VA detections | 706 (83%) | 417 (95%) | 289 (71%) | 280 (67%) | 426 (99%) |
| ICD therapy | 623 (73%) | 376 (86%) | 247 (60%) | 207 (49%) | 416 (97%) |
| Shock | 147 (17%) | 131 (30%) | 16 (4%) | 36 (9%) | 111 (26%) |
| ATP | 609 (72%) | 362 (83%) | 247 (60%) | 201 (48%) | 408 (95%) |
| SVT inappropriately detected as VT/VF | 141 (17%) | 21 (5%) | 120 (29%) | 138 (33%) | 3 (1%) |
| SVT inappropriately detected eliciting therapy delivery | 26 (3%) | 13 (3%) | 13 (3%) | 23 (5%) | 3 (1%) |

ICM: ischemic cardiomyopathy; NICM: non-ischemic cardiomyopathy; VA: ventricular arrhythmia; ATP: anti-tachycardia pacing; SVT: supra-ventricular tachycardia; VT: ventricular tachycardia; VF: ventricular fibrillation.

**Conclusion.** ATP is the most commonly delivered therapy also in primary prevention and non-ischemic patients. These observations have important implication for the broad application of subcutaneous ICD (S-ICD) to the current population of single-chamber ICD recipients, shock therapy being associated to increased mortality.

### A620: ANALYSIS OF SUBSTRATE MAP IN PATIENTS WITH ARRHYTHMIC STORM

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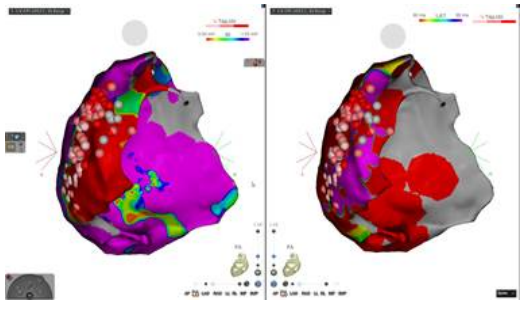
**Background.** Transcatheter ablation of ventricular tachycardias in patients with electrical storm represents a challenge due to the complexity of the substrate through which they arise. Below we will present 9 cases recently treated at our center. The average age of the patients is 59±22 years, 3 were suffering from ischemic heart disease, 2 from dilated cardiomyopathy, 2 from arrhythmogenic dysplasia, one patient had Becher's muscular dystrophy and one patient had no structural heart disease. In four cases an epicardial approach was required in addition to the endocardial one. Left ventricular ablation was performed in 8 cases and in 4 cases by retrograde aortic approach. In only 3 cases it was possible to perform a clinical VT activation map. In the other cases, due to poor haemodynamic tolerance, ablation was performed using a substrate map, which allows the localization of the area on which the arrhythmia is sustained, represented in the map as a low potentials zone. In cases where it wasn't possible to perform an activation map, the ablation target was the elimination of the late potential signals and the homogenization of the area. The choice to perform an epicardial approach was based on the patient's primary heart disease (dilated cardiomyopathy and arrhythmogenic dysplasia).
**Results.** The mean follow-up was 4 months (median 1, IQR 7 months) during which 2 patients had a sustained VT recurrence after 20 days and 1 month respectively after the procedure.



Epicardial bipolar map and late potentials in the postero-lateral wall of LV.

**Conclusions.** Endo-epicardial RF ablation was an effective treatment strategy in our patients with electrical storm The substrate map represented a valid ablation target in patients which it wasn't possible to create an activation map.

### A621: TASER AND RISK OF CARDIAC ARREST. RECOMMENDATIONS FOR A SAFER USE INTO ITALIAN POLICING

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Since September 2018 the Taser (electric gun) came into use among law enforcement also in Italy. 70 police officers of twelve Italian cities (Milano, Napoli, Torino, Bologna, Genova, Firenze, Palermo, Catania, Padova, Caserta, Reggio Emilia and Brindisi) were trained to use Taser. The model used is the TX2 made by Axon society (last year known as Taser) that has been in use in Europe for some time. Since 2001, acquisition date of the Taser in North America, there have been dozens of deaths following the use of Tasers. It can be lethal especially for individuals who already have congenital or acquired cardiac diseases (arrhythmogenic channelopathies like long QT syndrome). Moreover, it could interfere with some implanted medical devices, as the pacemaker or the implanted cardioverter defibrillator (ICD). People without cardiac diseases can also lose their life if hit by the Taser (ad example children, elders over 65 and pregnant women). Among the most vulnerable categories there are also people who take medicines, especially psychiatric drugs, high doses of alcohol and drugs (in particular cocaine). Antipsychotic drugs like piperazine phenothiazines and chlotiapine lengthen the QT interval causing an iatrogenic long QT syndrome and predisposing to cardiac arrest for ventricular fibrillation. Moreover, mood stabilizers (lithium, valproate, carbamazepine, oxcarbazepine, lamotrigine) change ventricular repolarization and their intake alongside antipsychotics and antidepressant drugs can cause proarrhythmic effects. The QT interval is also affected by methadone. There is, however, a potential risk of cardiac arrest caused by the Taser, it can in fact involuntary cause an arrhythmia and, consequently, an unwanted death by those who use it. So far there aren't any scientific studies on extensive cases. However, the Taser has already been object of some scientific publications. The scientific debate is still open and especially only at the beginning. Currently, from the medical and scientific viewpoint, it can be stated that before authorizing the use of a Taser, it is necessary for the police officers to take a specific training course. It is important to avoid hitting some particularly sensitive body parts such as the face or the precordial part, and to suspect a cardiac arrest or a respiratory arrest if the subject doesn't move in the minutes following the shot. Because of this risk, it has been suggested that law-enforcement experts reassess ECD use to maintain a balance of safety for subjects and officers while still achieving the goal of maintaining law and order. The use of TASERS may be increasing. I recommended ECD manufacturers should undertake an educational campaign to make all ECD users aware of the VF risk. Educational material should stress avoiding chest shots if possible and should warn against repeated or long trigger pulls. However, it is clear that a single 5-second shock can induce VF. A user should be judicious with ECD deployment and treat it with the same level of respect as a firearm, suspect cardiac arrest in any individual who becomes unresponsive after a shock, quickly call for medical support (call 118/112), and be prepared to resuscitate, including using an automated external defibrillator if needed.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 6
## Sessione Orale

### A622: A RARE CASE OF PULMONARY HYPERTENSION IN A PATIENT WITH CONSTRICTIVE PERICARDITIS AND PARTIALLY CORRECTED CONGENITAL HEART DEFECTS

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**Introduction.** Constrictive pericarditis (CP) is a pathological process leading to fibrosis of the pericardial layers with subseguent diastolic dysfunction. Pericardiectomy remains the only curative surgical procedure in most CP patients. CP is thought to be a rare cause of Pulmonary Hypertension (PH).
**Case report.** A 52-year-old man was referred to our clinic for evaluation of progressive dyspnea on exertion. 30 years previously, he underwent surgical repair comprising patch closure of the Sinus venosus-ASD and Partial Anomalous Pulmonary Venous Connection. At the admission he was in NYHA class III and referred shortness of breath. On cardiac examination, we found a variable intensity of S1 and pansystolic murmur four of six in left parasternal line of intercostal space II–III. Crackles were audible in the lower third of the pulmonary fields. The ECG showed atrial fibrillation and Right Bundle Branch Block. The transthoracic echocardiography revealed mildly right ventricular dilation, decreasing the size of the left ventricle (LV), dilated right and left atria, moderate tricuspid regurgitation with pulmonary artery systolic pressure of 40 mmHg, pericardial thickness, a plethoric inferior vena cava and engorged hepatic veins. Therefore, an elevated flow velocity was detected by Doppler interrogation of the posterior aspect of the right atrium adjacent to the interatrial septum. To investigate this further, transesophageal echocardiography was performed, which demonstrated a communication between the right upper pulmonary vein (RUPV) and the superior vena cava (SVC). Simultaneously, contrast echocardiography was performed and was first noted the RUPV drainage into the SVC, followed by opacification of the right atrium. We performed a chest CT angiography which showed the RUPV drainage into the SVC (Fig. 1). We also proceeded with CMR which showed pericardial thickening and calcification at the level of the medio-basal part of the LV with focal compression of the cavity (Fig. 2). Right heart catheterization (RHC) was

Figure 1

Figure 2

performed to better estimate the magnitude of the shunt and measurement of the pulmonary artery pressure. RHC confirmed the diagnosis of postcapillary PH and of CP. The resulting left-to-right shunt is hemodynamically significant with Qp/Qs: 1.9. Now, the patient is waiting for the pericardiectomy.
**Conclusion.** Herein we have reported a rare case of Pulmonary hypertension due to left heart disease (PH-LHD), in particular caused by Constrictive Pericarditis, in a patient with partial surgical correction of Partial Anomalous Pulmonary Venous Connection and Sinus venosus-ASD.

### A623: PROGNOSTIC ROLE OF MYOCARDIAL DEFORMATION ANALYSIS AND CARDIAC MAGNETIC RESONANCE IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATY

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**Objectives.** The aim of the present study was to evaluate the diagnostic and prognostic value of myocardial deformation indices evaluated by 2D speckle tracking echocardiography and of the presence of LGE at cardiac magnetic resonance (CMR) in a population of patients with hypertrophic cardiomyopathy.
**Materials and methods.** We enrolled patients with a diagnosis of hypertrophic cardiomyopathy excluding those patients with hypertrophic phenotype secondary to specific causes. For all patients, demographic, anthropometric and clinical data (birth date, race, sex, weight, height, BMI, BSA, comorbidities such as diabetes, arterial hypertension, dyslipidemia, COPD, coronary artery disease, chronic renal failure, previous implantation of PM/ICD) were extrapolated. Each patient underwent standard echocardiographic examination implemented by the measurement of myocardial deformation indices by speckle tracking echocardiography (AFI, GE). Global longitudinal strain, as the average of peak systolic strain in a 16 segments model was measured in the three myocardial layer: subepicardial, mid-ventricular and subendocardial layers. Mechanical dispersion, defined as the standard deviation of the average time to peak of all segments, was also measured. Each patient also underwent CMR and the presence and extension of "delayed enhancement" (DE) quantitatively measured after administration of contrast medium was analysed. Patients were followed for a median follow-up of 16 months and the occurrence of adverse cardiovascular events was recorded for all patients
**Results.** We enrolled 155 patients, 79 of whom were male (50.9%), M:F=1:1; the mean age was 56.9 ± 16.4 years. At the linear correlation analysis a statistically significant correlation was observed between the mass of DE at CMR and the GLS values (p = 0.001) and the mechanical dispersion (p = 0.01). A Pairwise linear correlation analysis was also conducted between the strain segment by segment and the percentage of DE per segment that did not show statistically significant correlations between the two parameters. Finally, we observed a statistically significant correlation between the DE mass at CMR and the strain of the subendocardial (p = 0.003), subepicardial (p = 0.02) and midwall (p = 0.004) layers, whereas we did not find a correlation with the delta of epicardium/endocardium strain. At multivariate analysis the most important predictor of DE mass at CMR was GLS (p = 0.012). During the 16-months mean follow-up, 36 major cardiovascular events were observed: 25 hospitalizations for heart failure, 2 non-sustained ventricular tachycardia (NSVT) diagnosed with dynamic ECG Holter, 4 heart transplantations and 5 deaths. According with the international literature the echocardiographic parameters that at linear correlation analysis correlated with prognosis in terms of major cardiovascular events were: the E/e' ratio (p = 0.017), the area of the left atrium (p = 0.04), the volume of the left atrium (p <0.001), the mass of DE> 15.9 g / m2 (p = 0.05), the DE of segment 2 (p = 0.02), segment 8 (p = 0.01) and segment 13 (p = 0.05). At multivariate analysis the most powerful predictor of major cardiovascular events during follow-up was DE of segment 8 (p = 0.01). The indices of global myocardial, segmental and multilayer deformation showed no statistically significant association with MACE in our population, a tendency towards statistical significance, which however was not reached, was found only with mechanical dispersion (p = 0.265). Finally, mechanical dispersion showed a statistically significant association with the presence of NSVT (p = 0.011).
**Conclusions.** Our study showed a correlation between the myocardial deformation indices (reduction of the global and multilayer strain and increase in mechanical dispersion) and the presence of DE at CMR in a population of patients suffering from hypertrophic cardiomyopathy. In particular, with multivariate analysis GLS was the most important predictor of DE mass at CMR, otherwise segmental strain showed no correlation with segmental DE. DE was a predictor of outcome and particularly the most powerful predictor of MACE was DE of segment 8.

### A624: CHARACTERIZATION OF VENTRICULAR ARRHYTHMIAS IN MYOCARDITIS PATIENTS AT DIFFERENT DISEASE STAGES

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**Aims.** To describe baseline and follow-up (FU) ventricular arrhythmias (VA), in patients with active (AM) vs. previous myocarditis (PM).
**Methods and Results.** We enrolled 185 consecutive patients (69% males, age 44±15y, LVEF 49±14%) with myocarditis and VA at index hospitalization, including VF, VT, NSVT and Lown's grade ≥ 2 PVC. AM and PM groups were defined based on endomyocardial biopsy (EMB) and cardiac magnetic resonance (CMR) findings. A subset of patients (n=46, 25%) underwent also electroanatomical mapping (EAM) and VA transcatheter ablation. At presentation, AM patients (n=123, 66%) had more commonly VF (8 vs. 0 cases, p=0.053), and both irregular (61 vs. 11%, p<0.001) and polymorphic VA (NSVT and VT: 19 vs. 2%, p=0.002; PVC: 63 vs. 16%, p<0.001). Only in PM patients with NSVT or VT, the dominant morphology (right-bundle branch block with superior axis) was 100% predictive of abnormal LV inferoposterior substrate at both CMR and EAM. At 27±7 months prospective FU, 55 patients (30%) experienced malignant VA (p AM vs. PM =0.385.). While a prevalence of polymorphic and irregular VA was confirmed in AM patients with persistent inflammation in FU (58%), a predominance of monomorphic and regular VA was found in AM patients after myocarditis healing (42%), as well as in PM ones (all p<0.001).
**Conclusion.** In myocarditis patients, polymorphic and irregular VA are more common during active inflammatory phase, while monomorphic and regular VA are associated with healed myocarditis.

### A625: INTRA-AORTIC BALLOON COUNTERPULSATION IN TAKOTSUBO SYNDROME COMPLICATED BY CARDIOGENIC SHOCK: SHORT- AND LONG-TERM RESULTS FROM A COHORT OF 2250 PATIENTS OF THE GERMAN-ITALIAN-SPANISH REGISTRY

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**Background.** Takotsubo syndrome (TTS) is featured by an acute and reversible left ventricular dysfunction and can be complicated by cardiogenic shock. Intra-aortic balloon pumping (IABP) use in this setting is controversial, and few data are available from large populations. Aim of this study was therefore to evaluate short- and long-term impact of IABP on mortality in TTS complicated by cardiogenic shock.
**Methods.** The GEIST registry is a multicenter, international registry on TTS involving 38 centers from Germany, Italy and Spain. Between 2006 and 2017, 2250 consecutive patients with TTS were enrolled.
**Results.** Of the 2250 patients, 211 (9%) experienced cardiogenic shock during hospitalization for TTS. Admission left ventricular ejection fraction (LVEF) was 30±15% and systolic blood pressure was 90±35 mmHg. Apical ballooning pattern was found in 77%, mid-ventricular/basal pattern in 11%, and 2% of the patients, respectively. Forty-two patients out of 211 (19%) received IABP after coronary angiography. Patients receiving IABP compared to standard medical therapy did not differ in terms of age, gender, cardiovascular risk factors and admission LVEF. No differences were found in term of in-hospital mortality (9.5% vs 17% p=0.35), length of hospitalization (19.3 vs 16.3 days p=0.34), need of invasive ventilation (35% vs 41% p=0.60), stroke (4.7% vs 11% p=0.17) and LV thrombus (0.5% vs 1.7%, p=0.98). At long-term follow-up, with a median of 2 years, overall mortality in patients with cardiogenic shock and TTS was 34.1%. Mortality was not different between the IABP and the control group (33.7% vs 35.0%; p=0.85).
**Conclusions.** In this large multicenter observational registry, the use of IABP has no impact on mortality at short and long-term follow-up. Further studies are needed to evaluate the best therapeutic strategy in TTS complicated by cardiogenic shock.

### A626: GENETIC BACKGROUND OF LATE-ONSET DILATED CARDIOMYOPATHY

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**Background.**Dilated cardiomyopathy (DCM) represents a specific subgroup of non-ischemic cardiomyopathies. Little is known about the genotypic characterization of DCM patients diagnosed over 60 years of age.
**Aim.** To investigate the different genetic background of a late-onset DCM compared to patients with typical-onset of the disease.
**Methods.** We analyzed a cohort of 566 DCM patients enrolled in the Familial Cardiomyopathy Registry from two tertiary referral centers. Genetic background was analyzed and patients were grouped into typical-onset DCM (<60 years of age at diagnosis) or late-onset DCM (≥60 years of age at diagnosis).
**Results.** Approximately 12% of patients (n=70) had late-onset DCM and female sex was significantly more frequent in the late-onset DCM cohort (p<0.001). Diagnostic yield of genetic testing was comparable between typical- and late-onset DCM (53% vs 50%, respectively p=0.438) whereas the prevalence of Titin gene truncation variants (*TTNtv*) was higher in the late-onset DCM group compared to the younger cohort (23% vs 13% respectively; p<0.05). Notably, patients with late-onset DCM had comparable long-term outcomes to those with typical-onset DCM.
**Conclusions.** Late-onset DCM patients have nearly double the rate of *TTNtv* mutations and are more likely to be female compared to younger DCM patients. These observed differences in mutational makeup and sex may reveal insight into age and sex dependent mechanisms for *TTNtv* and should prompt further study. Notably, the increased prevalence of *TTNtv* and female sex did not translate into noticeable differences in rates of measurable cardiac events.

### A627: FEASIBILITY AND INCREMENTAL VALUE OF AUTOMATED LONGITUDINAL STRAIN FOR THE DETECTION OF INDUCIBLE ISCHEMIA IN LEFT ANTERIOR DESCENDING ARTERY STENOSIS DURING DOBUTAMINE STRESS ECHOCARDIOGRAPHY

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**Background.** Dobutamine stress echocardiography (DSE) is a sensitive but subjective test of inducible ischemia. Speckle tracking echocardiography allows now a quantitative assessment of regional myocardial motion, even during DSE.The aim of the present study was to investigate the feasibility and accuracy of global and regional longitudinal strain during DSE to detect significant CAD.
**Methods.** This is a prospective, observational, multicenter study, including 88 patients undergoing DSE for suspected CAD. Patients with negative DSE (n=33) were excluded from further analysis. The remaining 50 patients (82% males, mean age 66.3±8.2 years) with positive DSE underwent subsequent invasive coronary angiography (CA). Besides visual regional wall motion score index (WMSI), global longitudinal strain (GLS) and regional longitudinal strain (RLS) were determined at rest, at peak stress and at early recovery by a dedicated software (Automated Function Imaging) incorporated in a quoad-screen of the echo machine and activated by automatic quantification. Obstructive CAD was defined as >70% stenosis or intermediate stenosis combined with fractional flow reserve <0.80.
**Results.** The feasibility of DES regional longitudinal strain was 100% (n=50/50) in the pooled population. Fifteen patients did not show significant coronary artery stenosis whereas obstructive CAD was detected in 35 patients (12 had multi-vessel disease). Patients with significant CAD had also higher rate of previous coronary artery stenosis (68.6% vs 33.3%), p<0.01). Among these patients, 18 patients had left anterior descending artery (LAD) stenosis, 18 had left circumflex coronary artery (LCX) stenosis and 15 had right coronary artery (RCA) stenosis. GLS reduction at peak stress (k=0.253, p=0.037) and WMSI increase at peak stress (k=0.217, p=0.04) showed mild but significant agreement with CA for detecting significant coronary stenosis, whereas the agreement of GLS at recovery (k=-0.087, p=0.52) was poor. When single lesion territory was considered, GLS at peak stress (17.4±5.5 vs 20.5±4.4%, p=0.03) and LAD longitudinal strain (= average of 8 myocardial segments: middle and apical posterior septum, basal, middle and apical anterior septum, basal, middle and apical anterior wall) at peak stress showed significantly lower values in the obstructed LAD regions than the territories perfused by non-obstructed coronary arteries (17.1±7.6 vs 21.6±5.5% p=0.02). Conversely, in presence of significant LCX or RCA stenosis, visual regional wall motion of LCX and RCA territories were higher at peak stress (WMSI LCX = 1.80±0.65 in presence of LCX stenosis vs. 1.38±0.44 in absence of stenosis, p<0.01; WMSI RCA = 1.89±0.52 in presence of RCA stenosis vs. 1.42±0.42 in absence of stenosis, p=0.002), but RLS at peak stress showed a trend to increase, without achieving the statistical significance (RLS RCA: p=0.13, RLS LCX: p=0.10).
**Conclusion.** AFI-based strain quantitative analysis appears to be highly feasible during DSE. It appears also to be more accurate than the visual wall motion assessment for the detection of myocardial ischemia in presence of LAD while the accuracy is suboptimal in patients with LCX and RCA stenosis.

## IPERTENSIONE ARTERIOSA
## Sessione Orale

### A628: BICUSPID AORTIC VALVE WITH LEFT VENTRICULAR HYPERTROPHY: ROLE OF MYOCARDIAL WORK TO ASSESS SUBCLINICAL SYSTOLIC DYSFUNCTION

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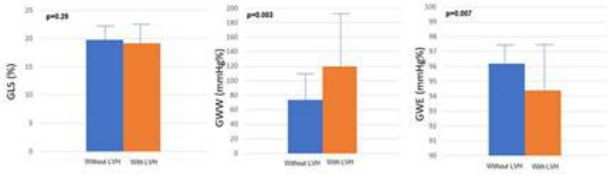
**Background.** An impairment of speckle tracking derived left ventricular (LV) global longitudinal strain (GLS) has been observed in patients with bicuspid aortic valve (BAV) and referred to abnormalities of aortic elasticity properties. The impact of LV mass on myocardial deformation has still not been investigated. This issue can be now better addressed by myocardial work software, which incorporates both deformation and hemodynamic load in the analysis.
**Aim.** To analyse the impact of both deformation and strain derived myocardial work in BAV patients with and without LV hypertrophy (LVH).
**Methods.** Sixty-five patients with BAV underwent a comprehensive echo exam, including speckle tracking derived calculation of GLS (in absolute value). Parameters of myocardial work such as global work index (GWI), global constructive work (GCW) global wasted work (GWW) and global work efficiency (GWE) were measured according to standardized procedures. Patients with reduced LV ejection fraction and with more than mild aortic stenosis and/or regurgitation were excluded. Other exclusion criteria included coronary artery disease, concomitant valvular heart disease, heart failure, primary cardiomyopathies, permanent and/or persistent atrial fibrillation and inadequate echo images. BAV patients were divided according to presence of LVH: 10 with LVH (LV mass index >47 g/m^2.7 in women and >50 g/m^2.7 in men) and 55 without LVH.
**Results.** The two groups were comparable for sex, age and heart rate whereas systolic blood pressure (p=0.006) and pulse pressure (p=0.002) were higher in patients with LVH, who also had higher relative diastolic wall thickness (p<0.02). No significant difference in ejection fraction (p=0.56), transmitral E/A ratio (p=0.504) and E/e' (p=0.311) was found between the two groups. GLS (19.1±2.5 in LVH group and. 20.0±2.4% in patients without LVH, p=0.290), GWI (p=0.356) and GCW (p=0.396) did not differ significantly whereas GWW was higher (119.5±72.9 vs. 72.3±38.7 mmHg%, p=0.003) and GWE lower (94.4±3.0 vs. 92.2±1.6%, p=0.007) in BAV patients with LVH (Figure). In the pooled population, LV mass index was related with GWW (r=0.26, p=0.03) and GWE (r=-0.30, p<0.01) but not with GLS (r=-0.22, p=0.08). The relation between GWE and LV mass index remained significant even after adjusting for pulse pressure (partial r=-0.28, p<0.02).
**Conclusion.** In patients with BAV, LVH plays a detrimental effect on LV systolic function which cannot be identified by ejection fraction and GLS assessment but is unmasked by the application of myocardial work. In presence of LVH, the wasted work of BAV patients is increased and myocardial efficiency is substantially reduced, it being negatively related to LV mass even after adjusting for a raw index of aortic stiffness such as pulse pressure.



### A629: CORRELATION BETWEEN LEFT VENTRICULAR STRAIN AND SHORT-TERM BLOOD PRESSURE VARIABILITY IN PTIENTS WITH PARKINSON'S DISEASE

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**Background.** Patients with Parkinson's disease (PD) often present cardiac blood pressure (BP) derangement as a result of autonomic dysfunction. However their echocardiography pattern have been poorly investigated yet. Study aim: to evaluate the correlation between indices of left ventricular function ad 24/h BP variability in patients with PD.
**Methods.** We evaluated 21 patients with diagnosed PD and autonomic dysfunction and 11 hypertensive age-matched subjects. All patients performed 24/h blood pressure monitoring (ABPM) and echocardiography. Left ventricular systolic function was evaluated by ejection fraction, tissue Doppler s wave and global longitudinal strain (GLS). BP variability was evaluated by average real variability.
**Results.** GLS (19.6±2.5 vs 22.8±3.3; p = 0.04) was reduced in the PD group compared to hypertensive patients. Conversely left ventricular ejection fraction and s wave was similar between the two groups. Patients with PD had an inverse significant correlation between GLS and 24/h systolic BPV (r= -0.64; p=0.002). Nocturnal diastolic BP was inversely related to GLS (r= -0.38; p=0.08).
**Conclusions.** In PD patients BP variability is inversely related to GLS is poor BP control. GLS appears to be an early detector of LV dysfunction in patients with PD and autonomic dysfunction.

### A630: BLOOD PRESSURE VARIABILITY AND LEFT VENTRICULAR HYPERTROPHY IN WELL-CONTROLLED TREATED HYPERTENSIVE PATIENTS

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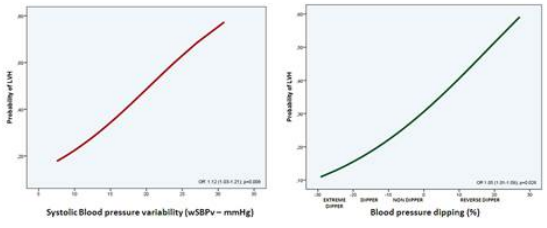
(a) IRCCS FONDAZIONE DON CARLO GNOCCHI ONLUS-MILANO-ITALY; (b) FONDAZIONE DON CARLO GNOCCHI ONLUS-PARMA-ITALY; (c) DEPARTMENT OF MEDICINE AND SURGERY-UNIVERSITY OF PARMA-ITALY

**Background.** Studies on hypertensive patients have shown that a greater blood pressure variability and a reduced degree of blood pressure fall at night are associated with the development, the progression and the severity of target-organ damage and with an increased risk of cardiovascular events and mortality, independently of BP mean values. However, whether blood pressure variability could impact on cardiac organ damage in hypertensive treated and well-controlled patients is still an open issue. Aim: The aim of our study was to investigate the association between the degree of 24-hour Systolic Blood Pressure variability (24 h SBPv) and Left Ventricular hypertrophy in a population of primary prevention essential treated hypertensive subjects with normal 24 hours blood pressure mean values.
**Methods.** We analysed 183 consecutive not selected hypertensive patients with 24 hours mean blood pressure values <130/80 mmHg. All patients underwent 24h blood pressure monitoring and echocardiography during the same day. 24h Blood Pressure variability was analysed from different points of view: Standard Deviation of average ambulatory BP (24 h SD), weighted mean of daytime and night-time standard deviation (24 h wSBPv) and coefficient of variation (CoV); blood pressure dipping was also evaluated. Left ventricular mass (LVM) and hypertrophy (LVH) was calculated using the Devereaux formula and LVM was indexed for body surface area.
**Results.** Mean age was 60±12 year, male gender was prevalent (62%); 16% were treated with three anti-hypertensive drugs and 54 % with two anti-hypertensive drugs. Mean 24h SBP values were 122±7 mmHg; mean SD-SBPv was 15±3 mmHg, mean CoV was 13±2 mmHg and mean wSBPv was 14±4 mmHg. LVH was found in 36,1% of patients and mean LVMi was 95±24 gr/m2. Logistic regression analysis showed a correlations between the probability of LVH and the increase of SBPv expressed as: SD SBPv (OR 1.09 – CI95%:1.01-1.17: p=0.036), wSBPv (OR 1.12 – CI95%:1.03-1.23: p=0.009) and CoV (OR 1.11 – CI95%:1.01-1.24: p=0.042). Moreover, a correlations between the reduction of the physiological BP dipping (OR 1.05 – CI95%:1.01-1.09: p=0.0026) an the probability of LVH was found.
**Conclusion.** Systolic blood pressure variability and dipping of BP are associated with left ventricular hypertrophy in well-controlled treated hypertensive patients.




### A631: INGRANDIMENTO ATRIALE SINISTRO IN UN AMPIO CAMPIONE DI PAZIENTI SOTTOPOSTI AD ECOCARDIOGRAMMA IN UN CENTRO IPERTENSIONE ITALIANO

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(a) MEDICINA INTERNA E 2 MEDICINA, UNIVERSITÀ DI BRESCIA E ASST SPEDALI CIVILI DI BRESCIA

L'ingrandimento atriale sinistro (IAS) si associa ad un aumento del rischio di complicanze cardiovascolari(CV), ed in particolare a fibrillazione atriale. Le Linee Guida ESC/ESH 2018 per l'ipertensione arteriosa propongono l'utilizzo del volume atriale piuttosto che le dimensioni lineari, e per la prima volta hanno proposto l'indicizzazione per altezza2 (h2).
**Scopo.** Valutare la prevalenza di IAS in un ampio gruppo di pazienti sottoposti ad ecocardiogramma per la stratificazione del rischio CV presso il laboratorio di diagnostica CV di un Centro Ipertensione italiano.
**Metodi.** 3872 soggetti sottoposti ad accertamenti diagnostici per ipertensione arteriosa(nota o sospetta):età media 56±15 anni,53% maschi,BMI26±5,44% normopeso,39% sovrappeso,17% obesi. Il volume atriale è stato misurato mediante metodo area-lunghezza(proiezione 2 e 4 camere apicale).
**Risultati.** La prevalenza di ipertrofia ventricolare sinistra(IVS) era pari a 11% con indicizzazione su superficie corporea(BSA) e 12% con indicizzazione su h2.7. IAE è stato osservato nel 30% dei soggetti con indicizzazione su h2 e nel 9% con indicizzazione su BSA.Nei soggetti obesi e sovrappeso la prevalenza di IAS era pari al 38% con indicizzazione su h2 e nell' 11% con indicizzazione su BSA.La differente prevalenza osservabile con le due indicizzazioni era particolarmente evidente nei pazienti con obesità grave.L'IAS è risultato molto frequente fra i pazienti con IVS: 62% e 26% con indicizzazione su h2 o su BSA, rispettivamente.Inoltre, l'IAS è risultato frequente anche fra i pazienti senza IVS, soprattutto applicando la indicizzazione su h2(25% con indicizzazione su h2 vs 7% con indicizzazione su BSA).
**Conclusioni.** In un ampio campione di soggetti sottoposti a work-up diagnostico per sospetta ipertensione arteriosa l'IAS è spesso presente,soprattutto adottando la nuova indicizzazione proposta dalle Linee Guida ESH/ESC 2018.Anche in assenza di IVS, l'IAS è stato osservato in un quarto dei soggetti.La indicizzazione su BSA comporta una identificazione subottimale dei pazienti con IAS, in particolare nei pazienti con sovrappeso od obesità.

### A632: FIBRILLAZIONE ATRIALE E ALDOSTERONISMO PRIMARIO: RISULTATI DELLO STUDIO PAPPHY

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Atrial fibrillation (AF), with a prevalence exceeding 10% above age 80 years, imposes a huge burden on the health care systems, not just because of its high prevalence rate, but also because of increased mortality and morbidity due to cardioembolic stroke and heart failure, and need for long-term anticoagulation. Arterial hypertension is common among patients with AF, and the risk of incident AF progressively raises with the increase of systolic blood pressure. Despite hyperaldosteronism being suggested as predisposing to AF, the relationship between AF and primary aldosteronism (PA) remains uncertain. Therefore, we tested the hypothesis that AF is a presentation of PA in hypertensive patients with unexplained AF.
**Study design.** The Prospective Appraisal on the Prevalence of Primary Aldosteronism in Hypertensive (PAPPHY Study) was set out as an investigator-initiated unsponsored prospective research project entailing three referral centers for hypertension.
**Patients.** Consecutive patients with AF and an unambiguous diagnosis of arterial hypertension. Diagnosis and management of PA and AF followed available guidelines (*J Clin Endocrinol Metab* 2008; *Eur Heart J* 2016). Exclusion criteria were valvular and/or coronary heart disease, chronic kidney disease, poor clinical status or advanced age, cancer, current abnormal thyroid function, heart failure, patient's refusal, acute stroke and/or coronary syndrome, known secondary form of hypertension other than PA, myocardiopathy associated with alcohol abuse, and pericarditis.
**Results.** In a cohort entailing 411 AF patients, 18% (age 61±11 years; 32% women) were found to have no known cause of the arrhythmia. A thorough diagnostic work-up allowed us to identify PA in 42% of these patients (95% confidence interval [CI]: 31.8-53.9). Subtyping of PA demonstrated that surgically curable forms of PA accounted for 48% of the cases (95% CI: 31.9-65.2). The high prevalence of PA was confirmed at a number of sensitivity analyses. Both PA and primary hypertension patients showed increased left ventricular (LV) dimensions and volumes compared to healthy subjects, indicating prominent hypertension-mediated LV changes and a very high rate of LVH by far of the concentric type. However, no significant difference was found between PA patients and primary hypertension patients.
**Conclusion.** These results provided compelling evidence that PA is

highly prevalent in hypertensive patients with unexplained AF. Accordingly, they suggest that patients with no identifiable cause of AF should be screened for PA to identify those who can be cured or markedly improved with target treatment.

### A633: THROMBOPHILIA AND PULMUNARY HYPERTENSION

Samanta Setola (a), Valeria Visco (a), Lucia Soriente (b), Gennaro Galasso (a, b), Adele Pierri (b), Chiara Aliberti (c), Generoso Mastrogiovanni (b), Andrea D'Armini (d), Maria Teresa De Donato (b)
(a) UNIVERSITÀ DEGLI STUDI DI SALERNO; (b) OSPEDALE SAN GIOVANNI DI DIO E RUGGI D'ARAGONA; (c) UNIVERSITÀ CATTOLICA DEL SACRO CUORE; (d) FONDAZIONE IRCCS POLICLINICO "SAN MATTEO" - PAVIA

**Introduction.** Pulmonary hypertension means the presence of mean pulmonary artery pressure (PAPm) values ≥ 25 mmHg at rest obtained by right heart catheterization. The normal value is equal to 14 ± 3 mmHg, with an upper limit of the normal range of ~ 20 mmHg. It has a complex pathogenesis and can accompany many diseases for which following a protocol means giving the best assistance to these patients.
**Clinical case.** A woman M.M.,60 years old arrived in our pulmonary hypertension clinic in September 2016 for thepresence at the echocardiographic of PAPs 115 mmHg. To RPH arterial hypertension, paroxysmal atrial fibrillation, DVT lower limb right with bilateral TEP in 2016 (in therapy with estrogen) treated with OAT only for 12 months.PE: asthenia, cyanosis, dyspnea due to minor exertion with leg edema. ECG: BBdx. Spirometry: mild obstructive disventilatory syndrome (FVC 100%, FEV1 71%), with slightly increased residual volume, such as alveolar hyperinflation of modest size, which is reduced after administration of beta2 adrenergic. The capillary diffusion of the CO (DLCO) was fairly low (56%). Blood Gas: slight hypoxemia with hypervia from hyperventilation and uncompensated respiratory alkalosis.Perfusion pulmonary scintigraphy: bilateral deficit. Thoracic AngioTC : thrombosis of the artery bilateral pulmonary. Right cardiac catheterization: severe precapillary pulmonary hypertension (Wedge 15 mmHg. RVP 2271 dyne * sec * cm-5. Cardiac index 1.34 l/min/m2. EF Vdx 8%. PAPm 80 mmHg. Haematochemical tests: Hep2 antinuclear antibodies and C677T and A1298C mutations of the heterozygous MTHFR gene. Sent to the PEA expert center, a pulmonary endarterectomy was performed and a caval filter in VCI at the suprarenal level was placed for thrombophilic diathesis and recurrent thromboembolism and recommended long-term OAT. At the control catheterization :Wedge 15 mmHg. RVP 381 dyne * sec * cm-5 (83% reduction). Cardiac index 3.5 l/min/m2. EF Vdx 23%. PAPm 32 mmHg. Initiated an intensive rehabilitation treatment, gradually it was possible to suspend the oxygen therapy. In the follow-up perfusion pulmonary scintigraphy and AngioTC were remarkably improved and the PAPs values never exceeded 40 mmHg.
**Discussion.** The MTHFR mutation affects the methylentetrahydrofolate reductase enzyme that produces the 5 methylentetrahydrofolate that allows the remethylation of homocysteine in methionine. Transmitted in an autosomal recessive manner, it causes a reduction in the activity of the enzyme, leading to an increase in homocysteine. About 40 aberrations are known, the most common defect is represented by the substitution of a cytosine (C) in thymine (T) at the nucleotide at position 677 of the MTHFR gene (mutation MTHFR C677T). The substitution of an adenine (A) with a cytosine (C) in position 1298 (genetic variant A1298C) is also quite frequent. The double heterozygosity, as in our case, preserves an enzymatic activity equal to 50-60%.
**Conclusions.** In thromboembolic pulmonary hypertension the surgical strategy gives excellent results as in our case and the genetic study for thrombophilia significantly conditions the prevention of recurrences.

## CARDIOPATIA ISCHEMICA – 3
## Sessione Orale

### A634: THE PRECISE-DAPT SCORE: AN UNDERUSED TOOL WITH HIGH PREDICTIVE VALUE FOR MORTALITY

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(a) CARDIOLOGIA AZIENDA OSPEDALIERA UNIVERSITARIA INTEGRATA VERONA

**Background.** The PRECISE-DAPT score has been validated as a simple tool for the prediction of out-of-hospital bleeding during dual antiplatelet therapy (DAPT) after percutaneous coronary intervention (PCI). It has been otherwise associated to poor in-hospital outcome in patients with acute coronary syndrome (ACS). The aim of this study was to evaluate the PRECISE-DAPT score distribution in a real-world population undergoing PCI and to assess its predictive value for medium-term mortality.
**Methods.** Patients who underwent PCI with stent implantation from September 2017 to January 2018 at our institution were included. Patients requiring oral anticoagulation for concomitant atrial fibrillation were excluded. The study population was divided into 2 groups: PRECISE-DAPT score ≥ 25 and PRECISE-DAPT score < 25, according to the "high bleeding risk" threshold identified in the score-validating original trial. Endpoint consisted of all-cause in-hospital and follow-up mortality within the first year after PCI. Cox regression models were used to assess hazard ratios. C-index was used to calculate the performance of the score in predicting mortality.
**Results.** A total of 196 consecutive patients were included in the analysis. High PRECISE-DAPT score (≥ 25) was calculated in 64 patients (32.6%). Patients with PRECISE-DAPT score ≥ 25 were more frequently hypertensive, diabetic, with a history of stroke and previous PCI. Female patients had more frequently high PRECISE-DAPT score (23/36, 63.8%). In-hospital and follow-up all-cause mortality was higher in patients with PRECISE-DAPT score ≥ 25 vs < 25 (14% vs 0.75% respectively; P=0.0001). PRECISE-DAPT was associated to mortality in an unadjusted model (HR 1.05 [1.02-1.08] p<0.0001 for 1 point increase and HR 19.6 [2.48-154.75] p=0.005 for PRECISE-DAPT ≥ 25), and even in a comprehensive multivariable model (HR 1.05 [1.01-1.08] p=0.011 for 1 point increase and HR 12.21 [1.44-103.34] p=0.022 for PRECISE-DAPT ≥25). The PRECISE-DAPT score showed a c-statistic of 0.79 for medium-term mortality after PCI.
**Conclusions.** The PRECISE-DAPT score in this real-world unselected population treated with PCI is frequently high. This simple score may be a significant predictor of all-cause medium-term mortality in patients undergoing PCI.

### A635: SECONDARY PREVENTIVE MEASURES FOR LDL CHOLESTEROL CONTROL ONE TO THREE YEARS AFTER ACUTE MYOCARDIAL INFARCTION. A SUBANALYSIS FROM THE EYESHOT POST-MI REGISTRY

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**Background.** The European guidelines on cardiovascular disease prevention recommend a low-density lipoprotein cholesterol (LDL-C) goal <70 mg/dL in subjects at very high cardiovascular risk, such as patients with history of recent myocardial infarction (MI). However, poor data are available on LDL-C control after MI in the real-world.
**Aim.** To evaluate the achievement of LDL-C target level of 70 mg/dL in a cohort of patients presenting to cardiologist 1 to 3 years after MI, and to identify the predictors of suboptimal LDL-C control in this very high risk population.
**Methods.** The EYESHOT post-MI was a prospective, observational, nationwide study aimed to evaluate the management of patients presenting to cardiologists 1 to 3 years from the last MI events. All patients admitted in cardiology unit and/or outpatient clinic with available LDL-C value at time enrollment were included in this sub-analysis. Baseline demographic, clinical and laboratory features were reported for patients with LDL-C <70 mg/dL as well as those with level ≥70 mg/dL. The lipid lowering therapies at baseline and at the end of the visit/discharge were collected. Univariate and multivariate logistic regression analyses were performed to identify the baseline variable correlated to LDL-C ≥70 mg/dL.
**Results.** The study population consisted of 903 patients (mean age 65.5±11.5 years; 79.6% males); LDL-C <70 mg/dL was observed in 429 (47.5%) and ≥70 mg/dL in 474 (52.5%). Patients with LDL-C ≥70 mg/dL were more often females and showed a lower prevalence of hypertension (p=0.024) and prior percutaneous coronary intervention (p=0.016). As expected, the use of statin (96,3% vs 90.5%, p=0.001) and high intensity statin (p=0.003) was higher in patients with LDL-C <70 mg/dL as compared to the subgroup with LDL-C ≥70 mg/dL. No differences for the use of ezetimibe (16.8% vs 15.8%, p=0.696), omega-3 fatty acid (8.6% vs 7.8%, p=0.654), fibrates (0.2% vs 0.6 %, p=0.366) and PCSK9 inhibitors (0.2% vs 0.6%, p=0.366) were observed among groups. Of note, a low education level (defined as lower than high school graduation or university degree) was prevalent in the group with LDL-C ≥70 mg/dL (54.1% vs 63.7%, p=0.008). Among patients with LDL-C ≥70 mg/dL, lipid lowering therapy was implemented in only 85 patients (17.9%) at the end of the visit or discharge. At multivariate regression analysis, the low education level (OR:1.58; 95%CI:1.16-2.17; p=0.004) was an independent predictor of LDL-C ≥70 mg/dL, whereas hypertension showed a negative association (OR: 0.650; 95%CI:0.443-0.954; p=0.028).
**Conclusions.** In patients presenting to cardiologists 1 to 3 years from the last MI event, LDL-C is not under control in a large proportion of patients, particularly in those with a low education level. History of hypertension seems to improve LDL-C control, probably due to the higher frequency of medical visit and to the adoption of behavior education measures.

Despite the availability of effective and well tolerated statin and non-statin lipid lowering therapies, LDL-C is still undertreated in this very high-risk clinical scenario.

### A636: CHARACTERISTICS AND PROGNOSIS OF A CONTEMPORARY COHORT WITH MYOCARDIAL INFARCTION WITH NON-OBSTRUCTED CORONARY ARTERIES PRESENTING DIFFERENT PATTERNS OF LATE GADOLINIUM ENHANCEMENT AT THE CARDIAC MAGNETIC RESONANCE IMAGING

Francesco Bianco (a, c), Valentina Bucciarelli (b, c),
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Martina Primavera (a), Giuseppe Ciliberti (d), Federico Guerra (d),
Antonio Dello Russo (d), Sante Donato Pierdomenico (a), Sabina Gallina (a)
(a) DEPARTMENT OF NEUROSCIENCE, IMAGING AND CLINICAL SCIENCE - "G.D'ANNUNZIO" UNIVERSITY, CHIETI; (b) PHARMACOLOGY DEPARTMENT - "G.D'ANNUNZIO" UNIVERSITY, CHIETI; (c) DEPARTMENT OF PEDIATRIC, CONGENITAL CARDIOLOGY AND CARDIAC SURGERY - AZIENDA OSPEDALIERO UNIVERSITARIA "OSPEDALI RIUNITI", ANCONA; (d) DEPARTMENT OF CARDIOLOGY, AZIENDA OSPEDALIERO UNIVERSITARIA "OSPEDALI RIUNITI", ANCONA

**Background.** Uncertainties persist regarding myocardial infarction with non-obstructed coronary arteries (MINOCA). We studied characteristics and prognosis of a contemporary cohort of patients with MINOCA which underwent cardiac magnetic resonance (CMR) imaging, with particular focus on CMR late gadolinium enhancement patterns.

**Methods.** We retrospectively examined and prospectively followed-up for 1 year 135 patients (49±20 years old, 45% male) that underwent CMR imaging due to MINOCA diagnosis in our institution, in 2015-17. Exclusion criteria were coronary lesions ≥50% and CMR limited data availability. We grouped and analyzed the sample according to ischemic and non-ischemic late gadolinium enhancement (LGE) CMR patterns and focal or transmural LGE CMR presentation. The primary outcome was all-cause of mortality, while the secondary a composite of cardiac-related rehospitalization, new occurrence of acute myocardial infarction (AMI) and heart failure (HF).

**Results.** A CMR exam was performed after a median-time of 28 days from the acute event. Ischemic patients were more often female, older, with a higher prevalence of hypertension, diabetes mellitus, and renal dysfunction. One-third of the ischemic MINOCA were firstly managed as myocarditis, while CMR modified the therapy regimen in 22% (30/135) of them. Over a median follow-up of 1.2 years, more cardiac-related death occurred in the non-ischemic group (2 versus 1). The ischemic group experienced more rehospitalizations (27.5%, P=0.006) and AMI (10.7%, P=0.002), while a residual edema had the worst prognosis (secondary end-point rate of 15%; log-rank test: 20; P<0.001). In a multivariable Cox regression model, a poor left ventricle ejection fraction, ST-elevation ECG presentation and transmural LGE pattern were independent predictors of outcomes.

**Conclusions.** In a relatively small cohort of MINOCA, ischemic and non-ischemic CMR patterns had distinct features and outcomes. These findings underline the concept that the latter should be considered as different entities. In this context, CMR imaging can modify the therapy regimen and stratify the prognosis of ischemic patients hospitalized with a MINOCA diagnosis.

### A637: EFFICACIA E SICUREZZA DELLA DAPT NELLE SINDROMI CORONARICHE ACUTE: UNO STUDIO OSSERVAZIONALE

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**Introduzione.** La terapia della cardiopatia ischemica si è evoluta nel tempo grazie alle innovazioni delle tecniche di riperfusione ed all'introduzione di nuovi antiaggreganti quali Prasugrel e Ticagrelor, i quali a fronte di una maggiore efficacia in termini di protezione ischemica ammettono un aumento del rischio di sanguinamento. Tale lavoro vuole valutare le differenze di efficacia e sicurezza della doppia terapia antiaggregante nei pazienti con STEMI o NSTEMI e con diverso rischio ischemico e di sanguinamento, effettuando un follow-up a 24 mesi dall'evento ischemico acuto.

**Materiali e metodi.** La raccolta dei dati per la realizzazione di tale studio è stata effettuata consultando le cartelle elettroniche dei pazienti ricoverati presso la Degenza e l'Unità di Terapia Intensiva Cardiologica (UTIC) del reparto di Cardiologia del Policlinico di Palermo sui pazienti ricoverati dal 1° gennaio 2012 al 30 aprile 2017 con diagnosi di STEMI e i pazienti ricoverati dal 1° gennaio 2016 al 30 aprile 2017 con diagnosi di NSTEMI. Tali pazienti, suddivisi in base al proprio rischio ischemico ed emorragico (tenendo in considerazione gli score GRACE-ACS e CRUSADE), sono stati sottoposti ad un follow-up a 24 mesi per valutare le eventuali complicanze ischemiche ed emorragiche. Il campione totale è di 484 pazienti, di cui 144 sono stati esclusi poiché non hanno risposto al follow-up condotto mediante intervista telefonica. Dei 340 rimanenti ne sono stati esclusi 78 poiché non sottoposti a rivascolarizzazione percutanea in quanto gravati da una prognosi peggiore e pertanto non confrontabili con i pazienti rivascolarizzati. Il campione totale è pertanto di 262 pazienti.

**Risultati.** Dall'analisi della distribuzione dell'incidenza cumulativa di eventi ischemici a 2 anni nei pazienti sottoposti a DAPT si evince che i pazienti post-SCA dimessi in terapia con Clopidogrel hanno un'incidenza di eventi ischemici superiore rispetto a quella dei pazienti in terapia con i nuovi antiaggreganti piastrinici sebbene non si raggiunga la significatività statistica in considerazione della ridotta dimensione del campione analizzato (Clopidogrel 35,5%; Ticagrelor 26,9% e Prasugrel 24,7%; p-value C vs P+T 0,0918). Dall'analisi dell'incidenza cumulativa di sanguinamenti si evince l'assenza di differenze significative tra i tre sottogruppi presi in considerazione (Clopidogrel 21,5%; Ticagrelor 19,2%; e Prasugrel 20,8%; p-value C vs P+T 0,93). Verosimilmente ciò è correlato alla scelta del secondo antiaggregante che è dipesa dalle caratteristiche all'ingresso dei singoli pazienti. È stato, infatti, osservato che i pazienti sottoposti a terapia con Clopidogrel avevano un maggior rischio di sanguinamento: età più avanzata (Età media Clopidogrel 73,39±11,12; Ticagrelor 65,52±11,40; Prasugrel 55,85±9,37; p-value <0,001), valori di emoglobina (Hb media Clopidogrel 12,55±2,00; Ticagrelor 13,67±1,65; Prasugrel 14,39±1,52; p-value <0,001) e di ematocrito (Ht media Clopidogrel 38,05±5,46; Ticagrelor 40,92±4,26; Prasugrel 42,45±4,11; p-value <0,001) più bassi e con valori di creatininemia più elevati (Creatininemia media Clopidogrel 1,42±1,65; Ticagrelor 0,93±0,30; Prasugrel 0,88±0,23; p-value <0,001).

**Conclusione.** Dallo studio si evince che nonostante la dimostrata efficacia dei nuovi antiaggreganti, l'utilizzo del Clopidogrel rappresenta un valido compromesso per quei pazienti che presentano determinate caratteristiche cliniche per cui i nuovi antiaggreganti esporrebbero ad un rischio emorragico eccessivo.

### A638: NOT ALL MYOCARDIAL INFARCTIONS ARE CREATED EQUAL. THE IMPORTANCE OF A PRECISION MEDICINE APPROACH IN ACUTE CORONARY SYNDROMES

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**Background.** ST-elevation myocardial infarction (STEMI) is a frightening cardiological event with standardised treatment options. However, identification of the different pathophysiological mechanisms leading to Acute Coronary Syndromes (ACS) may lead to individualized treatment strategies.

**Case summary.** Herein we report the case of a 44-year-old Caucasian male with no previous cardiological history, presenting with antero-lateral STEMI. The use of coronary imaging techniques, such as Optical Coherence Tomography (OCT) has lead to the diagnosis of plaque erosion with overlying abundant thrombus on left anterior descending artery (LAD). Medical therapy was started without stent implantation. Further administration of intracoronary Acetylcholine allowed to reveal LAD spasm, as a concomitant pathogenetic mechanism. The patient was discharged with aetiology-guided medical therapy.

**Discussion.** Not all STEMI are born equal: highlighting the exact mechanisms underlying ACS means identifying patients with different outcomes and tailoring therapy on the patient.

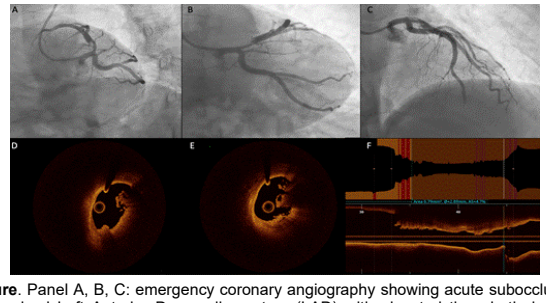


**Figure**. Panel A, B, C: emergency coronary angiography showing acute subocclusion of proximal Left Anterior Descending artery (LAD) with elevated thrombotic burden (Thrombus Grade 4) and TIMI flow 2. Panel C, D: Frequency Domain Optical Coherence Tomography (FD-OCT) cross-sectional images at culprit plaque level showing stratified red thrombus overlying eroded fibrous plaque (MLA 6.79 mm2). Panel E: FD-OCT longitudinal view showing culprit segment.

### A639: IMMUNE-METABOLISM IN T-CELL DYSREGULATION IN PATIENTS WITH ACUTE CORONARY SYNDROME

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**Aim.** An alteration of T-cell metabolism might be implicated in inflammatory diseases. As several studies suggest that an impairment of

adaptive immunity might play a pathogenetic role in acute coronary syndromes (ACS), the aim of the study is to investigate the glucose metabolic pathways involved in the T-cell dysregulation observed in ACS patients.
**Methods and Results.** 30 patients with non-ST-elevation myocardial infarction (NSTEMI) and 36 patients with stable effort angina (SA) were enrolled. At flow cytometry $CD4^+$T-cells from NSTEMI patients showed reduced expression of the key glycolytic enzymes GAPDH and PKM-2 as compared to $CD4^+$T-cells from SA patients (GAPDH: P=0,08; PKM-2: P=0,017). JMJD8 expression in NSTEMI patients is increased compared with SA patients (P=0,02). Furthermore, TCR-activated $CD4^+$T-cells from NSTEMI, showed enhanced GLUT-1 expression and glucose uptake and as compared with SA patients ((GLUT-1: P=0,0045; glucose uptake: P=0,0243). Glucose increased CD25 expression in NSTEMI patients as compared with SA (0.5 mg/L: P=0,009. 1 mg/L: P=ns. 2 mg/L: P=0,03.). Finally, high glucose concentration resulted in reduced Treg expression in NSTEMI patients compared to SA patients (0.5 mg/L: P=0,02; 1 mg/L: P=0,01).
**Conclusions.** Our results introduce a role for immune-metabolism in adaptive immunity dysregulation described in ACS and provide novel insights into the mechanisms responsible for coronary instability. We also highlighted the potential impact of immune-metabolic markers and targets in atherosclerosis.

## BIOMARCATORI E FISIOPATOLOGIA
## Sessione Orale

### A640: MITOCHONDRIAL A-KINASE ANCHOR PROTEINS LEVELS REGULATE AGING-ASSOCIATED CARDIAC DYSFUCTION AND GUT MICROBIOTA COMPOSITION

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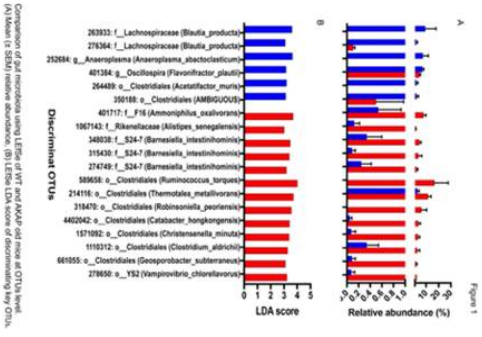
**Background.** Mitochondrial A-kinase anchoring proteins (mitoAKAP) encoded by the Akap1 gene are crucially involved in multiple cellular processes, including cardiomyocyte survival and function. Whether mitoAKAP levels play a role in aging and gut microbiota composition is currently unknown.
**Purpose.** Whether gut microbiota composition might influence cardiac function deterioration induced by aging is currently unknown. The purpose of the study was to highlight the complex interplay between gut microbiota, aging and cardiac dysfunction in young (6-month-old, 6m) and old (24-month-old, 24m) wild type (wt) and Akap1 heterozygous mice ($Akap1^{+/-}$).
**Methods.** Cardiac function was noninvasively analyzed by echocardiography in 6m and 24m wt and $Akap1^{+/-}$ mice. Gut microbial DNA was extracted and gut microbiota composition was analyzed by Illumina Mi-Seq analysis. Bioinformatics analysis was carried out to identify major intestinal populations. Bioinformatics analyses were performed using the analysis of similarities (ANOSIM).
**Results.** Partial loss of Akap1 accelerated the progression of cardiac dysfunction in 24m mice, as demonstrated by a significantly lower % fractional shortening (%FS) compared to 24m wt mice (%FS, wt 6m: 60±3; $Akap1^{-/+}$ 6m: 58±5; wt 24m: 49±6*; $Akap1^{-/+}$ 24m: 39±12*§; *p<0.05 vs. wt 6m; §p<0.05 vs. wt 24m). A principal coordinate analysis of fecal samples suggesting that $Akap1^{+/-}$ 24m mice exhibit a different assortment of microbial communities. This observation was supported by ANOSIM R statistic that revealed significant differences in gut microbiota composition between wt and $Akap1^{+/-}$ 24m mice (ANOSIM R=0.475, P=0.023), while no significant differences in bacterial assortment were identified between wt and $Akap1^{+/-}$ 6m mice. We identified 10 OTUs differently represented in wt and $Akap1^{+/-}$ 6m mice, while a bigger set of bacterial OTUs (19) were different between wt and $Akap1^{+/-}$24m mice (Figure1).




**Conclusion.** Akap1 deletion plays an important role in the progression toward HF and modulates gut microbiota composition during aging. This work highlights the complex interplay between gut microbiota and development cardiac dysfunction.

### A641: HIGH LEVELS OF THYROID STIMULATING HORMONE (TSH) ARE ASSOCIATED WITH WORSE SHORT- AND LONG-TERM OUTCOME IN PATIENTS UNDERGONIG PERCUTANEOUS CORONARY INTERVENTION

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(a) UNIT OF CARDIAC SCIENCES, CAMPUS BIO-MEDICO UNIVERSITY OF ROME

**Background.** The role of thyroid hormones in the prediction of worst short and long-term outcomes in patients undergoing percutaneous coronary intervention (PCI) has not been fully investigated yet. No data are available regarding periprocedural myocardial damage (PMD). Moreover population-based studies have shown that higher Thyroid Stimulating Hormone (TSH) is associated with lower glomerular filtration rate (GFR) and higher prevalence of chronic kidney disease (CKD); however not enough has been explored on contrast-induced acute kidney injury (CI-AKI) in hypothyroid patients undergoing PCI.
**Purpose.** The aim of this observational, prospective study was evaluate, in patients undergoing PCI, a possible correlation between TSH levels and the occurrence of PMD, CI-AKI and further long term major adverse cardiovascular events (MACEs).
**Methods.** We enrolled 195 patients undergoing PCI. In all patients, we evaluated the levels of thyroid hormones within 6 months before the procedure. The extent and severity of coronary artery disease (CAD) were assessed using Bogaty and Gensini scores. PMD was defined as an increase of cTnI > 5 times URL or > 20% of the basal value in patients with preprocedural abnormal levels. CI-AKI was defined as a rise in serum creatinine (sCr) levels > 0.3 mg/dl or >25% from the baseline within 48 hours following contrast administration. A clinical follow-up was reported for the occurrence of MACEs defined as cardiovascular death, non-fatal myocardial infarction (MI), target-vessel revascularization (TVR) and coronary artery bypass graft (CABG).
**Results.** TSH levels significantly correlated with the extension of coronary artery disease (p=0.001 for Gensini score and p=0.074 for Bogaty score). By ROC curve analysis, the optimal TSH cut-off for the detection of PMD was ≥ 1.8 μUI/mL (AUC= 0.612; 95% CI 0.508-0.716; p = 0.038). Thus, according to this cut-off, we observed that patients with TSH ≥ 1.8 μUI/mL had higher incidence of PMD (33.8% vs 18.3%; p = 0.026). Similarly, the incidence of CI-AKI was higher in patients with TSH ≥ 1.8 μUI/mL compared with those below this threshold even if without statistical significance (8,8 % vs 4.0 %, p = 0.167). During a mean follow-up of 33 months (2-135 months), a higher incidence of the composite clinical endpoint (cardiovascular death, MI, TVR, CABG) was observed in patients with hypothyroidism compared with eu/hyperthyroidism group (30% vs 18%, p=0.045)
**Conclusions.** Firstly we demonstrate that high TSH levels may predict short-term and long term PCI outcomes. This association may be partially explained by the increased atherosclerosis burden associated with thyroid dysfunction, such as diffused coronary atherosclerosis and increased plaque instability. Moreover, a possible relevant direct role of high TSH levels in endothelial damage and vascular complications should be considered, even though, further studies are needed to confirm these results.

### A642: ROLE OF S100B AS BIOMARKER OF CEREBROVASCULAR EVENTS IN PATIENTS UNDERGOING TAVI

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**Background.** Transcatheter aortic valve implantation (TAVI) has become the treatment of choice for patients with severe, symptomathic aortic valve stenosis who are at high risk of surgical treatment. Despite improved of devices, amelioration of delivery systems and improvement of operator expertise, risk of cerbrovascular accident, as stroke or transient ischaemic attack (TIA), remain a potential and serious complication after TAVI. Most of cerebrovascular events in patients undergoing TAVI occur during the first day after procedure, secondary to embolic pathophisiology, consequent of mechanical manipulation of calcific valve and aortic root. Instead subacute events probably are secondary to new-onset Atrial Fibrillatio or associated with pre-existent AF in patients with atherotrombotic risk increased. S100 B is a Ca2+-binding protein, released from astrocytes, that has a role as marker of brain injury and oxidative stress. The aim of our study is to evaluate the association beetwen serum levels of S100B and brain embolic injury correlated to TAVI.

**Methods.** In 40 patients subjected to TAVI, S100B serum levels was determined by immunoenzimatic assay ELISA test (DiaSorin Inc. S.p.a.). We compared the different values of S100B before TAVI, immediately post-procedure, 24 h post TAVI, 6 days pot-TAVI.
**Results.** Serum levels of S100b are rapidly increased immediately after TAVI in all patients, probably due to microembolism secondary to dilatation of native aorta and implantation of the device, and returns below baseline in the following determination. None of the patients developed neurological and cognitive impairment.
**Conclusion.** S100 B could have a applicable role as marker of embolic brain injury after TAVI. Quantification of the protein in the 24 h after procedure might be useful to identify patients with high risk to develop cerebrovascular major injury.

### A643: MODULATION OF EXOSOMAL MICRORNA IN PATIENTS WITH SEVERE AORTIC STENOSIS AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION (TAVI)

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**Introduction.** The introduction of percutaneous Transcatheter Aortic Valve Implantation (TAVI) into clinical practice has dramatically improved the outcome of AS patients. With the progressive technical improvement of prostheses and endovascular delivery systems a trend towards the extension of indications to TAVI is coming out, including lower risk patients. However, mechanisms that promote cardiac remodelling and clinical outcome after removal of the outflow obstruction with TAVI are not well understood. Circulating microRNAs are emerging as a novel class of biomarkers and that it is now recognized that circulating microRNAs are secreted by cells within exosomal particles. Previous studies have demonstrated that the circulating levels of specific microRNAs are associated to LV remodelling and to changes in shear stress across the aortic valve.
**Purpose.** The aim of our study was to evaluate the modulation of exosomal microRNAs in patients with severe Aortic Stenosis, after release of pressure overload to the left ventricle by means of transcatheter aortic valve implantation (TAVI).
**Methods.** Blood samples were obtained from AS patients at baseline, and 30', 1h, 24h and 30 days after TAVI. Circulating exosomes were isolated from plasma samples using the Total Exosomes Isolation Kit (Thermo Fisher) and characterized by size and number using Nanoparticles Tracking Analysis (NTA, NanoSight). MicroRNAs were isolated from purified exosomes using the miRVana Isolation Kit (Thermo Fisher) and evaluated by means of spectrophotometry (Bioanalyzer 2100, Agilent). A miRNA differential expression profile was obtained comparing 8 patients with optimal flow with 5 matched patients without optimal coronary flow after reperfusion, by means of the Affymetrix's GeneChip miRNA 3.0. The miRNAs with the largest differential expression between the two study groups were selected for validation by means of qRT-PCR. This report describes the preliminary reports of an ongoing prospective study.
**Results.** Samples from the first 16 patients were analysed, showing early halving of exosome concentration 1h after the procedure (p=0.007), followed by a progressive increase at 24h (p=0.09) and 30 days (p=0.001) of follow up. The differential microRNA expression profile comparing revealed significant modulation of several microRNA at 24h after TAVI compared to pre-treatment values (see HeatMap below). Among those differentially regulated, the miR-320b (p=0.003), miR-141-3p (p=0.041), miR-937-50 (p=0.034), miR-1908 (p=0.018) and miR-4508 (p=0.008) were significantly upregulated, while the miR-199a (p=0.048), miR-548ad (p=0.008), miR-33a (p=0.017 and miR-185 (p=0.044) were significantly downregulated. Interestingly, target and network analyses performed using Ingenuity Pathway Analysis, revealed that specific microRNAs that showed a significant modulation after TAVI are involved in the response to shear-stress and mechano-sensing (miR-33, miR-141), or associated to adverse LV remodeling, such as hypertrophy (miR-340), LV dilation (miR-185) or myocardial injury (miR-320, miR-199).
**Conclusions.** Exosome concentration was acutely reduced after TAVI, followed by a progressive increase at 1 month. Specific exosomal microRNAs involved in the response to shear-stress, mechano-sensing or associated to adverse LV remodeling were significantly modulated after TAVI. These findings might have important clinical relevance for the potential use of MicroRNAs as new clinical biomarkers in patients with aortic stenosis after TAVI.

### A644: STUDY OF PLIN2 PROTEIN IN MONOCYTES OF PATIENTS WITH ST-ELEVATION MYOCARDIAL INFARCTION

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**Introduction.** Atherosclerosis, hypertension, and consequent cardiovascular disease are among the most common age-related diseases and are major causes of death in old age. Accumulation of Lipid Droplets (LDs) leads to alteration of macrophages into foam cells, an important key factor in the pathogenesis of atherosclerosis. The main LD-coating protein in macrophages and foam cells is PLIN2. PLIN2 upregulation leads to cytoplasmic LD accumulation. Chaperone-mediated autophagy (CMA) selectively degrades the LD-proteins such as PLIN2 from the LD surface. At the lysosome, the substrate proteins bind to the CMA receptor, lysosome-associated membrane protein 2A (LAMP2A). PLIN2 has also been reported as a substrate of ubiquitin-proteasomal degradation.
**Methods and Results.** We enrolled 120 symptomatic patients with following conditions: stable angina (SA) and ST-elevation myocardial infarction (STEMI). At flow cytometer, $CD14^+$ monocytes showed a positive correlation of PLIN2 expression with age in STEMI patients (0,95±0,2; P=0,003) and in SA patients (0,77±0,1; P=0,01). STEMI patients showed an increased expression of PLIN2 as compared with SA. A key step during foam cells formation is the binding of oxidized LDL to macrophage surface scavenger receptors such as CD36, leading to internalization of lipoproteins within the cells. CD36 expression is increased with increasing age in STEMI patients (6,65±2,3; P=0,03) and in SA patients (6,78±3,5; P=0,02). Adipocyte ATP-binding Cassette A1 (ABCA1) promotes cholesterol and phospholipid efflux from monocytes. ABCA1 expression was inversely associated with age in STEMI patients (2,14±1,3; P=0,004) and in SA patients (0,95±0,5; P=n.s.). LAMP2A expression is inversely correlated with age in STEMI population (1,92±0,7; P=n.s.) and in SA population (2,36±0,9; P=n.s.). The presence of multi-vessel disease appears to be proportionally associated with PLIN2 expression both in STEMI and in SA patients. PLIN2 upregulation was inversely correlated with Trombolysis In Myocardial Infarction (TIMI) Grade Flow before percutaneous coronary intervention (PCI) and post-PCI. The Killip classification, in acute myocardial infarction patients, takes into account physical examination and the development of heart failure in order to predict and stratify their risk of mortality; PLIN2 upregulation was positively correlated with classification of Killip.
**Conclusions.** Many aspects regarding the biology of PLIN2 remain unsolved. Our data showed an increase of PLIN2 expression with age with an higher trend in STEMI population compared with SA. We also highlighted a link with hemodynamic results and with other prognostic factors and risk stratification in the patients studied. Future studies are needed to know if PLIN2 has roles other than participating in LD formation and stabilization, if it has roles in regulation of gene expression and to understand the threshold level of PLIN2 expression separating physiological from pathological effects. Lastly PLIN2 could be considered as a prospective biomarker and as a potential pharmacological target to fight atherosclerosis.

## LE MALATTIE CARDIOVASCOLARI NELL'ANZIANO: UN ANIMALE DIFFERENTE?
## Sessione Orale

### A645: ACUTE MYOCARDIAL INFARCTION IN EDERLY PATIENTS: INSIGHTS FROM THE EMIR REGISTRY

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(a) UMG MATER DOMINI, CATANZARO

The EMIR is an ongoing registry including elderly patients (≥75 years) consecutively referred to a single tertiary center with diagnosis of Acute Myocardial Infarction with indication for coronary angiography. Among the 487 patients enrolled to date, 39.2% were female, while mean age was 80±4 years. All patients underwent coronary angiography. Contrast-induced nephropathy was significantly more frequent in females (8.4%) than in males (3.4%, p=0.017). No evidence of critical coronary stenoses was reported in 10.1% of cases, more frequently in females (12.6%) than in males (8.4%). Percutaneous coronary intervention (PCI) was performed in 70% of the study population. Concomitant PCI of a non-target lesion (NTL) was performed within the same procedure in 9.5% of cases. A staged PCI of NTL was performed in 11.9% of cases, while a plannned surgical revascularization was performed after PCI of the IRA in 1.6% of cases. Altogether, a complete revascularization was achieved in 48.4% of cases before discharge. Atrial fibrillation (AF) was present in 13% of

patients, although the patient was aware ot this diagnosis at anamnesis only in 3.5% of cases. Interestingly, 27% of all patients with AF had no critical stenoses at coronary angiography, while a formal indication to a combined antiplatelet/anticoagulant treatment persisted in the remaining patients, where critical coronary artery disease was confirmed at coronary angiography.
Elderly patients with AMI represent a peculiar patient population, highlighting the need for dedicated clinical management protocols. Particularly, the relatively hich frequency of Atrial Fibrillation in elderly patients referred for AMI deserves particular caution in selection of antithrombotic treatment.

### A646: IMPACT OF RENAL FUNCTION ON OUTCOME IN ELDERLY PATIENTS WITH ACS TREATED WITH PCI

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(a) ASST GRANDE OSPEDALE METROPOLITANO NIGUARDA, MILANO; (b) IRCCS ARCISPEDALE S. MARIA NUOVA, REGGIO EMILIA; (c) OSPEDALE ALESSANDRO MANZONI, LECCO; (d) OSPEDALE TREVIGLIO-CARAVAGGIO, TREVIGLIO; (e) UNIVERSITÀ DI SALERNO; (f) UNIVERSITÀ DEL PIEMONTE ORIENTALE, NOVARA; (g) FONDAZIONE POLICLINICO SAN MATTEO IRCCS, PAVIA; (h) OSPEDALE SANTA MARIA DELLE GRAZIE, POZZUOLI; (i) OSPEDALE SANTO STEFANO, PRATO

**Background.** Chronic kidney disease (CKD) is common in patients with coronary artery disease (CAD) and its prevalence dramatically increases with age.
**Aim.** To assess the impact of baseline renal function on clinical outcomes of elderly patients presenting with acute coronary syndromes (ACS) and treated with percutaneous coronary intervention (PCI).
**Methods.** Patients aged 75 years or more presenting with an ACS and successfully treated with PCI were selected among those enrolled in three Italian multicentre studies (the Italian Elderly ACS study, the LADIES ACS study and the Elderly ACS 2 randomized trial). Patients were classified on the basis of the baseline estimated glomerular filtration rate (eGFR) as having none or mild (eGFR ≥ 60 ml/min/1.73 $m^2$), moderate (eGFR between 30 and 59 ml/min/1.73 $m^2$) or severe (eGFR < 30 ml/min/1.73$m^2$) renal dysfunction. Data on all-cause and cardiovascular mortality, non-fatal myocardial infarction or new myocardial ischemia, rehospitalization for cardiovascular causes, stroke and bleedings type 2,3, and 5 according to BARC classification were obtained at 12-month follow-up.
**Results.** 1094 patients (mean age: 81±4.6 years) were included. A moderate renal dysfunction was found in 623 (56.6.%) patients, whereas 203 (10.7%) patients were found to suffer with a severe renal dysfunction. A gradual increase in risk profile was observed according to the presence and stage of renal dysfunction. Patients with severe renal dysfunction were significantly older and showed the highest prevalence of hypertension, diabetes, peripheral artery disease, multivessel CAD and atrial fibrillation and, conversely, had significantly lower left ventricular-ejection fraction and blood haemoglobin levels (p<0.001 across groups). At 12-month follow-up, patients with renal dysfunction showed higher rates of all-cause mortality (4.5%, 7.5% and 17.8% in patients with none or mild, moderate and severe renal dysfunction, respectively). Similarly, rates of cardiovascular mortality and rehospitalization because of cardiovascular causes progressively increased in patients with renal dysfunction (for cardiovascular mortality: 2.8%, 5.2% and 10.2%; for cardiovascular rehospitalization: 5.7%, 9% and 16.7%, respectively). After adjustment for relevant confounders, severe renal dysfunction was associated with an increased risk of all-cause death (adjusted HR, $HR_{adj}$ 2.859, 95% CI 1.524-5.365, p=0.001) and cardiovascular death ($HR_{adj}$ 3.105, 95% CI 1.413-6.825, p=0.005), with a trend for increased rate of rehospitalization for cardiovascular causes ($HR_{adj}$ 1.873, 95% CI 0.912-3.847, p=0.087) after 12 months. Kaplan-Meier curves also showed a significantly higher all-cause and cardiovascular mortality in patients with renal dysfunction (log rank Mantel-Cox<0.001 for both endpoints), both in overall population and in STEMI and NSTEMI subgroups. Among patients with moderate or severe renal dysfunction, multivariate Cox regression analysis identified clinical presentation with STEMI, low blood haemoglobin, diabetes mellitus and older age as independent predictors of all-cause death, whereas only clinical presentation with STEMI and low blood haemoglobin could independently predict cardiovascular death.
**Conclusions.** Baseline renal dysfunction affects clinical outcome in elderly patients with ACS undergoing PCI, being associated with significantly higher rates of mortality and rehospitalization for cardiovascular causes at long-term follow-up.

### A647: VALUTAZIONE DEL RISCHIO CARDIOVASCOLARE NEI PAZIENTI ULTRA SETTANTACINQUENNI CANDIDATO A CHIRURGIA NON CARDIACA ELETTIVA

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**Introduzione.** Gli esiti di un intervento chirurgico in un paziente anziano cardiopatico sono correlati alla tipologia e alla gravità della cardiopatia, al tipo d'intervento e al regime temporale della sua esecuzione; dipendono inoltre da alcuni aspetti indagati nella Valutazione Multidimensionale Geriatrica, come la comorbidità ed il livello funzionale. Il fine del nostro studio è stato quello di verificare se le valutazioni delle comorbilità, dello stato funzionale e neuropsicologico, e della performance fisica possano risultare predittivi di esiti intraospedalieri a breve e medio termine e se quindi possano essere ritenuti un valido supporto agli abituali score per una più completa valutazione preoperatoria.
**Metodi.** Abbiamo aderito ad un protocollo Nazionale promosso dalla Società Italiana di Cardiologia Geriatrica (SICGe) che terminerà nel 2020 coinvolgendo circa 20 Centri Ospedalieri con il reclutamento di 3000 pazienti di età ≥75 anni, con una valutazione preoperatoria di chirurgia a rischio moderato/alto. È stata compilata una scheda di raccolta dati per inquadrare la storia clinica del paziente, calcolare degli indici di rischio chirurgico (CIRS, Lee, GUPTA ecc.) ed effettuare una rapida valutazione multidimensionale (Mini Cognitive Test, BADL, IADL, SPPB). Al temine della degenza post-chirurgica, sono stati registrati gli esiti dell'intervento e la presenza di eventuali eventi di rilievo e/o complicanze verificatisi. A 30 giorni dall' intervento è stato registrato lo stato funzionale del paziente, le eventuali re-ospedalizzazioni e i possibili eventi cardiovascolari acuti nel frattempo occorsi. Dopo 6 e 12 mesi dall'intervento, sono stati di nuovo somministrati al paziente i questionari funzionali (IADL e BADL) e valutate eventuali complicanze cardiovascolari intercorse.
**Risultati.** Sono stati reclutati in totale 151 pazienti di età ≥75 anni. 34 Pazienti (22,51%) erano candidati ad interventi con rischio chirurgico intermedio e 117 pazienti (77,48%) ad interventi con un rischio chirurgico alto. La maggior parte dei pazienti (86,74%) appartenevano alla classe I (61,58%) e II (25,16%) di Lee ed avevano un rischio cardiologico operatorio basso, 14 pazienti (9,27%) avevano un rischio intermedio; tutti i 6 pazienti (3,97%) appartenenti alla classe di rischio più elevata (Classe IV di Lee) hanno avuto un outcome negativo. Circa il 90 % del campione presentava un aumento del rischio cardiaco calcolato con l'indice di Gupta inferiore dell'1%, ma in tutti coloro che hanno ottenuto un valore >2% si è verificato un outcome negativo. Il 68,86% della popolazione in esame aveva un valore all'SPPB >4, indice di una buona performance fisica; di 34 pazienti con un punteggio <4, 28 (82,35%) hanno avuto una complicanza. Su 151 pazienti arruolati, il 31,12% (47 pazienti) ha avuto complicanze, di cui il 31,91% (n.13) prevalenti nel follow up a 6 mesi (il 15,24%, 23 pazienti). Nel follow up a 12 mesi, invece, la percentuale di complicanze ha raggiunto il 58,82%.
**Conclusioni.** La distribuzione delle complicanze in relazione all'indice di Lee dei pazienti valutati ci ha permesso di considerarlo come il miglior indice predittivo di rischio cardiovascolare nella chirurgia non cardiaca. Anche l'indice di Gupta e l'SPPB, nel nostro campione di pazienti, si sono dimostrati essere dei validi fattori predittivi di eventi negativi post intervento di tipo non cardiaco.

### A648: RELATIONSHIP BETWEEN SKELETAL MUSCLE AND HEART IN A SARCOPENIC AND FRAIL ELDERLY POPULATION

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Aging is associated with changes of skeletal muscle mass (SMM) and function, a clinical condition called sarcopenia, and a higher prevalence of left ventricular hypertrophy, especially in females. The connection between these two phenomena has still not been deeply investigated. Studies conducted in community-dwelling older people suggest the presence of muscle wasting during heart failure and show a positive relationship between physical frailty and subclinical cardiovascular diseases. Therefore, we hypothesize the existence of "cardiac-skeletal muscle axis" and a correlation between left ventricular mass (LVM), assessed by echocardiography, and SMM, assessed by DXA scan.
**Materials and methods.** To address this hypothesis we used data of 100 subjects aged ≥70 year sarcopenic and physical frail subjects enrolled in the Parma site of European multicenter SPRINTT population. The subjects were classified sarcopenic according to FNIH criteria (Appendicular Lean Mass, ALM<19.75 or 15.02 Kg, for males and females, respectively), and physical frail based on SPPB score in the range 3-9. Statistical analysis was performed through Pearson's correlation between LVM (independent variable) and ALM (dependent variable) stratified by sex and in a sex- and age-adjusted model (Model

1). A multivariable analysis (Model 2) including age, sex, BMI, systolic blood pressure (SBP), heart rate (HR), LVM, Cardiac output (CO), level of physical activity, haemoglobin concentration (Hb), Mini Mental status Examination and beta-blockers or Ace-inhibitors/angiotensin receptor blockers was also performed in order to identify factors associated to ALM.
**Results.** Mean age of subjects enrolled (67% females) was 79 ± 5 years. 40% of participants was chronically on β blockers, and 32% on ACE-inhibitor therapy. Average of LVM accounted for 193±67 g, indexed LVM (LVM/BSA) was 112±33 g/m², and CO 65±19 l/min. Factors independently associated to ALM included LVM (p<0.0001), LVM/BSA (p=0.0022), BMI (p<0.0001), fat mass (p<0.0001), Hb (p=0.0093) and CO (p<0.0001). In the multivariate analysis only LVM β= 0.02 (p=0.0003), CO β=0.04 (p=0.01), BMI β=0.27 (p<0.0001) and Hb β=0.52 (p=0.006) were independently associated to ALM.
**Conclusions.** In a sample of older, sarcopenic and physical frail subjects, LVM was positively and significantly associated to SMM independent of Hb, BMI, HR, levels of physical activity and CO.

### A649: THE IMPAIRMENT IN KIDNEY FUNCTION IN ANTICOAGULATION ERA. A PATHOPHYSIOLOGICAL INSIGHT

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The need for anticoagulation in patients with atrial fibrillation (AF) is fundamental to prevent thromboembolic events. Direct oral anticoagulants recently demonstrated to be superior, or at least equal to Warfarin in reducing the risk for stroke/systemic embolism and to prevent major bleeding and intracranial haemorrhages.
A great part of AF population suffers from chronic kidney disease (CKD). Indeed, the relationship between AF and renal function is bidirectional: AF can trigger kidney failure as well as the kidney impairment can promote alterations able to enhance AF.
Nevertheless, there are concerns in prescription of anticoagulants to patients with AF and CKD.
The worsening in kidney function can be effectively due to anticoagulants administration. Warfarin has been recognized to promote acute kidney failure in case of excessive anticoagulation levels. Nevertheless, further mechanisms can induce the chronic worsening of renal function this leading to the decline of kidney function observed in post-hoc analysis of registration trials and dedicated observational studies.
By contrast, DOACs more protect kidneys from injuries with more efficiency with respect to Warfarin, although they still continue to play a role in promoting some kidney lesions. The exact mechanisms are still unknown.
This review is aimed to discuss the influence of anticoagulants on renal impairment as well as to overview potential physio-pathological mechanisms related to this clinical complication.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 1
## Sessione Poster

### A650: NOVEL GLA MUTATION (C.666DELC) CAUSING GASTROINTESTINAL FABRY VARIANT IN AN ITALIAN FAMILY

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**Background.** Over 300, mostly private mutations of alpha-galactosidase A gene (GLA) have been reported in Fabry disease (FD). They can be benign or pathogenic causing peculiar clinical manifestations. Clinical variants, predominantly affecting single organs are recognized. Although gastrointestinal symptoms are common in FD, specific GLA mutations manifesting with elective involvement of gastrointestinal tract are not yet reported.
**Purpose.** Report of a novel GLA gene mutation causing an gastro-intestinal variant of FD.
**Methods.** Five italian family members (3 female and 2 male), aged 72 (F), 54 (F), 48 (M), 29 (M), and 21 (F) years with abdominal pain, diarrhea and in male subjects intestinal malabsorption with remarkable weight loss and iron-deficient anemia had normal repeated gastrointestinal endoscopies. Investigations for kidney, cardiac, nervous system, skin and eyes were negative but mild/moderate asymptomatic left ventricular hypertrophy in the oldest male. All pts underwent ECG, 2D-echo, cardiac magnetic resonance (CMR) as well as gastric, duodenal and left ventricular endomyocardial biopsy (LVEMB). Tissue samples were processed for histology, electronmicroscopy and immunohistochemistry for Gb3.
**Results.** ECG, 2D-echo and CMR were normal in the 3 women and in the 29-year-old man while showed increased QRS voltages and moderate LV hypertrophy in the 48-year-old male without any symptoms of chest pain, wheezing, palpitations or fatigue. Histology of intestinal biopsy samples showed in all massive accumulation of glycolipids in the enterocytes, which were positive to immunohistochemistry with anti-Gb3 antibody and had the configuration of myelin bodies at ultrastructural examination. LVEMB was negative for storage disease in females, showed normal myocytes with tiny glycolipid accumulation and negative immunohistochemistry for Gb3 in the 29-year old male while exhibited in the oldest male moderate hypertrophy of cardiomyocytes including perinuclear and cytoplasmic vacuoles positive at histology, electronmicroscopy and immunohistochemistry for glycosphyngolipids accumulation. Gene analysis confirmed the diagnosis of FD due to previously unreported c.666delC mutation of GLA gene. All five subjects had increased plasma levels of lyso-Gb3. Enzyme replacement therapy (ERT, agalsidase alpha 0.2mg IV every other week) has been administered to all with rapid improvement of the gastrointestinal manifestations.
**Conclusions.** Newly recognized c.666delC mutation of GLA gene causes a gastrointestinal variant of FD. It is susceptible to ERT administration.

### A651: INCIDENCE AND DETERMINANTS OF RECURRENCE IN PATIENTS WITH TAKOTSUBO SYNDROME

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**Introduction.** Takotsubo syndrome (TTS) is an heart failure syndrome which is affected by a not trivial rate of in-hospital complications and mortality. TTS recurrence is uncommon, however, few studies investigated this topic yielding conflicting results. Aim of the present study was to assess incidence and determinants of recurrence in a large cohort of TTS patients.
**Methods.** Study population included 234 TTS patients enrolled in a prospectic multicenter registry. Patients with TTS recurrence at follow-up (n=8, group A) were matched 1:9 for age (± 5 days), sex and length of follow-up (± 200 days) to patients who did not experience a recurrence (n=72, group B). Clinical and instrumental variables at admission and during hospital stay after the first TTS event were compared between groups.
**Results.** In the whole study population 3.4% of patients had a TTS recurrence (100% women, mean age at first event 76 years), with a mean annual rate of 8.1/1000 patient/year (95% CI 3.0-21.7). Recurrence rate had a homogeneous trend during the length of follow-up. Compared to Group B, patients in Group A more often had a physical trigger (75% vs 26%, P=0.01, OR 8.2 [95% CI 1.5 – 44.2], p=0.01), whereas emotional trigger was less common (12% vs 46%, p=0.13, OR 0.2 [95% CI 0.02 – 1.4], p=0.1). Among patients in group A, we observed a trend towards a higher prevalence of pneumological diseases (37% vs 12%, p=0.09, OR 4.7 [95% CI 0.9 – 22], p=0.07). No differences between groups were observed in terms of other clinical (symptoms at admission, other comorbidities), humoral (creatinine, hemoglobin, peak troponin) and instrumental (ECG at presentation, contraction pattern, left ventricular ejection fraction) variables.
**Conclusions.** The present study suggests that TTS recurrence is an uncommon event without characteristic temporal trend. In our population, presence of physical trigger or pulmonary disease were associated to TTS recurrence.

### A652: APICAL HYPERTROPHIC CARDIOMYOPATHY TREATED AS ST-ELEVATION MYOCARDIAL INFARCTION

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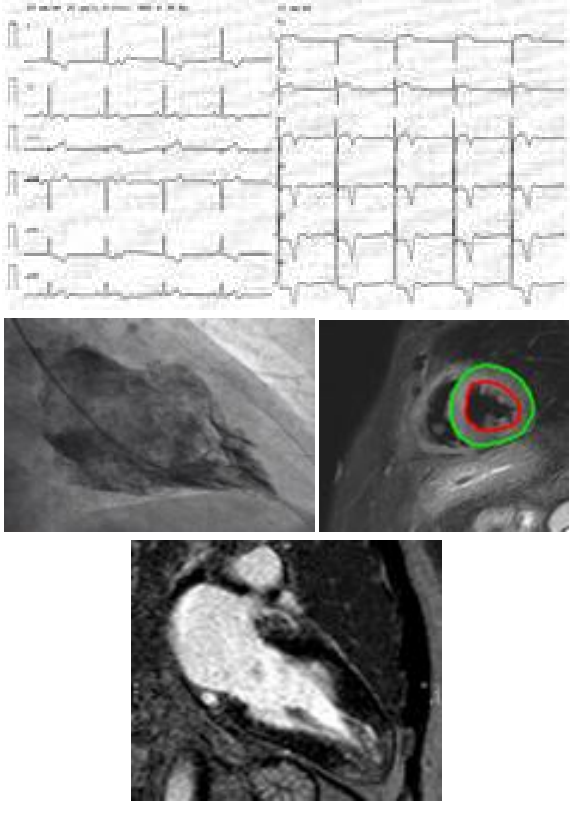
**Background.** Apical hypertrophic cardiomyopathy (AHCM - Yamaguchi syndrome) is a rare variant of hypertrophic cardiomyopathy, with electrocardiographic (ECG) changes and symptoms that may mimic an acute coronary syndrome (ACS).
**Case presentation.** A 64-year-old male was admitted to the emergency department (ED) two hours after awakening with a typical chest pain. He reported similar episodes of precordial pain at rest from two weeks. He suffered from hypertension, hypercholesterolemia, mild carotid

atheromasia and was a previous smoker. Vital parameters and physical examination were within normal limits. The ECG showed sinus rhythm, septal ST-segment elevation, ST-segment depression in lateral leads, and diffuse T-wave inversion. A diagnosis of anterior ST-elevation myocardial infarction (STEMI) was made, and the patient transferred to our hospital for urgent coronary angiography, which revealed non-obstructive coronary arteries. Left ventriculogram was performed, showing end-diastolic ace-of-spades configuration, with end-systolic obliteration of the apical cavity. Therefore, a diagnosis of AHCM was made, then confirmed by echocardiography. Cardiac magnetic resonance (CMR) demonstrated a normal left ventricular systolic function, left atrium enlargement, and a progressive thickening of myocardium toward the left ventricular apex (15 mm), with diffuse apical edema and fibrosis. The patient was discharged with medical therapy (β-blocker and angiotensin-converting enzyme inhibitor -ACEi) and outpatient follow-up; we did not proceeded to implant a defibrillator (ICD) for primary prevention, due to the low risk of sudden cardiac death (SCD) according to European Society of Cardiology (ESC) risk score.

**Discussion and conclusions.** AHCM is rare in the European population. It may mimic an ACS, therefore it should be considered in the differential diagnosis of chest pain. The classic ECG findings of "giant" negative T waves associated with high QRS voltage should rise suspicion and in this context echocardiography could lead to a prompt diagnosis; however, it was not made in our patient, given high risk profile and high index of suspicion for STEMI. A correct diagnosis is crucial because AHCM may lead to heart failure, arrhythmia, stroke from apical thromboembolism, and sudden cardiac death. Left ventriculogram reveals the pathognomonic end-diastolic ace-of-spades configuration of the apex; CMR is the gold standard for diagnosis and it could help in the stratification of prognosis, since fibrosis has been recently associated with an increased risk of SCD. All patient should be evaluated for ICD implantation, according to ESC guidelines. Treatment options include β-blockers, calcium-channel blockers, and ACEi, with heart transplant and apical myectomy in end stage disease.



### A653: VENTRICULAR ARTERIAL COUPLING ALTERATION AND LONG TERM PROGNOSIS IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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**Introduction.** The functional interaction between the left ventricle (LV) and the arterial system defines the performance of the cardiovascular system. Evaluating the coupling of these components is important in order to quantify myocardial efficiency. To date, arterial elastance (Ea), end systolic LV elastance (Ees) and their relationship - ventricular-arterial coupling (Ea/Ees) – have not been assessed in patients with hypertrophic cardiomyopathy (HCM). Aim of the study was to describe the distribution of these parameters in HCM patients, both obstructive and non-obstructive, and to assess their prognostic significance in terms of cardiovascular death, cardiac arrest or sudden death, hospitalizations for congestive heart failure (CHF) and onset of atrial fibrillation (AF).

**Methods.** We enrolled 349 patients with HCM (average age 45±16 years, male 71%), evaluated at baseline cardiovascular magnetic resonance imaging (CMR) and echocardiogram and followed for 7.5±3.9 years. Ea was calculated as the ratio of end systolic blood pressure and stroke volume (ESP/SV); Ees was calculated as the ratio between ESP and left ventricular end-systolic volume (ESP/ESV).

**Results.** Average Ea at baseline was 1.34±0.64 mmHg/ml, Ees 3.53±2.24 mmHg/ml and ventricular-arterial coupling was 0.49±0.41. Values differed significantly between sexes (Ea: 1.25±0.45 mmHg/ml in men vs 1.57±0.90 mmHg/ml in women, p<0.001; Ees: 3.06±1.48 mmHg/ml in men vs 4.66±3.17 mmHg/ml in women, p<0.001). Dividing the population into two groups based on average age at baseline, a significant difference was observed only for Ea (<45 years 1.23±0.49 mmHg/ml, ≥45 years 1.44±0.72 mmHg/ml, p=0.02). Patients with obstructive HCM differ from non-obstructive due to lower ventricular-arterial coupling (0.40±0.44 vs 0.51±0.40, p=0.029) and higher Ees (4.01±2.23 mmHg/ml vs 3.39±2.23 mmHg/ml, p=0.030). During follow-up, Ea values were directly related to the likelihood of AF, with markedly ascending trend based on Ea tertiles: 9.2% vs 14.5% vs 26.4%, p<0.001. Multivariable analysis by Cox regression showed increasing Ea values to independently predict global prevalence and de novo AF regardless of sex, age and Ees. No impact on mortality of CHF was observed.

**Conclusions.** In HCM patients, assessment of ventricular-arterial coupling yielded super-normal values correlated to an increase in Ees, reflecting enhanced LV inotropism. This tendency is especially evident in patients with obstructive HCM, who exhibited reduced coupling values and higher Ees. Mid-term we observed a strong direct correlation between Ea values and onset of AF during the follow-up. Further work is required to assess the benefits of pharmacological and surgical interventions on ventricular-arterial coupling in HCM, with potential impact on adverse remodeling and arrhythmic propensity.

### A654: NT-PROBNP AND HIGH-SENSITIVITY CARDIAC TROPONIN T TO DIAGNOSE CARDIAC AMYLOIDOSIS

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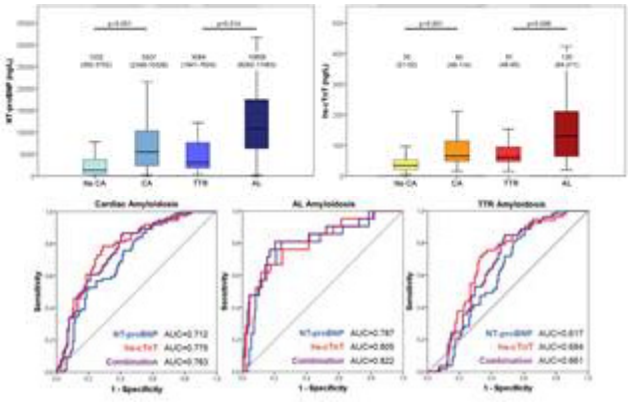
**Background.** Cardiac amyloidosis (CA) is characterized by the accumulation of misfolded proteins into amyloid fibrils, leading to cardiomyocyte toxicity, extracellular volume expansion and ventricular pseudohypertrophy. As a consequence of such processes, B-type natriuretic peptides and cardiac troponins are chronically elevated in CA and hold significant prognostic value. The diagnostic yield of these biomarkers for CA has never been explored so far.

**Methods.** Plasma levels of N-terminal fraction of pro-B-type natriuretic peptide (NT-proBNP) and high-sensitivity cardiac troponin T (hs-cTnT) were measured in 229 patients referred to a tertiary centre with the clinical suspicion of cardiac amyloidosis.

**Results.** Patients were aged 79 (interquartile interval 73-83) years and were predominantly males (n=147, 64%). Mean left ventricular (LV) ejection fraction was 55% (48-62%), and mean LV mass indexed was 150 (120-178) g/m$^2$. CA was confirmed in 86 patients (38%), who had either light chain (AL) amyloidosis (n=25, 29%) or transthyretin (TTR) amyloidosis (n=61, 71%). Alternative diagnoses were hypertensive cardiomyopathy (n=65, 45%), valvular disease (n=30, 20%), hypertrophic cardiomyopathy (n=23, 16%), or left ventricular hypertrophy with unknown or multifactorial mechanisms (n=25, 17%). Patients with CA showed higher NT-proBNP (5507 ng/L [2348-10326] vs. 1332 [392-3752], p<0.001) and hs-cTnT (65 ng/L [48-114] vs. 35 [21-52], p<0.001) than those without CA. The area under the curve (AUC) values for NT-proBNP and hs-cTnT were 0.712 and 0.775 respectively (p=0.062 for the difference). The combination of the two biomarkers improved discrimination over NT-proBNP alone (p=0.011), but not over hs-cTnT (p=0.470) (Figure). A NT-proBNP level <600 ng/L or a hs-cTnT level <17 ng/L were optimal for ruling out amyloidosis, with a negative predictive value (NPV) of 95% in both cases. Patients with AL amyloidosis had higher NT-proBNP and hs-cTnT than those with ATTR (10809 ng/L [6292-17483] vs. 3084 [1841-7624], p=0.014; 130 ng/L [64-211] vs. 61 [48-95], p=0.006). NT-proBNP and hs-cTnT could discriminate patients with AL amyloidosis among subjects with clinical suspicion of cardiac amyloidosis (AUC values of 0.787 and 0.805 respectively, p=0.697 for the difference). The diagnostic performance of the two biomarkers was weaker for the identification of TTR amyloidosis (Figure).

**Conclusions.** Plasma NT-proBNP and hs-cTnT have diagnostic value in patients with suspected CA. A NT-proBNP level <600 ng/L or a hs-cTnT level <17 ng/L are optimal for ruling out cardiac amyloidosis.




**A655: CARDIOMIOPATIA IPERTROFICA ED EMBOLIA RECIDIVANTE CEREBRALE E RENALE**

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**Introduzione.** I pazienti affetti da cardiomiopatia ipertrofica presentano, generalmente in presenza di fibrillazione atriale, un aumentato rischio trombo-embolico, la cui incidenza si attesta all' 1% annuo. Embolizzazioni sistemiche si possono però verificare anche in assenza di aritmie in pazienti che presentino trombosi ventricolare. I meccanismi alla base della formazione di trombi nel ventricolo sinistro non sono del tutto noti, si ipotizza che fenomeni di micro-necrosi miocardica, di frequente riscontro nella cardiomiopatia ipertrofica, determinino ipo-acinesia parietale che in caso di interessamento dell'apice può predisporre alla formazione del trombo. In ambito clinico, al fine di prevenire la formazione del trombo, è opportuna un'attenta e precoce valutazione della cinesi segmentale con metodiche quali ecocardiografia e risonanza magnetica nucleare.
**Caso clinico.** Un uomo di 43 anni, affetto da cardiomiopatia ipertrofica e in terapia con beta bloccanti, giungeva in Pronto Soccorso per vertigini oggettive di tipo rotatorio associate a dolore auricolare destro, nausea e vomito ripetuto. L'esame obiettivo neurologico evidenziava nistagmo spontaneo, in posizione primaria di sguardo; la valutazione otorinolaringoiatrica risultava negativa per patologie audiovestibolari. L'ecodoppler dei vasi epiaortici mostrava un flusso della arteria vertebrale destra caratterizzato dalla sola componente sistolica come per occlusione alta; all' angio-TC la stessa arteria, opacizzata nel tatto extracranico, si visualizzava a livello intracranico solo nel tratto prossimale. Il paziente, la cui sintomatologia era rapidamente regredita, veniva ricoverato in Medicina di Urgenza, ove la diagnosi di sospetto ictus del circolo posteriore veniva confermata dalla RM cerebrale (alterazione del segnale nelle sequenze T2 pesate ed in FLAIR, con diffusività ristretta in DWI, localizzata a livello emisferico cerebellare destro/verme cerebellare). Veniva eseguito quindi ecocardiogramma con documentazione di marcata ipertrofia asimmetrica del setto prossimale-medio del ventricolo sinistro, cinesi globale moderatamente depressa (FE 40%), acinesia dell'apice in toto e della parete posteriore. Veniva inoltre riscontrata trombosi apicale, successivamente confermata dalla RMN cardiaca (dimensioni 20x10mm) che evidenziava anche presenza di edema transmurale a carico dell'apice e del setto anteriore. La coronarografia dimostrava l'assenza di lesioni coronariche. Il paziente, dimesso in terapia con anticoagulanti orali, beta bloccanti e ace-inibitori, dopo una settimana si presentava nuovamente in Pronto Soccorso per dolore in fossa iliaca sinistra. La TC addominale con mdc evidenziava alcune aree corticali ipodense a morfologia triangolare, di significato ischemico, a carico del rene sinistro e difetto di opacizzazione di un ramo dell'arteria renale di sinistra come per trombo-embolia. L'INR era < 2. Il paziente veniva ricoverato in Cardiologia d'Urgenza ove iniziava terapia con eparina sodica embricata con Warfarin. Dopo 10 giorni di terapia anticoagulante correttamente eseguita un ecocardiogramma con contrasto (Sonovue) documentava la scomparsa della trombosi precedentemente individuata. Il paziente veniva quindi dimesso, con indicazione a continuare la terapia anticoagulante orale e a eseguire periodici controlli, a distanza di 5 mesi dalla dimissione non si sono più ripetuti fenomeni ischemici.

**A656: ARITMIA VENTRICOLARE RAPIDA COME PRIMA MANIFESTAZIONE DI AMILOIDOSI CARDIACA TTR WILD-TYPE**

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Riportiamo il caso clinico di un uomo di 69 anni, sportivo, senza precedenti cardiologici, giunto alla nostra attenzione per episodio lipotimico associato a dolore toracico insorto dopo sforzo. In anamnesi decompressione del nervo mediano bilaterale, assenza di familiarità per cardiopatie. All'elettrocardiogramma, eseguito in Pronto soccorso a Paziente sintomatico per malessere generalizzato**,** riscontro di tachicardia a QRS largo (130 ms circa), regolare con ciclo di 240 ms circa, sostenuta, monomorfa con ritardo di attivazione destra e deviazione assiale sinistra, trattata efficacemente mediante singolo DC-shock a 200 J bifasico. Gli esami ematochimici hanno escluso disionie e alterazioni della funzione tiroidea (TSH 1.35 mUi/mL). All'elettrocardiogramma in ritmo sinusale evidenza di bradicardia, conduzione atrioventricolare, ventricologramma e intervallo QT nei limiti di norma (Qtc 394 ms), indice di Sokolov negativo. All'ecocardiogramma riscontro di ipertrofia biventricolare con aspetto a vetro smerigliato (SIV 17 mm – spessore parete libera Vdx 7 mm), funzione sistolica sinistra e destra conservata, dilatazione biatriale, pattern transmitralico pseudonormale e assenza di valvulopatie di rilievo. È stata iniziata terapia con amiodarone e betabloccante, successivamente sospesi per alterazione della funzione tiroidea e persistente spiccata bradicardia. Lo studio coronarografico ha mostrato vasi epicardici indenni da lesioni. Al test ergometrico, massimale, evidenza per tutto l'esercizio di battiti extrasistolici isolati, ad accoppiamento tardivo, con morfologia identica a quella dell'aritmia clinica, con incremento della frequenza fino all'acme dello sforzo e riduzione durante la fase di recupero. La RMN cardiaca ha mostrato difficoltoso riconoscimento del corretto tempo di inversione con impossibilità di raggiungere un completo annullamento del segnale miocardico, pattern sospetto per amiloidosi cardiaca. L'elettroforesi delle sieroproteine, l'immunofissazione delle proteine sieriche ed urinarie e la ricerca della proteinuria di Bence Jonce hanno escluso presenza di discrasia plasmacellulare. È stata eseguita ricerca istologica dei depositi di sostanza amiolide tissutale mediante biopsie del grasso periombelicale, perirettale e perighiangolare risultate negative. La scintigrafia total-body con tacciante osseo (tecnezio-99m etilen-difosfonato) ha documentato diffuso accumulo in sede miocardica, reperto suggestivo per amiloidosi da depositi di transtiretina (ATTR). Il Paziente è stato sottoposto a impiantato ICD monocamerale in prevenzione secondaria. Per la ricerca di mutazioni a carico dei geni TTR e APOA1, il Paziente è stato inviato c/o altro centro; l'indagine è risultata negativa. Abbiamo quindi concluso per amiloidosi cardiaca TTR-wilde type, anche in assenza della conferma istologica mediante biopsia endomiocardica, in considerazione dell'elevata specificità del risultato scintigrafico. Durante il follow-up è stato rientrodotto amiodarone per comparsa di fibrillazione atriale parossistica ad elevata frequenza di risposta ventricolare condizionante intervento inappropriato del device. La tachicardia ventricolare rapida rappresenta una inusuale manifestazione d'esordio dell'amiloidosi cardiaca TTR-wilde type, ma attraverso un accurata anamnesi e un adeguato percorso diagnostico è stata individuata la cardiopatia infiltrativa responsabile della manifestazione aritmica maligna.

**A657: RARE CASE OF PERICARDITIS AS COMPLICATION OF INFLIXIMAB TREATMENT IN CROHN'S DISEASE**

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**Introduction.** Infliximab, a monoclonal anti-TNFα antibody, is a widely used drug in the treatment of inflammatory bowel disease. Various adverse reactions are attributed to infliximab therapy. Pericarditis as one of the adverse reactions is very rarely reported.
**Case report.** 23-year-old woman with a 2-year history of Crohn's disease (CD) who was admitted with a 2-days symptomatology of palpitations. Patient denied any preceding viral prodromal symptoms. There were no extraintestinal manifestations but, she was begun on infliximab. The patient had begun treatment with infliximab 2 months prior to presentation. On admission in emergency room, she was afebrile, tachycardic, and normotensive. Clinical examination, including of the cardiovascular and respiratory systems, was normal. At no time during his admission the patient was febrile and there were abnormalities in his white cell count. An electrocardiogram on admission noted tachycardia at 150 bpm and PR prolonged at 240 msec. A chest radiograph revealed radiological evidence of cardiomegaly. An echocardiogram noted a pericardial effusion of 7 mm, and normal left ventricular function. His viral serologies and auto-antibody screen were negative, except for auto-antibody ANCA, of low titre, without specificity identified. A computed tomographic (CT) pulmonary angiogram excluded a diagnosis of pulmonary embolus but confirmed the presence of a pericardial effusion. A diagnosis of pericarditis was made, and she was treated with Colchicine 0,5 mg twice a day and paracetamol.

**Discussion.** To date, only 2 case of pericarditis caused by infliximab therapy has been reported. With widespread use of anti-TNF-α treatment for inflammatory bowel disease, novel complications are being increasingly recorded.
**Conclusion.** This serious complication emphasizes the need for continued awareness of adverse events.

### A658: ACUTE MYOCARDITIS AFTER BLACK WIDOW SPIDER BITE

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Black widows are poisonous spiders whose bite can cause different clinical conditions varying from local damage to serious systemic complications including death. Cases of myocarditis after black widow spider (BWS) bite are rare though sometimes fatal, and their associated prognostic significance is unknown.
We treated a 50 years old patient who had myocarditis after BWS bite. He was admitted to intensive care unit (ICU) for cardiac monitoring. During the hospital stay, he showed worsening both on electrocardiographic and on echocardiographic evaluations despite the therapy. Therefore, further investigations such as cardiac magnetic resonance (CMR) and coronary angiography (CA) were required. Both of them did not show any significant abnormality; blood and instrumental tests slowly improved, and the patient was discharged home on twelfth hospital day without complications.
Acute myocarditis is an infrequent but potentially lethal complication of BWS bite. Such a diagnosis, which is not always easy, is important to identify those patients who can benefit not only from careful monitoring, but also from specific therapies aimed at reducing the risk of life.

### A659: DIAGNOSTIC APPROACH TO WILD-TYPE TRANSTHYRETIN CARDIAC AMYLOIDOSIS. A SINGLE-CENTRE EXPERIENCE.

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**Introduction.** The diagnosis of wild-type transthyretin cardiac amyloidosis (ATTRwt-CA) is frequently missed or delayed because of the limited specificity of clinical manifestations. A histological demonstration of amyloid is often required for a definitive diagnosis, although several non-invasive testing modalities have an established role in the diagnostic pathway of ATTRwt-CA, including electrocardiogram (ECG), serum biomarkers, echocardiography, bone scintigraphy, cardiac magnetic resonance (CMR) and abdominal fat pad biopsy. The aim of our study was to investigate the diagnostic approach and delay in patients with ATTRwt-CA between 2015 and 2019 in our hospital.
**Methods.** All the patients with a definitive diagnosis of ATTRwt-CA were enrolled in the study. All underwent family and personal history, physical examination, and complete cardiological evaluation including ECG and echocardiography. The diagnosis was achieved through different diagnostic modalities, in particular CMR, 99mTc-DPD bone scintigraphy and tissue biopsies (abdominal fat pad, endomyocardial and salivary glands). TTR gene molecular analysis was scheduled to rule out possible TTR mutations. Moreover, the patients underwent complete neurological examination, with a selected cohort undergoing also neurophysiology and nerve ultrasound.
**Results.** We studied 18 patients (17 males, mean age 75 ± 8 y). All were referred for cardiac symptoms: 9 (50%) dyspnea, 5 (28%) supraventricular arrhythmias, 4 (22%) syncope and 3 (17%) chest pain. ECG showed atrial fibrillation in 11 (61%), low QRS voltages in 4 (22%), atrio- or intraventricular conduction disturbances in 13 (72%), requiring pacemaker implantation in 6 (33%). Twelve patients (66%) had surgical correction of bilateral carpal tunnel syndrome (CTS). Neurophysiology, available in 8/18 patients disclosed mild axonal sensory-motor polyneuropathy in 2 patients (11%), persistent bilateral CTS in 3 (17%) and right ulnar nerve axonal neuropathy in 1 (5%). Nerve ultrasound, performed in 7/18 patients, showed increased cross-sectional area of the median nerves in 2 patients (11%) and of sciatic nerves in 1 (5%) with axonal neuropathy. Upon the suspicion of cardiac amyloidosis, obtained by the evidence of typical clinical, ECG and echocardiographic features, as first second-level diagnostic test patients underwent CMR in 12 (67%) cases, bone scintigraphy in 4 (22%) and endomyocardial biopsy in 2 (11%). Abdominal fat pad biopsy was performed in 8 patients (44%) as additional exam, showing in all cases negative results. The genetic test results were available and negative in 15 patients. The mean diagnostic delay, from clinical suspicion to definitive diagnosis, was 2.3 ± 1 years.
**Conclusions.** Although the increasing awareness among the clinicians of the clinical presentation of ATTRwt-CA and the improvement of the diagnostic modalities, the diagnostic delay is still long. Neurological involvement other than CTS is frequent and should be investigated.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 3
## Sessione Poster

### A660: ACUTE INFLAMMATORY CARDIOMIOPATHY: PREVALENCE, CHARACTERIZATION AND PROGNOSTIC IMPACT OF IMMUNOSUPPRESSIVE THERAPY

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**Background.** Inflammatory cardiomyopathy (IC) belongs to the spectrum of dilated cardiomyopathy (DCM). The real efficacy and indication to immunosuppressive therapy in acute (i.e. <6 months) IC remain debated.
**Aim.** To assess the prevalence of biopsy-proven IC in a population with acute left ventricular (LV) dysfunction and indications for endomyocardial biopsy (EMB). Moreover, we evaluated the prognostic impact of immunosuppressive therapy in that population.
**Methods.** We analyzed retrospectively all the patients with acute (<6 months) LV systolic dysfunction and indications for EMB consecutively admitted between 2000 and 2018. According to EMB results, we divided the whole population in two groups: IC and DCM. Thereafter, we divided the IC group in two subgroups: patients treated or no treated with immunosuppressive therapy. The study outcome measure was a composite of death from any cause or heart transplant (HTx) or major ventricular arrhythmias (MVAs). Finally, we evaluated the prevalence of left ventricular reverse remodelling (LVRR), defined as previously reported, at 24 months (range 9 to 36 months).
**Results.** The study population included 81 patients (45±16 years, 59% males; mean LV ejection fraction 29±10% and LV end-diastolic diameter 61±8 mm). The IC group included 65 (80.2%) subjects. There were no significant differences between IC and DCM group, except for the NYHA IV class, that was slightly more frequent in the IC group (p=0.049). At a mean follow-up of 163±12 months, no differences were found between IC and DCM (p= 0.743) in terms of Death/Htx/MVAs. In the IC group, immunosuppression therapy was administered in 52% (N=34). Descriptive analysis showed no significant differences between the group treated or no treated with immunosuppressive therapy. At Kaplan-meier analysis, no differences in terms of the combined endpoint experience were found in immunosuppressed compared to the non-immunosuppressed group (23.5% Vs 22.6% respectively; p =0.845). At 24 months of follow-up, LVRR was found in 19 patients (70.4%) in the immunosuppressed group and in 12 patients (63.2%) in non-immunosuppressed group (p=0.607).
**Conclusions.** To the best of our knowledge, this study is the first that evaluates the prevalence of IC and the impact of immunosuppressive therapy in a cohort of patients with acute LV dysfunction and indication to EMB according the most recent international statements. In patients with high clinical suspect of acute IC, EMB confirmed the diagnosis in 80% of cases. The use of immunosuppressive therapy in this setting seems not to impact on LVRR or on the rate of major events during long term follow-up. New prospective, randomized, controlled trials will be necessary to clarify the role of immunosuppressive therapy in patients with biopsy-proven acute IC.

### A661: UNEXPECTED PREVALENCE OF SUBTLE SYSTOLIC AND DIASTOLIC DYSFUNCTION IN GENOTYPE-POSITIVE PHENOTYPE-NEGATIVE RELATIVES OF DCM PATIENTS

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**Background and aims.** The early diagnosis of genetically determined dilated cardiomyopathy (DCM) could improve the prognosis in mutation carriers. Left ventricular global longitudinal strain (LV-GLS) and peak left atrial longitudinal strain (PALS) are promising techniques for the detection of subtle systolic and diastolic dysfunction. We sought to evaluate the prevalence of subtle systolic and diastolic dysfunction by LV-GLS and PALS in a cohort of genotype-positive phenotype-negative (GPFN) DCM relatives.

**Methods.** We analyzed echocardiograms of forty-one GPFN relatives of DCM patients (GPFN group - 37±14 years, 48.8% male). They were compared with an age and sex matched group of fifty-two healthy individuals (control group). Reduced LV GLS and PALS were defined as >-18% and <23.1%, respectively, according to literature data.
**Results**. LVEF and indexed left atrial end-systolic volume of the analyzed subjects were 61.3±6.4% and 28.3±8.0 ml/m$^2$, respectively. GPFN and control groups were grossly similar according to standard echocardiographic measurements. Conversely, LV GLS was -18.8±2.7% in the GPFN group vs. -24.0±1.8% in the control group (p<0.001). Twenty subjects (48.8%) in the GPFN group and no subjects in the control group had a reduced LV GLS. PALS was 29.2±6.7% in the GPFN group vs. 40.8±8.5% in the control group (p<0.001). Seven subjects (18.4%) in the GPFN group and one (2%) in the control group had a reduced PALS. During a median follow-up of 27 (interquartile range 8-59) months, 6 out of 18 (33%) GPFN relatives with available follow-up echocardiogram developed a LV ejection fraction <50%. Among them, 4 (66%) have a reduced LV GLS at initial evaluation.
**Conclusions.** LV GLS and PALS are impaired in GPFN relatives of DCM patients compared to healthy individuals, when standard echocardiographic parameters are within the normal range. Further studies are warranted to add prognostic significance to this result, which may lead in the future to an early therapy initiation.

### A662: ALCOHOL INDUCED CARDIOMYOPATHY: CARDIAC MAGNETIC RESONANCE FEATURES AND PREDICTORS OF LEFT VENTRICULAR REVERSE REMODELING

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**Background.** Alcohol induced cardiomyopathy (ACM) is a specific phenotype of non-ischaemic heart failure characterized by a dilated and impaired left ventricle due to chronic excess alcohol consumption. So far, uses of cardiac magnetic resonance (CMR) have been anecdotal and the most common parameters assessed have not been related to clinical presentation and functional parameters amelioration.
**Purpose.** In this study we sought to describe CMR features of ACM and to assess the prevalence of Left ventricular reverse remodeling (LVRR) in a cohort of ACM with left ventricular dysfunction at admission.
**Methods.** ACM was defined as a history of severe alcohol intake (>80g/day), left ventricular ejection fraction (LVEF) <45% and no other etiology explaining the disease. From 2016 to 2018, 12 patients were consecutively enrolled and followed for 15 months [interquartile range, 4-44 months]. All patients underwent careful etiological characterization, including coronary angiogram to rule out ischemic etiology. CMR at baseline and clinical and echocardiographic evaluation during follow-up have been performed. LVRR was defined as improvement of LVEF increase of ≥10 % or a LVEF of ≥50% and a decrease in indexed left ventricular end-diastolic diameter (LVEDD) of ≥10% or indexed LVEDD of ≥33 mm/m$^2$ at echocardiography during follow-up.
**Results.** Most of the patients (75%) were admitted due to decompensated heart failure. 83% of patients (n=10) were admitted with severe LV dysfunction (mean LVEF 27±10%). During follow-up, 50% of patients (n=6) experienced LVRR. Among those, 83% of patients (n=5) quitted drinking. LGE was present in 25% of patients (n=3) and was not associated with severe dysfunction at admission and with the occurrence of LVRR during follow-up. Patients who experienced LVRR had more frequently shorter QRS duration, lower incidence of restrictive filling patter at baseline, lower values of total bilirubin and a trend towards lower values of AST and ALT. Conversely, patients with LGE tend to have significantly lower values of AST and ALT, however the presence of LGE is not significantly associated with either morphological or functional parameters.
**Conclusions.** So far, the occurrence of LVRR in patients with ACM is a quite common phenomenon. The presence of LGE at baseline CMR is not related to severity of the disease at admission or with the occurrence of LVRR during follow-up. Further analyses have to be performed to confirm these results in larger population.

### A663: MISDIAGNOSIS OF CARDIAC MULTIPLE MYELOMA ASSOCIATED AL AMYLOIDOSIS AS ATTR AMYLOIDOSIS

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In November 2017, a 78 year-old male was referred to a cardiologist for the evaluation of cardiac hypertrophy with preserved ejection fraction, incidentally documented during hospitalization for gastrointestinal bleeding. This finding was confirmed by cardiac MRI. The radiologist who interpreted the MRI arose the suspect of transthyretin-related cardiac amyloidosis (ATTR). In January 2018 serum and urinary immunofixation revealed an IgGλ monoclonal component and λ Bence Jones proteinuria. The echocardiogram showed IVS 18 mm, PW 15 mm, and EF 50%. The cardiologist also suspected ATTR amyloidosis, and requested a bone scintigraphy and an endomyocardial biopsy. In March 2018, the $^{99m}$Tc-hydroxymethylene diphosphonate ($^{99m}$Tc-HDP) scintigraphy revealed diffuse and intense myocardial uptake. The Congo red staining of the endomyocardial biopsy was positive and immunohistochemistry in light microscopy showed an intense reaction both with antibodies anti-λ light chain and antibodies anti-transthyretin. These data were considered consistent with a diagnosis of cardiac ATTR amyloidosis and an off-label treatment with doxycycline (100 mg twice a day) was initiated. In June 2018 DNA analysis excluded amyloidogenic mutations in the TTR gene. In February 2019 the patient was evaluated for the first time by a hematologist. Concentration of □ free light chain was 430 mg/L (ratio 0.002). Total body CT scan was negative for lytic bone lesions. In May 2019 a bone marrow biopsy showed a 60% plasma cell infiltrate. The patient was then referred to our center of a new evaluation for the disease. Treatment with doxycycline was still ongoing and was complicated by solar erythema. In June 2019, we confirmed the presence of a high concentration of free light chain □ (406 mg/L; free light chain ratio 0.002), consistent with the diagnosis of multiple myeloma. We requested a sample of the endomyocardial biopsy for typing of amyloid deposits by immunoelectron microscopy. This analysis revealed that the amyloid fibrils were immunoreactive to anti-λ light chain antibodies, while the immunoreaction with anti-transthyretin antibodies was negative. A diagnosis of multiple myeloma and cardiac AL amyloidosis was established and appropriate chemotherapy was suggested, while treatment with doxycycline was discontinued. In this case, the suspicion of ATTR amyloidosis was raised based on tests that cannot discriminate different types of cardiac amyloidosis (echocardiography and cardiac MRI); moreover the fact that significant bone tracer uptake can be seen also in AL type amyloidosis was not considered, despite the presence of a monoclonal component. As per current guidelines an endomyocardial biopsy was required, but, as previously reported, light-microscopy immunohistochemistry with anti-TTR antibodies gave a non-specific stain. Importantly, the biopsy also stained for λ light chains, but this was disregarded. Overall, this caused a significant delay in starting chemotherapy for multiple myeloma-associated AL amyloidosis. Immuno-electron microscopy unequivocally typed the amyloid deposits as AL. Cardiac amyloidosis can be due to the deposition of clonal light chains (AL), of wild-type or variant TTR (ATTRwt and ATTRv) and by rarer hereditary mutations of other amyloidogenic proteins. Specific etiologic treatment of the different forms is available and should be started timely. Differential diagnosis requires adequate technology, careful interpretation of the results of diagnostic tests, and expertise. Patients should be referred to specialized centers for diagnosis and for the design of the therapeutic strategy.

### A664: VALUTAZIONE SEGMENTARIA DELLA FUNZIONE VENTRICOLARE SINISTRA IN PAZIENTI CON MALATTIA DI FABRY

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**Introduzione.** La malattia di Anderson-Fabry(AFD) è un raro disordine metabolico X-linked dovuto a carente attività dell'enzima lisosomiale alfa-galactosidase A, con conseguente accumulo patologico di glycosphingolipids nei tessuti e progressiva disfunzione multiorgano. Il Global Longitudinal Strain (GLS) del ventricolo sinistro (LV) mediante Speckle-tracking echo (STE) è considerato in grado di individuare fibrosi miocardica in AFD sub-clinica. Derivata dallo STE è la dispersione meccanica (MD), indicativa di contrazione miocardica eterogenea in alcune cardiomiopatie in cui è stata validata. Non ci sono dati relativi a MD in AFD.
**Scopo.** Valutare comportamento di GLS e MD in pazienti con AFD.
**Materiali e metodi.** 47 pazienti consecutivi affetti da AFD (37F, 12 M, età 44,9+10,7 a) afferenti al nostro ambulatorio di cardiomiopatie rare, sono stati esaminati con Ecocardio (ETT) completo mediante GE Vivid 7 ed E95, con STE eseguito in post-processing dalle sezioni apicali long-axis, 4-chambers, 2-chambers per determinare GLS e MD. Di ogni paziente abbiamo analizzato: spessori setto (SIVd) e parete laterale (PWd), massa indicizzata (LVMi), LV EF, volume atriale sinistro (LAVi), velocità del rigurgito tricuspidalico (TRV), velocità mitraliche (E, A) e loro rapporto, velocità TDI all'anulus mitralico (E', S' come media settale e laterale) e rapporto E/E', GLS e MD. I dati, espressi come media ± deviazione standard, sono stati analizzati mediante test T di Student, con livello di significatività per p<0.05 e confrontati con quelli rilevati in un gruppo di controllo di 20 soggetti normali (N).
**Risultati.** Il Gruppo AFD ha presentato, rispetto al gruppo N, maggiori valori di LVMi, LAVi, E/E', e MD, minor valore di GLS (Tabella). Sono stati riscontrati valori di GLS significativamente minori nei segmenti basali

(sept p<.002; post p<.0001) e medi (ant-sept p<.008; post p<.0001; ant p<.001). MD era significativamente maggiore nei segmenti inferiori (basal p<.003; mid p<.01; apical p<.005) e laterali (mid p<.004; apical p<.001).

| | | AFD | | N | | p |
|---|---|---|---|---|---|---|
| | | m | SD | m | SD | |
| LVMi | g/sqm | 77.1 | 29.8 | 62.3 | 14.1 | <0.008 |
| LVEF | % | 65.7 | 5 | 63.6 | 3.5 | 0.04 |
| LAVi | ml/sq m | 25.5 | 11 | 18.2 | 4.5 | 0.000 |
| E/E' | | 8.3 | 3 | 5.4 | 1.1 | 0.000 |
| TV vmax | m/s | 2.2 | 0.4 | 2.1 | 0.3 | - |
| LV GLS | % | -17 | 4 | -20 | 2 | 0.003 |
| LV MD | ms | 52 | 38 | 29 | 8 | 0.000 |

Queste alterazioni, localizzate alla parete postero-laterale, sono quindi evidenziabili già con ETT nei segmenti nei quali, come è noto dalla letteratura, si può avere nell'AFD una prima localizzazione della fibrosi miocardica, descritta con la risonanza cardiaca. Pertanto, in pazienti con AFD la valutazione della MD insieme al GLS può avere un ruolo aggiuntivo per la diagnosi precoce di disfunzione segmentale.

### A665: ROLE OF PSYCHIATRIC COMORBIDITIES ON TAKOTSUBO SYNDROME:DOES DEPRESSION INCREASE THE RISK OF RECURRENCE?

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The Tako-Tsubo syndrome (TTS) is characterized by acute left ventricular regional systolic dysfunction, generally transient and reversible, often triggered by a significant physical or emotional stressor, which predominantly affects postmenopausal women. At presentation it mimics an acute myocardial infarction in the absence of atherosclerotic obstruction of epicardial coronary arteries on angiography. TTS is frequently associated with psychiatric comorbilities. The aim of our study was to investigate the prevalence of comorbidities in our Takotsubo population, focusing on psychiatric diseases and their role in the course of the illness.

**Materials and methods.** From January 2007 to June 2019, 70 patients with TTS were admitted to our CCU (2% of ACS patients). All the patients enrolled in this study met the Mayo Clinic Criteria for the diagnosis of TTS. We analyzed the clinical features and the association between TTS and psychiatric illnesses already diagnosed at the time of admission to the hospital.

**Results.** We observed that the mean age of our population was 69.5±11.5, range 44-96; women comprised 86% of our cohort (60/70; M:F=1:6.6), with postmenopausal women representing 82.8% of our population. A trigger event was identifiable in 67.2%, 24 patients (34.3%) reported a stressful emotional event, 20 patients (28.6%) described a physical stress and, finally, 3 patients (4.3%) complained of intense mixed psycho-physical stress. On admission, 20% of our population (14/70) had received a diagnosis of a psychiatric disorders, 17.1% (12/70) were affected by a depressive disorder, one patient by an anxiety disorder associated with depressive syndrome, one patient had a psychotic pattern and two patients had isolated anxiety disorder. The depression representing 86% of all psychiatric comorbidities in our cohort. At the time of admission, 6 patients were treated with a selective serotonin ruptake inhibitor; 4 pts were treated with a serotonin modulator and stimulator; 1 patient was treated with a selective serotonin and noradrenaline reuptake inhibitor; these therapies were more or less associated with each other and / or with drugs of the benzodiazepine class. 34 patients (48.5%) were followed up over a median period of 5.5 years: we observed 3 cases of recurrence (4.2%) and all of them were women. The mean age of the patients who experienced recurrence was higher when compared to the patients who did not had recurrence (83.3±8 vs 68±11, p=0.030). Notably, 67% of the recurrences (2/3) was associated with depression, while only 16% of the patients who did not experienced recurrence was associated to depression (p=0.020). On multiple logistic regression analysis, the presence of depression was found to be the only determinant of recurrence (OR 4, IC 1.7-100, p=0.021). All patients who experienced recurrence were discharged with both beta-blockers and ACEi/ARBs at the first episode.

**Conclusions.** Our study confirms the existence of a high prevalence of stressful triggers in TTS patients and the frequent association with psychiatric disorders. In our population, TTS seemed to be frequently associated with depressive disorders and the use of antidepressants and not with anxiety disorders. Depression in our population was the only independent predictor of TTS recurrence at follow-up; we therefore suggest that psychiatric illnesses, and particularly depression, should be considered to assess the risk of recurrent in TTS patients.

### A666: CARDIAC INVOLVEMENT IN A PATIENT WITH ANCA-NEGATIVE EOSINOPHILIC GRANULOMATOSIS WITH POLYANGIITIS: WHEN CLINICAL PRESENTATION HELPS MORE THAN INVASIVE TESTS.

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(a) ISTITUTO CLINICO HUMANITAS

**Background.** Cardiac involvement in systemic immune mediated diseases is associated with adverse outcomes. Clinical presentation is often unspecific and may vary a lot among patients. Currently there is a lack of up-to-date clear cardiological diagnostic workup in clinical practice, leading to late recognition and under-diagnosis and under-treatment.

**Case summary.** Here we report a case of severe cardiac involvement in eosinophilic granulomatosis with polyangiitis (EGPA), formerly known as Churg Strauss Syndrome. A 60-year-old woman, who had been recently diagnosed with Antineutrophil Cytoplasmic Antibodies (ANCA)-negative EGPA based on a past history of asthma, nasal polyp, sinusitis and marked eosinophilia, was admitted to our department due to new-onset left bundle branch block and exertional dyspnea. She was under ACE-inhibitor treatment because of mild hypertension; an echocardiogram performed in October 2018 was normal. Beta-blocker therapy was started two months before admission because of frequent ventricular ectopic beats at a 24h Holter ECG monitoring. Physical examination revealed pulmonary congestion and peripheral edema. Blood tests showed a normal blood count with 300 eosinophils/mm3 (on low-dose prednisone), normal kidney and liver function, negative CRP levels, normal high sensitivity troponin I and increased BNP levels (1027 pg/mL). Trans-thoracic echocardiography showed severe left ventricular (LV) systolic impairment (EF 15%) with diffuse hypokinesis, increased LV filling pressures and pulmonary hypertension. She underwent coronary angiography that showed normal coronary vessels. Cardiac Magnetic Resonance (cMR) demonstrated normal T2-weighted STIR sequences, increased ECV and diffuse subendocardial LGE. Endomyocardial biopsy did not show neither eosinophilic infiltrates nor vasculitis or fibrosis. Concurrently, the patient reported symptoms consistent with peripheral neuropathy, and the EMG demonstrated sensory-motor multineuropathy, which is known to occur in up to 70% of patients with active EGPA. Although histological proof of eosinophilic inflammation was missing, we concluded that EGPA with cardiac involvement was the most likely explanation of the severe LV dysfunction, considering its rapid development, the new onset LBBB, and the diffuse subendocardial LGE on cMR consistent with subendocardial vasculitis. An immunosuppressive therapy with Mycophenolate Mofetil (up to 3 g/day with escalating dose) and intravenous Methylprednisolone (500 mg once a day) for 3 days followed by Prednisone (1 mg/kg) was therefore started on top of HFrEF GDMT, obtaining clinical and echocardiographic improvement at the first follow-up evaluation.

**Discussion.** Cardiac involvement in EGPA is more prevalent in patients with ANCA negative status. Clinical presentation can be extremely variable ranging from vasospastic angina, pericarditis, myocarditis or heart failure. Our case shows that EGPA cardiac involvement should be suspected even in the absence of peripheral blood eosinophilia, especially when multiorgan involvement is present. In such cases combination immunosoppressive therapy is needed and ameliorates disease progression.

### A667: MIDVENTRICULAR TAKOTSUBO SYNDROME INDUCED BY EPINEPHRINE AND VASOSPASM IN A YOUNG FEMALE

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In a 29-year-old, otherwise healthy female, severe bradycardia followed by asystole occurred during surgical thyroidectomy. Normal heart rhythm reappeared after intravenous injection of 2 mg of epinephrine and 2 mg of atropine. The ECG after drug administration showed sinus tachycardia and transient ST elevation in lateral leads followed by T-wave inversion in V3-V6 and in DII-DIII and QT interval prolongation. Blood sample analysis after surgery revealed the increase of cardiac biomarkers whereby Troponin Ths and CK-MB peak levels reached 0.175 ng/ml (normal <0.014) and 9.4 ng/ml (normal<4.94) respectively, associated with a significant elevation of brain natriuretic peptide 4453 pg/ml (normal range 0-125). The echocardiogram during the acute event showed regional wall motion abnormality extended in midventricular segments. Strain analysis demonstrated a mild decrease of global longitudinal strain (GLS) value with strain regional abnormalities typical of a Takotsubo midventricular pattern. 4 days after cardiac arrest, selective angiography showed the absence of coronary artery disease while left ventriculography confirmed the Takotsubo midventricular anatomical variant. During the angiography the patient had typical chest pain with a new significant elevation of Troponin Ths and CK-MB which respectively reached 0,518 ng/ml and 34,4 ng/ml the day after. Interesting the echocardiogram showed normal ejection fraction with improvement in regional abnormalities, as also confirmed by strain analysis. Magnetic resonance imaging, at 1 week, showed widespread midventricular oedema without late gadolinium

enhancement accumulation except for a small myocardial ischemia pattern in the inferior wall, which appeared probably related to a coronary vasospasm. Predisposition to epicardial spasm was also detected during coronarography as shown by the spasm of the main distal septal branch. Takotsubo syndrome (TTS) may be triggered by innumerable physical and emotional triggers and in this case appears therefore a potential complication of epinephrine administration, an observation that has been confirmed on numerous published cases. Probably its prevalence is underestimated because seldom searched for even if over the past years, atypical TTS types have been increasingly recognized. Remarkable this case confirmed the predisposition to coronary vasospasm in the early recovery period from an acute episode of TTS.

### A668: USEFULNESS OF INVASIVE CARDIOPULMONARY EXERCISE TEST WITH LEFT AND RIGHT HEART CATHETERIZATION AS OPPOSED TO ISOPROTERENOL CHALLENGE IN HYPERTROPHIC CARDIOMYOPATHY

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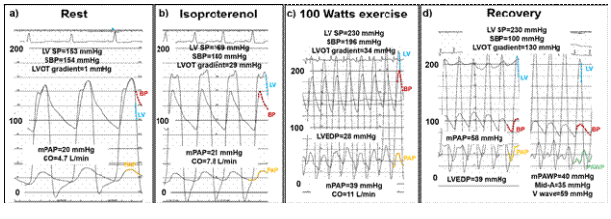
**Case report.** A 40-year-old man came to our attention because of exertional breathlessness. He presented a mild LV hypertrophy (septal thickness: 15 mm) and a systolic anterior movement (SAM) of the mitral valve apparatus responsible for LVOTO (50 mmHg at rest). MR was graded mild-to-moderate. Treatment with nadolol was undertaken, and a reduction of SAM, MR and LVOT gradient was observed. However, the patient was still limited in his daily activities due to exertional breathlessness. A cardiopulmonary exercise test (CPET) combined with exercise-stress echocardiography showed a mild reduction of exercise capacity (peak VO2 25 mL/Kg/min, 70% of predicted) mainly attributable to chronotropic incompetence (peak heart rate 101 bpm). LVOTO did not significantly increase during exercise. However, at the beginning of the recovery phase, SAM was accentuated and a color and continuous Doppler signal suggestive of dynamic MR was recorded and superposed on the LVOT gradient signal, thus complicating a correct assessment of LVOTO. To overcome these limitations, cardiac catheterization was performed. There was no LVOTO at rest (figure a). During slow isoproterenol titration up to 20 mcg/min LVOTO mildly increased, without any associated hemodynamic consequence (figure b). However, these results were in contrast with patient's symptoms. Therefore, we decided to perform another cardiac catheterization at rest and during exercise. LVOTO only mildly increased during effort (figure c), despite the development of exercise-induced pulmonary hypertension secondary to LV diastolic dysfunction. At the beginning of the recovery phase, LVOTO became apparent, with a 130 mmHg LVOT gradient and spike-and-dome configuration of the systemic blood pressure (BP) waveform (figure d). This was also accompanied by further rise of pulmonary artery pressure (PAP), whose waveform pulse contour was impressively modified by the appearance of giant V waves in the pulmonary artery wedge pressure (PAWP) position, indicating the acute development of SAM-related massive MR. The patient was then referred to the cardiac surgeon for septal myectomy.
**Conclusion.** Our case confirms that accurate invasive characterization of selected HCM patients may help to define the mechanisms underlying patients' symptoms. In particular, an invasive exercise stress test might be a more sensitive and physiological tool to uncover abnormal hemodynamic behaviors than pharmacological stress tests.




### A669: MIOCARDITE FULMINANTE IN CORSO DI TRATTAMENTO CON OSIMERTINIB

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**Introduzione.** L'incidenza di miocardite nei pazienti sottoposti a trattamento con inibitori dei checkpoint immunitari, sebbene non comune, non è trascurabile e secondo alcune casistiche recenti può avere un decorso fulminante. Meno nota è l'associazione tra inibitori della tirosin-chinasi (TKI) e l'insorgenza di miocardite. Osimertinib è un inibitore irreversibile dei recettori per il fattore di crescita epidermico (EGFR), che presenta mutazioni sensibilizzanti (EGFRm) e la mutazione di resistenza ai TKI T790M. È impiegato nel trattamento di alcune neoplasie quali il carcinoma polmonare non a piccole cellule.
**Caso clinico.** Uomo di 50 anni, ex fumatore, con diagnosi di adenocarcinoma polmonare G3 in stadio avanzato diagnosticato a luglio 2019, si presenta alla nostra osservazione circa quattro settimane dopo l'inizio della terapia con Osimertinib per dispnea. In pronto soccorso diagnosi di tamponamento cardiaco. Per tale motivo viene sottoposto in urgenza a pericardiocentesi. Al termine della procedura ancora sintomatico per dispnea e dolore toracico. ECG negativo per acuzie ischemiche. All'ecocardiogramma TT evidenza di severa disfunzione sistolica biventricolare (FE 15%). Lo studio coronarografico documenta stenosi critica di tronco comune e discendente anteriore prossimale. Tuttavia in considerazione della transitorietà del sintomo (dolore toracico), dell'ECG negativo, del rischio emorragico e della natura non nota della coronaropatia si decide di soprassedere ad eventuale trattamentodi rivascolarizzazione e di impostare terapia di supporto del circolo con adrenalina e contropulsatore aortico. Durante la successiva degenza in UTIC progressiva stabilizzazione del compenso di circolo. Sottoposto a rivalutazione coronarografica mediante TC e a coronarografia con OCT che concludono per assenza di stenosi ateromasiche o di immagini riferibili a dissezione coronarica e/o ematoma. Pertanto il reperto della prima coronarografia è stato attribuito a vasospasmo coronarico. Durante la stessa seduta eseguita biopsia endomiocardica in considerazione del possibile nesso causale tra l'insorgenza dello shock cardiogeno e l'inizio della terapia oncologica. La biopsia ha confermato miocardite linfocitaria acuta virus negativa. Progressivo svezzamento dal supporto meccanico al circolo. Sottoposto quindi ad RM cuore in data 04/09/19 che documenta recupero della funzione ventricolare destra e parzialmente di quella sinistra (FE 28%), diffuso edema di apice, setto e ventricolo destro nelle sequenze STIR, aumento dei valori di T2 mapping, T1 nativo ed ECV e focali aree di LGE a livello del SIV. Osimertinib è stato proseguito, in accordo con immunologo ed oncologo, in considerazione del progressivo recupero della funzione sistolica biventricolare e della necessità di proseguire trattamento oncologico, parallelamente alla terapia antirimodellamento.
**Discussione**: il trattamento della miocardite fulminante in corso di trattamento con inibitori dei checkpoint prevede la sospensione del farmaco ed il trattamento immunosoppressivo. Non è al momento codificata la terapia della miocardite in corso di trattamento con osimertinib e sono pochi i casi descritti in letteratura.
**Conclusioni.** La tossicità cardiaca maggiormente descritta con osimertinib è il prolungamento del QTc. Non è al momento nota l'incidenza di miocardite. Se consideriamo il grande numero di pazienti affetti da neoplasia polmonare eleggibili a trattamento con osimertinib, dovrebbe essere maggiormente attenzionato il rischio di cardiotossicità legato a questo farmaco.

## MALATTIE DEL MIOCARDIO E DEL PERICARDIO – 4
## Sessione Poster

### A670: CARDIAC MAGNETIC RESONANCE AND ARRHYTHMIC RISK STRATIFICATION OF LMNA-ASSOCIATED CARDIOMYOPATHY

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**Background.** No studies so far addressed the role of late gadolinium enhancement (LGE) in arrhythmic risk stratification of LMNA-associated cardiomyopathy (CMP).
**Methods.** We present data from a multicenter national cohort of 164 patients with LMNA mutations. Patients with cardiac magnetic resonance (CMR) performed by 12 months from the time of genetic diagnosis were enrolled (n=41, age 35±17 y, 51% males, mean LVEF by echocardiogram 56%). The endpoint of the study was follow-up (FU) occurrence of malignant ventricular arrhythmias (MVA, including VT, VF and appropriate ICD therapy) in patients with and without LGE at baseline CMR.
**Results.** At baseline CMR, 25 subjects (61%) had LGE, with nonischemic pattern in all of the cases. Overall, 23 patients (56%) underwent ICD implant. By 11.2±4.3 y FU, 8 patients (20%) experienced MVA, consisting of appropriate ICD shocks in all of the cases. In particular, the occurrence of MVA in LGE+ vs. LGE- groups was 8/25 vs. 0/16 (p=0.014). Of note, no significant differences between LGE+ and LGE- patients were found in currently recognized risk factors for sudden cardiac death (male gender, non-missense mutations, baseline left ventricular ejection fraction < 45% and nonsustained VT), all p > 0.05.
**Conclusions.** In LMNA-CMP patients, LGE at baseline CMR is significantly associated with MVA. In particular, with 100% negative predictive value, the absence of LGE allowed to rule-out MVA at 11y mean FU.

### A671: DIAGNOSI E TERAPIA DELLA MIOCARDITE ARITMICA: STATO DELL'ARTE ED ESPERIENZA DI UN CENTRO DI RIFERIMENTO PER IL TRATTAMENTO DELLE ARITMIE

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(a) IRCCS SAN RAFFAELE HOSPITAL AND UNIVERSITY; (b) PADUA UNIVERSITY HOSPITAL

La miocardite è una malattia infiammatoria complessa del muscolo cardiaco, in genere secondaria ad un'infezione virale o a meccanismi autoimmunitari. Tra le sue molteplici manifestazioni cliniche, la presentazione aritmica è spesso sottodiagnosticata, nonostante il suo considerevole impatto clinico. In particolare, tra tutti i tipi di aritmia descritti nei pazienti con miocardite attiva o pregressa, le forme prognosticamente più rilevanti sono rappresentate dalle aritmie ventricolari, che sono causa non trascurabile di morte improvvisa, specialmente nei pazienti giovani. Per l'eterogenea e poco consistente quantità di studi clinici finora dedicati a questo tema, le linee guida internazionali riportano raccomandazioni estremamente generiche riguardo alla gestione clinica ottimale del paziente con diagnosi di miocardite aritmica. Presentiamo un opinion paper che ha un duplice obiettivo: 1) illustrare lo stato dell'arte sul tema delle miocarditi a manifestazione aritmica, con particolare riferimento alle aritmie ventricolari; 2) suggerire percorsi diagnostici e terapeutici ottimali, maturati dall'esperienza della gestione clinica di un alto volume di pazienti con miocardite all'interno di un centro di riferimento internazionale per la gestione delle aritmie ventricolari. La qualità del materiale presentato è impreziosita dalla collaborazione con un centro di eccellenza per l'anatomia patologica cardiovascolare, presso il quale vengono processati ed analizzati i campioni istologici di tessuto endomiocardico.

### A672: 2D ECHOCARDIOGRAPHY DIAGNOSTIC ACCURACY AND CHARACTERIZATION OF CARDIAC MASSES

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(a) DEPARTMENT OF EXPERIMENTAL, DIAGNOSTIC AND SPECIALTY MEDICINE - DIMES, UNIVERSITY OF BOLOGNA, BOLOGNA, ITALY

**Background.** Cardiac Masses (CM) represent a rare and heterogeneous group with an estimated prevalence of 0.3% at autopsy. This condition includes benign masses - primary tumors and pseudotumors - and malignant ones - primitive tumors and, more frequently, metastasis. 2D Echocardiography is nowadays the first-line approach to define nature and management of CM.

**Purpose.** To evaluate the diagnostic accuracy of echocardiogram for CM in patients admitted to a cardiological unit between 1997 and 2017.

**Materials and methods.** We retrospectively evaluated 180 consecutive patients referred to our echocardiographic lab for suspected CM. A definitive diagnosis was obtained by histologic examination of the biopsy, surgical samples or, in cases of cardiac thrombi, by radiological evidence of thrombus resolution after adequate anticoagulant treatment. Normal anatomical variants in pseudotumor group were excluded due to the impossibility of obtaining histological examination. Comparisons between categorical variables were performed by Chi-square or Fisher exact test. P values ≤ 0.05 were considered significant. Variables with a statistical significance lower than $p < 0.05$ in univariable analysis were included in logistic regression analysis to determinate independent predictors of malignancy. Sensitivity, specificity, predictive accuracy for either a positive test or for a negative test were calculated by standard formulas.

**Results.** In 11 of the 180 patients referred, a poor acoustic window did not allow an optimal examination; in the remaining 169 patients, classical 2-D echocardiogram identified 153 masses with a diagnostic accuracy of 90.5%. Benign CM (71.6%) were localized predominantly in left heart chambers, while malignant tumors were mainly detected in right heart chambers, in the pericardium or in pulmonary artery branches ($p< 0.001$). The largest echographic diameter was greater for malignant masses (mean of 49 ± 26 mm) than benign ones (30 ± 16 mm, $p=0.005$). The presence of any pericardial effusion ($p<0.001$) and extension to pericardium ($p=0.01$) or to main vessels ($p=0.06$) were also associated with malignant masses. Multivariable analysis identified only largest diameter ($p=0.001$) and pericardial effusion ($p<0.001$) as independent predictors of malignancy. Of the 153 CM identified, 103 were classified by the echocardiographer as benign (101 true benign at histological examination) and 26 as malignant (all malignant after histological confirmation); 24 cases were undetermined and needed second level instrumental investigations in order to be characterized. The diagnosis of benign mass based on echocardiography showed 85.1% sensitivity, 94.6% specificity, 98.1% positive predictive value, 70% negative predictive value, with 88.9% overall diagnostic accuracy in identifying lesions'nature. The diagnostic accuracy for differentiating primary benign tumors from pseudotumors decreased to 81.9% with 86.8% sensitivity, 64% specificity, 89.7% positive predictive value, 57.1% negative predictive value.

**Conclusion.** 2D Echocardiography provide a high diagnostic accuracy in identifying CM and their benign or malignant nature. In particular, a large mass associated with pericardial effusion must pose suspect of malignancy. Conversely, echocardiogram is not sufficiently discriminatory in classifying CM in primary benign tumors or pseudoturmors and primary or secondary malignant masses and second level instrumental examinations were often required.

### A673: A CASE OF MASSIVE LEFT VENTRICULAR THROMBOSIS COMPLICATING ARRHYTMOGENIC RIGHT VENTRICULAR CARDIOMIOPATHY WITH BIVENTRICULAR INVOLVEMENT IN A YOUNG MALE PATIENT

Maria Cristina Carella (a), Paolo Pollice (a), Teresa Immacolata Achille (a), Domenico Zanna (a), Carlo Caiati (a), Stefano Favale (a)
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**Background.** Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a heritable heart muscle disorder that predominantly involves the right ventricle but that can also interest the left ventricle in long standing illness, causing so biventricular pump failure.

It is easier to diagnose ARVC between the second and fourth decades of life. The disease is more serious in men than in women. Progressive loss of right ventricular myocardium and its replacement with fibrofatty tissue predisposes to ventricular arrhythmias, right ventricular dysfunction, and risk of sudden cardiac death. Intracardiac thrombosis is not a common complication of ARVC but some isolated cases in literature have been previously reported.

**Case presentation and discussion.** We report the case of a 34-years-old man with an end-stage ARVC who was admitted to Intensive Care Unit of our hospital, after a routine cardiological visit, due to echocardiographic finding of a suspected thrombotic formation in ventricular apex. The diagnosis of ARVC had been accidentally made in 2001. Cardiac magnetic resonance (CMR) with gadolinium showed a right ventricular dilatation with marked apical trabeculation and conspicuous deposition of subpericardial fat. Left ventricular systolic function was initially within the limits. Successive echocardiographic evaluations showed a progressive decline in left ventricular systolic function till a severe left ventricular systolic dysfunction (left ventricular ejection fraction of 20% calculated with Simpson biplane method) (Figure 1). At one of the last echocardiographic control in July, we detected the presence of a massive thrombotic formation in the apex of the left ventricle, ovoidal, mobile, attached with a fine pedicle to the apex of the left ventricle, with the dimensions of 31x36 mm (Figure 2). This mass was not present at the echographic evaluation performed one month before. Laboratory tests for the detection of thrombophilic states and/or autoimmune diseases were negative. An anticoagulant regimen therapy with low molecular weight heparin was promptly started with evidence of progressive mass reduction. This case shows an infrequent but serious complication such as left ventricular endocavitary thrombosis of ARVC, even more dangerous for the size and the pedunculated aspect of the thrombus itself and for the time of formation of the mass.

**Conclusions.** This is a case of rapidly progressive ARVC with biventricular involvement in a young 34-years-old patient candidate to heart transplantation, complicated with massive left ventricular thrombosis. There are other cases of intraventricular thrombosis in ARVC patients described in literature but this is the first case described in such a young patient. This category of patients needs strict clinical and echocardiographic follow-up. The possible etiological link between ARVC and intraventricular thrombosis deserves further clinical investigations.

Figure 1

Figure 2

### A674: A VOLTE RITORNATO: UN INASPETTATO CASO DI MALATTIA REUMATICA ACUTA

Alessandro Russo (a), Martino Baluci (a), Joseph Cosma (a), Saverio Muscoli (a), Valeria Cammalleri (a), Francesco Romeo (a)
(a) MALATTIE DELL'APPARATO CARDIOVASCOLARE, POLICLINICO TOR VERGATA, ROMA

Paziente di 44 anni, iperteso. Riferiva da circa 15 giorni faringotonsillite per cui eseguiva tampone faringeo, risultato positivo per Streptococco pyogenes. Veniva impostata dal medico curante terapia antibiotica con levofloxacina e amoxicillina-ac.clavulanico. In seguito alla comparsa di febbre, cardiopalmo ritmico ed artralgie a carico di ginocchio, piede destro

e mano destra giungeva presso il nostro Pronto Soccorso. All'ECG tachicardia a complessi QRS stretti con alterazioni diffuse della ripolarizzazione ventricolare. Agli esami ematochimici leucocitosi neutrofila (GB 16960/µL), aumento della PCR (60 mg/L) e lieve rialzo della TnI Hs (242 ng/L). Eseguiva RX torace che mostrava ipodiafania in sede postero-basale destra e successivamente TC torace che mostrava a destra formazione nodulare di massimo di 4mm, presenza di alcune formazioni linfonodali in ambito mediastinico. Il paziente veniva pertanto ricoverato presso il reparto di Cardiologia. All'esame obiettivo azione cardiaca ritmica, soffio sistolico 2/6 sui focolai della punta; MV lievemente ridotto su tutto l'ambito polmonare. Per la persistenza di tachicardia a QRS stretti alla FVM di 150 bpm, in assenza di attività atriale ben evidente, si posizionavano gli elettrodi secondo le derivazioni di Lewis e si procedeva a manovra di Valsava evidenziando la comparsa di onde P incise nell'onda T permettando la diagnosi di tachicardia sinusale con BAV di I grado (PR 380 msec). A causa di cardiopalmo mal tollerato associato a sudorazione algida, si decideva di somministrare 5 mg di Metoprololo e.v. con miglioramento della sintomatologia nonostante comparsa di periodismo di Luciani - Wenckebach regredito dopo circa due ore. Veniva eseguito ecocardiogramma c/D che mostrava ventricolo sinistro di normali dimensioni con normale funzione sistolica, insufficienza valvolare mitralica di grado moderato; presenza di iperecoriflettenza del pericardio. In considerazione della presenza di tampone faringeo positivo ed in accordo con i criteri di Jones [criterio maggiore: cardite con aumento dei valori di troponina; criteri minori: clinici (artralgie, febbre), di laboratorio (leucocitosi con aumento della PCR) ed elettrocardiografici (intervallo PR prolungato)] veniva posta diagnosi di cardiopatia reumatica acuta. Il paziente veniva valutato dallo specialista infettivologo, il quale poneva indicazione a prosecuzione della terapia antibiotica (amoxicillina-ac. clavulanico 872/125 mg ogni 8 ore e levofloxacina 750 mg per os ogni 24 ore) ed impostava terapia con Prednisone (2 mg/kg/die) per 4 settimane, proseguendo successivamente con ibuprofene (800 mg ogni 8 ore) per riferita scarsa tolleranza del paziente all'aspirina. Durante la degenza si assisteva a miglioramento della sintomatologia del paziente, riduzione degli indici di flogosi e normalizzazione dei valori di troponina hs, dopo circa 5 giorni. Contestualmente, agli elettrocardiogrammi seriati si verificava riduzione dell'intervallo PR (230 msec alla dimissione). Il paziente veniva dimesso, dopo 8 giorni di degenza, asintomatico, con indicazione ad assumere deltacortene per un mese, con progressiva riduzione delle dosi, e successivamente ibuprofene. Veniva inoltre impostata profilassi secondaria con benzatin-penicillina 1200000 UI intramuscolo/mese. Circa venti giorni dopo veniva eseguita RMN cardiaca che non evidenziava alterazioni della cinesi segmentaria, assenza di aree di flogosi con conservato spessore del pericardio. Venivano inoltre effettuati monitoraggi ECG secondo Holter seriati (ad uno e a quattro mesi) che mostravano normalizzazione del PR in assenza di eventi aritmici maggiori ed ecocardiogramma c/D che mostrava risoluzione del quadro clinico.

### A675: IMPACT OF RESPIRATORY STRESSOR ON SHORT- AND LONG-TERM OUTCOME IN PATIENTS WITH TAKOTSUBO CARDIOMYOPATHY. RESULTS FROM A MULTICENTER PROSPECTIVE STUDY

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(a) DEPARTMENT OF CARDIOLOGY, UNIVERSITY OF FOGGIA

**Background.** Takotsubo Cardiomyopathy (TTC) is a form of acute heart failure syndrome typically precipitated by a large variety of stressors. Although considered for a long time a relatively "benign" condition, recent data showed long term high rates of mayor cardiac adverse events, especially with physical precipitating stressor. Aim of the study was therefore to evaluate the rate of in-hospital and long-term follow-up adverse events in subjects with respiratory stressor.

**Methods.** Two-hundred seventy-three consecutive patients from three Italian hospitals were enrolled in the study. History, clinical data and in-hospital and long-term follow up events were evaluated.

**Results.** Stressor triggering TTC were distributed as follows: 33% emotional, 52% physical, 25% unclear. Respiratory stressor was present in 19 out of 142 (13.3%) physical stressors. When comparing respiratory with physical stressors, no significant differences were found in terms of age, gender and cardiovascular risk factors. Respiratory stressor was associated with higher rates of in-hospital adverse events (pulmonary edema, cardiogenic shock, death, stroke, need of invasive ventilation and ventricular arrhythmias; 58% vs 34% p<0.05). At 1-year follow-up, death rates were 31.5% vs 9% (p<0.05); at long term 47% vs 13% (p<0.01).

**Conclusions.** Patients with TTC and respiratory stressor may have higher rates of in-hospital events and death at long-term follow-up. This subset of patients may require a strict cardiological monitoring and follow-up.

### A676: PREVALENCE, MANAGEMENT AND OUTCOME OF ADVERSE RHYTHM DISORDERS IN TAKOTSUBO SYNDROME. RESULTS FROM THE INTERNATIONAL MULTICENTER GEIST REGISTRY.

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**Background.** One important complication related to takotsubo syndrome (TTS) is adverse rhythm disorders.

**Objectives.** Our study was conducted to determine the incidence and management of adverse rhythm disorders in TTS and its long-term prognostic impact. We analyzed 906 TTS patients from 9 European centers.

**Methods.** Patients were divided into the adverse rhythm disorders group (encompassing ventricular tachycardia, ventricular fibrillation, torsade de pointes, asystole as well as complete atrioventricular block) and non-adverse rhythm disorders group.

**Results.** In our study cohort we identified 67 (7.4%) patients with presence of adverse rhythm disorders. TTS patients were followed-up over a period of 2.8 years. In the adverse rhythm disorders group 18% of patients presented adverse rhythm disorders before hospital admission. Asystole and/or AV-Block were significantly more presented before admission (13 patients versus 8 patients; p<0.01), whereas ventricular tachyarrhythmias were more presented in-hospital (4 patients versus 42 patients; p<0.01). Adverse rhythm disorders patients suffered more frequently from cardiogenic shock (31% versus 7.6%, p<0.01) and in-hospital death (10.9% versus 3.6%; p<0.01). Furthermore, the long-term survival was significantly impaired in adverse rhythm disorders patients as compared to non-adverse rhythm disorders patients; (log-rank p<0.01). Using multivariate Cox-regression analysis cardiogenic shock (HR 2.86, 95% CI 1.1-6.9; p=0.02) was identified as independent predictors of adverse rhythm disorders.

**Conclusion.** The short- and long-term mortality rate of TTS patients presenting with adverse rhythm disorders was significantly higher than in TTS patients presenting without it. Therefore, TTS patients with adverse rhythm disorders should be carefully monitored during hospital stay and at long-term follow-up.

### A677: BEYOND APPEARANCES: MYOPERICARDITIS AS AN UNCOMMON PRESENTATION OF RHEUMATOID ARTHRITIS

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**Introduction.** Rheumatoid arthritis (RA) is a progressive systemic autoimmune disease, typically presenting with inflammatory polyarthritis, although near half of RA patients develop an additional non-joint involvement. However, cardiac manifestations are rarely observed as first presentation of RA.

**Case description.** A 65-year-old Caucasian woman was admitted to our Cardiology Unit because of asthenia and progressively worsening dyspnoea within 4 days. Her past medical history included arterial hypertension but was unremarkable for previous cardiovascular events. At physical examination, bilateral basal rales and loss of normal respiratory sound were detected. Bilateral ulnar drift and swelling, and achiness of metacarpophalangeal joints were also noticed. Chest X-ray showed bilateral pleural effusions, with costophrenic angle obliteration. Transthoracic echocardiography revealed moderate pericardial effusion, while left ventricular systolic function was reduced at 45%, with apical dyskinesia and a mural thrombotic stratification. Chest computed tomography confirmed the presence of bilateral pleural effusion with parenchymal atelectasis of the lower lobes, and parenchymal inflammatory areas of ground glass opacity in the upper lobes; epicardial coronary arteries were free of significant atherosclerotic lesions. The patient underwent diagnostic thoracentesis, which drained lymphocyte-enriched pleural fluid with negative cultures and cytology. Blood exams revealed high levels of rheumatoid factor (467 IU/mL) and C-reactive protein (164 mg/L), as well as of cardiac troponin I and N-terminal-pro-brain natriuretic peptide (peak concentrations 11.6 and 26.347 µg/L respectively). Hand X-ray was also performed, revealing severe bilateral carpal and metacarpal ankylosis, with pen-like erosions at the 2$^{nd}$ and 3$^{rd}$ metacarpophalangeal joints and gull-wing erosions of the 3$^{rd}$ and 4$^{th}$ proximal interphalangeal and 2$^{nd}$ distal interphalangeal joints. The patient was diagnosed with RA-related myopericarditis, triggered by community-acquired pneumonia. She was treated with ceftriaxone and started on anti-inflammatory therapy for RA.

**Discussion.** Cardiac involvement, albeit uncommon, is possible in RA, and may include pericarditis, myocarditis and coronary vasculitis. However, pericardial and myocardial disease are frequently unrecognised. A comprehensive and multimodality diagnostic approach plays a pivotal role in diagnosing RA-related cardiac disease and, thus, starting an appropriate therapy.

### A678: FOCAL TAKOTSUBO SYNDROME: A SYSTEMATIC REVIEW

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**Background.** A focal contraction pattern in Takotsubo Syndrome (TTS) is considered rare. Due to its peculiar presentation with segmental, and not diffuse, left ventricular (LV) regional wall motion abnormalities (RWMA), the focal TTS pattern may be particularly difficult to differentiate from other entities, such as myocarditis or myocardial infarction.
**Methods.** We performed a comprehensive systematic literature review researching for works in English published in Journals indexed in PubMed, available online for consultation, using the following keywords (in Title and/or Abstract): ("takotsubo" OR "broken heart" OR "apical ballooning" OR "stress cardiomyopathy") AND ("focal" OR "atypical" OR "segments").
**Results.** Twenty-three papers were retrieved: 13 case reports, 2 case series (each including a single focal TTS patient) and 8 population studies (with a total of 62 focal TTS cases). Prevalence of focal TTS ranged widely between 0.1% and 14%. Epidemiologic characteristics of focal TTS patients, including mean age of onset (56 ± 23 years), gender (88% of females) and type of trigger, appeared similar to those of TTS patients with other variants, even if in the majority of population studies information about focal TTS were not reported. RWMA often involved the interventricular septum and the antero-lateral LV segments (32 out of the 40 cases with an available morphological description). LV ejection fraction was frequently preserved and greater than what reported for typical TTS. Consistently, prognosis appeared more favorable than in other TTS variants, in particular in terms of mortality, with no in-hospital nor long-term deaths. In the majority of focal TTS cases with an adequate description, ECG abnormalities were localized and not diffuse, always matching RWMA, and in 3 cases reciprocal ECG changes were reported.
**Conclusions.** The focal TTS contraction pattern may be more prevalent than generally reported. While its epidemiologic characteristics are apparently similar as compared to other TTS variants, the focal TTS pattern presents specific echocardiographic and ECG features**.** In this specific regards, current ECG diagnostic criteria for TTS may not apply to focal variants, thus rendering the diagnosis even more complex.

### A679: TAKO TSUBO SYNDROME COMPLICATED BY COMPLETE ATRIO-VENTRICULAR BLOCK: AN UNUSUAL PRESENTATION

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**Introduction.** Complete atrioventricular block (AVB) is a rare complication of Tako-tsubo syndrome (TTS) whose pathophysiological mechanism is not known. We describe a case of a complete AVB in a young woman with TTS persisting after complete recovery of left ventricle function.
**Case report.** A 34 years old woman presented to the emergency department with chest pain after an emotional stress. ECG showed a complete AVB with junctional escape rhythm (35 bpm). Transthoracic echocardiogram showed akinesia of mid and apical segments of left ventricle with hypercontractile basal segments and an ejection fraction (EF) of 30%. Urgent coronary angiography was performed, showing normal coronary arteries. Left ventriculography showed a apical ballooning suggestive of TTS. A transfemoral temporal pacemaker was implanted and the patient was transferred in intensive care unit. During the following days the patients was asymptomatic although the AVB persisted with a narrow QRS escape rhythm (40 bpm). On 4$^{th}$ day, the temporary pacemaker was removed and the patient was monitored.
Echocardiography showed progressive amelioration of left ventricle EF until its normalization on 9$^{th}$ day. Cardiac MRI showed mild myocardial edema on mid and apical segments of left ventricle, without late gadolinium enhancement. On the 14$^{th}$ day, ECG monitoring showed intermittent resolution of AVB, especially during periods of sinus bradycardia. An exercise stress test was performed showing impaired chronotropic reserve associated with exertional dyspnea. Electrophysiological study was performed showing infra-hisian block with a 10 second pause during atrial pacing. Therefore, on the 21$^{th}$ day of hospital stay, considering the persistence of intermittent infra-hisian AVB, a dual chamber permanent pacemaker was implanted.
**Discussion.** AVB is a rare complication of TTS. Contrary to left ventricle function which completely recovers in a vaste majority of patients, AVB occurring during TTS rarely regresses, and unless immediately resolved, a permanent pacemaker should be implanted.

## CARDIOPATIE CONGENITE E DEL CIRCOLO POLMONARE – 1
## Sessione Poster

### A680: CLINICAL IMPACT OF RIGHT VENTRICULAR DIASTOLIC PATTERNS IN IDIOPATHIC PULMONARY ARTERIAL HYPERTENSION BY SPECKLE TRAIKING ECHOCARDIOGRAPHY

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(a) DIPARTIMENTO DI SCIENZE CARDIOVASCOLARI E RESPIRATORIE-SAPIENZA UNIVERSITÀ DI ROMA; (b) DIPARTIMENTO DI CARDIOLOGIA-NUORO; (c) DIPARTIMENTO DI CARDIOLOGIA-ERASME UNIVERSITY HOSPITAL, BRUXELLES

**Objectives.** Aim of this study was to describe strain-derived right ventricular (RV) diastolic patterns by speckle-tracking echocardiography (STE) and its clinical impact in idiopathic pulmonary arterial hypertension (IPAH).
**Background.** STE of the RV has been extensively described in PAH. However, diastolic function has been yet underlooked (neglected) for no reason.
**Methods.** In 108 consecutive IPAH patients we identified three distinct strain-derived patterns from the mid-basal RV free wall segments. Each patient underwent baseline clinical, hemodynamic and complete echocardiographic evaluation and followed-up for clinical worsening occurrence.
**Results.** The three strain-derived diastolic patterns were characterized by high reproducibility (Cohen's κ=0.64, p=0.0001). Pattern 1 was associated with mild pulmonary hypertension and preserved clinical and RV function (preserved RV phenotype). This pattern was repetitively found in a cohort of 30 healthy subjects. Pattern 2 was associated with moderate to severe pulmonary hypertension, WHO functional class II and III, still preserved RV function (RV adaptive phenotype). Pattern 3 was associated with advanced stage of IPAH, characterized by high right atrial pressure, low cardiac index and severe RV remodeling (RV maladaptive phenotype). Multivariable models for clinical worsening (CW) prediction demonstrated that the addition of RV diastolic patterns to clinical and hemodynamic variables significantly increased the prognostic power of the model (0.79 vs 0.66; p<0.001). Freedom from CW rates at 1 and 2 years from baseline were, respectively, 100% and 93% for Pattern 1; 80% and 55% for Pattern 2; 60% and 33% for Pattern 3.
**Conclusions.** The results of the present study suggest that using speckle tracking echocardiography we can identify three phenotypically distinct, reproducible and clinically meaningful RV strain-derived diastolic patterns.

### A681: RISK REDUCTION AND RIGHT HEART REVERSE REMODELING BY UPFRONT TRIPLE COMBINATION THERAPY IN PULMONARY ARTERIAL HYPERTENSION

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(a) DIPARTIMENTO DI CARDIOLOGIA, OSPEDALE MONALDI- UNIVERSITÀ DI NAPOLI L.VANVITELLI; (b) DIPARTIMENTO DI SCIENZE CARDIOVASCOLARI E RESPIRATORIE-SAPIENZA UNIVERSITÀ DI ROMA; (c) DIPARTIMENTO DI PATOFISIOLOGIA-FREE UNIVERSITY OF BRUSSELS

**Background.** Combinations of therapies are currently recommended for the most severely ill patients with pulmonary arterial hypertension (PAH), and excellent results have been reported with triple upfront combination of these drugs. We evaluated the effects of this approach on right ventricular (RV) function and outcome in patients with severe PAH.
**Methods.** Twenty-one patients aged 44±15 years with newly diagnosed high-risk idiopathic PAH that was non-reversible by the inhalation of nitric oxide were treated upfront with a combination of ambrisentan, tadalafil and subcutaneous treprostinil between 2014 and 2018. Clinical evaluation, World Health Organization functional class, 6-min walk distance, biomarkers, echocardiography and right heart catheterization data were recorded at baseline and during follow-up.
**Results.** At a median follow-up of 2 years, all patients were still alive. The REVEAL score decreased from 10±1 to 5±1, right atrial pressure from 13±3 to 5±2 mmHg, mean pulmonary artery pressure from 60±9 to 42±5 mmHg, pulmonary vascular resistance (PVR) from 16.4±4.4 to 5.5±1.3 Wood units, NT-proBNP from 3379±1921 to 498±223 pg/mL and World Health Organization functional class from 3.4±0.5 to 2.0±0.4 (all $p$<0.001). Cardiac index increased from 1.8±0.3 to 3.5±0.8 L/min/m$^2$ and 6-min walk distance from 158±130 to 431±66 m (both $p$<0.001). Echocardiography showed decreased right atrial and RV areas, improved left ventricular eccentricity index and increased fractional area change (all $p$<0.001) in proportion to treatment-induced decrease in PVR.
**Conclusions.** Triple upfront combination therapy with ambrisentan, tadalafil and subcutaneous treprostinil in severe non-reversible PAH is

associated with considerable clinical and hemodynamic improvement and right heart reverse remodeling.

### A682: PERSISTENZA DELLA VENA CAVA SUPERIORE SINISTRA: UNA LUNGA STRADA PER IL CUORE

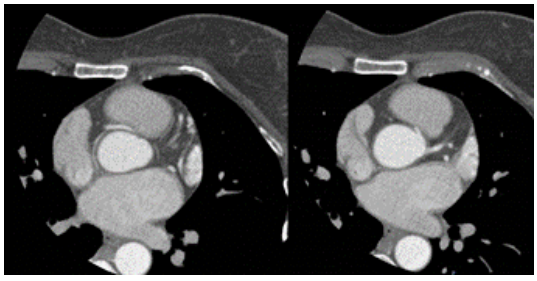
Martino Baluci (a), Cinzia Monaco (a), Andrea Bezzeccheri (a), Andrea Matteucci (a), Giuseppe Stifano (a), Francesco Romeo (a)
(a) POLICLINICO TOR VERGATA, ROMA

La persistenza della vena cava superiore sinistra (PLSVC) è una malformazione comune (prevalenza 0.3-0.5%). La sua anatomia è variabile: nella maggioranza dei casi sbocca nel seno coronarico, più raramente nelle vene polmonari o nell'atrio sinistro e si associa ad altre malformazioni cardiache. Più rara la sua associazione all'assenza della vena cava superiore destra (PLSVC isolata). La PLSCV risulta essere una condizione che complica l'accesso per il posizionamento di dispositivi impiantabili nelle sezioni destre ed in alcuni casi la rende impossibile lasciando come unica alternativa l'impianto epicardico.
Una paziente di 72 anni in follow up per steno-insufficienza mitralica, nel 2017 mostrava all'ecocardiogramma una riduzione della frazione d'eiezione del ventricolo sinistro con ipocinesia del setto interventricolare e della parete laterale e pertanto veniva sottoposta ad angio-TC. Dall'esame emergeva l'assenza di lesioni significative a carico dell'albero coronarico in presenza di cardiomegalia, shift mediastinico destro ed ipoplasia della vena cava superiore destra con sbocco nella vena cava inferiore e PLSCV con sbocco nel seno coronarico. Ad aprile 2019 a seguito di cardiopalmo veniva sottoposta ad ECG Holter da cui emergeva malattia del nodo del seno con indicazione ad impianto di PMK bicamerale. In considerazione della TC del 2017 la procedura è stata effettuata previo studio del distretto venoso con puntura a cielo chiuso della vena succlavia sinistra ed angiografia con diagnostici da emodinamica. Durante la procedura si evidenziava: normale decorso dell'asse venoso fino alla vena anonima sinistra; PLSCV di buon calibro con sbocco in seno coronarico, vena cava superiore destra di buon calibro con sbocco nella porzione sovraepatica della vena cava inferiore; rotazione estrema destra dell'asse cardiaco. Avendo testato e valutato l'accessibilità per il posizionamento degli elettrocateteri e la stabilità degli stessi attraverso entrambe le vie, si procedeva al posizionamento attraverso la PLSCV ed il seno coronarico di elettrocateteri a vite in corrispondenza del setto interventricolare medio ed in corrispondenza della parete laterale dell'atrio destro.
Nonostante in caso di PLSVC nota si preferisca un accesso venoso destro, nel nostro caso è stato necessario procedere attraverso la PLSVC per la non stabilità degli EC attraverso la VCS destra.

### A683: ANOMALIE CORONARICHE CON DECORSO INTER-ARTERIOSO: STRATIFICAZIONE DEL RISCHIO PER TERAPIA CONSERVATIVA

Gianluca Di Giovanni (a), Andrea Bezzeccheri (a), Marco Centioni (a), Saverio Muscoli (a), Valeria Cammalleri (a), Francesco Romeo (a)
(a) POLICLINICO TOR VERGATA

Le anomalie coronariche (AC) sono un gruppo di difetti cardiaci congeniti caratterizzati da anomalie dell'origine e/o del decorso del vaso arterioso, con prevalenza dell'1.3% nei nati vivi. Nella maggior parte dei casi, le AC sono asintomatiche e diagnosticate occasionalmente con tecniche di imaging. Tuttavia, le AC presentano un rischio di complicanze quali ischemia miocardica, aritmie maligne e morte cardiaca improvvisa (MCI). La MCI nel giovane asintomatico è causata da una anomalia coronarica nel 15% dei casi.
Descriviamo il caso di una donna di 49 anni, di etnia indiana, senza fattori patogenetici ambientali e precedenti cardiologici di rilievo, asintomatica. La paziente giungeva alla nostra attenzione per ottenere nulla osta per intervento odontoiatrico. All'ECG di base si riscontrava sottoslivellamento del tratto ST-T in sede infero-laterale; all'ecocardiogramma transtoracico riscontro di normale cinesi segmentaria e regionale con funzione sistolica globale conservata, in assenza di valvulopatie di rilievo. Veniva posta indicazione a test ergometrico su pedana mobile: al carico di lavoro massimale accentuazione del sottoslivellamento del tratto ST-T con raggiungimento dei criteri di significatività per ischemia miocardica inducibile con rapida regressione nella fase di recupero, in assenza di sintomi e aritmie iper- o ipocinetiche. Pertanto, la paziente veniva sottoposta ad angiografia coronarica documentante assenza di lesioni angiograficamente significative con origine anomala della arteria coronaria destra dal seno aortico sinistro. Per la valutazione prognostica, veniva effettuato approfondimento diagnostico con TC coronarica che documentava decorso inter-arterioso della coronaria destra; al monitoraggio ECG dinamico delle 24 ore secondo Holter riscontro di ritmo sinusale con normale trend cronotropo e variabilità circadiana in assenza di aritmie significative.
L'origine anomala dell'arteria coronaria destra dal seno aortico controlaterale con decorso inter-arterioso è classificata come una variante emodinamicamente rilevante caratterizzata da una maggiore incidenza di morte cardiaca improvvisa. Ciononostante, alla luce dell'assenza di sintomi a riposo e durante lo sforzo, della non inducibilità di aritmie maligne con test provocativi e dell'assenza di anomalie della cinesi alla valutazione ecocardiografica, si poneva controindicazione al trattamento percutaneo o chirurgico dell'anomalia coronarica sulla base del rapporto rischio-beneficio e del rifiuto della paziente. Il corretto management dei pazienti con AC dovrebbe prevedere una valutazione multiparametrica al fine di permettere la stratificazione del rischio per la corretta gestione terapeutica.



### A684: DIAGNOSTIC PERFORMACE OF ECHOCARDIOGRAPHIC CORONAY ARTERIES ABNORMALITIES ASSESMENT

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**Aims.** To assess the diagnostic performance of a new echocardiographic-based screening program for coronary arteries abnormalities (CAA) in pediatric and young adults' population.
**Methods.** In 2014-2018, we screened for CAA 5,998 patients applying a focused 4-views echocardiographic coronary assessment: parasternal short-axis, parasternal long-axis, apical 5-chambers, and parasternal long-axis for the right ventricle outflow tract. All the suspected CAA underwent a coronary-CT scan for confirmation. Two independent physicians retrospectively reviewed the echocardiographic images and adjudicated the diagnosis in a double-blinded fashion.
**Results.** Over 5 years, we detected 27 total CT-confirmed CAA. The overall prevalence was 0.0045%, 0.027% every 1,000 patients. N=17/27 (63%) were anomalous aortic origin of coronary arteries (AAOCA), N=3/27 (11%) anomalous coronary arteries from the pulmonary artery (ACAPA), and 7/27 (26%) fistulas. We found a progressive increment of CAA diagnosis (P for Trend=0.038), in particular of AAOCA: both left and right coronaries (P-trend=0.021 and P=trend 0.010, respectively). Our method showed better sensitivity than traditional CAA echocardiographic evaluation: 85% vs 55%, P=0.032 [AUC 0.77, 95% CI (0.68, 0.87) and AUC 0.92, 95% CI (0.85, 0.99), respectively], with a good interrater agreement for adjudicated retrospective diagnosis, blinded to coronary-CT (99.75%, K=0.73, P<0.001).
**Conclusions.** The application of an echocardiographic screening program for CAA-detection led to a significantly increased rate of identified anomalies. This approach demonstrated better sensitivity than traditional echocardiographic one-view assessment. Implementing this protocol in clinical practice may improve the CAA diagnosis, and probably reduce the occurrence of CAA-related sudden cardiac death.

### A685: A MULTIMODAL APPROACH IN A PATIENT WITH AN UNCORRECTED TETRALOGY OF FALLOT: A CLINICAL CASE REPORT

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(a) POLICLINICO TOR VERGATA

Tetralogy of Fallot (TOF) is one of the most common congenital heart diseases. The clinical presentation generally begins in the first days of life, with difficult in feeding, breathing and cyanosis. TOF usually needs a surgical correction to allow a better quality of life. Without such surgical correction, mortality is frequent. Cases of uncorrected TOF that reach adult age without a surgical correction are rare.
Here in, we describe a case report of a 61-year-old male patient with an uncorrected TOF, diagnosed at 21 years old. In 2012, complaining chest pain and dyspnea, he was admitted to the emergency room (ER) of our institute. The electrocardiogram showed a 2:1 atrioventricular block (AV) with normal cardiac markers of necrosis. For this reason, first a temporary pacemaker was placed, followed by a definitive pacemaker implantation. During the same hospitalization, a coronary angiography was performed showing anomalies in the origin of the coronary branches: the right sinus of Valsalva gave rise to the right coronary artery, which divided to form the anterior descending artery and the right coronary artery. The left circumflex arose from the left sinus of Valsalva with a dominant pattern. A ventriculography was performed: the left ventricle was hypertrophic with

normal ejection fraction; right ventricle was hypertrophic with infundibular stenosis. No hemodynamically significant coronary stenosis were found. Four years later, because of recurrence of chest pain, he arrived at the ER and a new coronarography study was performed confirming the coronaries anomaly without evidence of stenosis. To better evaluate the anatomy of the heart, a thoracic computed tomography angiography was performed showing the four typical structural anomalies of TOF and a residual communication between the aortic isthmus and the proximal tract of the left pulmonary artery.
In this case report we can evaluate the association of different congenital anomalies. It is not common to find an uncorrected tetralogy of Fallot in old age and the hemodynamic stability of this patient is possible thanks to a wide ventricular septal defect and a residual patent ductus arteriosus that creates the possibility to bypass the pulmonary stenosis and determinates a left-to-right shunt. It is rare to have an AV block in a patient without a coronary artery disease and an uncorrected tetralogy of Fallot. It is also uncommon, to find anomalies in the origin of the coronaries.
In conclusion, our study highlights the importance of a multimodality approach in adults with complex congenital heart disease, especially if symptoms such as chest pain and bradyarrhythmias are present.

### A686: IPERTENSIONE POMONARE CRONICA POST TROMBO-EMBOLICA: DIFFERENTI TRATTAMENTI, DIFFERENTI OUTCOMES

Antonio Martellini (b), Tiziano Mariani (b), Guya Bernacchi (a), Alessio Garcea (a), Marianna Scola (a), Chiara Cresci (a), Miroslava Stolcova (b), Giacomo Campi (a)
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**Introduzione.** L'ipertensione polmonare cronica post tromboembolica è una complicanza rara dell'embolia polmonare che incide tuttavia in maniera drammatica sulla prognosi e sulla qualità di vita dei pazienti. L'endoarterectomia polmonare (PEA) rappresenta il trattamento di scelta mentre la terapia medica è riservata ai pazienti inoperabili o con ipertensione polmonare residua.
**Metodi.** Abbiamo confrontato i dati clinici e strumentali (cateterismo cardiaco destro, ecocardiogramma transtoracico, prove di funzionalità respiratoria complete, test del cammino ed emogasanalisi) alla diagnosi, al I° follow-up (12 mesi) ed al II° follow-up (24 mesi), ove disponibile di pazienti consecutivi afferenti all'Ambulatorio di Ipertensione Polmonare, dal 2016 al 2019.
**Risultati.** Sono stati arruolati 22 pazienti (72,2 % donne, età media 64,7± 14,4 anni), con diagnosi confermata di CTEPH, di cui 18 pazienti avevano il primo follow-up a 12 mesi, 10 sottoposti a endoarterectomia polmonare, 8 a terapia medica (2 con lesioni distali e 6 per rifiuto all'intervento), e 11 al II follow-up a 24 mesi (4 operati). Confrontando i dati dei pazienti al baseline e al follow-up, indipendentemente dalla terapia intrapresa, sono emerse differenze significative riguardo parametri clinici (miglioramento della classe funzionale WHO p=0,00, riduzione dei ricoveri ospedalieri p=0,00) e strumentali (ecografici: riduzione della Vmax tricuspidalica p=0,01, gradiente Vd/Ad p=0,00; al cateterismo cardiaco destro: riduzione della PVR p=0,05; ed emogasanalitici miglioramento della PO2 p=0,03 e Po2 standard p=0,03). Questi miglioramenti si mantenevano anche al II° follow-up. Confrontando i pazienti sottoposti a PE ed i pazienti sottoposti solo a terpia medica, al I° follow-up sono emerse differnze significative riguardo parametri clinici (miglioramento della classe funzionale WHO p=0,04) e strumentali (ecografici: TAPSE p=0,04, gradiente Vd/Ad p=0,04, frazione d'eiezione del ventricolo sinistro p=0,01; al test del cammino: più metri percorsi p=0,02, minor numero di desaturazioni>5% p=0,02; ed emogasanalitici miglioramento della PO2 p=0,05).
**Conclusioni.** Le attuali terapie per i pazienti con CTPH incidono in maniera significativa sull'outcome clinico dei pazienti a 12 mesi e 24 mesi. La terapia chirurgica, quando praticabile, rappresenta la migliore opzione terapeutica e permette un miglioramento clinico e funzionale superiore rispetto alla terapia medica.

### A687: LA MALATTIA DEI CORTO CIRCUITI: UN CASO EMBLEMATICO DI CARDIOPATIA ARITMOGENA A PREDOMINANZA SINISTRA

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**Introduzione.** La cardiomiopatia aritmogena è una patologia rara, ma risulta essere una delle cause principali di morte improvvisa nei giovani. È caratterizzata da una distrofia miocardica progressiva con sostituzione fibroadiposa, che predispone all'insorgenza di aritmie maligne e scompenso cardiaco. Una classificazione semplicistica prevede la distinzione di una forma classica, con interessamento ventricolare destro (ARVC), una biventricolare e una a preponderanza ventricolare sinistra (LDAC). La LDAC presenta un predominante coinvolgimento ventricolare sinistro con funzione ventricolare destra preservata. Per la diagnosi, risulta fondamentale il riscontro alla risonanza magnetica cardiaca di un'area di late enhancement (LGE) subepicardico e mediomiocardico ventricolare sinistro.
**Caso clinico.** Una paziente caucasica di 57 anni, con noto prolasso mitralico e un figlio con diagnosi di ARVC, veniva valutata per la prima volta nel 2001 per precordialgie e riscontro elettrocardiografico di onde T negative in V3-V6. Dopo la dimostrazione angiografica di coronarie epicardiche esenti da lesioni critiche, si poneva indicazione per esecuzione di una risonanza magnetica cardiaca. La paziente vi si sottoponeva solo nel 2011, in seguito all'evidenza all'Holter ECG di frequente extrasistolia ventricolare; la risonanza mostrava: una dilatazione ventricolare sinistra (volume telediastolico indicizzato 113 ml/mq), frazione di eiezione 41% e LGE inferodorsolaterale mediobasale per cui veniva sospettata una LDAC. Alla revisione dei tracciati elettrocardiografici, si evidenziava inoltre la presenza di onde epsilon in V4-V6. I test genetici risultavano negativi. Nel 2015 si eseguiva uno studio elettrofisiologico e successiva ablazione del focus aritmico. La procedura veniva interrotta per occlusione di ramo marginale, trattata con angioplastica. Per induzione di aritmie sostenute ad un successivo studio elettrofisiologico si impiantava un defibrillatore. Ad Aprile 2017 la paziente veniva ricoverata nel Nostro Centro per storm aritmico. L'ecocardio mostrava: ventricolo sinistro dilatato con ipocinesia diffusa e frazione di eiezione 25%. Veniva potenziata la terapia betabloccante e introdotto amiodarone, con beneficio. Ad Ottobre 2017 la paziente veniva infine sottoposta con successo a trapianto.
**Discussione e conclusioni.** Il caso presentato è peculiare, in quanto la presenza di una forma più rara della malattia si associa a plurime particolarità, quali la discordanza del fenotipo (il figlio della paziente presentava una ARVC), onde epsilon in sede laterale all'elettrocardiogramma e una "fase calda" di attività della malattia estrinsecatasi con storm aritmico. Mentre la paziente muove i primi passi con un nuovo cuore, le sfide ancora aperte nella cardiopatia aritmogena restano tante: la scoperta di nuovi fattori genetici e ambientali, l'individuazione delle cause alla base della diversità fenotipica della malattia, l'identificazione precoce dei pazienti asintomatici e il miglioramento della stratificazione del rischio e delle terapie.

### A688: CARDIOPATIE CONGENITE IN ETÀ NEONATALE: QUANDO ARRIVARE ALLA DIAGNOSI NON È COSÌ SEMPLICE

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**Caso clinico.** G., piccola nata a termine, AGA, APGAR 8 a 1', 9 a 5', giunge presso ambulatorio di Cardiologia Pediatrica in 15° giornata di vita per riscontro presso il punto nascita di soffio cardiaco sistolico 2/6 secondo scala di Levine. All'ECG di superficie a 12 derivazioni riscontro di ritmo sinusale a FC di 160 bpm; PR nei limiti; fisiologica prevalenza destra. QTc 366 ms in V5; lieve sottoslivellamento del tratto ST in V1-V3. All'ecocardiogramma riscontro di normale origine delle coronarie nel tratto esplorabile, con presenza di numerose fistole tra l'arteria interventricolare anteriore ed il ventricolo dx, delle quali la più ampia si reperta a livello apicale, condizionanti uno shunt sn-dx di grado complessivamente lieve-medio. Considerati tali reperti, si predisponeva ricovero per proseguire l'iter diagnostico. Al cateterismo cardiaco si evidenziava alla coronarografia normale calibro, origine e decorso delle coronarie con apparente assenza di fistole; alla ventricolografia sinistra, invece, si riscontrava camera di aspetto globoso e significativo difetto interventricolare (DIV) muscolare, trabecolato in sede medio-apicale, con shunt sn-dx. Tuttavia, lo studio della coronaria sinistra non veniva eseguito in maniera selettiva. A seguito della procedura, la piccola veniva trasfusa con emazie concentrate per repentina caduta del valore dell'emoglobina di 2,6 g/dl. La piccola veniva pertanto dimessa in terapia con furosemide 1 mg/kg/die, indicazione a praticare controlli cardiologici seriati ed eventuale integrazione con esame coro-TC. Ai controlli ecocardiografici successivi veniva confermata la presenza di DIV muscolare medio-apicale, tuttavia persisteva il sospetto sulla presenza di fistola coronarica dell'arteria interventricolare anteriore. Dopo 4 mesi, considerata la clinica silente e le normali dimensioni delle camere cardiache all'ecocardiogramma, veniva sospesa terapia con furosemide e diradata la frequenza dei controlli.
**Discussione.** Giungere ad una diagnosi conclusiva in epoca neonatale con metodiche non invasive non è sempre possibile. Tuttavia, le metodiche invasive come il cateterismo cardiaco, in tale epoca di vita sono ad elevato rischio di arresto cardiaco, aritmie, rigurgiti valvolari di nuova insorgenza, tamponamento cardiaco, sanguinamenti con caduta di emoglobina maggiore di 3 punti o necessitanti trasfusione. Pertanto il ricorso a quest'ultimo non è così frequente come nell'adulto né è sempre possibile un'accuratezza di esecuzione elevata, visti i suddetti rischi. D'altro canto, anche metodiche non invasive più accurate come la coro-TC non sono di facile esecuzione in epoca neonatale (elevata frequenza cardiaca, necessità di sedazione).

### A689: PROGNOSTIC VALUE OF STROKE VOLUME INDEX IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION AT INTERMEDIATE RISK

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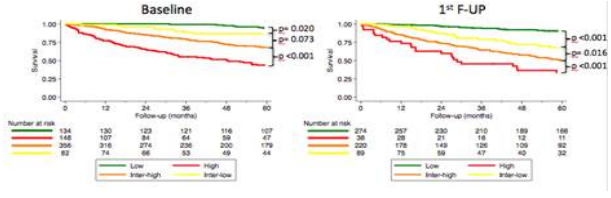
(a) DIMES: DEPARTMENT OF EXPERIMENTAL, DIAGNOSTIC AND SPECIALTY MEDICINE

**Background.** Current pulmonary hypertension (PH) guidelines stratify the risk of patients with pulmonary arterial hypertension (PAH) using a multiparametric approach. Low, intermediate and high-risk are defined by estimated 1-year mortality of <5%, 5-10% and >10%, respectively. This risk assessment has been recently validated in 3 cohorts of PAH patients and a simplified risk table for patients with idiopathic/heritable (I/H) PAH and PAH associated with connective tissue disease (CTD) and congenital heart disease (CHD) has been recently proposed and validated. However, with this method most patients are classified in the intermediate risk category and additional strategies are required to further stratify this group of PAH patients. Stroke volume index (SVI) has been recently highlighted as an important prognostic parameter beyond the factors included in current PH guidelines risk table.
**Purpose.** To evaluate the prognostic value of SVI measured with right heart catheterization (RHC) in patients at intermediate-risk.
**Methods.** All treatment naïve patients with I/H-PAH, CTD-PAH and CHD-PAH referred to a single centre were included from 2003 to 2017. All patients were assessed at baseline and at the 1st follow-up at 3-4 months after starting PAH-specific therapy (1st F-UP) with RHC, brain natriuretic peptide (BNP) plasma levels, 6-min walking distance (6MWD) and WHO functional class. We applied a simplified risk assessment strategy using the following criteria: WHO functional class, 6MWD, right atrial pressure or BNP plasma levels and cardiac index (CI) or mixed venous oxygen saturation (SvO2). The last 2 criteria were based on which parameter was available; if both were available the worst was chosen. Risk strata were defined as: Low risk= at least 3 low risk and no high-risk criteria; High risk= at least 2 high risk criteria including CI or SvO2; Intermediate risk= definitions of low or high risk not fulfilled. The prognostic value of SVI was assessed using Cox regression analysis. Intermediate risk patients were further stratified in intermediate-low and intermediate-high risk taking into account the value of SVI that best discriminate prognosis (according to ROC curve analysis). Kaplan Meier curves and Log-rank test were used for survival analysis.
**Results.** Seven hundred and twenty-five patients were enrolled. SVI is able to stratify the prognosis of PAH patients at 1st F-UP [HR 0.979 (0.964-0.994), p-value= 0.008] but not at baseline [HR 0.986 (0.970-1.002), p-value= 0.085]. The best predictive cut-off value is 38 ml/m2 (AUC= 0.66, sensitivity= 73%, specificity= 59%). Survival curves are shown in the Figure.




**Conclusions.** SVI assessed at 1st F-UP is predictive of prognosis and the cut off value of 38 ml/m2 is able to further stratify the survival of intermediate risk PAH patients.

### A690: PROGNOSTIC ROLE OF COMORBIDITIES IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION

Alessandro De Lorenzis (a), Fabio Dardi (a), Riccardo Bertozzi (a), Massimiliano Palazzini (a), Andrea Rinaldi (a), Filippo Pasca (a), Elisa Zuffa (a), Daniele Guarino (a), Ilenia Magnani (a), Mariangela Rotunno (a), Alberto Ballerini (a), Alessandra Manes (a), Nazzareno Galiè (a)
(a) DIMES: DEPARTMENT OF EXPERIMENTAL, DIAGNOSTIC AND SPECIALTY MEDICINE

**Background.** Epidemiology of pulmonary arterial hypertension (PAH), as outlined by the most important registries, is changing; in particular the age at diagnosis is increasing. This means that comorbidities are becoming more frequent. Anyway, whether they influence the prognosis or not is substantially undefined.
**Purpose.** To evaluate the prognostic value of comorbidities in patients with PAH and in the different clinical subgroups.
**Methods.** All patients with PAH referred to a single centre were included from 1977 to december 2018. All patients were assessed at baseline with right heart catheterization, brain natriuretic peptide (BNP) plasma levels, 6-min walking distance (6MWD), WHO functional class (FC) and anamnestic comorbidities [in particular: thyroid disorders, diabetes, dyslipidemia, smoke, chronic obstructive pulmonary disease, obstructive sleep apnea syndrome, systemic hypertension, coronary artery disease, previous pulmonary embolism, chronic kidney disease, anemia, body mass index (BMI), arrhythmia and cancer]. All patients were treated according to current guidelines. The prognostic value of each variable was assessed using Cox regression model and a p-value <0.1 was consider for inclusion in the multivariate analysis.
**Results.** Thirteen hundred and eleven patients were included [median age 51 years, 63% female; etiology: 522 idiopathic/heritable/drug-induced (I/H/D)-PAH, 258 connective tissue disease (CTD)-associated PAH, 242 congenital heart disease (CHD)-associated PAH, 196 portal hypertension/HIV (PoHIV)-associated PAH and 93 pulmonary veno-occlusive disease (PVOD)]. Only 5% of patients have no comorbidities. At multivariate analysis comorbidities independently associated with prognosis are: systemic hypertension in I/H/D [HR 0.616 (0.397-0.955), p= 0.030], mean systemic blood pressure in CTD [HR 0.980 (0.968-0.993), p= 0.002] and PVOD [HR 0.962 (0. 936-0.989), p= 0.006], dyslipidemia in CTD [HR 0.447 (0.283-0.707), p= 0.001] and PoHIV [HR 0.201 (0.049-0.824), p= 0.026], estimated glomerular filtration rate in PoHIV [HR 1.000 (0.999-1.000), p <0.001] and BMI [HR 0.966 (0.930-1.003), p= 0.069] in CTD. In CHD comorbidities are not independent predictors of prognosis. Advance age is an independent risk factor in all PAH subgroups (except PVOD, maybe because their age is usually advanced) and male gender is an independent risk factor in I/H/D. 6MWD is an independent predictor of prognosis in I/H/D [HR 0.995 (0.993-0.997), p <0.001], CTD [HR 0.997 (0.996-0.998), p <0.001] and PVOD [HR 0.994 (0.991-0.997), p <0.001]. BNP is an independent predictor of death in I/H/D [HR 1.525 (1.149-2.025), p= 0.004], CHD [HR 1.865 (1.097-3.170), p= 0.021] and PVOD [HR 1.628 (0.928-2.856), p= 0.089]. Haemodynamic independent predictors of prognosis are cardiac index in CTD [HR 0.555 (0.406-0.757), p <0.001], right atrial pressure in I/H/D [HR 1.053 (1.003-1.105), p= 0.039] and mixed venous oxygen saturation in CHD [HR 0.964 (0.933-0.996), p= 0.029].
**Conclusions.** Our study confirm Literature data according to which the mean age at PAH diagnosis and the prevalence of comorbidities are increasing. Anyway, their prognostic role seems of poor relevance. As a matter of fact, we found a protective role of these variables: high systemic blood pressure (maybe indicative of a better haemodynamic stability) is protective in I/H/D, CTD and PVOD; dyslipidemia and high BMI (maybe indicative of a better nutritional status and a less severe autoimmune disease) are protective in CTD; dyslipidemia and a high glomerular filtration rate (both indicative of a less severe hepatic disease) are protective in PoHIV.

## CARDIOPATIE CONGENITE E DEL CIRCOLO POLMONARE – 2
## Sessione Poster

### A691: PROGNOSTIC VALUE OF PULMONARY ARTERY DIAMETER IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION

Ilenia Magnani (a), Fabio Dardi (a), Federico Donato (a), Massimiliano Palazzini (a), Andrea Rinaldi (a), Elisa Zuffa (a), Filippo Pasca (a), Alessandro De Lorenzis (a), Daniele Guarino (a), Mariangela Rotunno (a), Alberto Ballerini (a), Alessandra Manes (a), Nazzareno Galiè (a)
(a) DIMES: DEPARTMENT OF EXPERIMENTAL, DIAGNOSTIC AND SPECIALTY MEDICINE

**Background.** Pulmonary artery (PA) dilation is common in pulmonary arterial hypertension (PAH) but its prognostic role has been poorly evaluated even if it can cause a poli-compressive syndrome including left main coronary artery (LMCA) compression, a potential cause of sudden cardiac death. The prevalence and treatment strategies of LMCA compression in PAH patients symptomatic for angina have been recently evaluated, anyway little is known about asymptomatic patients.
**Purpose.** To evaluate the prognostic value of PA diameter (at baseline and at last radiological evaluation) in patients with PAH and the prevalence of LMCA compression in patients both symptomatic and asymptomatic for angina.
**Methods.** All patients with PAH referred to a single centre that underwent a baseline angio-CT scan evaluation were included from 2000 to December 2018. If an angio-CT scan was repeated during the follow-up the last available PA diameter was considered to calculate the velocity of PA diameter increase. The prognostic value of each variable was assessed using Cox regression model. Patients that during follow-up complained of angina or developed radiological CT scan signs of suspicion for LMCA compression underwent a coronary (cor)-CT scan. Patients with a not negative cor-CT, as described by Galiè et al., underwent an invasive coronary angiography. In case of acute coronary syndrome, known coronary artery disease, very high cardiovascular risk at baseline assessment or indication for invasive surgical procedure an invasive coronary angiography was performed without a preliminary cor-CT. To evaluate the predictivity for compression at coronary angiography the PA diameter at cor-CT or at the nearest angio-CT scan was considered.
**Results.** Nine hundred and fifty-eight patients were included (median age

52 years, 66% female). PA diameter at baseline is higher in patients with congenital heart disease (CHD) and is not predictive of death neither in the overall population nor in the different etiological subgroups. The velocity of PA diameter increase is lower in patients with connective tissue disease (CTD) and is a risk factor of death in both the overall population and in the different etiological subgroups except CHD and pulmonary veno-occlusive disease (PVOD). During the follow-up 180 patients complained of angina and underwent cor-CT and/or coronary angiography and 50 patients had LMCA compression treated with coronary stenting. Among the 778 asymptomatic patients 120 underwent cor-CT and/or coronary angiography and 15 patients had LMCA compression treated with coronary stenting. The best cut-offs predicting LMCA compression in symptomatic/asymptomatic patients were, respectively, a PA diameter of 40/42 mm (sensitivity and specificity, respectively, 80 and 72%/87 and 77%) and a PA/Aorta ratio of 1.5/1.4 (sensitivity and specificity, respectively, 78 and 72%/80 and 71%).
**Conclusions.** 28% of patients with angina have LMCA compression anyway also a not negligible percentage of asymptomatic patients (13%) in our study have a critical LMCA stenosis at coronary angiography. Despite a not systematic study we found a similar PA diameter predicting LMCA compression in symptomatic and asymptomatic patients. PA diameter, instead, is not predictive of prognosis and this can be due to the fact that most deaths in patients with PAH are related to heart failure and that patients with a significant LMCA stenosis are treated with stenting, maybe preventing sudden cardiac death. Eventually, PA diameter velocity increase is associated with prognosis anyway this may simply reflect a more severe disease refractory to medical therapy.

### A692: PRE-CAPILLARY PULMONARY HYPERTENSION IN SARCOIDOSIS PATIENT

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**Case report.** *Past History:* male, 61 years old, pulmonary sarcoidosis diagnosed in 1987 after chest x-ray (histologic confirmation with transbronchial biopsy), moderate to severe restrictive respiratory deficit, pre-capillary pulmonary hypertension. GERD and chronic gastritis, OSAS treated with nocturnal oxygen therapy. Since 2007 he suffered from exercise-induced worsening dyspnea; in 2013 underwent right heart catheterization with evidence of pre-capillary pulmonary hypertension; off-label bosentan therapy was started with first clinical improvement and subsequent clinical stabilization. In 2015, echocardiogram showed chronic cor pulmonale, mild right ventricle (RV) dilatation with normal systolic function, pulmonary hypertension (PAPs 52 mmHg). Because of worsening dyspnea, present for mild efforts, and profound asthenia, he underwent a second right heart catheterization with evidence of normal pulmonary wedge pressure, mild pulmonary hypertension with severe increase of arteriolar resistance, normal cardiac index (CI 2.93 lit/min/mq). Combination therapy with bosentan and sildenafil (off-label) was started but the patient did not tolerate it because of important asthenia. *Recent history*. February 2018: he underwent bilateral pulmonary transplantation with ECMO support. He suffered from several episodes of atrial fibrillation during post-operative hospitalization. Echocardiogram: biventricular normal dimensions and function. In March 2018 severe desaturation due to right total pneumothorax, treated with drenaige. In May 2018: cardiac arrest due to massive pulmonary embolism and, thereafter, left arm compartment syndrome treated with surgical fasciectomy. To date, the patient is in fair clinical condition and hemodynamic compensation; he suffers from reduced effort tolerance due to muscular hypotrophy secondary to the cardiac arrest hospitalization.
**Discussion.** Pulmonary sarcoidosis is an uncommon cause of pre-capillary pulmonary hypertension. Our patient was treated off-label with bosentan first and bosentan plus sildenafil after; which would be the optimal medical therapy in this kind of patients? Are indication and timing to pulmonary transplantation acceptable? Which could be the cause and the appropriate therapy for pulmonary embolism in this patient? This case could lead to substantial discussion and confrontation.

### A693: EFFICACY OF RIVAROXABAN TREATMENT OF AN EXTENDED DEEP VEIN THROMBOSIS WITH PULMONARY EMBOLISM IN AN ANTITHROMBIN III DEFICIENT PATIENT

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**Background.** Patients with low Antithrombin III (AT III) have an increased risk of artero-venous thromboembolic (TE) disease and heparin resistance.

**Case report.** We report a 28-year-old woman presenting with spontaneous right calf pain and swelling lasting about one week. A heterozygous AT III deficiency with phenotype expression of deep vein thrombosis also in fist-degree relatives (mother and sister) was reported. Thrombophilia study showed residual AT III activity of 58% and normal protein C and protein S laboratory samples. Autoimmune essays were negative. The computed tomographic angiography (CTA) that revealed a bilateral subsegmental pulmonary embolism (Fig. 1)and a deep vein thrombosis (right leg) extended into the inferior vena cava up to the confluence of the left renal vein. Echocardiography showed an extended thrombosis within the inferior vena Cava (Fig. 2). Thrombolytic therapy, haemodynamic or ventilator support, or placement of an inferior vena cava filter were excluded and, given the hemodynamic stability, anticoagulant therapy with Rivaroxaban 15 mg bid was started. After 10 days of treatment with Rivaroxaban, the echocardiographic examination (Fig. 3) revealed the complete resolution of the thrombus located in the inferior vena cava and the CTA (Fig. 4) documented the complete resolution of the pulmonary embolism.

Figure 1

Figure 2

Figure 3

Figure 4

**Discussion and conclusions.** Patients with AT III deficiency could be heparin-resistant and may need for higher heparin doses or AT III replacement therapy, with an increased hemorrhagic risk.
Direct Factor Xa inhibition by Rivaroxaban allowed to obtain an anticoagulant effect through an alternative mechanism, particularly useful in this patient with familial AT III deficiency, deep vein thrombosis and pulmonary embolism.

### A694: CONFRONTO TRA SEGMENTAZIONE CON METODO MANUALE E SEMIAUTOMATICO IN RMC NELLA VALUTAZIONE DI VOLUMI E FUNZIONE BIVENTRICOLARI IN PAZIENTI CON TETRALOGIA DI FALLOT

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**Background.** La risonanza magnetica cardiaca (RMC) è considerata il gold standard per la quantificazione dei volumi, della funzione e degli spessori del ventricolo destro (VD). Nei pazienti con Tetralogia di Fallot corretta chirurgicamente (rTOF) tali parametri hanno un importante valore clinico predittivo. Il post-processing manuale delle immagini richiede tempo ed introduce variabilità nelle misurazioni. L'utilizzo del post-processing semiautomatico, oltre ad essere più rapido, potrebbe ridurre tale variabilità. In questo studio abbiamo confrontato entrambe le metodiche di segmentazione per valutarne le differenze, la variabilità e la riproducibilità in una popolazione di pazienti con rTOF.
**Metodi.** Abbiamo analizzato 62 esami di RMC (Siemens Aera 1.5 T, cine-SSFP con respiro trattenuto, TR 14-45 ms, spessore slice 8 mm senza interslice gap, pixel size 2.3x2.9mm) in 43 pazienti con rTOF (età media 19 anni, IQR 14-38). Utilizzando il software Q mass v8.1 (Medis, NL) tre operatori indipendenti hanno analizzato funzione e volumi biventricolari secondo due metodiche diverse: 1) post-processing manuale includendo le trabecole e i muscoli papillari nella delineazione della cavità (Metodo A), 2) post-processing semiautomatico MassK a soglia con due cutoff, 30 (Metodo B-30) e 50 (default, Metodo B-50). Per il confronto tra le diverse metodiche sono state utilizzate le analisi ANOVA, Bland Altman e regressione lineare $r^2$.
**Risultati.** Rispetto al metodo manuale il metodo B-30 sovrastima il volume telediastolico del VD (VDvtd) del 2.6% (differenza media 4.7±9 ml,

P< 0.001) ed il volume telesistolico del VD (VDvts) del 7.6% (differenza media 6.3±14.8 ml, P< 0.001) mentre la frazione d'eiezione del VD (VDef) rimane sostanzialmente invariata (differenza media 1±4.5%, P=0.23). Per il ventricolo sinistro (VS) le differenze in termini di LVvtd (P>0.99), LVvts (P=0.43) e LVef (P=0.41) risultano non significative. Rispetto al metodo manuale il metodo B-50 sottostima del 10% sia il VDvtd sia il VDvts (P< 0.0001) e sovrastima ampiamente la massa del VD (23%), senza differenze significative in VDef (P>0.99). Inoltre sottostima il VSvtd e il VS vts dell'11% e 15% rispettivamente (*P*<0.0001), con una sovrastima della VSef del 3% (P<0.001). L'analisi Bland Altman illustra le differenze tra ciascuno dei metodi semiautomatici a soglia ed il metodo manuale. Per ogni metodo semiautomatico a soglia la correlazione con il metodo manuale è buona-eccellente ($r^2$ da 0.68 a 0.98). Il metodo B-30 ha una migliore riproducibilità rispetto al metodo B-50 in quanto mostra una minore variabilità per tutte le misure. Il tempo di analisi delle immagini è più breve per i metodi semiautomatici a soglia (P < 0.001).
**Conclusioni.** In pazienti con rTOF la misurazione della funzione e dei volumi biventricolari mediante postprocessing semiautomatico a soglia è più veloce e più riproducibile del postprocessing manuale, pertanto potrebbe essere utilizzato per l'analisi clinica di routine e per ridurre la variabilità in studi multicentrici. Nonostante la lieve sovrastima dei volumi, la soglia a 30 è preferibile rispetto a quella a 50 in quanto quest'ultima tende a sottostimare significativamente i volumi del VD.

### A695: CLINICALLY DIAGNOSIS OF RIGHT VENTRICLE ARRHYTMOGENIC CARDIOMYOPATHY ASSCOCIATE WITH AN UNREPORTED GENE MUTATION

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Right ventricle arrhythmogenic cardiomyopathy (ARVC) is a chronic, progressive, heritable cardiomyopathy; genes associated to ARVC predominantly encode desmosomal proteins. More genes have been reported to be associated with ARVC, but the frequencies of gene variations in these genes are unknown. ARVC is one of the leading causes of sudden unexpected cardiac death in young, apparently healthy individuals. Prevalence is estimated to be 1:1000-1:5000.
We report a case of hyperlipidemic 42-year-old man, admitted to our emergency department the day after a prolonged episode of palpitations. He was known to have suffered from Guillaume-Barrè syndrome, gastro esophageal reflux disease and vitiligo; he has two sisters with BRCA mutations and a young nephew known for cardiac arrest in ARVC. At the admission, electrocardiogram showed negative T waves in V4-V6 and inferior leads. Troponin T was elevated and transthoracic echocardiogram (TTE) showed inferior-lateral kinetic abnormalities. DAPT, anticoagulant, beta-blocker and statin were administered, and coronary angiography was performed showing right coronary arteriovenous fistula. During hospitalization ventricular tachycardia (178 bpm, left branch block and superior axial deviation) was observed. Amiodarone infusion has been effective to stop arrhythmia. Electrophysiological study was then performed and showed inducibility of a non-sustain form of clinical tachycardia (maximum run of three beats) by programmed ventricular stimulation with dual extrastimuli from the right apex. Electroanatomic mapping of right ventricle was performed and low-potential areas were detected in the infundibulum and in the anterolateral peritricuspid region; moreover, late potentials were recorded in a limited region of the anterior infundibulum of the right ventricle. Another TTE was performed to analyze right chambers and it revealed only basal wall slight hypertrapping and two middle-distal recesses, split from the hyperechoic moderator band. Cardiac magnetic resonance confirmed compatible pattern with ARVC. Bicameral ICD was implanted. Molecular evaluation of genes related to ARVC (DSC2, DSG2, DSP, PKP2, JUP, TMEM43, RYR2, PLN) was performed. The molecular analysis of the entire coding region of PKP2 gene has detected the nucleotide substitution c.2182G> T (NM_004572.3) in heterozygous exon 11; it codes for a premature stop codon p.Glu728X (chr12 : g.32955454> A, GRCh37 / hg19). No other mutations were identified. One of the two sisters had the same mutation, which had never been associated with ARVC. Nevertheless, clinical presentation, imaging morphology and familiar anamnesis suggest a possible relation to ARVC.

### A696: IL RUOLO DEL TEST DA SFORZO CARDIOPOLMONARE NELLA DIAGNOSI PRECOCE DELL'IPERTENSIONE ARTERIOSA POLMONARE IN PAZIENTI AFFETTI DA SCLEROSI SISTEMICA

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**Razionale.** L'ipertensione arteriosa polmonare (PAH) rappresenta la principale causa di morbidità e mortalità associate a sclerosi sistemica (SSc). Ciò è in parte legato al ritardo diagnostico che tipicamente caratterizza la PAH, causato dall'assenza di sintomi specifici; l'utilizzo di programmi di screening, volti alla diagnosi precoce di PAH nei pazienti con SSc, si è dimostrato efficace nel migliorare la sopravvivenza in pazienti affetti da SSc. Ci siamo quindi proposti di verificare il ruolo del CPET (test cardiopolmonare) nell'identificazione di PAH in una coorte di soggetti affetti da SSc-related disorders. Obiettivo secondario dello studio è stato valutare la presenza di eventuali differenze del CPET tra pazienti affetti da sola SSc e un gruppo di soggetti di controllo.
**Pazienti e metodi.** Abbiamo sottoposto 103 pazienti affetti da SSc-related disorders a indagini preliminari, quali visita reumatologica, visita cardiologica, ecocardiogramma, elettrocardiogramma, prove di funzionalità respiratoria, prelievo venoso, test del cammino. Al CPET abbiamo valutato consumo dell'ossigeno al picco (VO2 picco), polso dell'ossigeno, pendenza del rapporto ventilazione al minuto/anidride carbonica esalata (VE/VCO2 *slope*), pressione teleinspiratoria dell'anidride carbonica (PetCO2) ed equivalenti ventilatori dell'anidride carbonica (EQCO2) basale. Sulla base di questi risultati, i pazienti con sospetto di PAH sono stati inviati a cateterismo cardiaco destro.
**Risultati.** 11 pazienti hanno ricevuto una diagnosi di PAH; tali soggetti presentavano pressione polmonare sistolica (PAPs) più elevata (40 vs 26 mmHg, p <0,001), area dell'atrio destro (18 vs 13 cm2, p <0,001) e diametro base del ventricolo destro aumentati (42 vs 37 mm, p = 0,03) e diffusione alveolo-capillare diminuita (55 vs 82,5%, p <0,001) rispetto al gruppo di non ipertesi. Al CPET, i pazienti con PAH avevano valori di VE/VCO2*slope* (40 vs 29, p <0,001) ed EQCO2 (44 vs 37, p = 0,003) più elevati rispetto ai pazienti con sola SSc e VO2 picco (14 vs 17,9 mL/min/kg, p = 0,02) e PetCO2 (23,8 vs 29,4 mmHg, p <0,001) diminuiti. Inoltre, pazienti con SSc senza PAH, sembravano avere valori di CPET alterati rispetto a 13 controlli sani di pari età e sesso per quanto riguarda la VO2 picco (17,9 vs 27,8 mL/kg/ min, p = 0,01) e la VE/VCO2 *slope* (29,1 vs 24,7, p = 0,002).
**Conclusioni.** In pazienti affetti da SSc-related disorders, il CPET è uno strumento promettente per l'identificazione di PAH. I pazienti con SSc senza ipertensione polmonare, inoltre, presentano comunque alterazioni al CPET rispetto a controlli sani che potrebbero identificare un sottogruppo di soggetti a rischio di sviluppare coinvolgimento vascolare polmonare.

### A697: EMBOLIA POLMONARE CON ANGIOTC NEGATIVA: L'IMPORTANZA DELLA CLINICA

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Paziente, donna di 61 anni, ipertesa e dislipidemica, giunge nella UOC di Medicina Interna per l'approfondimento clinico-strumentale di una lesione ossea sacrale di ndd che causava deficit di deambulazione in assenza di traumi che potessero spiegarla. Ai primi esami ematochimici si riscontrano solo anemia megaloblastica e iperlipidemia mista; al primo ecocardiogramma si evidenzia insufficienza mitralica lieve, minimo jet di insufficienza tricuspidalica con PAPS 38 mmHg e fibrosclerosi mitralica ed aortica; il primo ECG ha un unico reperto patologico che è il ritardo nella conduzione intraventricolare destra con ritardo incompleto (con morfologia rSr'). Alla prima Tc lombo-sacrale effettuata si reperta: segni diffusi di osteopenia in particolare alle ossa sacrali. Aspetto diabolizzato delle vertebre lombari. Alterazioni spondilosiche osteofitosiche diffuse. Canale vertebrale ampio. Calcificati i vasi addominali. Durante il periodo di degenza la paziente manifesta episodio di febbricola (picco massimo 37.4° C) con dispnea acuta ed ingravescente. Pertanto si effettuano le opportune indagini e consulenze specialistiche per comprendere la causa di tale sintomatologia: il pattern infettivologico risulta negativo eccetto per la presenza di Coronavirus OC43 con pannello respiratorio. Il primo EGA arterioso descrive un quadro di insufficienza respiratoria acuta: pH 7.407, pCO2 42.5 mmHg, PO2 44.2 mmHg, $HCO_3^-$ 26.1 mmol/l, SO2 80%, Indice P/F 210.4 mmHg. Il D-dimero risulta pari a 3,54 mg/L (v.n. 0,0-0,55), mentre Nt-proBNP è pari a 441 pg/ml (v.n. 0-125). Si effetua un ECG che dimostra rispetto al precedente una deviazione assiale a destra. L'ecocardiogramma effettuato in urgenza riscontrava: un'insufficienza mitralica di grado lieve-i,moderato con evidenza di doppio-jet e un'insufficienza tricuspidale di grado moderato con valori di PAPS calcolata pari a 55-60 mmHg. L'Angio-TC del circolo polmonare eseguita in urgenza risultava negativa per difetti di riempimento dell'arteria polmonare e delle sue diramazioni. In considerazione dei dati ottenuti dalle indagini, nel sospetto di una embolia polmonare, si effettua terapia con *Clexane* 4000 Ui 1fl x 2/ die associata a terapia antibiotica con *Ceftazidime* 2 gr x 3/ev/ die (in 250 cc SF, t.i. 3 h) + *Levofloxacina* 750 mg /ev/die e *Urbason* 20 mg in bolo lento. Si decide di effettuare scintigrafia polmonare di perfusione in considerazione della negatività dell'AngioTc polmonare e del forte sospetto clinico di embolia polmonare: si evidenzia deficit della perfusione di tipo triangolare ed a base pleurica in corrispondenza, a destra, del segmento apicale e anteriore del lobo superiore, del lobo medio e del segmento basale del lobo inferiore, a sinistra, del segmento anteriore del lobo superiore, del segmento lingulare superiore e del segmento latero-basale del lobo inferiore. A tal proposito si imposta terapia con Coumadin embricato con Clexane fino al

raggiungimento del target di INR. Si richiedono a questo punto diversi esami per comprendere l'origine di tale embolia polmonare. Si effettua: TC total body in cui non si evidenzia alcun tipo di neoformazione, si reperta solo un aspetto finemente rimaneggiato del bacino con fratture traumatiche bilaterali e simmetriche a carico delle ali sacrali, delle ali iliache e della sinfisi pubica; Scintigrafia ossea in cui vengono riconfermate le aree di ipercaptazione a livello del sacro, delle ali iliache e della sinfisi pubica; studio trombofilico che riporta un deficit importante della Proteina S e un deficit lieve di Proteina C. Pertanto scoperta la causa della tromboembolia polmonare la paziente viene dimessa con Rivaroxaban 20 mg/die. Al controllo scintigrafico dopo un mese di trattamento si evidenzia una riduzione dell'estensione del deficit di perfusione di tipo triangolare ed a base pleurica precedentemente segnalato a carico di entrambi i polmoni. Dal caso pertanto si evince come la scintigrafia perfusionale polmonare sia più sensibile dell'angioTC nella diagnosi di embolia polmonare nei casi dubbi e come nei casi di trombofilie ereditarie la terapia anticoagulante sia necessaria alla prevenzione secondaria di eventi tromboembolici.

### A698: POTENTIAL EXTENDED ROLE OF ULTRASOUND-ENHANCED CATHETER-DIRECTED THROMBOLYSIS IN INTERMEDIATE-HIGH-RISK ACUTE PULMONARY EMBOLISM

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**Introduction.** Pulmonary embolism (PE) is a frequent clinical syndrome. Guidelines provide indications about acute-phase treatment according to patients' risk class, but do not clearly indicate the role of ultrasound-enhanced catheter-directed thrombolysis (UCDT) in intermediate-risk classes. The purpose of this study is to evaluate the potential role of UCDT in the intermediate-risk classes.

**Materials and methods.** We evaluated 108 consecutive patients admitted with a diagnosis of acute PE to our cardiac intensive care unit (CCU) between April 2010 and June 2018. Patients' clinical data, laboratory tests, CT-scan and echocardiographic reports were obtained from our Institute internal database. All patients were classified into early-mortality-risk classes according to guidelines, and the risk-adjusted therapeutic strategies were evaluated in terms of clinical and imaging outcomes.

**Results.** General in-hospital mortality was 12% (N=13). The highest mortality (40%, N=10) occurred in the high-risk class (N=25). In high-risk population (N=23) the in-hospital mortality rate was 60% (N=3) in patients that received UCDT (N=5) and 71.4% (N=5) in patients treated by anticoagulant therapy (N=7). Among intermediate-high-risk patients (N=39), in-hospital death occurred only among those treated by anticoagulant therapy; major bleeding complications occurred in 11.1% (N=2) of patients treated by anticoagulant therapy (N=18), in 6.7% (N=1) of patients treated by UCDT (N=15), in none of patients treated by low-dose thrombolysis (N=2), and in 25% (N=1) of patients treated by full-dose thrombolysis (N=4). 93.3% (N=14) of intermediate-high-risk patients treated by UCDT (N=15) were discharged with TAPSE > 20. All patients at intermediate- low-risk treated by UCDT (N=2) showed PASP ≤40 and TAPSE>20 at discharge.

**Conclusion.** The present retrospective analysis shows that UCDT could represent an alternative to full-dose systemic thrombolysis in compromised hemodynamically unstable patients with a high risk of bleeding and for whom the latter is contraindicated. Additionally, UCDT instead of anticoagulation alone appears safe and effective in intermediate-high risk patients and could have a role in intermediate-low-risk patients.

### A699: PULMONARY EMBOLISM: PROGNOSTIC STRATIFICATION OF CONSECUTIVE PATIENTS ADMITTED TO OUR CARDIAC CARE UNIT AND CARDIOLOGY DEPARTMENTS

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**Introduction.** Pulmonary embolism (PE) is a potentially life-threatening disease, therefore risk stratification is mandatory to guide therapy. European Society of Cardiology (ESC) 2019 guidelines proposed a new risk-adjusted algorithm introducing in normotensive patients two validated scores, BOVA and modified FAST, to further stratify the severity of the acute PE.

**Aim.** The aim of the study is to evaluate the 1-month EP-related mortality of patients admitted for PE in our Cardiac Care Unit and Cardiology Departments and to evaluate the performance of PESI, sPESI and ESC 2019 scores in all population and of BOVA and modified FAST scores in normotensive patients.

**Methods.** Consecutive adult patients with a diagnosis of PE, admitted between 01 January 2015 and 01 August 2019 were retrospectively included. We recorded patient characteristics, diagnostic work-up and treatment, mortality during a 1-month follow-up, PESI and sPESI variables (age, gender, cancer, heart failure, chronic lung disease, pulse ≥ 110/', systolic blood pressure < 100 mmHg, respiratory rate ≥ 30/', temperature < 36°C, altered mental status, arterial oxygen saturation < 90%), and other variables included in ESC 2019 prognostic algorithm (troponin, BNP, signs of RVD), in BOVA score (pulse ≥ 110/', systolic blood pressure 90-100 mmHg, troponin) and in modified FAST score (pulse > 100/', troponin, syncope).

**Results.** 194 patients were enrolled in this study. The mean age was 68 years (± SD 12); PE was unprovoked in 59% patients and cancer-related in 10.3% patients. Overall mortality rate were 5.1% (CI 95%, 2.8-9.2%) at 1 month; all deaths were EP-related. All high risk patients without contraindications to it were treated with systemic thrombolysis; 23% of intermediate-high risk patients considered by clinicians at lower risk of bleeding and at higher risk of early death received full-dose fibrinolysis, 6% of them low-dose fibrinolysis and 16% loco-regional ultrasound-assisted fibrinolysis.

EP-related mortality, 1 month follow-up, n/N, % (95% CI), P value (Fisher's exact test)

| | | | | |
|---|---|---|---|---|
| ESC 2019 | High risk | 5/14 | 35.7% (16.3-61.2%) | High vs not high-risk P =0.008 |
| | Intermediate-high risk | 5/119 | 4.2% (1.8-9.4%) | Intermediate-high vs intermediate-low and low risk P=0.1684 |
| | Intermediate-low risk | 0/44 | 0% (0-8.0%) | |
| | Low risk | 0/17 | 0% (0-18.4%) | |
| PESI | III-V | 10/132 | 7,5% (4.1-13.8%) | P=0.0321 |
| | I-II | 0/62 | 0% (0-5.8%) | |
| sPESI | >0 | 10/158 | 6.3% (3.4-11.2%) | P=0.2129 |
| | 0 | 0/36 | 0% (0-9.6%) | |

EP-related mortality, 1 month. n/N. % (95% CI), P value (Fisher's exact test)

| BOVA | | Modified FAST | |
|---|---|---|---|
| 1-4 | >4 | <3 | 3-5 |
| 1/131 | 4/49 | 3/100 | 2/80 |
| 0.7% (0.1-4.2%) | 8.1% (3.2-19.1%) | 3% (1.0-8.4%) | 2.5% (0.6-8.6%) |
| P=0.0199 | | P=1 | |

Accuracy of the prognostic models to predict 1-month mortality for low vs. intermediate-high and high risk patients

| | Sensibility, % (95% CI) | Specificity, % (95% CI) | PPV, % (95% CI) | NPV, % (95% CI) |
|---|---|---|---|---|
| PESI | 100% (72.2-100%) | 30.6% (24.3-37.8%) | 6.8% (3.6-12.5%) | 100% (0-6.6%) |
| sPESI | 100% (72.2-100%) | 17.7% (12.8-24.0%) | 5.7% (3-10.5%) | 100% (0-10.7%) |
| ESC 2019 | 100% (72.2-100%) | 8,70% 5.3-13.8%) | 5.4% (2.8-9.9%) | 100% (0-20.3%) |
| BOVA | 80% (37.5-96.3%) | 74.2% (67.3-80.1%) | 8.1% (3.2-19.1%) | 99.2% (95.8-99.8%) |
| Modified FAST | 40% (11.7-76.9%) | 55.4% (48.0-62.6%) | 2.5% (0.6-8.6%) | 97% (91.5-98.9%) |

**Conclusion.** In this consecutive patients population, ESC 2019, PESI and sPESI scores confirmed their prognostic accuracy; all patients who died were classified at intermediate-high or high risk according to them. In normotensive patients BOVA score was able to predict 1 month EP-related mortality.

### A700: ROLE OF AN INTEGRATED NON-INVASIVE ULTRASOUND IMAGING TEST FOR DIAGNOSIS OF RIGHT-TO-LEFT SHUNT SECONDARY TO PFO

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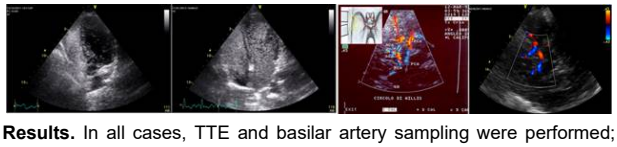
Although patent foramen ovale (PFO) is present in asymptomatic subjects, previous data confirm that its presence associates with a three-fold increased risk of cerebral embolism. Moreover, ischemic stroke, migraine with aura, decompression sickness and platipnea-ortodeoxia appear related to PFO.

**Purpose.** The purpose of this study was to evaluate the role of an integrated, non-invasive ultrasound imaging test, performed in the same session, for diagnosis of right-to-left shunt secondary to PFO.

**Methods.** 64 patients with history of cryptogenic cerebral ischemic events documented on MRI (55 patients, 86%), diver decompression syndrome (3 patients, 5%), and persistent migraine with aura (6 patients, 9%) were evaluated by 1) trans-thoracic echocardiography (TTE) [Figure 1] and 2) trans-cranial ecocolorDoppler (TCCD) [Figure 2] with sampling of middle cerebral artery and basilar artery. Using TTE we studied: 1) atrial septum morphology, 2) presence of right-to-left shunts, before and after microbubble injection, at rest and after Valsalva maneuver, 3) site of microbubbles passage, 4) time of onset of microbubbles in the left atrium within three cardiac cycles from opacization of the right atrium. Using TCCD we evaluated: 1) presence of shunts, 2) Doppler signal disturbance duration, calculated from the first to the last recordable microembolic signal (MES). Feasibility of methods and concordance of results between the two exams were also evaluated. When discrepancy between the results were found, trans-esophageal echocardiogram (TEE) was performed.



**Results.** In all cases, TTE and basilar artery sampling were performed; mean cerebral artery sampling was feasible in 58 patients (90.6%). An excellent agreement between the two methods (k test with k> 0.80) to confirm and quantify the shunt was found. In thirty patients (46.8%), the evaluation was negative for right-to-left shunt using both methods, in thirty-one (48.4%), it was positive by both methods, while in three (4.8%) the two methods gave discordant results. The TEE was concordant with TTE in 2 of these 3 patients; in the third one it was concordant with TCCD. There was no statistically significant association (p = 0.831) between the extent of interatrial shunt and the presence of septal aneurysm. The MES had a longer duration in the TCCD with basilar artery

sampling compared to TCCD with middle cerebral artery sampling (7065 ± 893 ms vs. 5922 ± 781 ms; p = 0.2), reducing the risk of underestimating the shunt.
**Conclusions.** TTE, with the help of Doppler sampling of basilar and mean cerebral artery, performed in the same session, shows high value in terms of feasibility and accuracy to screen and evaluate patients with PFO. Therefore, an advanced approach with TEE could be limited to the small group of patients in whom a first-level imaging test shows discordant results. The sampling rate of basilar artery was higher than that of mean cerebral artery and it can be a valid alternative to estimate the shunt.

### A701: UN CASO DI ORIGINE ANOMALA DELLA CORONARIA DESTRA DAL VERSANTE LATERALE DELL'AORTA ASCENDENTE A DECORSO INTRA-ARTERIOSO

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**Introduzione.** Le anomalie coronariche costituiscono, una delle principali cause di morte cardiaca improvvisa soprattutto nei giovani. La diagnosi, in assenza di sintomatologia o di reperti sospetti all'ECG a 12 derivazioni, è spesso un reperto occasionale alla coronarografia o alla coronaro-TAC. Tra le anomalie coronariche particolare attenzione va posta nel caso in cui vi siano decorsi intra-arteriosi tra il tronco polmonare e l'aorta ascendente, in quanto il tratto anomalo può essere compresso durante esercizio fisico o a riposo e dare sintomi e/o segni di ischemia o nei casi gravi morte improvvisa. Tuttavia vi sono pazienti asintomatici che riscontrano tale anomalia in tarda età e la prognosi in tal caso è significativamente migliore rispetto ai pazienti sintomatici.
**Case report.** A un signore di 58 anni, ex pugile professionista e podista agonista, viene sospesa l'idoneità medico-sportiva per la comparsa durante il test da sforzo di una singola coppia di extrasistoli polimorfe a morfologia blocco di branca sinistra all'acme dello sforzo. In anamnesi non presenta fattori di rischio cardiovascolari e non assume terapia. Viene pertanto indirizzato a coronaro-TAC che mostra l'origine della coronaria destra (dominante) dal versante sinistro dell'aorta ascendente e decorso intra-arterioso del vaso fino a costeggiare il seno coronarico destro e proseguire il suo normale decorso. Svariati ECG Holter delle 24 ore non mostrano, a riposo, segni di ischemia o aritmie. A lato di ciò vengono segnalate placche ateromasiche del 20% sull'arteria discendente anteriore media e sulla coronaria destra media e ectasia dell'aorta ascendente 40 mm. Per tali ragioni viene interrotta definitivamente l'idoneità medico-sportiva.
**Discussione.** Le anomalie coronariche con decorso intra-arterioso costituiscono una rara e grave malformazione congenita. L'origine anomala della coronaria destra presenta prognosi migliore rispetto alle malformazioni in cui il tronco comune ha origine dal seno coronarico destro, e si associa maggiormente a segni e sintomi di ischemia piuttosto che alla morte improvvisa. In taluni individui essa può restare asintomatica per tutta la vita in virtù del fatto che non si esplica a riposo o anche durante sforzo, la compressione del lume vasale. Nel nostro caso pertanto, il podista è rimasto asintomatico negli anni e l'unico segno sospetto, ma non certo, di ischemia è stato il rilievo della coppia di extrasistoli ventricolari polimorfa durante l'acme dello sforzo. Dalle immagini TAC si evince che il lume vasale minimo, a riposo, del tratto intra-arterioso, risulta di 2,8 mm, calibro che renderebbe ragione dell'assenza di ischemia a riposo. Ragionevolmente, durante l'esercizio fisico, dati l'anomalia coronarica, la presenza di ectasia aortica e di minima ateromasia bivasale, il rischio di ischemia stress indotta non è trascurabile, motivo per cui viene interrotta l'idoneità medico-sportiva.
**Conclusioni.** Le anomalie coronariche intra-arteriose asintomatiche costituiscono una condizione potenzialmente fatale e spesso misconosciuta ai normali test non invasivi. In questi soggetti il rischio di eventi cardiovascolari maggiori, aumenta all'aumentare dell'età e dei fattori di rischio cardiovascolari.

## CARDIOPATIE CONGENITE E DEL CIRCOLO POLMONARE – 3
## Sessione Poster

### A702: L'ATTESA IN GRAVIDANZA: UN CASO DI DIFETTO INTERATRIALE

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(a) AOU SASSARI

**Razionale.** Durante la gravidanza si assiste ad una progressiva espansione del volume ematico, circa il ~45% del valore pre-gravidanza, con incremento della gittata cardiaca, dal 30% al 50% del valore basale (1) Tali adattamenti fisiologici possono slatentizzare una patologia cardiovascolare misconosciuta con incremento significativo di morbilità e mortalità. Il difetto interatriale (DIA) è una delle patologie più ricorrenti in donne gravide con cardiopatia congenita. Diversi studi hanno dimostrato in questa popolazione un rischio più elevato di embolia paradossa, aritmia e insufficienza cardiaca congestizia(2). Inoltre, i neonati di donne non sottoposte a correzione percutanea del difetto avrebbero una più alta incidenza di eventi maggiori (3).
**Caso clinico.** una donna di 23 anni primipara alla 36ª settimana gestazionale, senza precedenti cardiologici noti, veniva inviata per riscontro accidentale, durante il settimo mese di gravidanza, di difetto interatriale di tipo Ostium Secundum. *Diagnosi*: La paziente si presentava asintomatica ed in buon compenso emodinamico. L'esame obiettivo rivelava un soffio olosistolico 3/6 con sdoppiamento fisso del secondo tono cardiaco. L'ECG registrava un ritmo sinusale con blocco di branca destra. L'ecocardiogramma transtoracico documentava un ampio difetto interatriale (22 mm) con shunt sinistro-destro (Qp:Qs = 2:1), un ventricolo destro dilatato (RVOT1 43 mm) con insufficienza tricuspidale di grado lieve (G max 23 mmHg), movimento paradosso del setto interventricolare e vena cava inferiore dilatata.
**Gestione e risultati.** Come indicazione generale, un DIA di tipo ostium secundum richiede un chiusura percutanea del difetto (4), differibile in gravidanza fino a 6 mesi dopo il parto. Pertanto si è preferito un atteggiamento conservativo di follow up. A due giorni dal parto cesareo programmato, l'ecocardiogramma documentava una riduzione in ampiezza del difetto interatriale (2.2±1.8 mm), del sovraccarico ventricolare destro (RVOT 43±34 mm) e dello shunt sinistro- destro (Qp:Qs = 1:1). Il bambino era sano senza eventi neonatali acuti. Un follow up a 3 e 6 mesi veniva consigliato alla paziente in previsione di ulteriori gravidanze.
**Lezione.** lo stato ipervolemico durante la gravidanza, può essere un importante fattore confondente nella gestione clinica di donne con cardiopatie congenite. Un atteggiamento cauto e una gestione personalizzata, offrono risposte terapeutiche risolutive di caso in caso.

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### A703: VALUTAZIONE DEL SISTEMA NERVOSO SIMPATICO CARDIACO CON SCINTIGRAFIA 123I-MIBG IN PAZIENTI AFFETTI DA IPERTENSIONE ARTERIOSA POLMONARE

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**Background e scopo.** L'iperattività del sistema nervoso simpatico ha un ruolo ben noto nella fisiopatologia dell'insufficienza cardiaca con ridotta frazione di eiezione (heart failure with reduced ejection fraction, HFrEF). È stato ipotizzato un possibile ruolo del sistema nervoso simpatico anche nell''ipertensione arteriosa polmonare (pulmonary arterial hypertension, PAH), tuttavia non è chiaro quali siano le alterazioni a carico del sistema nervoso simpatico cardiaco e se tali alterazioni correlino a parametri clinici, emodinamici e funzionali nei pazienti con PAH. Gli obiettivi di questo studio sono stati quello di valutare l'attività del sistema nervoso simpatico cardiaco mediante scintigrafia cardiaca con 123Iodio-metaiodobenzilguanidina (I-MIBG) in pazienti con PAH e di esplorare la sua possibile correlazione con markers di gravità della malattia.
**Metodi e Risultati.** Dodici pazienti affetti da PAH (9 donne, con età mediana di 56,5 (RIQ 17,8)), di cui 8 affetti da PAH idiopatica e 4 da PAH associata a malattia del connettivo, sono stati arruolati e sottoposti a scintigrafia cardiaca con I-MIBG. I risultati ottenuti sono stati confrontati con quelli di 12 soggetti con anamnesi negativa per patologie cardiovascolari o polmonari e che sono stati sottoposti allo stesso test di imaging nucleare per sospetto paraganglioma o feocromocitoma, con un risultato negativo (controlli) e con quelli di 12 pazienti con HFrEF. Per i pazienti con PAH sono stati raccolti dati di cateterismo cardiaco destro, ecocardiografia, test del cammino, test da sforzo cardiopolmonare e NTproBNP effettuati entro una settimana dalla scintigrafia cardiaca con I-MIBG. L'uptake di I-MIBG, valutato come H/M ratio (heart/mediastinum, rapporto cuore-mediastino) precoce e tardivo, era significativamente ridotto nei pazienti con PAH rispetto ai controlli (p = 0,001), ma simile a quello osservato nei pazienti con HFrEF. Il turnover miocardico di I-MIBG, espresso come washout rate, era simile nei pazienti con PAH e con HFrEF, e significativamente più alterato rispetto ai controlli (p = 0,016). Nei pazienti con PAH i paramteri ottenuti alla scintigrafia con I-MIBG correlavano significativamente con i parametri emodinamici, clinici e

funzionali di gravità della malattia, quali: resistenze vascolari polmonari, pressione atriale destra, TAPSE, NTproBNP e $VO_2$ di picco.
**Conclusioni.** Sebbene queste valutazioni derivino da un piccolo numero di soggetti, questo studio ha mostrato la presenza di una significativa compromissione del sistema nervoso simpatico cardiaco in pazienti con PAH, analoga a quella osservata nei pazienti con HFrEF. L'entità di questa compromissione è correlata con gli indici di gravità della malattia.

### A704: VALORE AGGIUNTIVO DELL'ECOCARDIOGRAFIA 3D NELLA VALUTAZIONE DEI PAZIENTI CONGENITI ADULTI GIÀ SOTTOPOSTI A CORREZIONE CHIRURGICA

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Uomo di 40 anni, già sottoposto nel 1984 a riparazione chirurgica di canale parziale atrioventriculare [cleft del lembo anteriore mitralico (MV) e difetto interatriale tipo ostium primum], veniva ricoverato per peggioramento della tolleranza agli sforzi (NYHA classe III). Negli ultimi 2 anni lamentava comparsa di dispnea per sforzi minimi e astenia. Nel Marzo 2017 per alcuni episodi di flutter atriale persistente (AF), il paziente si era sottoposto ad un ecocardiogramma transtoracico (TTE) che evidenziava normali dimensioni e lieve disfunzione sistolica del ventricolo sinistro (LV), ventricolo destro dilatato (RV) con normale funzione. sistolica, insufficienza mitralica e tricuspidalica di grado moderato. Emergeva il dubbio di uno shunt interatriale sx-dx. Tuttavia, un successivo 2D ETE confermava buon risultato del pregresso intervento chirurgico. Nonostante la transitoria efficacia della cardioversione elettrica nel ripristino del ritmo sinusale, non si registrava alcun miglioramento dei sintomi. All'esame obiettivo al momento del ricovero non erano presenti segni di stasi centrale e periferica; apprezzabile soltanto un soffio apicale olosistolico. All'ECG evidenza di flutter atriale, f.c. 95 bpm, blocco di branca destro incompleto. Un nuovo TTE confermava l'ingrandimento del RV, mostrando tuttavia un anomalo flusso attraverso il setto interatriale alla valutazione color-Doppler. Un ETE 2D e 3D mirato evidenziava deiscenza della chiusura del patch chirurgico con un ASD in sede inferiore e posteriore (Pannello B e C) realizzante massivo shunt sinistro-destro. All' analisi 3D è stata analizzata la posizione e la dimensione di tale difetto, la presenza del cleft del lembo anteriore MV corretto chirurgicamente, oltre alla presenza di una duplice vena cava superiore drenante nell'atrio dx (Pannello D). Il cateterismo destro mostrava un Qp/Qs pari a 3,1 con lieve ipertensione polmonare (PAPm= 26 mmHg) e resistenze vascolari polmonari normali (1.5 UW). Veniva dunque posta indicazione a riparazione chirurgica.
**Commento.** Nella valutazione del paziente adulto con cardiopatie congenite già sottoposto a riparazione chirurgica è necessario conoscere in maniera dettagliata la storia anamnestica e chirurgica del paziente ed eseguire una valutazione ecocardiografica dettagliata. Nel nostro caso, la prima valutazione mediante 2D ETE non aveva identificato la persistenza dello shunt perché le proiezioni apicale 5-camere e bicavale mostrano solo la porzione anteriore e media del AS, mentre il difetto era postero-inferiore. La valutazione 2D fornisce solo "fettine sottili" di cuore, cioè un'area di dimensioni ed orientamento limitato, dando l'impressione all'operatore inesperto di essere rappresentative di tutto il cuore. Invece con l'ecografia 3D si ottiene una valutazione più affidabile e completa dell'anatomia cardiaca. Con la visualizzazione "en-face" delle strutture cardiache come il setto interatriale (non possibile con il 2D) si ottiene una valutazione anatomica dettagliata, incrementando l'accuratezza diagnostica e fornendo aiuto al chirurgo. A causa della risoluzione spaziale subottimale delle attuali metodiche 3D e dello spessore esiguo del AS potrebbero verificarsi artefatti da drop-out, talora confusi con veri difetti interatriali. Per evitare il rischio di una diagnosi errata nel work-up diagnostico di uno shunt è mandatorio a nostro parere acquisire sempre un completo data-set 3Dcolor.

### A705: SOMETIMES THE HEART COULD APPEAR DIFFERENT IF SEEN UNDER A MAGNETIC RESONANCE SCANNER: MISDIAGNOSED CASES OF ISOLATED LEFT VENTRICLE APICAL HYPOPLASIA AND DOUBLE CHAMBERED LEFT VENTRICLE

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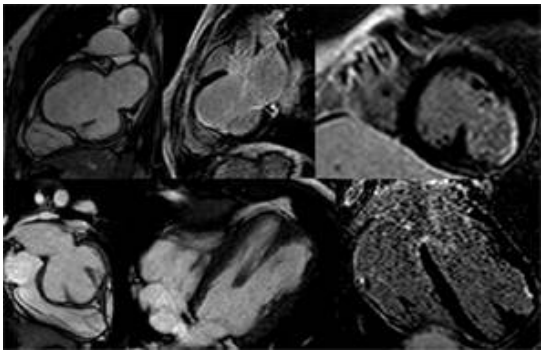
**Introduction.** Congenital heart diseases (CHD) are detected in 1% of children, often usually the first year of life; however, many defects are diagnosed later or remain undiagnosed. Both congenital and acquired disorders could affect the left ventricle (LV). First-line assessment includes echocardiography; nonetheless, because of intrinsic or technical limitations and artefacts, further investigation may be required. Cardiac Magnetic Resonance (CMR) is capable of providing anatomical and functional information without many of limitations and drawbacks of echocardiography. We describe CMR findings of misdiagnosed cases of two rare congenital LV abnormalities: isolated LV apical hypoplasia (ILVAH) and double-chambered LV (DCLV).
**Case report 1.** An 18 yrs girl diagnosed with dilated cardiomyopathy (DCM) was submitted to our CMR Lab for a functional assessment. After birth, deep Q waves in the inferior leads were noted on the ecg, and an echocardiographic examination showed a dilated and hypokinetic LV. At 1 year of age, she underwent cardiac catheterization that excluded coronary arteries anomalies and confirmed a reduced LV systolic function. A diagnosis of idiopathic DCM was formulated and she was initiated with anticongestive therapy. During the follow-up she felt well with normal exercise tolerance, longitudinal echocardiography did not show any substantial modification over the years. In 2018, a CMR study was performed. Surprisingly, the cardiac apex was formed exclusively by the right ventricle, wrapped around the LV. The LV appeared spherical and truncated inferiorly, and the apical portion was missing; LV volumes and ejection fraction were normal; regional akinesia and subendocardial late gadolinium enhancement (LGE) were evident at the inferior wall. These findings were consistent of ILVAH.
**Case Report 2.** A 24 yrs old boy with prenatal diagnosis of LV diverticulum came to our observation for a CMR study. He was asymptomatic, particularly, no palpitations or syncope were referred, nor arrhythmias were detected during the follow-up; exercise tolerance was normal. CMR showed a coarse muscle band in the LV cavity, extending from the apex to the posterior papillary muscle, thus delimiting a contractile accessory chamber. LV volumes and global systolic function were normal. The LV accessory chamber presented a normal structured free lateral wall with a normal systolic thikening, except at the apical infero-lateral segment where it appeared thinned and akinetic and showed LGE with a subendocardial pattern. These findings were consistent of DCLV.



**Conclusions.** The LV could be affected by many diseases with different etiological, clinical and morphological features. Compared to other imaging diagnostic modalities, CMR allows better definition of LV morphology, function and tissue characterization, becoming essential for LV abnormalities diagnosis and follow-up.

### A706: SUDDEN CARDIAC DEATH IN INFANCY AND CONGENITAL CORONARY ARTERY ANOMALIES

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**Introduction.** Congenital coronary artery anomalies (CCA) occur rarely.They are usually an incidental finding at transthoracic echocardiography (TTE), but diagnosis could be extremely challenging.
**CC1.** A 3 months old male child without a family history of congenital heart diseases and SCD was admitted in our Hospital after a resuscitated cardiac arrest. The infant was in good health condition until he suddenly fell lifeless after feeding. EKG was normal; TTE showed normal cardiac anatomy, normal coronary arteries origin, trivial aortic regurgitation and a substantially preserved left ventricle (LV) function. The subsequent course was favourable. The day after he was was weaned from mechanical ventilation, he had a second cardiac arrest that was recorded by a Holter EKG showing ST segment depression, followed by severe bradycardia and complete atrio-ventricular block. TTE detected hypokinesia of the infero-lateral LV wall, iperechogenic spots in the LV endocardium and in the mitral valve (MV) papillary muscles, mild-moderate MV and aortic valve (AV) regurgitations. An obstruction of the left coronary artery (LCA) was suspected, but coronary angiography (CA) failed to identify anomalies. Considering the possibility of tecnical limitations in a low weight infant, and the strong evidence of an underlying ischemic mechanism, the hypothesis of a LCA ostial stenosis wasnot abbandoned,

and he underwent a open heart surgery (HS) that found a hypoplastic and stenotic LCA ostium. LCA ostial plasty with a pericardial patch was performed. There were no complications, postoperative course was regular and uneventful. Medical therapy with acetylsalicylic acid (ASA), captopril, carvedilol and furosemide was started. At 6 month F-UP no major LV and MV/AV functional sequelae were evident at TTE, and he remained asymptomatic.

**CC2.** A female child who was followed since birth for a postnatal diagnosis of ostium secundum ASD and perimembranous VSD, underwent surgical correction at 9 months old. After, she had recurrent episodes of loss of consciousness and hypotension during or immediately after meals not associated with EKG alterations and experienced a cardiac arrest. CA did not show coronary stenosis or anomalies. So, these events were suspected to be related to an addominal trigger and surgery was undertaken. However, symptoms persisted and she was transferred to our Center for further investigations. She had other two episodes of cardiac arrest preceded by sinus tachycardia and ventricular arrhythmias and during one of these TTE documented a gradually worsening AV regurgitation followed by LV systolic dysfunction. Cardiac CT resulted normal and a new cardiac catheterization was achieved including ADP Test, hyperventilation test, stress-dobutamine test, nitrates test, and finally temporary ballon occlusion of the pulmonary artery. During these test, ST segment depression in V1-V6, D1, D2, aVL with simultaneous ST elevation in AVR was documented, and a simultaneous TTE confirmed previous findings. LCA ostial anomaly was suspected. During HS the surgeon discovered an endoluminal flap in the proximal part of the LCA that presented a slit-like orifice: an ostial plasty with an autologous saphenous vein graft was performed. The patient was discharged on medical therapy with ASA, captopril and carvedilol. At 3 y/o CA showed good surgical result, and no signs nor symptoms of myocardial ischemia were detected.

**Conclusion.** CCA are rare, but these must be suspected in case of unexplainable pediatric aborted SCD, especially if related to feeding, and with an apparently unexplainable and aspecific TTE finding of AV regurgitation.

## A707: SCOMPENSO CARDIACO DESTRO: TANTE CAUSE... PERCHÉ SE SI SENTONO ZOCCOLI SI PENSA ALLA ZEBRA ?

Laura Orrù (a), Giacomo Perpignano (b), Monica Urru (a), Ramona Stara (a), Michela Congia (a), Federica Scano (a), Enrica Marini (a), Andrea Marini (a), Donatella Manca (a), Sabrina Montis (a), Gildo Matta (c), Vinicio Atzeni (b), Roberto Tumbarello (a)

(a) CARDIOLOGIA PEDIATRICA E CARDIOPATIE CONGENITE OSPEDALE SAN MICHELE BROTZU CAGLIARI; (b) MEDICINA INTERNA II OSPEDALE SAN MICHELE BROTZU CAGLIARI; (c) RADIOLOGIA OSPEDALE SAN MICHELE BROTZU CAGLIARI

**Caso clinico.** Paziente di 73 anni, affetto da ipertensione arteriosa, malattia da reflusso gastro-esofagea e calcolosi della colecisti. Da qualche mese comparsa di angor e dispnea per sforzi moderati, alla visita cardiologica riscontro di flutter atriale non databile, per cui è stata iniziata terapia anticoguante orale e B-bloccante; all'ecocardio evidenza di cardiopatia ipertensiva con lieve ipertrofia concentrica, SIV discinetico con normale funzione sistolica globale (FE 65%,) lieve IM, moderata dilatazione delle sezioni destre (atrio area 30 cm2, Vn dx DTD 52 mm), aneurisma del tronco dell'arteria polmonare (65 mm) e lieve dilatazione dei rami polmonari, lieve IT con PAPS nella norma. La prima ipotesi diagnostica ad essere vagliata è stata una condizione di cuore polmonare secondario a malattia tromboembolica cronica, per cui il paziente è stato sottoposto a TC torace risultata negativa. Con il passare dei mesi la sintomatologia anginosa e dispnoica è divenuta ingravescente rendendo necessario un ricovero per scompenso cardiaco ed inizio di terapia diuretica. All'ecocardio evidenza di lieve riduzione della funzione sistolica globale (FE 50%), con SIV discinetico correlato a sovraccarico dx; sezioni destre dilatate, dilatazione aneurismatica del tronco dell'arteria polmonare e lieve dilatazione dei rami polmonari. La RMN cardiaca ha confermato la dilatazione e disfunzione del ventricolo destro, dilatazione dell'atrio destro, dilatazione aneurismatica del tronco dell'arteria polmonare e insufficienza severa della valvola polmonare; inoltre è stato evidenziato un ritorno venoso anomalo parziale, nello specifico della vena polmonare superiore sinistra che drenava in vena anonima.

Il cateterismo cardiaco destro ha confermato il ritorno venoso anomalo parziale confermando un salto di saturazioni tra porzione prossimale della vena anonima (SPO2 66%) e dell'arteria polmonare (SPO2 75%). Al cateterismo cardiaco sinistro riscontro di malattia coronarica bivascolare. All'ecocardio evidenza di ulteriore riduzione della funzione sistolica globale (FE 35%).

Il paziente è stato sottoposto a consulenza cardiochirurgica per valutare un intervento sull'aneurisma dell'arteria polmonare, che ha dato esisto negativo dato il notevole rischio chirurgico legato all'intervento stesso e alle comorbilità del paziente. Il paziente è stato preso in carico da un ambulatorio scompenso dove esegue regolare follow-up clinico.

Questo caso clinico è peculiare in quanto conferma che la presenza di piccolo difetto congeniti come appunto un ritorno venoso polmonare parziale possa non dare segno di se e passare inosservato per tutta la

vita del paziente che persiste asintomatico finché la dilatazione e disfunzione delle sezioni destre diventa clinicamente manifesta con sintomi di scompenso quale appunto dispnea o comparsa di aritmie quale flutter atriale. In presenza di dilatazione delle sezioni destre si è portati, a pensare subito come ipotesi diagnostica alla displasia artimogena del ventricolo destro specie se evidenziata in un giovane adulto o alla malattia tromboembolica cronica nell'adulto-anziano, quando invece bisognerebbe pensare in prima battuta ai difetti congeniti quali appunto ritorni venosi anomali o difetti interatriali che sono statisticamente più frequenti e che possono decorrere silenti per tutta la vita di un soggetto e dare manifestazione di se solo in età avanzata con un quadro di scompenso destro.

## A708: ECHOCARDIOGRAPHIC ASSESSMENT OF RIGHT VENTRICULAR STRAIN IN PATIENTS WITH PULMONARY HYPERTENSION: COMPARISON WITH OTHER PARAMETERS OF RIGHT VENTRICULAR SYSTOLIC FUNCTION

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**Introduction.** Transthoracic echocardiography is a non-invasive, available and low-cost imaging test and in patients with pulmonary hypertension (PH) is performed to the detection of the effects of PH on the heart, to estimate the pulmonary arterial pressure and to suppose the causes of this pathophysiological disorder. Speckle tracking echocardiography is a quantitative ultrasound technique that describes myocardial deformation (strain) during the cardiac cycle. The right ventricular (RV) myocardial strain analysis could represent a sensitive tool for an earlier detection of RV disfunction and a determinant for risk assessment in this set of patients.

**Objectives.** The aim of our study is to evaluate the role of the speckle tracking echocardiography describing RV performance in patients with PH through 1) a correlation analysis between the strain data and two common parameters of RV function, commonly used in clinical practice and 2) evaluation of the inter-operator reproducibility of these data.

**Methods.** We enrolled 15 patients with PH; a transthoracic echocardiogram was performed with the sampling of the traditional parameters of RV function: the tricuspid annular plane systolic excursion (TAPSE) and the fractional area change (FAC). Two different operators calculated the RV free wall peak of systolic longitudinal strain (obtained by averaging the basal, middle and apical lateral peak systolic strains**)** during an off-line analysis**.**

**Results.** RV free wall peak of systolic longitudinal strain and the two traditional and validated parameters of right ventricular function showed good correlation: TAPSE (with r coefficient = -0.7) and FAC (with r coefficient = -0.66). The RV free wall peak of systolic longitudinal strain was pathological in 60% of patients, while TAPSE and FAC were altered only in 33% and 27% of cases, respectively. Furthermore, an excellent correlation emerged between the values obtained by the two different operators (coefficient r = 0.93), confirming a good reproducibility of the speckle-tracking echocardiography. No significant correlation was obtained between the variables under study and the anatomical data of the end-diastolic and end-systolic RV areas.

**Conclusion.** From these preliminary data we could affirm that in the population of patients with PH the speckle tracking echocardiography is a reproducible, non-invasive, low-cost index of the right ventricular function and strain data are complementary to those traditionally used in diagnosis and follow-up of these patients. It could also be configured as a more sensitive method compared to TAPSE and FAC in identifying an initial dysfunction of the right ventricle in this population.

### A709: THROMBOEMBOLIC PULMONARY HYPERTENSION: A SHARED THERAPEUTIC DIAGNOSTIC PATH

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(a) CARDIOLOGIA AOU SAN GIOVANNI DI DIO E RUGGI D'ARAGONA,PLESSO G.FUCITO,MERCATO SAN SEVERINO-SALERNO; (b) CARDIOLOGIA AOU SAN GIOVANNI DI DIO E RUGGI D'ARAGONA.PLESSO SANTA MARIA INCORONATA DELL'OLMO,CAVA DEI TIRRENI,SALERNO; (c) CARDIOLOGIA INTENSIVA AOU SAN GIOVANNI DI DIO E RUGGI D'ARAGONA,PLESSO RUGGI,SALERNO; (d) CLINICA CARDIOLOGICA AOU SAN GIOVANNI DI DIO E RUGGI D'ARAGONA,SALERNO; (e) CLINICA DI MALATTIE DELL APPARATO RESPIRATORIO AOU SAN GIOVANNI DI DIO E RUGGI D'ARAGONA,SALERNO; (f) EMODINAMICA AOU SAN GIOVANNI DI DIO E RUGGI D'ARAGONA,SALERNO; (g) CARDIOLOGIA RIABILITATIVA AZIENDA OSPEDALIERA DI RILIEVO NAZIONALE CARDARELLI, NAPOLI

**Introduction.** Chronic thromboembolic pulmonary hypertension (CTEPH) is the only class of pulmonary hypertension that can be treated by pulmonary endoarteriectomy (PEA), thus it is relevant that all cases of CTEPH are early detected and evaluated in an Expert Centre.
Clinical suspicion of CTEPH should be high in patients with previous episodes of venous thromboembolism and/or pulmonary embolism, furthermore the severity of the onset clinical situation allows to make a prognostic stratification in the short and medium term. Patients with a main diagnosis of pulmonary embolism should have a unified outpatient follow-up pathway regardless of the areas of admission (cardiology, pneumology, internal medicine, surgery and intensive care unit) in order to monitor anticoagulant therapy, reducing the possibility of bleeding and preventing new thromboembolism events.
**Methods.** The algorithm for the diagnosis and management of CTEPH adopted by our University Hospital expected in patients with symptoms an echocardiogram 3 months after the acute episode that it is followed by a pulmonary ventilator and perfusional scintigraphy and/or chest CT angiography if there is the suspect of pulmonary hypertension. If suggestive signs of CTEPH are found, the patient is referred to an PEA Expert Centre for surgical assessment.
**Discussion.** PEA allows the majority of patients to restore a normal quality of life; long-term survival of patients having surgery is comparable with that of the general population with extremely low operating mortality rates (2-3%). For patients with persistence or recurrence of pulmonary hypertension or judged inoperable, is adopted a specific therapy. In the event that maximum medical therapy is ineffective, the patient is evaluated for lung transplantation. Moreover, for inoperable patients in medical treatment there is the possibility of a new experimental angioplasty of the pulmonary arteries.
**Conclusions.** The shared diagnostic therapeutic pathway is proving to be a useful tool in ensuring appropriate performance and spending restraint. The choice and monitoring of process and outcome indicators according to the pathway verify the goodness of the pathway and ensure continuous improvement.

### A710: EFFECTS OF SILDENAFIL ON RIGHT VENTRICULAR SYSTOLIC FUNCTION IN PULMONARY ARTERIAL HYPERTENSION

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**Introduction.** In pulmonary arterial hypertension (PAH) the right ventricle (RV) adaptation to effort the increased afterload of the pulmonary circulation depends on the RV ability to increase its systolic performance. RV function remains the main determinant of prognosis in these patients.
The objective of our study is whether in-chronic Sildenafil therapy affects RV systolic performance assessed invasively by right heart catheterization (RHC).
**Materials and methods.** We enrolled in the Policlinico of Modena 84 consecutive patients affected by PAH of different etiologies who underwent a baseline and at 6-months RHC after the initiation or adjunction of Sildenafil in therapy. Primary end-points were: 1) Change in RV stroke volume (RVSV), in pulmonary vascular resistance (PVR), both assessed by right heart catheterization (RHC), from baseline to 6 months.
**Results.** In our population, we showed at 6-months a significative improvement of RVSV and reduction in PVR (+16.6 mL, p<0.0001; 37% reduction, p<0.0001). Moreover, we observed an improvement of cardiac index and a reduction of mean arterial pressure (mPAP) (+ 0.41, p<0.01; -8.32, p<0.001). In a subgroup of 34 patients, we performed RV ventriculography during RHC and we found an improvement in RV ejection fraction at 6-months (+12.8, p<0.0001).
**Conclusion.** In our PAH population, Sildenafil therapy had a direct and positive impact on RV systolic function and other hemodynamic parameters assessed by RHC.

### A711: CONFRONTO TRA ECOCARDIOGRAFIA 3D E RISONANZA MAGNETICA CARDIACA NELLA VALUTAZIONE DEL VENTRICOLO DESTRO IN PAZIENTI CON CARDIOPATIA CONGENITA DOPO SOSTITUZIONE DELLA VALVOLA POLMONARE

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**Background.** La valutazione del ventricolo destro (VD) in pazienti con cardiopatia congenita dopo sostituzione della valvola polmonare (SVP) è fondamentale per una ottimale gestione clinica del paziente tuttavia è difficile da ottenere mediante ecocardiografia 2D. La risonanza magnetica cardiaca (RMC) è considerata il gold standard per la quantificazione di volumi, funzione e spessori del VD. L'ecocardiografia 3D (3DE) può costituire un'alternativa più rapida per esaminare dettagliatamente il cuore destro.
**Obiettivo.** L'obiettivo di questo studio è la valutazione del significato clinico e della sovrapponibilità di RMC e 3DE nella valutazione del VD in pazienti con cardiopatia congenita dopo SVP.
**Metodi.** Dal 2014 al 2017 abbiamo sottoposto 51 pazienti a 3DE e RMC al fine di eseguire una valutazione quantitativa del VD in termini di volume telediastolico (VTD), volume telesistolico (VTS) e frazione d'eiezione (FE). Questi parametri sono stati misurati con entrambe le metodiche utilizzando i software attualmente in commercio (Tomtec – Germany – per 3DE e Medis Suite – Netherlands – per RMC). Per confrontare le metodiche sono sono state eseguite le seguenti analisi statistiche: paired T test, Bland Altman e correlazione di Pearson. La RMC è stata considerata come reference standard.
**Risultati.** In 36 pazienti (71% della popolazione totale) la qualità delle immagini era adeguata in entrambe le metodiche e sono stati inclusi nello studio. 3DE e RMC sono stati eseguiti lo stesso giorno nel 75% dei pazienti. VTD medio ed il VTS medio sono risultati significativamente maggiori alla RMC rispetto al 3DE (Tabella). Le differenze tra le due tecniche sono state più evidenti in pazienti con dilatazione del VD riscontrata alla RMC. La FE è risultata lievemente minore alla RMC rispetto al 3DE (49,5% vs 52,9%; ns). L'analisi di Bland Altman ha dimostrato che il 3DE ha sottostimato significativamente il VTD e il VTS, rispettivamente del 12% e del 15%, mentre ha sovrastimato la FE dell'8% rispetto alla RMC. L'analisi mediante regressione lineare ha mostrato una moderata correlazione tra 3DE e RMC (VTD r=0.42; VTS r=0.53; FE r=0,31; p< 0.001).
**Conclusioni.** Le misure quantitative di volumi e FE del VD mediante 3DE e RMC in pazienti con cardiopatia congenita e SVP mostrano differenze statisticamente significative e clinicamente rilevanti. In particolare il 3DE sottostima significativamente i volumi e sovrastima la FE. La correlazione tra le due metodiche 3DE e RMC è moderata.

### A712: A DYSPNEA WITH SURGICAL INDICATION

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**Background.** Dyspnea affects up to 25% of the patients observed in a clinic; it can result from multiple underlying conditions and without an effective etiological treatment it is a short-term negative prognostic factor.
**Case report.** The patient S.G., 70 years, arrived at our cardiology clinic for worsening dyspnea, which had been present for 2 years. In patient history: previous removal of right pulmonary echinococcus cysts, deep vein thrombosis of the right popliteal vein, high blood pressure and previous smoking habit. Normal cardiac and thoracic physical examination, but evidence of lower limb edemas; electrocardiogram showed sinus rhythm and incomplete right bundle block. Echocardiography showed signs of pulmonary hypertension (PAPS 65 mmHg) without left ventricle disease. The patient performed chest CT angiography that documented bilateral pulmonary thromboembolism and started oral anticoagulants. Laboratory tests showed: hyperhomocysteinemia with heterozygous mutation of MTHFR and absence of autoimmune disease. Spirometry documented a medium degree airway obstruction, not reversible after administration of b2-adrenergic bronchodilator; DLCO 79% of the standard. A.B.G.: marked hypoxemia with normocapnia (pH 7.45, PaCO2 32.7 mmHg, PaO2 58.7 mmHg). After 3 months of oral anticoagulant therapy, the TTE showed persistence of dilation of the right chambers with D-shape left ventricle and small circle pressures still severely increased, while the echocolordoppler of lower limbs was normal. Lung scintigraphy showed multiple defects, compatible with bilateral pulmonary thromboembolism; chest CT angiography showed marked indirect lung signs of chronic thromboembolism disease, vascular asymmetry and diffuse mosaic

perfusion aspects with scars of previous pulmonary infarctions, without alterations of the pulmonary interstitial tissue: chronic thromboembolic disease was confirmed with thrombotic material already in the main branches. Consequently, the patient was referred to a center experienced in pulmonary endarterectomy (PEA), where he had right catheterization which concluded for severe pre-capillary pulmonary hypertension (pulmonary artery pressure 101/56/28 mmHg, wedge 5 mmHg, RVP 1028 dyne*sec*cm$^{-5}$) and significant reduction of cardiac index (2 l/min/m2). Therefore, filter placement was made in inferior vena cava at the subrenal level through right jugular vein; then, was performed bilateral PEA. At scintigraphic control was obtained perfusion improvement and right catheterization showed: 55% reduction in lung pressures (25 vs 56 mmHg), 85% of RVP (154 vs 1028 dyne*sec*cm$^{-5}$) and an increased cardiac index (2.6 vs 2 l/min/m2).

**Discussion and conclusion.** Chronic thromboembolic pulmonary hypertension (CTEPH) is a pathological condition linked to unabsorbed and fibrous organization of the thrombus within the pulmonary artery lumen following an acute pulmonary embolism and PEA is the gold standard for restoring cardiorespiratory function to a state of near-normality. In the case of our patient, the instrumental examinations performed showed the excellent success of the surgery with the interruption of home O2 therapy. The challenge remains the clinical suspicion for an early diagnosis with multidisciplinary approach, because in more than 50% of cases the episode of acute pulmonary embolism goes unnoticed.

### A713: UN'IPERTENSIONE POLMONARE INTRIGANTE

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**Introduzione.** L'ipertensione polmonare (PH) secondo le Linee Guida ESC 2015 è definita da una pressione arteriosa polmonare media ≥ 25 mmHg a riposo, può associarsi a multiple condizioni cliniche e solitamente all'esordio si manifesta con la dispnea. Riportiamo un caso di ipertensione polmonare con un'insolita presentazione in cui un corretto iter diagnostico ha favorito un precoce inquadramento.

**Caso clinico.** Una donna di 52 aa veniva inviata presso l'Ambulatorio Ipertensione Polmonare per recente embolia polmonare in NAO e TIA da embolia paradossa per ampio aneurisma del SIA con PFO. In anamnesi patologica remota Sindrome di Sjögren. L'ETT evidenziava ventricolo destro ingrandito con ridotta funzione di pompa (TAPSE 14 mm), atrio destro ingrandito, rigurgito tricuspidale lieve con velocità max 4 m/s che unitamente alla distensione con ipocollassabilità della vena cava inferiore era indicativo di alta probabilità di PH sistolica severa (74 mmHg). Il ventricolo sinistro appariva normofunzionante. L'ECG documentava R.S. e blocco di branca destra incompleto. E.O. negativo. La spirometria dimostrava una patologia restrittiva lieve con lieve riduzione della DLCO; alla scintigrafia polmonare non deficit significativi della perfusione. L'eco-Doppler venoso degli arti inferiori e l'angioTC torace escludevano una tromboembolia polmonare cronica ricorrente. Si procedeva a ricovero in Cardiologia per eseguire cateterismo destro che concludeva per ipertensione arteriosa pre-capillare di grado severo (PAPm 51 mmHg; PCWP 12 mmHg; RAP 13 mmHg), marcato aumento delle resistenze vascolari polmonari (RPV 12 wood), riduzione della gittata cardiaca (CO 2.28 L/min/m2) e dell'indice cardiaco (IC 1,76 l/min/m2). Al CPET capacità funzionale severamente ridotta (piccoVO2 9 ml/min/kg) su base prevalentemente cardiogena con segni di alterati scambi alveolo-capillari. Le teleangectasie del volto, la microchelia, la facies amimica, l'ispessimento cutaneo delle dita di entrambe le mani, il dato anamnestico di ripetuti episodi di fenomeno di Raynaud e di dattiliti, insieme all'elevazione degli indici di flogosi e la positività di Ab anti-Ag intracel. ANA (pattern centromerico), conducevano alla diagnosi definitiva di sclerosi sistemica con secondaria ipertensione arteriosa polmonare (PAH - gruppo 1) di grado severo. Veniva iniziata terapia di combinazione specifica con inibitori recettoriali dell'endotelina (Macitentan) ed inibitori della degradazione dell'ossido nitrico (Riociguat) oltre ad ossigenoterapia, terapia cortisonica e con micofenolato mofetile. Il controllo a tre mesi evidenziava miglioramento clinico (classe NYHA II), riduzione del BNP (50 ng/l) ed incremento del VO2 di picco (13 ml/kg/min), con successiva interruzione dell'ossigenoterapia domiciliare.

**Discussione e conclusioni.** La PAH è una patologia di difficile diagnosi, poiché si iscrive nel quadro clinico di patologie complesse come le connettiviti, specie la sclerosi sistemica. Una precoce diagnosi ed un tempestivo intervento terapeutico con terapia di combinazione iniziale ha avuto un impatto favorevole sulla prognosi nel nostro caso.

## CARDIOPATIA ISCHEMICA – 1
## Sessione Poster

### A714: PRIMARY ANGIOPLASTY VERSUS EARLY FIBRINOLYSIS: THE ROLE OF REPERFUSION DELAY

Peter Louis Amaduzzi (a), Sasko Kedev (b), Oliver Kalpak (b), Goran Stankovic (c), Zorana Vasiljevic (c), Maria Vavlukis (b), Davor Milicic (d), Sasa Pavasovic (d), Akos Koller (e), Lina Badimon (f), Raffaele Bugiardini (a), Olivia Manfrini (a)
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**Background.** Although primary angioplasty has been shown to be superior to fibrinolysis in terms of clinical benefit, the influence of total ischemic time is essential for positive outcomes in both reperfusion strategies. The aim of this study was to compare the effects of reperfusion delay in primary percutaneous coronary intervention compared to fibrinolysis.

**Methods.** We identified 7406 ST-elevation myocardial infarction patients, of which 6315 underwent primary percutaneous intervention and 1091 were given fibrinolysis, arriving within 12 hours from symptom onset at hospitals participating in the ISACS-TC (International Survey of Acute Coronary Syndromes in Transitional Countries) registry (NCT01218776) from 2010 through 2017. The primary endpoint was 30-day all-cause mortality while the secondary endpoint consisted in the combination of 30-day incidence of all-cause mortality, severe heart failure, stroke, and reinfarction.

**Results.** The median delay between symptom onset and reperfusion was 187 min in the fibrinolysis group and 252 in the primary angioplasty group. Among those receiving fibrinolysis, 42.9% underwent coronary angiography and 32.3% received percutaneous coronary intervention. The rate of all-cause mortality at 30 days was 7.8% in the fibrinolysis group and 4.1% in the primary angioplasty group (p<0.0001), while the rates of the secondary endpoint were 14.8% and 10.1%, respectively (p<0.0001). However, among patients receiving reperfusion within 3 hours, no differences in the rates of mortality (6.3% vs 3.9%, p=0.069; OR 1.24, 95% CI, 0.58-2.66) or in the rates of the secondary combined endpoint (13% vs 11.1%, p=0.342; OR 1.02, 95% CI, 0.65-1.62) were observed.

**Conclusions.** Timely fibrinolysis, combined with percutaneous coronary intervention when necessary, is as effective primary angioplasty in ST-elevation myocardial infarction patients treated within 3 hours from symptom onset.

### A715: PRIMARY PERCUTANEOUS CORONARY INTERVENTION IN NONAGENARIAN PATIENTS

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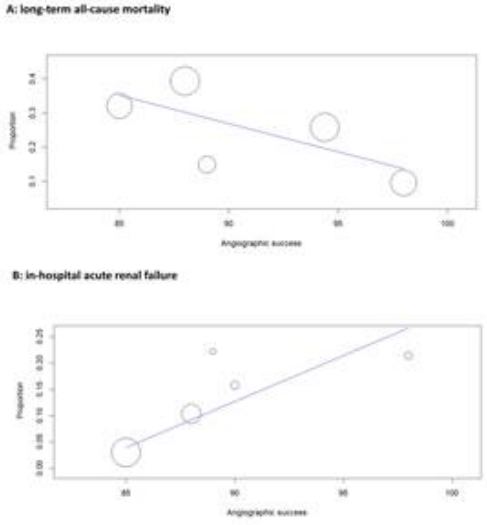
**Background.** Given the continuous increase in life expectancy, the number of elderly patients with ST segment elevation myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (pPCI) is growing. However, this population is usually excluded from randomized trials and limited data are available to drive clinical decisions. The aim of this study-level meta-analysis was to describe and analyze the determinants of outcomes in this population.

**Methods.** We searched the literature for studies reporting ischemic and hemorrhagic outcomes and/or mortality in nonagenarian patients undergoing pPCI. Pooled analysis of incidence was performed with random effect. Endpoints of interest were in-hospital and long-term mortality and in-hospital stroke, bleeding and acute renal failure (ARF. A univariate meta-regression analysis was conducted to explore the relationship between outcomes of interest and patients and procedural characteristics.

**Results.** Overall, 14 observational studies met our inclusion criteria, with a total of 6704 patients; mean age was 92 ± 0.58, 38% were male and mean follow-up was 9 months. Meta-analytic pooling of event rates showed an in-hospital mortality of 22.5% (95% CI 17.8% - 27.2%; $I^2$: 75%) and a long-term rate of death of 20.4% (95% CI 10.4% - 30.4%; $I^2$: 84%); the incidence of in-hospital major bleeding was 2.3% (95% CI 0.6% - 4.0%; $I^2$: 25%), while the rate of in-hospital blood transfusion was 6.9% (95% CI 0.3% - 13.6%; $I^2$ 62%). In-hospital ARF occurred in 11.1%of patients (95% CI 5.8% - 16.3%; $I^2$ 68%) and 1.4% of patients suffered an in-hospital stroke (95% CI 0.2% - 2.7%; $I^2$: 0%). At meta-regression analysis: Killip III-IV at admission was related with increased in-hospital mortality (β: 0.2%; p: 0.041); angiographic success (β: -1.7%; p: 0.017; figure A) and the use of IABP (β: 6.5%; p <0.001) were associated with a

lower incidence of long-term all-cause mortality but angiographic success came at the cost of a higher incidence of ARF (β: 1.7%, p <0.001; figure B). A higher long-term all-cause mortality was related with male gender (β: 0.9%; p: 0.027) and previous MI (β: 1.5%; p: 0.007). History of MI (β: 0.1%p: 0.049), as well as the use of GPI (β: 0.1%; p: 0.04) were associated with a higher incidence of in-hospital major bleeding.




**Discussion**. Our meta-analysis, pooling the largest cohort of nonagenarians undergoing pPCI confirms the feasibility of urgent percutaneous coronary intervention also in this high-risk population. In particular, although angiographic success increased the incidence of in-hospital ARF, it was associated with a higher long-term survival, underling that pivotal role of myocardial reperfusion.

### A716: TRATTAMENTO PERCUTANEO DI UN VOLUMINOSO EMATOMA TARDIVO DEL VENTRICOLO DESTRO IN ESITI DI PERFORAZIONE CORONARICA

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Un uomo di 78 anni, iperteso e dislipidemico, giunge in pronto soccorso per NSTEMI. All'ecocardiogramma la cinesi globale e segmentaria del ventricolo sinistro è conservata e non sono presenti valvulopatie di rilievo. Alla coronarografia viene evidenziata una coronaropatia trivasale con stenosi critiche della coronaria destra dall'ostio al tratto medio-prossimale, dell'arteria discendente anteriore ostiale e media, e della arteria circonflessa al tratto medio. Visto lo score Syntax e dopo discussione con il paziente si decide di procedere a rivascolarizzazione miocardica percutanea, per cui nella stessa seduta si procede ad angioplastica con impianto di due stent medicati su coronaria destra al tratto pstio-prossimale ed al tratto medio; durante la procedura si verifica una perforazione coronarica da filo guida Ellis tipo 2 a carico di un ramo di biforcazione di IVP, che si risolve con gonfiaggio prolungato di pallone.
Dopo 3 giorni viene eseguito un controllo coronarografico che mostra buon risultato della recente PCI su coronaria destra, e si procede ad angioplastica con impianto di due stent medicati su tronco comune verso arteria discendente anteriore e su arteria discendente anteriore al tratto medio. Ai controlli ecocardiografici dopo la prima PCI e predimissione il quadro appariva invariato rispetto al ricovero e si escludeva la presenza di versamento pericardico. Dopo 22 giorni dalla dimissione il paziente giungeva in pronto soccorso per dolore toracico oppressivo da alcune ore, e agli ematochimici si osservava un rialzo della troponina. Veniva eseguito un ecocardiogramma che mostrava una massa a livello del ventricolo destro. Veniva quindi eseguita una TC cardiaca che mostrava un voluminoso ematoma (5.4x3.2X3.7 cm) a livello della parete libera del ventricolo destro. Vista la recente insorgenza del dolore toracico di decideva per controllo coronarografico che mostrava uno pseudoaneurisma di parete a livello del vaso perforato durante la prima PCI. Veniva quindi eseguita embolizzazione con singola spirale a rilascio controllato. Al controllo TC predimissione era evidente una riduzione delle dimensioni dell'ematoma (4.8x2,8x3.2 cm), con la spirale visibile proprio all'interno dello stesso.
Seppur nella maggioranza dei casi le perforazione coronariche dopo risoluzione acuta non portano a problematiche a distanza, questo caso mostra come la sorveglianza debba essere sempre alta anche a distanza. Il trattamento percutaneo, la cui efficacia è stata mostrata dalla presenza della spirale all'interno dell'ematoma, ha permesso di bloccare il sanguinamento in atto e di evitare ulteriori complicanze come la rottura della parete libera del ventricolo o la disfunzione ventricolare destra.

### A717: PARACRINE ACTIVITY OF CARDIAC PROGENITOR CELLS IS EXERTED THROUGH THE RELEASE OF EXOSOMES THAT AFFECT BOTH CELLULAR AND EXTRACELLULAR COMPARTMENT

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Exosomes are nano-vesicles released in body fluids and culture media by several types of cells, including stem cells. These small extracellular vesicles are loaded with a cargo of proteins, lipids, mRNA, miRNA, DNA and specific factors that they convey from one cell to another. Therefore, exosomes are involved in cellular intercommunication and signaling and can influence numerous biological mechanisms like cell death, proliferation and differentiation.
We hypothesize that cardiac progenitor cells (CPCs) exert the paracrine effects that direct cardiac regeneration and remodeling by delivering exosomes to the injured myocardium. To test our hypothesis, we isolated CPCs (CPC-N) from the heart of donors, and CPCs (CPC-P) and fibroblasts (CF-P) from the heart of patients undergoing heart transplantation. First, we cultured CPC-N and collected the exosomes they released in the culture medium (Exo-CPC-N). Then, we characterized Exo-CPC-N cargo, in terms of mRNA and growth factors, and analyzed their effects on proliferation, migration and apoptosis of CPC-P as well as on extracellular matrix synthesis and deposition by CF-P, by administering Exo-CPC-N to CPC-P and CF-P *in vitro*. Real-Time PCR analysis revealed that Exo-CPC-N carry specific transcripts for proteins involved in cardiac (Nkx2.5, Mef2C, ACTC1, TBX, GATA6, ACTA2) and mesenchymal differentiation (TM4SF1, Sox9, CD90, CD105), while growth factor array showed the presence of specific factors as HGF, IGF, TGF that are known to enhance cell proliferation, growth and migration. When administrated to CPC-P, Exo-CPC-N not only increased CPC-P proliferation rate and resistance to apoptosis induced by oxidative stress, but also induced the differentiation towards cardiac myocytes as testified by the expression of a well-structured alpha-sarcomeric actin resulting at the immunofluorescence analysis. Additionally, Exo-CPC-N modulated *in vitro* the CF-P deposition of ECM proteins typical of the cardiac matrix, like collagen IV, fibronectin and laminin.
Our study strengthens the hypothesis that exosomes are mediators of CPCs regenerative effects with the potential to empower the regenerative potential of resident cells through the spread of tailored molecules, and are, then, to be considered as a promising alternative to cardiac cell therapy.

### A718: ANEURISMA CORONARICO: TRA RISCHIO ISCHEMICO E RISCHIO EMORRAGICO

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(a) POLICLINICO TOR VERGATA

La dilatazione coronarica, focale o diffusa, superiore di almeno 1.5 volte il diametro maggiore del segmento coronarico adiacente viene definita aneurisma (AC) se coinvolge meno del 50% della lunghezza del vaso oppure ectasia (EC) se colpisce almeno la metà della lunghezza del vaso. La sua incidenza varia tra l'1.2% e il 5% dei soggetti sottoposti a coronarografia, con una prevalenza tra maschi e femmine di 3:1. Gli AC coronarici vengono distinti dagli pseudoaneurismi poiché coivolgono tutte e tre gli strati della parete vasale. Sulla base della loro morfologia possono essere classificati in sacculari o fusiformi. L'eziologia di queste anomalie coronariche più frequente è l'aterosclerosi, seguita dalle forme congenite. Nel 30-50% dei casi si presentano come sindrome coronarica acuta (SCA) per l'instabilità della placca aterosclerotica all'interno dei segmenti ectasici.
Descriviamo il caso di un uomo di 56 anni, caucasico, iperteso, dislipidemico, fumatore, con familiarità per CAD. Il paziente giungeva alla nostra attenzione per dolore toracico irradiato al giugulo con aumento dei marker di necrosi miocardica, in assenza di alterazioni elettrocardiografiche suggestive di ischemia miocardica. Veniva effettuata un'angiografia coronarica che documentava malattia trivasale per cui si procedeva a rivascolarizzazione miocardica percutanea con impianto di stent medicati su arteria discendente anteriore, arteria circonflessa e arteria coronaria destra. Un ulteriore reperto angiografico era rappresentato da multipli tratti ectasici a livello del tratto medio dell'arteria coronaria destra con trombosi endoluminale eccentrica. Tale lesione è stata trattata tramite esclusione con stent medicato. In tale maniera veniva evitata la necessità di aggiungere alla terapia antiaggregante una terapia anticoagulante nonché la possibilità di microembolizzazione del materiale trombotico ai segmenti coronarici distali.
La trombosi intra-aneurismatica, in assenza di una lesione ostruttiva coronarica, può essere la causa di ripetute disseminazioni di microemboli nei segmenti vascolari distali alla dilatazione oppure all'occlusione trombotica livello dell'AC. L'angiografia coronarica è il gold standard per la diagnosi e la classificazione degli AC. Gli AC si presentano anche in setting di elevato burden ischemico, ponendo un dilemma circa il corretto

bilanciamento tra rischio emorragico ed ischemico. Un'adeguata strategia terapeutica permette la gestione di queste alterazioni coronariche minimizzando il rischio di sanguinamenti.

### A719: UN CURIOSO CASO DI ST SOPRAELEVATO BRUGADA LIKE NELLE DERIVAZIONI INFERIORI CAUSATO DA VASOSPASMO CORONARICO

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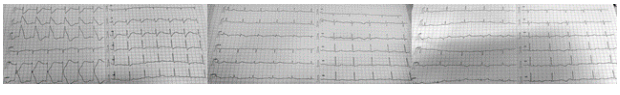
**Background.** L'angina vasospastica è causata da vasocostrizione improvvisa di un segmento di una arteria epicardica che può causare ischemia miocardica transiente con sopraslivellamento del tratto ST all'elettrocardiogramma (ECG); se prolungata può portare a necrosi del tessuto miocardico. Dal 30 al 64% dei pazienti presenta vasospasmo su coronarie angiograficamente normali, esso è favorito da abitudini tabagiche, alcol e cocaina. La sindrome di Brugada (BrS) è invece una patologia ereditaria aritmogena con ECG diagnostico caratterizzato da elevazione del tratto ST tipo coved nelle derivazioni precordiali destre (spesso intermittente) solitamente non associata a malattie strutturali del miocardio. Le due sindromi tuttavia non sono generalmente correlate fra loro, sebbene non ne sia possibile escludere la coesistenza.
**Case report.** Donna italiana di 57 anni, ipertesa, dislipidemica, con apnee ostruttive e abitudine tabagica attiva, accedeva al PS del Policlinico Umberto I dopo arresto cardiocircolatorio insorto dopo episodio di dolore toracico durante attività lavorativa, sottoposto ivi a rianimazione e shock 200 J con ripristino di circolo spontaneo. Un mese prima la paziente, per episodi di dolore toracico della durata di alcuni minuti, veniva sottoposta a coronarografia diagnostica che mostrava coronarie esenti da stenosi angiograficamente significative e lento flusso. All'arrivo presso il PS si eseguiva nuovamente studio coronarografico che documentava vasospasmo del tratto prossimale della coronaria destra, regredito dopo somministrazione di nitrati intracoronarici. Successivamente un ECG, eseguito durante riscontro al monitor di ritmo normofrequente a complessi QRS larghi, documentava coved ST –segment elevation nelle derivazioni inferiori (II, III e aVF) e cambiamenti speculari in I e aVL. 30 secondi dopo si verificava regressione del ST segment elevation e comparsa di onda T negativa nelle derivazioni inferiori ed ulteriori 40 secondi dopo, si assisteva a normalizzazione della fase di ripolarizzazione anche nelle medesime derivazioni; si iniziava infusione nitrati e somministrazione di calcio antagonisti. Nessun nuovo episodio di alterazione del tratto ST è stato più registrato. Data la caratteristica elevazione del tratto ST tipo Coved e la descrizione in letteratura di Brugada fenocopia, veniva eseguito nei giorni a venire test alla Flecainide, risultato negativo per pattern di Brugada inducibile. Si ovviava pertanto a esecuzione test genetico per mutazioni SCN5A data la bassa sensibilità (30-40%) rispetto ai test provocativi.



**Discussione.** Il caratteristico pattern Brugada like della paziente nelle derivazioni inferiori, esclusa la BrS con test provocativo, depone per vasospasmo coronarico, unitamente ai risultati angiografici. La causa del pattern fenocopia Brugada potrebbe essere il vasospasmo dell'arteria conica, primo ramo della coronaria destra, che fornisce sangue al tratto di efflusso ventricolare destro (RVOT). Tale spasmo può portare a ritardo di conduzione ventricolare e dispersione della velocità di conduzione nel RVOT, con anomalie dell'ECG e aritmie ventricolari, causate da alterazioni del potenziale d'azione e del gradiente di membrana, con meccanismi aritmogeni simili alla BrS indotti dall'ischemia (quali inattivazione dei canali del sodio).

### A720: PROGNOSTIC ROLE OF THE MULTIDIMENSIONAL PROGNOSTIC INDEX (MPI) IN ELDERLY PATIENTS WITH ACUTE CORONARY SYNDROME

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(a) POLICLINICO TOR VERGATA

**Background.** Management of elderly patients with acute coronary syndrome (ACS) is challenging due to lack of knowledge about the link between fragility, outcomes and interventional procedures. The aim of this study was to establish the prognostic role of the Multidimensional Prognostic Index (MPI) at the time of hospitalization in elderly patients with ACS.
**Methods.** A total of 126 patients with ACS and age ≥ 65 y.o. were continuously enrolled in this prospective observational study from March 2018 to July 2019. The comprehensive geriatric assessment was performed using the MPI in all patients. Our study population was divided into three groups of MPI score, low risk (MPI-1 value ≤ 0.33), moderate risk (MPI-2 value 0.34–0.66), and severe risk of mortality (MPI- 3 value ≥0.67). The primary end-point was in-hospital mortality, and 30-days and 6-months mortality.
**Results.** Mean age of patient population was 75.34±7.23 y.o. Mean MPI score was 0.36±0.17. Sixty-nine patients (54.8%) belonged to MPI-1 group, 47 (37.3%) to MPI-2 group and 10 to MPI-3 group (7,9%). FE was significantly different between groups (44,4±10%, 40,7±11%, 34±12%, p <0,024). In hospital and 30-days mortality rate were significantly different between the three MPI groups (0%, 12 %, 20%, p<0.001; 0%, 0%, 12,5 %, p<0.001, respectively). Kaplan Meier 6-month survival stratified by MPI groups was significantly different (99%, 98%, 70%, LogRank 21,897, p <0.001). MPI-2 group had a significantly higher rate of intra-hospital complications, particularly acute pulmonary edema (11,6%, 8,5%, 40%, p= 0,02) and heart rupture (0%, 2,1%, 20%, p= 0,001). Moreover, MPI-0 group had a significantly lower rate of pneumonia (14 %, 40 %, 50 %, p=0,005) and need for antibiotic therapy (p<0,05).
**Conclusion.** In the setting of ACS, baseline MPI may be very useful in the daily clinical practice to manage older patients and predict risk of in-hospital complication. Additionally the MPI score influences in-hospital mortality and 1-month mortality.

### A721: MULTIPLE MYOCARDIAL INFARCTIONS IN A YOUNG CADASIL PATIENT WITH SUSPECTED FABRY DISEASE

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**Background.** Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) is the most common single-gene disease causing damage of the small blood vessels of the brain and leading to subcortical cerebrovascular disease. It is caused by mutations in the NOTCH3 gene, affecting the number of cysteines in the extracellular domain of the receptor, causing protein misfolding, receptor aggregation and eventually degeneration and loss of vascular smooth muscle cells. Although a systemic angiopathy, the most common clinical manifestations are confined to the central nervous system, while the involvement of other vascular beds, such as coronary macro- and microcirculation, is still debated.
**Case report.** A 49-year-old male CADASIL patient with history of early revascularized anterior STEMI and multiple lacunar cerebral infarcts, carrier of both the R1006C pathogenetic mutation in the exon 19 of the CADASIL NOTCH3 gene and an α-galactosidase genetic variant of unknown/uncertain significance (intron 4, c639+6>C), was referred to our cardiac magnetic resonance (CMR) laboratory to rule-out Fabry cardiomyopathy. CMR study showed mildly impaired left ventricular systolic function with akinetic mid-basal inferior segments and no left ventricular hypertrophy. Late post-contrast PSIR images showed areas of subendocardial late-gadolinium enhancement (LGE) with transmural extent >75% and a central hypoenhanced rim of the mid inferior wall. Modified look-locker inversion recovery (MOLLI) native T1 maps showed increased T1 values matching areas of LGE, but normal T1 and T2 mapping values within the remote myocardium, likely excluding sphingolipid storage in the myocardium. Neither regional wall motion abnormalities, nor LGE were found in the left coronary artery territory, indicating complete myocardial salvage after primary PCI. CMR findings were in keeping with the presence of clinically occult inferior transmural infarction with circumscribed microvascular obstruction, in the absence of any feature of Fabry disease.
**Discussion.** We reported the case of a young CADASIL patient with history of multiple myocardial infarctions and lacunar stroke, carrier of a GLA gene variants of uncertain significance, where the unrivaled versatility of CMR imaging allowed (i) to rule-out the suspicion of concurrent Fabry disease; (ii) to assess the efficacy of prior LAD-PCI early revascularization by post-infarction salvaged myocardium assessment; and (iii) to reveal the presence of clinically occult inferior myocardial infarction with evidence of microvascular obstruction requiring further cardiological assessment. In a series of 15 CADASIL Dutch families, NOTCH3 mutation carriers presented a higher frequency of early acute myocardial infarction than non-mutation carriers; these findings were explained by reduced vascular reactivity and diminished vasodilator reserve due to coronary microvascular involvement. Interestingly, pathologic examination of myocardial tissue revealed typical CADASIL arteriopathic changes of the coronary microvasculature, i.e. presence of granular osmiophilic material, rarefaction of vascular smooth muscle cells, and positive staining with NOTCH3 antibody.
**Conclusion.** Whether ischemic heart disease is part of manifestation of CADASIL is still uncertain, however, both cardiologists and neurologists should be alerted that CADASIL patients may be at increased risk of ischemic heart disease. Further investigation is warranted to clarify the epidemiological relationship between CADASIL and coronary artery disease, and to better understand the underlying pathophysiological mechanisms.

### A722: ISCHEMIC HEART DISEASE AND DEPRESSION

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The relationship between depression and cardiovascular diseases is already known. Since 1628, William Harvey wrote: “every affection of the mind that is attended either with pain or pleasure, hope or fear, is the cause of an agitation whose influence extends to the heart”. The aim of this chapter is to evaluate the link between depression and coronary artery diseases (CAD).

The linkage between these two clinical conditions is well-established on a patho-physiological point of view. Different mechanisms had been proposed in order to explain such relationships. Pathophysiologic changes, behavioral issues, medication adherence and side effects are the main determinants of the linkage between depression and CAD. Depressive mood is able to alter autonomic system regulation of cardiovascular system: depression increases noradrenaline production which reduces the threshold for ischemia and ventricular tachycardia/fibrillation induction, as well as endothelial dysfunction. Pro-inflammatory and pro-coagulant conditions seem to be over-express in depression condition. An increased production of interleukin-6 and C-reactive protein is a common condition in depression, as well as the higher level of platelet factor-4, adhesion molecules and endotelin-1 that favor a pro-thrombotic condition. Such a situation is even due to the increased levels of circulating catecholamines, which is able to increase the aggregation of the platelets in the bloodstream.

The patient suffering from depression is often addicted to smoke, unable to dedicated himself to physical activity or to participate in exercise or rehabilitation programs. Furthermore, depression leads to unhealthy diets, able to increase individuals body mass index, thus favoring one of the most important determinant of CAD incidence: obesity. In the end, depressive patients showed higher rates of non-adherence to prescribed medications.

Myocardial infarction and coronary artery diseases are generally able to induce the presence of a depressive mood in patients. Post-procedure depression induces an increased rate of major adverse cardiac events (MACE), mortality and further revascularization as compared to patients not-experiencing depression condition after the procedure.

### A723: A CLINICAL CASE OF KOUNIS SYNDROME TYPE II

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**Introduction.** Kounis Syndrome (KS) is a peculiar entity defined as the concurrence of acute coronary syndrome in the setting of allergic or hypersensitivity and anaphylactic or anaphylactoid insults. Three variants of KS have been described: type I, characterized by coronary vasospasm without significant coronary disease; type II, including patients with pre-existing coronary disease in which the release of pro-inflammatory mediators can cause vasospasm or instability of atherosclerotic plaques; type III, including patients with coronary artery stent thrombosis associated with a hypersensitivity reaction. Several different triggers may be involved in KS onset such as drugs, food items or environmental factors. KS is not a rare disease, but maybe it’s often underdiagnosed; moreover, differential diagnosis with Takotsubo Syndrome occurring during allergic reactions should be made.

**Case presentation.** We report the case of a 69 years-old Caucasian man admitted to our emergency department because of an urticarial rush involving trunk and limbs associated to labial edema, occurred at seventh day of intramuscular therapy with ceftriaxone and prednisone. A therapy with corticosteroids was promptly instituted. The next day, soon after the allergic manifestation, the patient complained sudden epigastric and chest pain. An ECG was performed, showing a transient ST segment elevation from V1 to V6 leads*; l*aboratory analysis detected elevation of cardiac biomarkers with troponin I (cTnI) 0,48 ng/mL, creatine kinase-MB (CK-MB) 57 U/L and myoglobin 38 ng/ml. Transthoracic echocardiography revealed a mildly reduced left ventricular ejection fraction with akinesia of septal apex and mid-apical segments of lateral and posterior-lateral walls associated to hypokinesia of the apical segment of anterior wall. Patient promptly underwent a coronary angiography which revealed two critical stenosis of the left anterior descending coronary artery at medium segment (LAD), treated through implantation of two drug eluating stent. In-hospital course was uneventful and he was discharged on 9$^{th}$ day of recovery.

**Conclusion.** In literature, there are three cases previously reported due to ceftriaxone assumption. Our case represents the first case of type II variant of KS due to vasospasm triggered by ceftriaxone therapy. The management of these patients is challenging, due to the needed to treat both cardiac and allergic symptoms simultaneously. Patients with systemic allergic reactions associated with clinical, electrocardiographic and laboratory findings of acute myocardial ischemia should be promptly suspected as having KS, in order to institute the correct management, even if their past medical history is not positive for any allergic reactions.

### A724: CONGENITAL ATRESIA OF THE LEFT MAIN ARTERY IN AN ASYMPTOMATIC ADULT PATIENT WITHOUT EVIDENCE OF INDUCIBLE MYOCARDIAL ISCHEMIA: A CASE REPORT WITH CONSERVATIVE MANAGEMENT

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A 58 year-old man was electively admitted to our department to undergo coronary angiography. His cardiovascular risk factors included arterial hypertension and hypercholesterolemia under pharmacological treatment. He had an ectasia of the ascending aorta in regular follow-up. He had never reported symptoms and he had an active life style.

The last aortic CT showed a stable dilatation of the ascending aorta (45 mm) and a suspected occlusion of the left main with collateral circulation from right coronary artery to left anterior descending (LAD) and circumflex coronary artery. The patient was therefore referred to our institution to undergo coronary angiography.

At the arrival to our centre the patient was asymptomatic. Physical examination was unremarkable. The ECG showed an incomplete right bundle branch block. Transthoracic echocardiography showed a concentric remodeling of the left ventricle with normal systolic function, dilatation of the ascending aorta and a tricuspid aortic valve with a mild regurgitation. Routine laboratory tests were within normal limits.

Coronary angiography showed a congenital atresia of the left main coronary artery. The left coronary system was retrogradely supplied through a developed collateral circulation (Rentrop 3) from the right coronary artery. The caliber of these collaterals was similar to that of the target left-sided vessels. No obstructive coronary artery disease was detected. In addition, aortography demonstrated hypoplasia of the left sinus of Valsalva and hyperplasia of the non-coronary one, with aneurismatic dilatation of aortic root (50 mm) and of the ascending aorta (44 mm). A myocardial scintigraphy was performed and no exercise-induced myocardial ischemia was detected. Therefore regular clinical follow up was planned.

True left main coronary artery atresia is an extremely rare congenital disorder in which there is no left coronary ostium and no left main trunk: the descending anterior and circumflex arteries are connected as usual, but proximally end blindly and their blood supply comes from the right coronary artery, through collateral circulation. This condition often coexists with supravalvular aortic stenosis and other congenital cardiac defects. Usually patients develop symptoms during infancy or early childhood, but there have been reports of patients who developed symptoms later in life, due to the inadequate blood support from the collateral circulation. Coronary artery bypass graft was reported to solve this congenital coronary anomaly.

The peculiar aspect of our case report is that the patient was asymptomatic and did not have obstructive coronary artery disease. Collaterals from the right coronary artery had a caliber similar to that of the target left-sided vessels. Myocardial scintigraphy was completely normal, indicating that under physical stress, collateral circulation was able to adequately supply the myocardium. Considering all this features, included the possibility of a failure of a aorto-coronaric bypass due to the absence of obstructive coronary artery disease and competitive flow from the developed collateral circulation, we decide to plan a close and regular clinical follow-up.

### A725: SINDROME NSTEMI-LIKE CAUSATA DA INGESTIONE DI TONNO CRUDO: LA VARIANTE ‘ISCHEMICA’ DELLA SINDROME DELLO SGOMBROIDE

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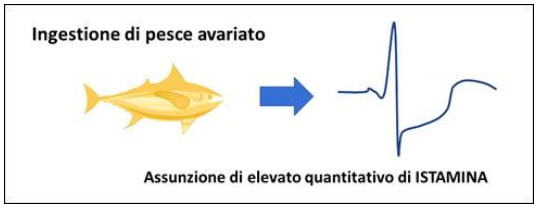
**Obiettivi.** La sindrome dello sgombroide (SSG) nota anche come “avvelenamento da sgombroide o da pesce crudo”, è una intossicazione alimentare nota da anni. È causata dall’ingestione di pesce contaminato da batteri gram-negativi produttori di notevoli quantità istamina e di altre sostanze tossiche. È responsabile di circa il 5% di tutte le intossicazioni alimentari segnalate negli Stati Uniti. Tuttavia, non è noto alla comunità scientifica la possibilità di causare una sindrome coronarica NSTEMI-like in un certo numero di casi.

**Metodi.** durante il mese di giugno 2018 sono giunti alla nostra osservazione 3 pazienti (2M e 1F) recatisi al pronto soccorso generale (PSG) per sintomi da intossicazione da cibo avariato. Tutti avevano ingerito del tonno crudo, che le informative da parte dei Media annunciarono appartenere ad una distribuzione avariata.

**Risultati.** Tutti i pazienti presentavano i segni dell'intossicazione alimentare (flushing, eruzione cutanea, malessere generale, nausea), ma lamentavano anche senso di oppressione toracica, dispnea, ed in un caso, segni di iniziale shock emodinamico. L'ECG effettuato al PSG evidenziò un probabile NSTEMI e 2 dei 3 pazienti sono stati ricoverati in UTIC ed avviati al laboratorio di emodinamica entro 24 ore. La coronarografia non ha però mostrato lesioni coronariche significative.
**Conclusioni.** La SSG può causare una sindrome coronarica istaminergica, con meccanismo di tipo vasospastico (epicardico e/o microcircolatorio), che abbiamo definito "SSG ischemica". I fattori predisponenti non sono noti, ma probabilmente la sindrome è unicamente legata alla concentrazione tessutale di istamina (e altre sostanze tossiche) nel pesce avariato.




(modif. da Ferrazzo G, Andò G, Cerrito M, de Gregorio C, Am J Cardiol 2019;124:4)

## CARDIOPATIA ISCHEMICA – 2
## Sessione Poster

### A726: RECONSTRUCTION OF CTNT RELEASE CURVE AFTER ACUTE MYOCARDIAL INFARCTION (AMI) BY MEANS OF A MATHEMATICAL MODEL

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**Background.** Cardiovascular disease is the major cause of morbidity and mortality in western and developing Countries. Acute Myocardial Infarction (AMI) represents its most dreaded manifestation, both for the mortality risk associated with the acute phase than for the risk to develop chronic heart failure. High sensitivity cardiac troponins have significantly improved diagnostic algorithms. However, its higher sensitivity frequently represents a diagnostic hurdle. In order to optimize the diagnosis and prognosis, speeding up patients' triage, we have developed a mathematical model of the evolution in blood levels of high sensitivity Troponin T (hsTnT) around the AMI.
**Methods.** We designed a mathematical model describing the diffusion of TnT between cardiac cells compartments and plasma, using differential equations. The model was than applied run on clinical data from an ongoing prospective AMI registry from the Cardiology Unit of the Magna Graecia University of Catanzaro, Italy. Patients with a confirmed STEMI diagnosis were selected for analyses.
**Results.** The model has been tested under two experimental conditions: a) the whole hsTNT dataset is available for each patient; b) only a limited number of hsTnT measurements after the peak value are provided to the algorithm for the identification (while the remaining are blinded). In both cases, the model returned a good fit and very good predictions of peak hsTnT values and times (Fig.1).
**Conclusions.** The model was able to correctly track hsTnT kinetics, showing a good agreement with the experimental data. Potential clinical applications of the model include: 1) estimation of infarct time in patients in whom it is difficult to determine at anamnesis; 2) extrapolation of the infarct size from the modeled hsTNT release curve. The model will be included in a software package endowed with a graphical user interface, along with the identification algorithm, to facilitate its use in the clinical environment.

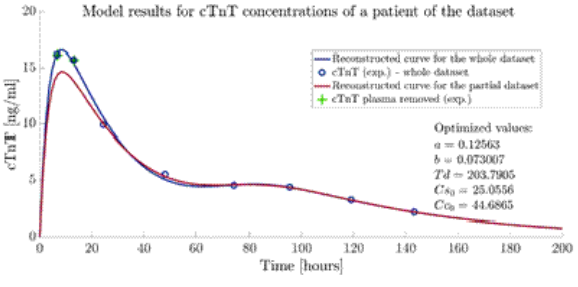


**Fig.1**: Model results obtained by using the whole (–) and the partial dataset (–), created by removing the first acquisitions (+) from the whole dataset, in order to simulate the arrive of the patient to the hospital after the peak of cTnT release and evaluate the capability of the model to reconstruct this information.

### A727: KOUNIS SYNDROME: A SINGLE-CENTER CASE SERIES

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**Background.** Kounis syndrome is defined as the concurrence of acute coronary syndromes (including coronary spasm, acute myocardial infarction, and stent thrombosis) with conditions associated with mast-cell degranulation and platelet activation and involving inflammatory cells, such as macrophages and T-lymphocytes, in the setting of allergic or hypersensitivity and anaphylactic or anaphylactoid insults. The purpose of our study is to evaluate the incidence of this condition in a single-center cohort, and to illustrate the diagnostic and therapeutic characteristics through analysis of single cases.
**Methods.** We retrospectively identified cases of Kounis syndrome through systematic revision of the medical records of all patients hospitalized for Acute Coronary Syndrome (ACS) in the Cardiac Unit of IRCCS San Martino Hospital (Genova). As no universally agreed criteria regarding Kounis syndrome exist, we relied on the coexistence of signs and symptoms of mast-cell degranulation and of an obvious allergic trigger (drug, insect bite, food or i.v. contrast material) with a definite ACS diagnosis. Blind agreement between two experienced physicians was required for definitive allocation.
**Results.** Two-hundred and seventy hospitalizations for ACS (136 for ST-elevation ACS and 134 for non ST-elevation ACS) occurred in the analysed period of time (01/06/2018-30/06/2019). We found 3 (1.1% of ACS) cases of Kounis syndrome, 1 NSTE-ACS (0.7 % of NSTE-ACS) and 2 STE-ACS (1.5 % of STE-ACS). First case was of a 49-year-old man admitted with retrosternal pain occurring immediately following multiple bee bites, in whom an inferolateral STE-ACS was diagnosed and an uneventful primary percutaneous intervention (PCI) of an occluded right coronary artery was performed (type 2 Kounis). Second case was of a 68–year-old man admitted for acute respiratory distress due to asthmatic crisis after exposition to pollen, in whom an anteroseptal STE-ACS was diagnosed, no occluded coronary vessels were found, and coronary spasm was suspected (type 1 Kounis). Third case was of a 68-year-old man admitted with chest pain after multiple wasp bites and onset of diffuse cutaneous rash, in whom NSTE-ACS was diagnosed and PCI of the left anterior descending artery was necessary (type 2 Kounis). Besides mild eosinophilia in case 2, no other peculiar biomarker alteration was found in these patients.
**Conclusion.** Kounis syndrome is a rare disease, explaining a minority of ACS in a single-center cohort. Collection of larger datasets is needed to highlight any specificity in pathophysiology or prognosis for these patients.

### A728: EFFECTIVENESS OF BETA-BLOCKERS AND CALCIUM CHANNEL BLOCKERS ON SYMPTOMS AND EXERCISE TOLERANCE IN PATIENTS WITH MICROVASCULAR ANGINA UNDERGOING INTRACORONARY ACETYLCHOLINE-TEST

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**Background and purpose.** Patients with microvascular angina (MVA) often have persistence of symptoms despite full classical anti-ischemic therapy. The CorMiCa study has recently shown that therapy based on the results of interventional diagnostic procedures (IDP) may improve health status in MVA patients. The aim of this cross-over and open-label study is to investigate whether the efficacy of beta-blocker (BB) and calcium channel blockers (CCB) therapy may be predicted by performing an intracoronary Acetylcholine (Ach)-test, in MVA patients.
**Methods**. We studied 21 patients admitted to our cardiovascular department for stable or unstable angina with no obstructive coronary artery disease (NOCAD) at coronary angiography, undergoing intracoronary Ach-test. In this open-label, crossover trial, we assigned patients to receive a cardioselective BB (metoprolol, 50 mg bid.) or a non-dihydropyridine CCB (diltiazem, 120 mg bid.) for a period of four weeks. Patients were invited to report symptoms in a clinical diary during each of the 2 periods of treatment. At the end of each period of treatment in which they had received either the BB or CCB, patients underwent an exercise stress test (EST) and filled in the Seattle Angina Questionnaire (SAQ).
**Results.** In 15 patients who completed the study, therapy with CCB tended to be associated with better SAQ scores than therapy with BB. During the period in which they received CCB, patients reported lower frequency of angina and illness insight at SAQ, compared to BB (SAQ item 3: 83,3±18 vs. 76,0±22, p=0,04; and SAQ item 5: 73,8±20 vs. 63,9±24, p=0,05, respectively). EST tended to show also a higher exercise tolerance after treatment with CCB compared to BB (492±115 s vs. 460±112 s, p=0,06). No difference was observed, however, in the frequency of angina episodes reported in the patients' diary. Data were confirmed in the subgroup of patients with positive intracoronary Ach-test

(n=5), with a significant difference between CCB and BB at SAQ in angina stability (SAQ item 2: 90±14 vs. 70±27, p=0,01). No significant differences were found between therapy with CCB and BB in EST results and diary angina data in this subgroup of patients. Furthermore, no significant differences between CCB and BB in both clinical and EST data were observed in the subgroup of patients with negative Ach-test (n=10).
**Conclusions.** Our preliminary data show that, in MVA patients, the choice of the first-line anti-ischemic treatment based on the results of Ach test may result in a better control of symptoms, at least in a short-term follow-up.

### A729: ECHOCARDIOGRAPHIC ASSESSMENT OF LEFT VENTRICULAR SYSTOLIC FUNCTION IN PATIENTS UNDERGOING PRIMARY PERCUTANEOUS CORONARY ANGIOPLASTY FOR ACUTE ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION

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**Background and purpose.** Data in the era of treatment of ST-segment elevation myocardial infarction (STEMI) with thrombolytic agents showed that left ventricular (LV) function improves during follow-up. There are scarce data, instead, about the evolution of LV function in patients with STEMI treated by primary percutaneous coronary intervention (pPCI). Accordingly, in this study we aimed to investigate the time course of LV ejection fraction (LVEF) in this population of patients. We also aimed to identify possible predictors of adverse LV remodeling in these patients.
**Methods**. Between February 2018 and June 2019, we studied 49 patients (age 63,6±12 years, 33 male) undergoing pPCI or PCI rescue for STEMI. Patients with other significant systemic disease (e.g. liver and/or kidney failure, cancer, inflammatory diseases, etc) were excluded. Before discharge, all patients underwent: 1) 12-lead ECG; 2) transthoracic echocardiography (TTE) with 2D speckle tracking for global longitudinal strain (GLS) baseline assessment; 3) 24-hour Holter ECG monitoring for evaluation of arrhythmias and heart rate variability (HRV). TTE was repeated at 6-month follow-up to carefully reassess both LV systolic and diastolic function. Patients were divided in 3 groups according to LVEF at 6 months compared to baseline: 1) patients with an improvement in LVEF >3%; 2) patients with no significant changes in LVEF; 3) patients with a worsening of LVEF <3%.
**Results.** In the whole population of the study, at 6-month follow-up a significant improvement of LV systolic function was observed, with higher values of LVEF (57.6±10 vs. 53.6±10%, p=0,003) and GLS (20.3±3.6 vs.18.2±3.9, p <0,001), compared to pre-discharge. At 6 months, 28 patients (57%) showed improvement of LVEF, 9 patients (18%) showed no changes in LVEF and 12 patients (25 %) showed impairment of LVEF. Patients with improvement of LVEF at follow-up had a significantly higher glomerular filtration rate (GFR) (p=0.04) and lower peak levels of serum creatine kinase-MB (CK-MB) (p=0.07). Furthermore, this group had a lower baseline LVEF (50.5±10%) compared to both patients with no change (57.4±9) or worsening (58.2±9) of LVEF (p=0,04). The mean pre-discharge GLS did not differ between the 3 groups of patients (17.2±3.7, 18.7±2.7 and 19.1±3.4, respectively, p=0.35). Furthermore, no significant differences were found in pre-discharge cardiac autonomic function between the three groups.
**Conclusion.** Our data show that LV function, as assessed by LVEF and GLS, improves at follow-up in most patients undergoing pPCI for STEMI. Despite full coronary revascularization, about one fourth of these patients, however, shows negative LV remodeling the mechanisms of which remain to be elucidated.

### A730: PREDICTORS OF CLINICAL OUTCOME IN PATIENTS UNDERGOING PRIMARY PERCUTANEOUS CORONARY ANGIOPLASTY FOR ACUTE ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION

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Laura Manfredonia (a), Veronica Melita (a), Monica Filice (a),
Eleonora Ruscio (a), Gessica Ingrasciotta (a), Antonio Bisignani (a),
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**Background and purpose.** Although the pathophysiological and clinical features of acute ST-segment elevation myocardial infarction (STEMI) have been widely studied, there are scarce data about the predictors of clinical outcome in patients undergoing primary percutaneous coronary intervention (pPCI) for STEMI. Accordingly, aim of this study was to identify possible predictors of clinical events in this population of patients.
**Methods.** We studied 87 consecutive patients (age 66±12 years, 25 F) undergoing pPCI for STEMI. Before discharge, all patients underwent the following diagnostic investigations: 1) 12-lead ECG; 2) transthoracic echocardiography (TTE); 3) peripheral endothelial function, by measuring the variation of the right brachial artery diameter in response to hyperemia (flow mediated dilatation FMD) and to sublingual nitroglycerine (nitrate mediated dilatation NMD); 4) 24-hour Holter ECG monitoring for evaluation of arrhythmias and heart rate variability (HRV). At 1-month after discharge patients also underwent an exercise stress test (EST).
**Results.** At 12-month follow-up, 16 patients (18,4%) developed major adverse cardiac events (MACE), a composite end-point, including all-cause mortality, recurrent non-fatal myocardial infarction, rehospitalization for acute heart failure or a reduction in the left ventricular ejection fraction (LVEF) > 5%. Patients with MACE had a higher prevalence of hypertension (p=0.01) and higher creatine kinase-MB (CK-MB) serum levels (p=0.04), compared with patients without MACE. Furthermore, at TTE, patients with MACE showed a lower value of LVEF (p=0.05), and higher E/e' ratio (p=0,04) and wall motion score index (WMSI) (p=0,07). Importantly, the exercise tolerance assessed by EST was lower in the group of patients who developed MACE than in the other group (236±172 vs 413±167 second, p=0,01). No significant relation was found between the two groups in term of cardiac autonomic function and peripheral vascular function.
**Conclusion.** Although obtained in a small number of patients, our data suggest that left ventricular function and exercise capacity are the most important predictors of MACE in patients with STEMI treated by pPCI. Our study failed to show a prognostic value for cardiac autonomic function and peripheral vascular function in this population.

### A731: RECURRENT ASYMPTOMATIC TAKOTSUBO SYNDROME AFTER 20 YEARS: ARE WE LOOKING AT THE TIP OF THE ICEBERG ONLY?

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Rocco Antonio Montone (a), Maria Chiara Meucci (a),
Riccardo Rinaldi (a), Filippo Luca Gurgoglione (a),
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Takotsubo syndrome (TS) is an acute and reversible form of myocardial stunning precipitated by an emotional or physical stress. Chest pain and dyspnoea are the most common presenting symptoms, however, nonspecific presentations make the diagnosis challenging for clinicians. Here we present the case of a 76-years old female, with history of arterial hypertension, anxiety and hypercholesterolemia, who experienced two completely asymptomatic episodes of TS at a distance of twenty years. The patient acceded at the emergency room (ER) of our hospital sent from her cardiologist for the finding during a scheduled cardiologic check-up visit of new-onset electrocardiographic (EKG) changes characterized by deep T-wave inversion in anterolateral and inferior leads and QT-prolongation (Figure A). When she arrived at ER, she was hemodynamically stable and completely asymptomatic. She reported to be under stressful circumstances, dealing with her brother's death which had occurred the day before. Transthoracic echocardiogram showed normal ventricular size and preserved left ventricular systolic function and focal apical hypokinesia. Lab tests showed a slight elevation of Troponin I and a significant increase in NT-proBNP levels (0.101 ng/ml and 2674 pg/ml respectively). The InterTAK score was 67 with a probability of TS of 79.8%. Coronary angiography was performed detecting non-obstructed coronary arteries whereas ventriculography showed focal apical hypokinesia. Cardiovascular Magnetic Resonance performed 3 days after admission revealed normal global and regional systolic function, and apical oedema in absence of late gadolinium enhancement. However, these EKG abnormalities and the clinical scenario, were not completely new in the patient history. Twenty years prior to admission and few days after her father's death, she underwent a preoperative gynaecological visit and, in that occasion, the same EKG pattern was found, and patient was sent to ER (Figure B). At that time, she was completely asymptomatic and was dismissed without a specific diagnosis. Since then, she underwent an annual cardiologic follow-up, from which emerged a complete normalization of the baseline EKG (Figure C). As long as we know, this is the first description of a case of TS recurrence twenty years after the first presentation. The mechanisms explaining the lack of symptoms are speculative, given that no similar cases have been outlined until now. The plausible explanations are 1) the wide interpersonal elaboration of cardiac pain genesis and its processing, extended from silent ischemia to sensitive heart syndrome, and 2) the possibility that the patient suffered from a mild form of TS in both occasions, as documented by the slight cardiac abnormalities at the time of the diagnosis. The temporal proximity of the trigger with the event makes unlikely that this presentation may represent the tail of a more severe presentation, giving support to the notion that the most typical TS forms represent only the "tip of the iceberg" of a still underestimated and poorly understood syndrome.

### A732: CIRCADIAN VARIATION OF INFLAMMATORY RESPONSE AND INFARCT SIZE IN PATIENTS WITH STEMI

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(a) IRCCS MULTIMEDICA, SESTO SAN GIOVANNI (MI) ITALY; (b) DIVISION OF CARDIOLOGY, FONDAZIONE IRCCS POLICLINICO SAN MATTEO, PAVIA; (c) DEPARTMENT OF INTERNAL MEDICINE AND THERAPEUTICS, UNIVERSITY OF PAVIA; (d) DEPARTMENT OF MOLECULAR MEDICINE, SECTION OF CARDIOLOGY, UNIVERSITY OF PAVIA; (e) DIVISION OF CARDIOLOGY, CITTÀ DELLA SALUTE E DELLA SCIENZA DI TORINO, DEPARTMENT OF MOLECULAR SCIENCES, UNIVERSITY OF TURIN; (f) CORONARY CARE UNIT-FONDAZIONE IRCCS POLICLINICO SAN MATTEO AND UNIVERSITY OF PAVIA, DEPARTMENT OF MOLECULAR MEDICINE, PAVIA; (g) CARDIAC INTENSIVE CARE UNIT, ARRHYTHMIA AND EXPERIMENTAL CARDIOLOGY, FONDAZIONE IRCCS POLICLINICO SAN MATTEO

**Background.** Circadian rhythm affects many physiological functions. Some studies suggest a circadian variation of the infarct size (IS). An intriguing potential underlying mechanism could be the circadian variation of inflammation, which is known to have a central role in the ischemia-reperfusion damage, thus contributing to determine IS.

**Purpose.** We sought to evaluate the presence of a circadian variation of IS according to the reperfusion time of the day and to assess the possible circadian variation of inflammatory markers and their effects on markers of effective myocardial reperfusion.

**Methods.** We enrolled 40 patients (pts) with ST elevation myocardial infarction (STEMI) treated by primary percutaneous coronary intervention (pPCI). We divided patients in: morning group (MG), reperfused between 6 AM and noon, afternoon group (AG) reperfused between noon and 8 PM and night group (NG), reperfused between 8 PM and 6 AM. Inflammatory markers (IL-6 and hsCRP) were measured on blood samples collected before and 6-12-24-36 hours after reperfusion; the peak values were analysed for each patient. Infarct size was measured assessing Troponin I peak value. Effective myocardial reperfusion was estimated using electrocardiographic (ST-Resolution) and angiographic (Corrected TIMI Frame Count, CTFC) indexes. Variables were log-normalized when needed.

**Results.** The mean age of the population was 63±9 years. There were 15 pts in the MG, 12 pts in the AG and 13 pts in the EG. There were no significant differences between the three groups in age, time to reperfusion or prevalence of pre-existing diabetes. A one-way between groups analysis of variance showed a statistically significant difference in inflammatory markers between the three groups (p=0.02); post-hoc comparison using Tukey test indicated that AG did not differ significantly from EG. Patients in the MG showed a significantly higher peak of both IL6 and hsCRP when compared to AG+EV: 23.4 (IQR:17.1-29) vs 12 (5.8-19.8) pg/ml (p=0.03) and 1.60 (IQR: 0.6-5.2) vs 0.5 (0.34-0.88) mg/L (p=0.04) respectively. Furthermore, when compared to AG+EG, patients reperfused in the morning showed higher values of CTFC (21.2 vs 11.1 p<0.01) and lower rate of ST-Resolution (62.1% vs 69.7% p=0.01). Troponin I peak was higher in the MG vs AG+EG: 80 (35-180) vs 63 (24-148) (p<0.01).

**Conclusion.** Our findings support a circadian variation of both inflammatory response during STEMI and infarct size. Patients reperfused in the morning showed the highest inflammatory response, the lowest markers of effective tissue reperfusion and the largest infarct size.

### A733: TIME IS MUSCLE: LA RIVASCOLARIZZAZIONE MIOCARDICA DEL PAZIENTE STEMI NELL'ERA DELLA RETE IMA: ORGANIZZAZIONE DELL'ASSISTENZA ED OUTCOME CLINICI A DUE ANNI

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**Introduzione.** È ampiamente dimostrato che una riduzione dei tempi di riperfusione nel paziente STEMI ne diminuisca significativamente il tasso di complicanze post-SCA e la mortalità. Da ciò nasce in Italia il progetto Rete IMA: un network per la diagnosi preospedaliera e per una conseguente riduzione dei tempi di riperfusione tramite trasporto diretto in Emodinamica per l'esecuzione tempestiva della PCI primaria. Scopo del nostro studio è stato quello di verificare l'efficacia della Rete IMA nel ridurre i tempi di rivascolarizzazione dei pazienti STEMI e l'impatto che ciò determina in termini prognostici.

**Materiali e metodi.** Lo studio è stato svolto presso L'U.O. Complessa di Cardiologia Clinica del Policlinico Universitario Paolo Giaccone di Palermo, centro Hub. Sono stati contattati i pazienti ricoverati per infarto miocardico acuto con sopraslivellamento del segmento ST dal 1 gennaio 2017 al 31 dicembre 2017 (n=129) e 81 di questi sono stati arruolati nello studio. I pazienti sono stati divisi in 2 gruppi, in base al tipo d'accesso in emodinamica: Gruppo Rete IMA (n=39) e Gruppo Pronto Soccorso (n=42). È stato, sulla base dei tempi d'intervento, calcolato il tempo totale d'ischemia, a sua volta diviso in due sotto-intervalli che sono: Patient Delay e il System Delay. Tutti i pazienti sono stati rivalutati con un follow-up medio di due anni e sottoposti a visita cardiologica, elettrocardiogramma ed ecocardiogramma. Al follow up è stata indagata l'insorgenza di eventi cardiovascolari e cerebrovascolari avversi (MACCE), in dettaglio: morte per causa cardiovascolare (intraospedaliera ed extra-ospedaliera), re-IMA, ripresa di angina, nuova rivascolarizzazione e ictus ischemico.

**Risultati.** L'analisi dei tempi d'intervento, ha mostrato un guadagno netto in tutti i tempi a favore dei pazienti pervenuti tramite rete IMA rispetto a quelli che hanno fatto accesso in PS. Il guadagno medio di tempo è di 121 minuti per il Patient Delay (rete IMA: 342 ± 613 vs PS: 463 ± 700; p=0,418), 59 minuti per il System Delay (rete IMA: 68 ± 38 vs PS: 127 ± 108; p=0,002) e di 180 minuti per il tempo d'ischemia (rete IMA 410 ± 620 vs PS 590 ± 709; p=0,233). L'analisi statistica ha mostrato che il dato statisticamente significativo è quello del System Delay (p=0,002) che è un'importante indice di efficienza della rete IMA. Allo studio ecocardiografico non sono emerse differenze tra i due gruppi né all'esame effettuato durante la degenza né in quello alla rivalutazione. Sono state ricercate differenze tra i due gruppi in termini di prognosi, valutando l'incidenza di MACCE (eventi maggiori avversi cardiovascolari e cerebrovascolari), sia come endpoint composito sia come singole complicanze. Per questi dati non sono state rilevate differenze significative tra i due gruppi (MACCE Gruppo Pronto Soccorso= 33,3% vs MACCE Gruppo rete IMA 35,9% p=0,808).

**Conclusioni.** La rete IMA Sicilia è efficace nella riduzione del System delay e risponde adeguatamente alle richieste del territorio, centrando 2 su 3 obiettivi posti all'epoca dell'istituzione di questa. Il tasso di complicanze è simile tra i due gruppi. Tuttavia il dato sulla mortalità ospedaliera risulta ancora alto (17,9%) rispetto alla riduzione <10% posta come target. Ancora oggi, nonostante la rapidità del Sistema, la prognosi è condizionata dalla tempestività dei pazienti nell'allertare i soccorsi. Ridotto quindi il ritardo del sistema, l'obiettivo per il futuro è quello di sensibilizzare la popolazione al riconoscimento dei sintomi ischemici e all'attivazione della rete IMA, la cui esistenza ancora a molti non è nota.

### A734: A CASE OF ACUTE CORONARY SYNDROME AFTER STRESS WITHOUT CORONARY DISEASE: A TAKOTSUBO SYNDROME OR SOMETHING ELSE?

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(a) UO CARDIOLOGIA UTIC OSPEDALE "SANTA MARIA DELLA SPERANZA" BATTIPAGLIA (SA)

**Case report.** A.M a 54 year old female patient with history of hypertension in treatment with enalapril 20 mg/die, reports an oppressive chest pain and itching arose after a state of strong fear and anxiety associated to the accidental inhalation of a common home insecticide. Vital parameters are normal, electrocardiogram shows inverted T Wave in inferolateral leads and echocardiography shows and hypokinesis in the inferolateral wall. The evaluation of troponin showed a typical ischemic curve. At the angiographic study the patient had no coronary disease. Therefore both takotsubo syndrome and Kounis syndrome were taken into account. Kounis syndrome is defined as a acute coronary syndrome caused by a strong immune reaction or an allergic reaction to durgs (especially antibiotics) and other substances. The release of inflammatory cytokines leads to coronary spasm. Takotsubo cardiomyopathy is an ischemic syndrome triggered by emotional stress and responsible for a massive release of catecholamines at the likely base of a coronary spasm. The differential diagnosis is an interesting challenge for the cardiologist. The patients in particular had a strong emotional stress that, with no evidence of coronary disease suggested us at the very beginning a takotsubo syndrome but the echocardiographic findings were not typical for takotsubo (apical ballooning), while the involved wall was more frequently detected in Kounis syndrome. Moreover the side symptoms (itching) suggested an allergic reaction against pesticide that is the reason why we orientated our diagnosis to the Kounis syndrome. The diagnosis of Kounis syndrome after more than 20 years from its first description still represents a challenge and most of cases remains unknown. More studies are needed for a better definition of the syndrome and the finding of a biomarker which could drive a better diagnosis and therapy.

### A735: CENTRAL APNEAS CAUSE TICAGRELOR RELATED DYSPNEA IN PATIENTS WITH ACUTE CORONARY SYNDROME

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(a) FONDAZIONE TOSCANA G. MONASTERIO, PISA, ITALY; (b) SCUOLA SANT'ANNA SUPERIORE, PISA, ITALY; (c) FONDAZIONE TOSCANA G. MONASTERIO, MASSA, ITALY

**Background.** Dyspnea of unknown origin often occurs in patients with acute coronary syndrome (ACS) treated with ticagrelor, in which central apneas have sometimes been described. Therefore, this study aimed to explore the contribution of central apneas to ticagrelor related dyspnea in patients with ACS.

**Methods.** We consecutively enrolled patients with ACS, preserved left

ventricular ejection fraction and no history of obstructive sleep apnea, treated either with ticagrelor 90 mg bid (n=22) or prasugrel 10 mg od (n=10). One week after ACS onset, all patients underwent 2-dimensional Doppler echocardiography, pulmonary static and dynamic testing, carbon monoxide diffusion capacity, 24-hour cardiorespiratory monitoring for apnea-hypopnea detection and chemosensitivity to hypercapnia by rebreathing technique.
**Results.** No differences were found in baseline demographic and clinical characteristics, as well as in any echocardiographic and pulmonary data between groups treated with ticagrelor or prasugrel. Patients treated with ticagrelor reported more frequently dyspnea (45% versus 10%, p<0.05) and showed higher apnea-hypopnea index (AHI) and central apnea index (CAI) during the day, the night and over the entire 24-hour period, as compared to patients treated with prasugrel (all p<0.05). Patients treated with ticagrelor also showed higher chemosensitivity to hypercapnia than patients treated with prasugrel (p<0.05). Among patients treated with ticagrelor, those referring dyspnea had the highest AHI, CAI and chemosensitivity to hypercapnia (all p<0.05).
**Conclusions.** Central apneas should be screened for and considered a likely mechanism of dyspnea in ACS patients treated with ticagrelor. A drug related sensitization of the chemoreflex may be the cause of ventilatory instability in this setting.

### A736: CARDIAC TROPONIN T IN PATIENTS ADMITTED TO THE EMERGENCY ROOM: ANALYSIS OF EIGHT CONSECUTIVE DAYS

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Alberto Passi (b), Roberto De Ponti (a)
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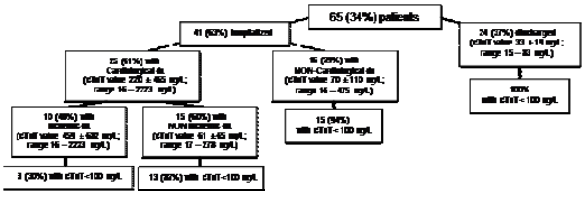
**Introduction.** Cardiac troponin T (cTnT), together with ECG and clinical presentation, is an essential tool to rule out or to confirm an acute coronary syndrome (ACS). Furthermore, its concentration appears to be predictive of future adverse events. Although the modern dosage methods have a high sensitivity, being able to detect the smallest myocardial injury, we must deal with the poor specificity because several diseases (such as sepsis, hypovolemia, atrial fibrillation, congestive heart failure, pulmonary embolism and renal failure) are associated with its increase.
**Aim.** The aim of our study was to evaluate the association between cTnT values in the emergency room (ER), the clinical decision and the diagnosis at discharge.
**Methods.** Values of cTnT in patients admitted to the ER in 8 consecutive days were considered together with their discharge diagnosis and the clinical decision taken in each case. cTnT values > 14 ng/L were considered abnormal. Significant cTnT increase was considered when there was a 50% change in an initial normal value, or a 20% change in an initial abnormal value.
**Results.** During this period, 192 pts had cTnT evaluation (98 males/94 females, 62 ± 19 y.o.) and 65 (34%) of them had abnormal cTnT values. Among them, 24 were discharged while 41 were hospitalized: 25 (61%) with a cardiological diagnosis (dx) at discharge and 16 (39%) with a non-cardiological dx. As shown in the *Figure,* the vast majority (≥87%) of pts who were discharged, had a non-cardiological dx, or a non-ischemic cardiological dx showed lower cTnT values (<100 ng/L), while only 30% of those with an ischemic cardiological dx had cTnT values <100 ng/L. Conversely, one patient with unstable angina had normal cTnT values in three consecutive determinations. Among the 47 pts who had at least a second cTnT evaluation, those who were discharged or had a non-cardiological dx had no significant increase, while in pts who had a cardiological dx a significant cTnT increase was observed only in 50% of those with an ischemic dx and in 20% of those with a non-ischemic dx.
**Conclusions.** Positive cTnT values were found in a considerable proportion (34%) of pts presenting to the ER who, based on clinical evaluation, were discharged or received a cardiological or a non-cardiological dx. Moreover, pts with an ischemic dx had higher cTnT levels compared to the other pts; however, a normal cTnT value does not rule out an ACS. Finally, a significant cTnT increase was limited to 50% of pts with an ischemic dx and very low in the other pts. These data call for further analysis in a larger cohort.




### A737: THE STEMI-EQUIVALENT SYNDROME: SOMETHING TO KEEP IN MIND

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**Initial presentation.** A 78-years-old hypertensive man, with a family history of cardiovascular disease, called the emergency service for a continuous epigastric pain started 45 minutes before. Upon arrival of the medical service, first ECG showed sinus rhythm, ST-segment depression >1 mm at the J point and tall, prominent and symmetrically peaked T waves in the inferior and in most precordial leads (V3-V6), and slight ST-segment elevation (1 mm) in aVR. (Figure 1)
**Diagnosis and management.** After immediate diagnosis of acute coronary syndrome, he was transferred to the emergency department, then to the cath lab where cardiac catheterization showed thrombotic occlusion of the proximal LAD coronary artery with diffuse multivessel calcification. The left coronary artery was then reopened with multiple non-compliant balloon inflations and percutaneous transluminal coronary angioplasty with a single drug-eluting stent (4.00 mm x 12 mm) was performed with a final normal flow (TIMI grade flow 3). (Figure 2a-2b) A transthoracic echocardiogram showed left ventricular hypertrophy with an ejection fraction of 40% and akinesia of the left ventricular apex and antero-septal wall, in the absence of any intracavitary thrombus. In the following days, the patient progressively recovered. Subsequently, given the stable clinical conditions, the patient was transferred to the Cardiology department. In the following days, serial ECGs and echocardiographic checks were performed. After 15 days the patient was transferred for cardiac rehabilitation.
**Conclusions.** ECG abnormalities other than ST-segment elevation are recognized as possible indicators of transmural myocardial injury. This case shows a so-called anterior "STEMI-equivalent syndrome", known as "De Winter syndrome". Although a clear ST-segment elevation was absent, an occlusion of the proximal LAD coronary artery was present in the same way, resulting in a clinical presentation at increased morbidity and mortality.

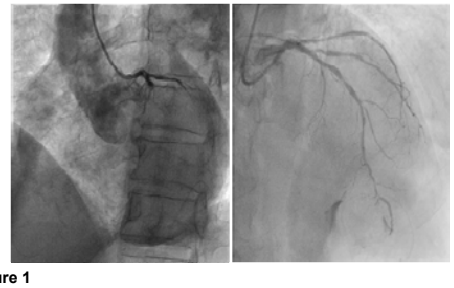

**Figure 1**

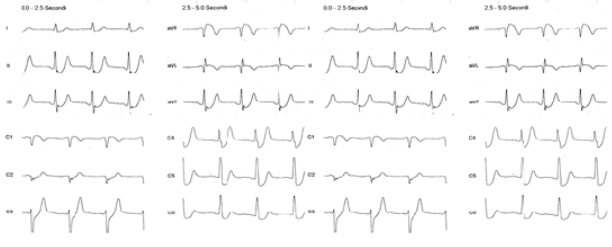

**Figure 2A** **Figure 2B**

## CARDIOPATIA ISCHEMICA – 3
## Sessione Poster

### A738: CORONARY REVASCULARIZATION STRATEGY AND CLINICAL OUTCOMES IN PATIENTS WITH ACUTE CORONARY SYNDROME WITHOUT PERSISTENT ST-SEGMENT ELEVATION: A SINGLE CENTRE EXPERIENCE

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Angelo Quagliana (a), Francesco Matteini (a), Antonino Saladino (a),
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**Background.** Reperfusion strategies for patients with myocardial infarction without persistent ST-segment elevation (NSTEMI) have undergone a continuous evolution. Guidelines are not peremptory on the issue of timing of culprit and non-cluprit lesions revascularization. Our

single-centre registry aims at describing current clinical practice and eventual advantages of a revascularization strategy over the other admitted alternatives.
**Methods.** A perspective observational study enrolled 165 consecutive patients admitted to our Hub center between January 2015 and December 2016 with a final diagnosis NSTEMI. Non-revascularized patients were excluded. We collected clinical, laboratoristic and echocardiographic data during hospital stay and about the occurrence of further cardiovascular events for the following two years.
**Results.** Most of the patients were revascularized within the first 24 hours from admission (early invasive strategy, n=109), while a second group was revascularized within 48 hours (standard invasive strategy, n= 43). A third group was revascularized beyond 48 hours according to the clinician's choice. The first two groups were not different at baseline in terms of ischemic risk, stratified by GRACE Risk Score, nor in terms of age, sex, cardiovascular risk factors and initial troponin values. An early invasive strategy, often motivated by an higher initial value of troponin, did not provide any advantage in terms of troponin peak (8433 ± 14573 vs 7951 ± 13791 ng/L; p=0,933) and ejection fraction at discharge (51,6 ± 11,5% vs 49,2 ± 10,9%; p=0,006) in comparison to a standard 24-48 hours strategy. Accordingly, the incidence of MACCE at two years did not differ (37,1% vs 34,7 %, P= n.s.). Among 53 patients showing non-culprit significant lesions, 30 were completed within the same admission, while the other 23 were deferred. The first group didn't show any advantage in terms of MACCE at 24 months (41,4% vs 36,4%), at the expenses of a significantly longer first hospital stay (11,4 ± 15,9 vs 5,9 ± 2,9 days; p=0,113).
**Conclusion.** A routine early invasive strategy in intermediate ischemic risk patients does not provide any advantage in terms of extension of ventricular damage and incidence of new MACCE at 2 years. Deferral of reperfusion completion on non-culprit lesions, if clinically feasible according to patient's stability, does not implicate any adjunctive risk of MACCE and allows a shorter hospital admission in the acute phase.

### A739: UNFRACTIONATED HEPARIN AND DUAL ANTIPLATELET THERAPY:ANALYSIS AO THE SAFETY OF THE PRETREATMENT IN ST-ELEVATION MYOCARDIAL INFARCTION

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**Objectives.** The aim of this observational study was to determine the safety of the pre-treatment with dual antiplatelet therapy (DAPT) only and DAPT plus unfractionated heparin in patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (pPCI).
**Background.** STEMI patients undergoing primary PCI should receive aspirin and a $P2Y_{12}$ receptor inhibitor as soon as the diagnosis of STEMI is established. Moreover ESC guidelines on myocardial revascularization (2018) affirm that immediate and sufficient anticoagulation is mandatory in the setting of primary PCI for STEMI. Nowadays, is a consolidated practice to administer UFH as pre-treatment in addition to DAPT in STEMI patients and according to strong evidences we can find in literature. Limited data exist regarding the safety of this combined pre-treatment.
**Methods.** in our retrospective observational study we enrolled 420 STEMI patients transported by EMS and admitted to our hospital to undergo a pPCI between 1st January 2009 and 31st March 2019. Patients were divided into three groups based on the pre-treatment they received and no pre-treated patients (group 1) were compared with patients pretreated only with DAPT (group 2) or with DAPT plus unfractionated heparin (group 3). Primary endpoint was in-hospital bleedings.
**Results.** DAPT plus heparin were administered in 154 out of 420 patients (group 3); 160 patients received DAPT only (group 2) and 106 patients were not pre-treated (group 1). We found no differences about in-hospital bleedings between three groups (9.4% vs 7.5% vs 4.5%; p=0.29). The mean decrease of hemoglobin was 3.53±1.4 g/dl. Bleeding episodes were defined using two different classifications: TIMI bleeding classification and BARC classification. According to both of them, the most frequent bleeding episodes were minor bleedings (75.8% and 86.2% respectively) and such as hematuria (72.4%), melena (6.9%), hematoma or ecchymosis especially in the PCI puncture site (44.8%). Minor bleedings has been equally recurrent in each groups we divided our population and both with the TIMI bleeding score and BARC classification (80% vs 83.3% vs 71.4%; p= 0.33 and 90% vs 91.6% vs 71.4%; p= 0.38, respectively). We didn't find considerable variances among the two systems of classification. There were no significant differences also in who required a blood transfusions and based on the pretreatment they received (30% vs 16.7% vs 0%; p=0.27).
**Conclusions.** Dual antiplatelet therapy only and double antiplatelet therapy plus unfractionated heparin is a safe pretreatment for STEMI patients undergoing primary percutaneous coronary intervention and is not associated with increased risk of bleeding complications or necessity of blood transfusions.

### A740: EFFECT OF INTRAVENOUS FERRIC CARBOXYMALTOSEON LEFT VENTRICULAR SYSTOLIC FUNCTION AFTER ACUTE MYOCARDIAL INFARCTION

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**Introduction.** Treatment with intravenous ferric carboxymaltose (FCM) showed to improve symptoms, functional capacity, and quality of life in patients with heart failure and iron deficiency. No data are currently available in the setting of acute coronary syndromes. The aim of our study was to investigate the role of iron supplementation on left ventricular (LV) function and shape in acute myocardial infarction (AMI).
**Material and methods.** A total of 11 consecutive patients (age 64 ± 12 years) hospitalized for ST elevation myocardial infarction (STEMI) in the anterior wall underwent physical examination, echocardiography and blood samplings with the assessment of high sensitivity troponin (hsTr), ferritin, transferrin and transferrin saturation (TSAT) within 24h from admission. Echocardiographic examination, ferritin, transferrin and TSAT were re-assessed after 6 months from FCM administration. The determination of the initial iron need was calculated based on body weight and haemoglobin levels. A single dose of intravenous FCM was administered in patients with a TSAT ≤20% as an undiluted slow bolus injection within 24h from hospital admission and irrespective of anaemia status. If needed, a second dose was administered one week later.
**Results.** All patients showed a ferritin concentration □ 100 □gr/ml. Five patients had a TSAT ≤20% (group A) and 6 patients a TSAT >20% (group B). The two groups were similar in terms of pain-to-balloon time, LV systolic function and volumes at baseline. After six months of follow-up all patients treated with FCM showed a TSAT >20% and a haemoglobin value >13 gr/dl. Patients in group A showed a significant increase in LV ejection fraction (from 38.6 ± 1.3% to 46.8 ± 3.5%; p=0.0015) and a slight non-significant trend in reduction of LV end-diastolic volume (from 84.6 ± 26.2 ml to 79.1 ± 16.5 ml, p=0.42) from baseline. Opposite, no significant modifications in LV systolic function and remodelling parameters were showed in group B.
**Conclusions.** The administration of FCM in patients with anterior STEMI and iron deficiency was correlated to an improvement in LV systolic function compared to patients with normal TSAT. Potential beneficial effect of FCM administration in patients with AMI should be further examined.

### A741: EFFECT OF BODY MASS INDEX ON ISCHEMIC AND BLEEDING EVENTS IN PATIENTS PRESENTING WITH ACUTE CORONARY SYNDROMES: FROM THE START ANTIPLATELET REGISTRY

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Arturo Cesaro (a), Pia Clara Pafundi (b), Margherita Cesarano (a),
Giuseppe Patti (c), Dario Di Maio (a), Marzia Conte (a), Ilaria Cavallari (c),
Emilia Antonucci (d), Plinio Cirillo (e), Pasuale Pignatelli (f),
Gualtiero Palareti (d), Ferdinando Carlo Sasso (b), Vittorio Pengo (g),
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**Background.** A reduced mortality rate has been described for obese patients presenting with acute coronary syndromes (ACS), but mechanisms underlying this phenomenon still need to be clarified. We aimed at evaluating the impact of obesity on ischemic and bleeding events as possible explanations to the obesity paradox in ACS patients.
**Methods.** For the purpose of this sub-study, patients enrolled in the START-ANTIPLATELET registry were stratified according to Body Mass Index (BMI) into three groups: normal, BMI<25kg/m2; overweight, BMI:25-29.9kg/m2; obese,BMI≥30kg/m2. The primary endpoint was net adverse clinical endpoints (NACE), defined as a composite of all-cause death, myocardial infarction (MI), stroke, and major bleeding.
**Results.** Patients were classified as follows: 410(33.9%) normal, 538(44.5%) overweight, 261(21.6%) obese. Compared to the normal weight group, obese and overweight patients had a higher prevalence of cardiovascular risk factors, but were younger, with a better left ventricular ejection fraction (LVEF) and lower PRECISE-DAPT score. At one-year follow-up NACE was more frequently observed in normal than in overweight and obese patients (15.1%,8.6%, and 9.6%, respectively; p=0.004), driven by a significantly higher rate of all-cause death (6.3%,2.6%, and 3.8%, respectively; p=0.008), while no significant differences were noted in terms of MI, stroke, and major bleeding. At multivariable analysis, LVEF<40% (HR:3.05;CI 95%,2.13-4.37;p<0.001), PRECISE-DAPT (HR:1.04;CI 95% 1.03-1.05;p<0.001), and hypertension (HR:0.65;CI 95% 0.44-0.96;p=0.031) remained independent predictors of NACE.

**Conclusions.** Obesity paradox in ACS population may be explained by a lower bleeding risk in obese patients allowing a more aggressive medical treatment, and by a better LVEF translating into a higher survival rate.

### A742: UNSTABLE ANGINA AND INTERFERON TREATMENT OF MULTIPLE SCLEROSIS: A CLINICAL CASE REPORT

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**Introduction.** Multiple sclerosis (MS) is the most common cause of neurological disability affecting young adults. Patients with MS have an increased risk of cardiovascular diseases (CVD) such as myocardial infarction (IM), coronary artery disease (CAD), stroke and heart failure (HF) due to several causes, including reduced physical activity, abnormal uric acid levels and use of high doses of glucocorticoids in the acute phases. It seems unlikely that MS may lead to CVD without any more risk factors; it is more reasonable to think that different factors such as inflammation, reduced physical activity, thrombogenic factors, altered endothelial function and vascular autonomic dysfunction may lead to a major risk in developing CVD. Few reports in literature underlined a possible negative cardiovascular effect of interferon therapy, not necessary related to administration dose or duration. Even if the pathophysiology effect is not clear, both coronary and not-coronary vasospasms are possible mechanisms contributing to the heart damage, which is also increased by direct cardiotoxic effect and peripheral vascular damage.
**Case report.** Here in, we describe a case report of a 59-year-old male patient, former smoker with no other cardiovascular risk factors, diagnosed at 34 years old with MS and treated with interferon beta-1a (12 million IU three times per week). In the previous months, the patient had complained mild oppressive chest pain during exercise, for whom he underwent an ECG stress test detecting a 1.5-2 mm horizontal ST-T depression in V4-V6 during the stress, associated to oppressive chest pain. Because of the result, a coronary angiography was scheduled. Some days later, complaining the same chest pain, the patient arrived to the Emergency Room (ER): the ECG showed no ST-T abnormalities and the high-sensitive troponin I level was in the normal range. In consideration of the symptoms and the positive ECG stress test, a coronary angiography was performed, showing a diffuse coronary artery disease treated with PCI and different drug eluting stents (DES) on the left main coronary artery, the circumflex artery, the left anterior descending artery, the right coronary artery and the posterior descending artery. The patient was discharged with the diagnosis of unstable angina.
**Discussion.** We report a case of a patient with a three-vessel coronary disease no explained by CV risk factors such as age and past smoke habit. MS may be considered an adjunctive risk factor, even if in this case the patient complained only one single neurological episode; for this reason, even if it is possible to think that the inflammatory stress is always in action, it is less probably it can explain alone the coronary disease. For this reason we want to take into consideration the possible role of interferon treatment. According to the literature, interferon determinates vasospasm and vasoconstriction, contributing to the coronary damage. However we have few dates to establish the real role of this medication. In conclusion with this case report we want to point the attention to the risk a long inflammatory modulation therapy can determinate on the coronary vessels and the need of further evaluation.

### A743: MEDICAL THERAPY AND OUTCOMES IN PATIENTS WITH MYOCARDIAL INFARCTION WITH NON OBSTRUCTIVE CORONARY ARTERY DISEASE

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**Background.** Myocardial infarction with non-obstructive coronary arteries (MINOCA) represents a heterogeneous group between 5% to 10% of all patients with myocardial infarction (MI). Several trials have demonstrated that dual antiplatelet therapy (DAPT), β-blocker, RAAS inhibitor (angiotensin-converting enzyme inhibitors [ACEIs]/angiotensin receptor blockers [ARBs]) and statin therapy improve the prognosis in patients with obstructive myocardial infarction (ob-MI). However, clinical trials of medical therapy for secondary prevention in MINOCA patients are lacking.
**Purpose.** To examine the associations between treatment with 1-year-DAPT, RAAS inhibitor, β-blockers and statins and cardiovascular events among MINOCA patients.
**Methods.** Among 1093 acute MI admission in our single Center between 2016 and 2018, we enrolled 125 consecutive MINOCA according to 2016 ESC MINOCA Position Paper criteria. All patients were followed until 24 months for outcome events, except for 28 patients who were lost during follow-up because they were not traceable or the diagnosis of MINOCA was not confirmed by second level instrumental examinations performed after discharge. For DAPT, the analysis was based on 1-year follow-up according to the current guideline recommendation. The primary end-points were all-cause mortality and a composite one defined as all-cause mortality, myocardial re-infarction and ischemic stroke.
**Results.** Overall, 66% were females and the mean age was 70.2 ± 13.1 years. The median follow-up time was 19.8 ± 4.6 months. At admission, there were no differences in terms of age between MINOCA and ob-MI. Regarding the traditional cardiovascular risk factors, MINOCA more frequently were females (63.4% vs 28.1%; *p<0.001*) and non-smokers (50% vs 64.2%; *p=0.009*) whereas patients with ob-MI had higher prevalence of diabetes (28.4% vs 13.6%; *p=0.002*). There were no statistically significant differences in the prevalence of hypertension and dyslipidemia. At discharge, 80.8% patients with MINOCA were treated with an antiplatelet drugs and only 49.6% were in dual antiplatelet therapy, in contrast with 99.6 % and 90% of ob-MI patients (*p<0.001*). Regarding the remaining medical therapy, MINOCA patients were undertreated with RAAS inhibitor and statins as compared to ob-MI (70.4%, and 68.3 % vs 81.4% and 84.4% respectively, *p<0.01*) whereas there was not difference in β- blockers therapy (MINOCA 83.3 %, and ob-MI 88%; *p=0,21*). At follow-up, no statistical differences were observed in all-cause mortality (*p=0.09*) and in the composite end-point (*p=0.09*) between MINOCA patients treated with DAPT versus single antiplatelet therapy. However, DAPT therapy did not significantly increase bleeding events (*p=0.8*). Moreover, MINOCA patients treated with RAAS inhibitor had a significant reduction of all-cause mortality (*p=0.015)* and the composite one (*p=0.05*); however, no statistical benefit was reported in MINOCA treated with β-blockers (*p=0.3*) or statins (*p=0.3*).
**Conclusion.** Our data support that treatment with RAAS inhibitor provide long-term beneficial effects on outcomes in patients with MINOCA; in contrast, we report a neutral effect of dual antiplatelet, β-blocker and statin therapy. Properly powered randomized trials are warranted.

### A744: ANTIPLATELET THERAPY IN PATIENTS WITH MYOCARDIAL INFARCTION WITH NON-OBSTRUCTIVE CORONARY ARTERY DISEASE

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**Background.** Myocardial infarction with non-obstructive coronary arteries (MINOCA) represents a heterogeneous group between 5% to 10% of all patients with myocardial infarction (MI). Several trials have demonstrated that antiplatelet drugs decrease the risk of cardiac events after acute MI and are recommended for 12 months in current guidelines. Clinical trials of antiplatelet therapy for secondary prevention in MINOCA patients are lacking.
**Purpose.** The aim of this study was to examine the associations between single or dual antiplatelet therapy and cardiovascular events in MINOCA patients.
**Methods.** According to 2016 ESC MINOCA Position Paper criteria, we enrolled retrospectively 125 consecutive MINOCA patients among 1093 acute MI admission in our center between 2016 and 2018. Twenty-eight patients were lost during follow-up because they were not traceable or the diagnosis of MINOCA was not confirmed by second level instrumental examinations performed after discharge, 30 patients were excluded due to concomitant treatment with anticoagulant therapy and five patients were excluded because discharged without antiplatelet therapy. Analysis was carried out on 62 patients for 1-year follow-up stratified by single antiplatelet therapy (acetylsalicylic acid - ASA or P2Y12 inhibitors) and DAPT. The primary end-points were all-cause mortality and the composite end-point defined as all-cause mortality, myocardial re-infarction and ischemic stroke. Safety end-point was occurrence of bleeding.
**Results.** Overall, 59% were females and the mean age was 66±13 years. There were no differences in terms of age and traditional cardiovascular risk factors between patient treated with DAPT and those treated with single antiplatelet agent. At discharge, 29% patients received single antiplatelet therapy (aspirin and P2Y12) and 71% DAPT. No statistical differences were observed both in all-cause mortality (p= 0.5) and in the composite end-point (p=0.5) between the two groups. Regarding safety end-point, there was no significant increase of bleeding events in patients treated with DAPT compared to those treated with single antiplatelet therapy (p=0.2). In the group treated with single antiplatelet therapy, treatment with ASA was not associated with better outcomes (both all-cause mortality and the composite end-point) compared to P2Y12 inhibitor (p=0.7).
**Conclusions.** Our data showed a neutral effect of use of single antiplatelet agents or dual antiplatelet therapy in MINOCA. These patients are included in MI population trial, however this group should be considered as a specific nosological entity with defined management. Currently, clear recommendations for the use of antiplatelet drugs in

MINOCA patients are lacking and it is an open topic which require additional investigation. Properly powered randomized clinical trials to confirm these results are warranted.

### A745: RABDOMIOLISI COMPLICATA DA MOF INDOTTA DA DAPTOMICINA IN PAZIENTE CON SHOCK CARDIOGENO

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La daptomicina (DPT) è un antibiotico lipopeptidico utilizzato nel trattamento di infezioni causate da microrganismi Gram-positivi. In letteratura sono documentati rari casi di danno epatico, miopatia e rabdomiolisi da DPT. La miopatia interessa il 2-14% dei pazienti ed è caratterizzata da minima degenerazione e infiammazione in assenza di fibrosi a livello del muscolo scheletrico, con un rialzo oltre il valore normale delle creatinchinasi (CK). La rabdomiolisi è più rara ma può essere spesso letale e si presenta con diffusa necrosi muscolare e insufficienza renale, associata ad un aumento delle CK 10 volte oltre la norma.

Descriviamo il caso di un uomo di 60 anni, fumatore, iperteso, giunto presso il Pronto Soccorso in FV trattata con 3 scariche di DC shock 200J, l'ECG successivo documentava STEMI anteriore esteso. Il paziente veniva sottoposto ad intubazione oro-tracheale e condotto in stato di shock cardiogeno in sala di emodinamica, dove si eseguiva posizionamento di contropulsatore aortico e PPCI con impianto di 5 stent medicati sull'arteria discendente anteriore, con buon risultato finale (flusso TIMI 3). Successivamente, veniva trasferito in terapia intensiva cardiologica, dove agli esami ematochimici si riscontrava Creatinina 1.3 mg/dl, CK 116 UI/L, Mioglobina 1265 ng/ml, CK-MB 3.45 ng/ml, GPT 150 U/L, Fosfatasi Alcalina 79 UI/L, Bilirubina totale 0.33 mg/dl. Dopo 8 ore si assisteva a rialzo febbrile. Per la persistenza della sintomatologia a 12 ore, nonostante la terapia antibiotica standard, veniva sottoposto ad ecocardiogramma c/D transesofageo, documentante piccola formazione iperecogena adesa alla cuspide aortica, come da vegetazione. Il videat infettivologico consigliava l'esecuzione di 3 set di emocolture, di cui una risultava positiva per Staphilococcus Hominis. Si impostava terapia con Piperacillina/Tazobactam 2.25 g ogni 6 ore e DPT ad un dosaggio ridotto di 3.68 mg/kg/die per il riscontro di Creatinina 2.4 mg/dl al momento della consulenza infettivologica. Nei giorni successivi, si assisteva ad un progressivo incremento dei valori di Mioglobina (picco >20.000 ng/ml in 5° giornata), di CK (picco >14000 UI/L in 5° giornata), di Creatinina (picco 4.9 mg/dl in 7° giornata) e degli indici di colestasi e di citolisi epatica. Nel sospetto di miopatia da farmaci, in 5° giornata si sospendeva la terapia antibiotica precedentemente impostata e si iniziava terapia con Vancomicina e Gentamicina. Il paziente eseguiva inoltre idratazione e tre cicli di emofiltrazione, con progressiva riduzione dei valori di Mioglobina (551 ng/ml) e di CK (254 UI/L) sierici. Al successivo ETE si documentava scomparsa della formazione iperecogena adesa alla cuspide aortica non coronarica.

Riportiamo un caso che dimostra la correlazione tra DPT e MOF drug-induced con danno epatico associato a rabdomiolisi e insufficienza renale acuta. In considerazione della terapia farmacologica in atto al momento della manifestazione del quadro clinico-laboratoristico, abbiamo escluso che altri farmaci possano aver contribuito alla sintomatologia e abbiamo calcolato la probabilità che tale quadro fosse legato alla DPT con lo score di Naranjo, riscontrando un valore di 7/10, che rientra nella categoria "probabile". I fattori di rischio per sviluppare epatopatia e miopatia da DPT non sono al momento noti, ma risulta importante eseguire stretto monitoraggio degli enzimi di danno cellulare e sospendere temporaneamente eventuale terapia con statine.

### A746: RAPID AND EFFECTIVE METHOD TO DECELLULARIZE THE HUMAN HEART USING A HAND-MADE SAMPLE-HOLDER

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Cells *in vivo* are surrounded by a specialized and intricate microenvironment mainly consisting of extracellular matrix (ECM). The ECM affects cell behavior and can support organ function and repair, with an appropriate architecture and a molecular composition unique for each tissue and specific for the role played by the resident cells.

During the last decade, the increasing interest for decellularized ECM (d-ECM) as natural scaffold for cell delivery and tissue regeneration has boosted the search for the optimal protocol to decellularize the human myocardium.

In this study we propose an innovative, reproducible and effective decellularization method to produce a well-preserved cardiac d-ECM.

Cardiac samples harvested from the free wall of both ventricles of adult human hearts were scaled down to fit embedding cassettes and decellularized by immersion in a solution containing SDS, Triton X-100 and antibiotics under constant agitation. To avoid the random suspension within the beaker and the irregular and uncontrolled solution transport through the samples, a plexiglass sample-holder was specifically designed and hand-made to hold up to four cassettes in a steady position while equally exposing samples to decellularizing detergents.

After decellularization, samples were fixed and processed for histological analyses or snap-frozen for molecular biology analyses. The effectiveness of the decellularization procedure was confirmed by the absence of nuclei at the Hematoxylin and Eosin staining and by the quantification of DNA content that resulted well below the accepted threshold of 50 ng/mg of dry tissue. Masson's and Mallory's trichrome stainings revealed the preservation of the three-dimensional architecture of cardiac d-ECM, while Van Gieson, Alcian Blue, Periodic Acid Schiff and Sirius Red stainings documented the retention of elastic fibers, glycosaminoglycans (GAGs), non-collagenous proteins and collagen, respectively. Further, immunohistochemistry revealed in the cardiac d-ECM the retention of proteins typical of the native cardiac ECM, like fibronectin, tenascin and laminin, while quantitative dye binding assay and specific protein array documented the retention of elastin and growth factors, respectively.

These results prove that our method, combined with a hand-made sample-holder specifically designed for decellularization procedures under constant agitation, yields a cardiac d-ECM well preserved in its composition and architecture.

### A747: SELF-ASSEMBLING SCAFFOLD OF FIBRIN AND DECELLULARIZED CARDIAC MATRIX FOR THE DELIVERY OF CARDIAC PROGENITOR CELLS FOR MYOCARDIAL REGENERATION

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Cardiac tissue engineering (CTE) is a promising approach to replace and regenerate the injured and not functional cardiac tissue. Injectable self-assembling scaffolds consisting of biomaterials mimicking the native extracellular environment are an attractive option to promote specific homing and cell retention with minimal invasiveness. Among biological injectable materials, fibrin has been tested in several pathological conditions, either in combination with autologous stem cells or not, to stimulate wound healing through tissue regeneration, as it offers the unrivalled advantages of being autologous, enriched in growth factors and capable of gelling at 37 °C.

In this study we combined fibrin with human cardiac decellularized extracellular matrix (d-ECM) and human Cardiac Progenitor Cells (hCPCs) to prepare an injectable hybrid three-dimensional scaffold serving as a natural cardiac platform for the delivery and engraftment of hCPCs. To this aim, samples of adult human hearts of recipients of heart transplantation were either decellularized to obtain the native cardiac d-ECM or disaggregated mechanically and by enzymatic digestion to obtain hCPCs. d-ECM was then lyophilized and solubilized to be incorporated along with the hCPCs into fibrin gels that were prepared by combining fibrinogen and thrombin.

We tested three ratios of fibrin:d-ECM to determine the ideal combination. Specifically, we prepared 1:1, 1:2 and 2:1 fibrin:d-ECM gels and we allowed them to gel at 37°C. Gelling occurred in all preparations, but differences in the time needed for gelling and organization of gels occurred. The 2:1 preparation gelled after one hour, but solubilized d-ECM and fibrin did not combine well as the fibrin gel floated into the solubilized d-ECM. The 1:1 and 2:1 preparations, instead, gelled in a time ranging between eight and twenty hours, respectively, and produced homogenous gels. Gels were processed for histological analysis after three days of culture and hematoxylin-Eosin staining showed the presence and distribution of hCPCs throughout the entire thickness of the gels with 1:1 ratio, while for 1:2 and 2:1 ratios hCPCs coated the surface but were not visible inside the gels. Furthermore, the presence of collagen and ECM glycoproteins was detected by Sirius Red, Periodic Acid Schiff and Masson's Trichrome stainings exclusively in the gel with 1:1 ratio.

Our results suggest that the combination of fibrin and d-ECM at 1:1 ratio yields a well-structured self-assembling scaffold that might be used as a minimally invasive method to deliver hCPCs and cardiac d-ECM in the injured myocardium to boost cardiac regeneration.

### A748: YOUNG WOMEN WITH ACUTE CORONARY SYNDROME: WHAT TO EXPECT

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**Introduction.** Spontaneous coronary artery dissection (SCAD) is a rare serious condition caused by non-atherosclerotic acute myocardial infarction (AMI) that affects mainly women. Clinical presentation of SCAD is very challenging. Currently, there are no randomized data and no common consensus to define the optimal management for SCAD.

**Hypothesis and methods.** To assess the clinical characteristics of young women admitted to our Institution with an AMI secondary to SCAD during a 2-years period. A homogeneous case series of 5 women (median age 32±3 years) was analysed. The clinical and angiographic features were compared.
**Results.** Two patients were in the postpartum period while 2 other women were affected by connective tissue disorders and one had an acute emotional stress. ST-elevation myocardial infarction (STEMI) accounted for 2 cases, non- ST-elevation myocardial infarction (NSTEMI) for 3. Two patients presented with typical chest pain, 2 with atypical chest pain and in one woman the first findings were ventricular arrhythmias. On coronary angiography all women presented distinctive pattern of non-atherosclerotic single vessel disease: proximal left anterior descending (LAD) dissection causing anterior AMI in 2 cases (40%), proximal right coronary artery (RCA) dissection with an inferior AMI in 1 case (10%), first obtuse marginal (OM) branch dissection with lateral AMI in 2 cases (40%). Coronary dissections were suggested by a visible intraluminal filling defect with an abrupt demarcation from the normal segments in all cases. An additional tract of extraluminal opacity or flap was found in the 2 STEMI cases. Three women were treated with multiple percutaneous transluminal coronary angioplasty (PTCA) with stent placement (PTCA of proximal LAD for the anterior STEMI and one NSTEMI and PTCA of proximal RCA for the inferior STEMI). Medical therapy was the first choice in the first OM branch SCAD. None of the women were affected by congenital cardiac disorders. The left ventricular ejection fraction (LVEF) at discharge after AMI was >50% in 4 cases, only the anterior STEMI developed a moderate reduction of LVEF.
**Conclusion.** SCAD in young women showed a direct association with hormonal-related structural changes and with connective tissue disorders. The misconception of young women being at low risk for AMI is pervasive. Such presentations in women at risk should prompt invasive coronary angiography to rule out SCAD. Medical therapy was the first choice in mid-distal SCAD.

## IMAGING – 5
## Sessione Orale

### A749: DIPHOSPHONATE SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY IN CARDIAC TRANSTHYRETIN AMYLOIDOSIS: IMPLICATIONS FOR EARLY DIAGNOSIS AND EVALUATION OF DISEASE PROGRESSION

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**Background.** Planar scintigraphy is an established diagnostic tool for cardiac involvement in amyloid transthyretin (ATTR) cardiomyopathy, while single photon emission computed tomography (SPECT) has never been evaluated. We aimed to assess diphosphonate as a tool for optimizing the detection of myocardial infiltration in cardiac ATTR.
**Methods.** Data from consecutive patients undergoing cardiac $^{99m}$Tc-hydroxymethylene diphosphonate ($^{99m}$Tc-HDMP) SPECT and diagnosed with ATTR cardiomyopathy at a tertiary referral center from June 2016 to April 2019 were collected.
**Results.** Thirty-eight patients were included (median age 81 years, 79% men, 92% with wild-type ATTR). In patients scoring 1 on the Perugini scale, the most intense diphosphonate regional uptake, accordingly to the standard 17 segment model, was found in septal segments, particularly in infero-septal segments followed by antero-septal and apical septal segments segment followed, while the lowest uptake was observed in the other apical segments (15, 16, 17). Among patients scoring 2, the amyloid burden in the septum became more significant, and extended to inferior (4 and 10), and apical segments (14 and 15), while an intense and quite widespread uptake was found in patients scoring 3. All patients scoring 1 on the Perugini scale had LGE in at least one antero-septal (2, 8), one infero-septal (3, 9), and one infero-lateral segment (5,11). All patients with score 2 displayed LGE in infero-septal, inferior, and infero-lateral segments. LGE became extensive in case of score, with all patients having at least one LGE-positive segment in each region.
**Conclusions.** In patients with ATTR, diphosphonate SPECT imaging increase the chance to detect cardiac involvement and quantify regional amyloid burden. This increase the possibility of an early diagnosis and provides an insight into disease progression (from infero-septal to apical-lateral segments).

### A750: STRAIN ANALYSIS REVEALS SUBTLE SYSTOLIC DYSFUNCTION IN CONFIRMED AND SUSPECTED MYOCARDITIS WITH NORMAL LVEF. A CARDIAC MAGNETIC RESONANCE STUDY

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**Aims.** Lake Louise Criteria (LLC) have good accuracy for the diagnosis of acute myocarditis (AM) with normal left ventricular (LV) ejection fraction (EF). However, they are time-dependent and some AM could be missed, due to the limited accessibility of Cardiac Magnetic Resonance (CMR). We aimed to assess the potential value of CMR feature tracking (FT) imaging in AM with normal LVEF.
**Methods and Results.** Eighty-three patients with clinically suspected AM and normal LVEF were divided in two groups based on CMR-LLC: 39 positive LLC patients ("confirmed AM") and 44 negative LLC patients ("suspected AM"). An age- and gender-matched control sample of 42 normal subjects underwent CMR. Biventricular strains were measured by FT analysis in all groups. Strain values below the 5th percentile of the control group were considered abnormal. "Suspected" and "confirmed" AM were similar, except for medium time of CMR evaluation (5.2 vs 1 months from clinical presentation, respectively; p=0.004). Compared to healthy controls, both "suspected" and "confirmed" AM showed significantly impaired strain values. LV- global circumferential strain (GCS), right ventricular GCS and LV- global longitudinal strain (GLS) were abnormal in 15.4% and 15.9%, 20.5% and 15.9%, 7.7% and 9.1% in "confirmed" and "suspected" AM, respectively.
**Conclusions.** "Confirmed" and clinically "suspected" AM with normal LVEF have similar CMR-FT strain values, significantly reduced compared to healthy controls. Up to 20% of these AM patients have abnormal cardiac strain values, suggesting subtle LV dysfunction. Reduced strain could be found months away from the acute phase when LLC diagnostic accuracy decreases.

### A751: COMMON SYMPTOM FOR UNCOMMON PATHOLOGY

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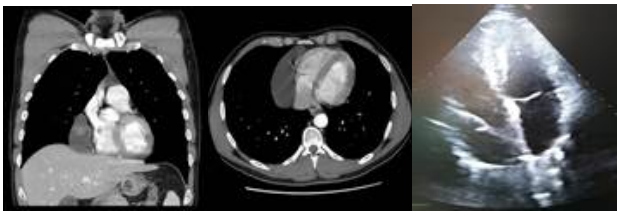
**Background.** Pericardial cysts (PC) are rare lesions which often appear as incidental findings in asymptomatic patients; they are generally located in the middle of the mediastinum and the mean diameter is usually between 1 and 5 cm. Sometimes pericardial cysts may determine symptoms like dyspnea, chest pain, or persistent cough.
**Case description.** We present the case of a 42 year old man, without relevant anamnestic pathologies, presented in the emergency department with fever, vomit, persistent dyspnea and syncope. The blood analysis showed a mildly increased CRP with 88% neutrophils, mildly increased D-dimer; all other values were in the normal range. A cardiac clinical evaluation was performed. The physical evaluation showed normal blood pressure, normal heart rate; no abnormality was found. The electrocardiogram was normal. The echocardiogram performed immediately after, showed normal LV dimension and function, normal RV dimension and function, no valvular disease; evidence of an anechogenic area near the right atrium, at the level of the tricuspid valve, moving with the heart and partially compressing the right chambers: the differential was with a loculated pericardial effusion, pericardial cyst or other kind of mediastinal mass. For a better definition of the finding, a chest CT was performed, and it confirmed the presence of a large lesion measuring 11x4,2 cm, adjacent to the right atrium with fluid density, referable to a pericardial cyst. The patient refused a surgical evaluation.
**Discussion.** Pericardial cysts are uncommon lesions, which often are asymptomatic; sometimes, they can provoke symptoms like chest pain, cough, fever, dyspnea and fatigue. Uncommon presentation is represented by syncope and symptoms due to compression of the right heart chambers. In our case, we thought that the presence of a large cyst compressing the right atrium, associated with fever and condition of dehydration could have caused a reduction of the venous return and this could explain the syncopal episode. The diagnosis of a PC can be made by echocardiogram, but the gold standard is represented by Cardiac MRI and CT, which aloud to define the precise dimensions, tissue characterization and relation with the heart chambers, big vessels and the pericardium. The management depends on the presence of symptoms and it is not necessary to intervene if the patient remain asymptomatic; a clinical and imaging follow-up is anyway indicated, and the appearance of new symptoms or the evidence of growing dimensions during the follow up represent an indication to the cyst resection. In our case, for the

moment the patient refused the surgical evaluation, but a clinical and imaging follow-up will be performed to establish the future management.
**Conclusion.** PC are benign and incidental findings, which sometimes may have an impact on the quality of life of our patients. They need a close follow-up to intervene with surgical resection at the right time. Syncope is an atypical presentation and it is related to the compression of the heart chambers. Dehydration and other conditions that reduced venous return could provoke the onset of syncope and unmask these lesions.



### A752: NATIVE T1 AND T2 ARE INTERRELATED AND PROVIDE DISTINCTIVE SIGNATURES IN HYPERTROPHIC CARDIAC CONDITIONS - COMPARISON OF UREMIC, HYPERTENSIVE AND HYPERTROPHIC CARDIOMYOPATHY

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**Aims.** Profound left ventricular (LV) hypertrophy with diastolic dysfunction and heart failure is the cardinal manifestation of remodelling in chronic kidney disease (CKD). Previous studies related increased T1 mapping values in CKD with diffuse fibrosis. Native T1 is a non-specific readout that may also relate to increased intramyocardial fluid. We examined concomitant T1 and T2 mapping signatures and undertook comparisons with other hypertrophic conditions.
**Methods and results.** In this prospective multicentre study, consecutive CKD patients with eGFR <60 ml/min (n=154) undergoing routine clinical cardiac magnetic resonance (CMR) imaging were compared with hypertensive (HTN, n=163) and hypertrophic cardiomyopathy patients (HCM, n=158) as well as with normotensive controls (n=133). Native T1 was significantly higher in all patient groups, whereas native T2 was higher in CKD as compared to all study groups (p<0.001). In both CKD and HCM, native T1 was positively associated with LV mass (r=0.308 and r=0.38 respectively, p<0.001 for both), whereas significant correlations with native T2 were restricted to CKD group and included positive relationships with LV-EDV, LV mass and LVWT (r=0.231, 0.366 and 0.21 respectively, all p<0.01). Native T1 and T2 were interrelated in patient groups and the strength of association was condition-specific: CKD r=0.558, HTN: r=0.324, p<0.001; HCM r=0.157, p=0.05). Native T1 and T2 progressively increased with declining of renal function (p<0.001 for both), and were similarly correlated in all CKD stages (S3 r=0.501, S4 0.586, S5 r=0.424, p<0.001 for all). Native T1 was the strongest myocardial discriminator between patients vs. controls (area under the curve, AUC HCM: 0.97; CKD: 0.97, HTN 0.98), native T2 between CKD patients vs. HCM (AUC 0.90) and native T1 and T2 between CKD vs HTN (AUC: 0.83 and 0.80), p<0.001 for all.
**Conclusions.** Our findings reveal differential phenotypical signatures of common hypertrophic cardiac conditions. Native T1 was raised in all conditions, indicating the presence of pathological hypertrophic remodelling. Markedly raised native T2 was CKD-specific, suggesting a prominent role of intramyocardial fluid.

### A753: LATE GADOLINIUM ENHANCEMENT PREDICTS APPROPRIATE DEFIBRILLATOR SHOCK IN PATIENTS WITH DILATED CARDIOMYOPATHY

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**Aims.** Late gadolinium enhancement (LGE) at cardiovascular magnetic resonance (CMR) has been demonstrated to predict ventricular arrhythmias and implantable cardioverter defibrillator (ICD) discharge in non-ischaemic dilated cardiomyopathy (DCM), but which pattern, location and extent of LGE is associated with worse outcome is still uncertain.
**Methods.** We retrieved the data of all DCM patients (n=183) receiving an ICD for primary prevention at our Institution, and undergoing CMR within 1 month before implantation. LGE extent was calculated as percentage of left ventricular (LV) mass. The primary endpoint was appropriate ICD shock, the secondary endpoint was a composite of appropriate ICD shock and cardiac death.
**Results.** One hundred and eighty-three patients were evaluated (men 73%, median age 66 years, LVEF 24%, median N-terminal fraction of pro-B-type natriuretic peptide 1217 ng/L, atrial fibrillation, flutter or atrial ectopic rhythm 21%). They received single-chamber (n=21, 12%), dual-chamber (n=34, 19%), or cardiac resynchronization therapy devices (n=127, 69%); one patient (1%) received a subcutaneous defibrillator. LGE was present in 116 patients (63%), but on average accounted for limited percentage of LV mass (4% [2-11%]). During a median 30-month follow-up, 20 patients (11%) experienced the primary and 30 patients (16%) the secondary endpoint. LGE presence and extent predicted both the primary (HR 6.79, 95% CI 1.57-29.5, p=0.010 for LGE; HR 2.32, 95% CI 1.44 – 3.75, p=0.001 for LGE extent) and the secondary endpoint (HR 3.51, 95% CI 1.33 – 9.25, p=0.01 for LGE; HR 1.50, 95% CI 1.05 – 2.15, p=0.025 for LGE extent). LGE mass >12% was the best cut-off at receiver operating characteristics analysis. Both endpoints were significantly associated with inferior wall LGE, as well as LGE with a 50-75% transmurality.
**Conclusions.** Among DCM patients undergoing ICD implantation according to current guidelines, only a minority experienced an appropriate shock or cardiac death. LGE presence and extent predicted both endpoints. Patients with an LGE extent >12%, with 50-75% transmurality LGE or with inferior wall LGE were associated with the highest risk.

### A754: UNUSUAL PRESENTATION OF A RARE DISEASE

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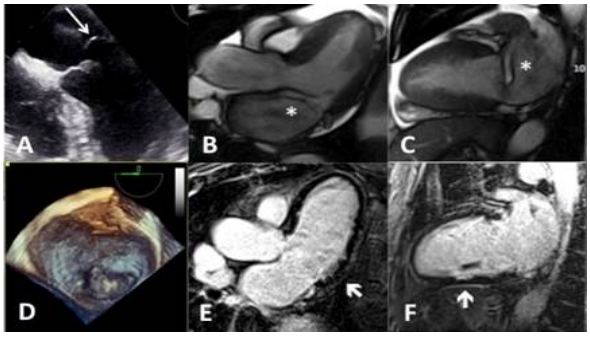
A 78 yo woman presented to the emergency department with progressive dyspnoea on effort, night sweats, muscle pain and a recent episode of purpura. She had a long-standing history of asthma, multiple renal and hepatic cysts and a heterozigotic mutation of methyltetrahydrofolate reductase. Physical examination was unremarkable. Chest X-ray showed mild signs of congestion and an ECG was normal. Blood samples showed leukocytosis with hypereosinophilia, mildly increased brain natriuretic peptide (BNP) and elevated high sensitive Troponin I. Coronary angiography showed unobstructed coronaries and focal areas of lung consolidation were found on a chest CT scan. She suddenly presented hypotension and tachycardia, with a new systolic murmur. A trans-thoracic echocardiogram showed severe mitral regurgitation, with normal left ventricular volumes and function and no wall motion abnormalities. To better assess the mechanism underlying mitral regurgitation, a trans-oesophageal echocardiogram was performed showing a P2 scallop prolapse with chordal rupture (Fig.1A and D, white arrow).



Further laboratory work-up showed muscle and liver impairment, while allergic, parasitic, autoimmune and lymphoproliferative diseases were excluded. Total IgE count was markedly elevated and a bone marrow biopsy revealed increased precursor and mature eosinophilic cells, leading to the diagnosis of eosinophilic granulomatosis with polyangiitis (EPGA), based on the American College of Rheumatology criteria. The patient was treated with oral corticosteroid, with remission of hypereosinophilia, while waiting for mitral valve repair. A cardiovascular magnetic resonance (CMR) was performed to assess tissue characterization. CMR confirmed severe eccentric mitral regurgitation (Fig.1B and C, asterisk) and showed oedema of the papillary muscles, mainly of the postero-medial one, and patchy subendocardial spots of late gadolinium enhancement (LGE) of all left ventricular basal segments, of the inferior and inferolateral mid-cavity walls (Fig.1E-F, white arrows) and of the papillary muscles.

## INTERESSAMENTO CARDIOVASCOLARE IN PATOLOGIE SISTEMICHE E DI ALTRI APPARATI
## Sessione Orale

### A755: CARDIOMETABOLIC ALTERATIONS IN OBESE PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME

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**Background.** Obesity and obstructive sleep apnea syndrome (OSAS) has been recognized as two of the major cardiac risk factors. OSAS is widely spreaded in the general population and it's still a misdiagnosed disease as the majority of patient with moderate-severe OSAS did not receive diagnosis to date. It is a risk factor for mortality from all causes and particularly from cardiovascular disease such as myocardial infarction, heart failure and arrhythmias. On the other hand, obesity it's one of the leading causes of death worldwide. The excess of fat tissue has an unfavorable effect on the cardiovascular system since it causes insulin resistance, dyslipidemia, sympathetic hyperactivation, chronic inflammation and endothelial dysfunction. Through all this mechanism obesity is linked to cardiovascular disease. Both, obesity and OSAS often coexist in the same patient.
**Aim.** To evaluate cardiometabolic profile, echocardiographic alterations and the presence of arrhythmias in obese patients with Obstructive Sleep Apnea Syndrome.
**Patients and methods.** Fiftyeight obese patients (32 male/26 female) and 49 non obese patients (40 male/9 female) were enrolled.
On the first day, after 12-h fasting, subjects underwent anthropometrical evaluation and a venous blood sample was drawn for biochemical and hormonal determinations including fasting plasma glucose, fasting plasma insulin and Hba1c. On the second day, after a 12-h fasting, a 75 g OGTT to 5 hours was performed with sampling for plasma glucose, plasma insulin and C-peptide. The insulin resistance was evaluated by HOMA-IR. All the patients underwent polysomnographic evaluation, in order to diagnose the OSAS, and a simultaneous 12-lead Holter ECG to evaluate the presence of nocturnal arrhythmias. In addition, echocardiographic examination has been performed. The data has been analyzed by t-Students test, ANOVA, and r-Pearson correlation.
**Results.** As expected, weight and BMI were significant higher in obese patients. No differences in fasting plasma insulin, HOMA-IR, uric acid and HDL-cholesterol were observed between two group. Obese patients display a severe OSAS compared to non-obese patient as shown by higher values of AHI (26.37 ±24.95 vs 16.58 ±14.07; P<0.05), TC90 (19.61 ±24.45 vs 8.63 ±17.80; P<0.05) and ODI (40.55 ±27.41 vs 21.06 ±22.78; P<0,05). In obese patients we also found a significant reduction of both ejection fraction (55.54 ±7.97 vs 66.52 ±8.95; P<0.05) and A-wave (0.75 ±0.17 vs 0.83 ±0.19; P<0.05). In 10 obese patients (20%),12-lead Holter ECG showed during apnea the presence of cardiac pause > 3 sec. In obese population alone we demonstrated a significant negative correlation between AHI and E-wave (r= -0.3; P=0.04) and a positive correlation with interventricular septum (*r*=0.38; *P*=0.01) and left ventricular mass (r=0.32; P=0.02). Post-hoc analysis shown how these findings maintained statistical significance even when the obese patients were stratified in subgroups according to the severity of OSAS.
**Conclusions.** Our data, even if preliminary, seem to indicate that OSAS is not only linked to obesity but also acts as a negative factor on the cardiovascular parameters. Though these results are encouraging, our small sample observational study requires confirmation in larger cohorts.

### A756: CHARACTERIZATION OF DYNAMIC LEFT VENTRICULAR SYSTOLIC AND DIASTOLIC FUNCTION IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME AND PRESERVED LEFT VENTRICULAR EJECTION FRACTION

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**Aims.** In subjects with obstructive sleep apnea (OSA), hypoxia affects myocardial oxygen supply resulting in subclinical cardiac dysfunction. The aim of this study was to assess left ventricular (LV) myocardial deformation and diastolic function at rest and during exercise in this subset of patients.
**Methods and results.** Conventional echocardiography, Doppler myocardial imaging and LV 2D speckle tracking echocardiography at rest and during exercise, were performed in 55 OSA patients with preserved LV ejection fraction (EF), and 35 age and sex-comparable healthy controls. Peripheral levels of OB were also evaluated by flow cytometry. Despite comparable LVEF, LV global longitudinal strain (GLS) was significantly reduced in OSA at rest (-13.4±3.8 *vs* -18.4±3.3 in controls, *P*<0.001) and at peak exercise (-15.8±2.6 vs -23.4±4.3, *P*<0.001). Systolic pulmonary artery pressure and E/E′ ratios increase during effort were higher in OSA than in controls (ΔsPAP 44.3%±6.4 *vs* 32.3%±5.5, *P*<0.0001, and ΔE/E' 87.5%±3.5 *vs* 25.4%±3.3, *P*<0.0001, respectively). The best correlation with exercise capacity was E/E′ at peak stress (*r* =−0.50, *P*<0.001). OB was significantly increased in OSA patients in comparison with healthy subjects (*P*=0.001).
**Conclusions.** Evaluation of diastolic function and myocardial deformation during exercise is feasible through stress echocardiography. OSA patients with preserved LVEF show subclinical LV systolic dysfunction, impaired LV systolic and diastolic reserve, reduced exercise tolerance, and increased peripheral levels of OB. A continuous positive airway pressure (CPAP) and a therapy aimed at increasing LV diastolic function reserve might improve the quality of life and the exercise tolerability in this population.

### A757: LEFT ATRIAL FUNCTION AS A HALLMARK OF EARLY CARDIAC DYSFUNCTION IN THALASSEMIA MAJOR PATIENTS

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**Background.** T2* is the standard of care for detecting myocardial iron overload in Thalassaemia Major. However, around half of normal T2* patients have a low myocardial T1, suggesting T2* misses a lot of mild iron. The significance of this is uncertain. The atria are known to become abnormal early with iron overload. We sought to determine whether atrial abnormalities tracked low myocardial T1 which would suggest that a low T1 is an early cardiomyopathy marker.

| | MIO +/+ | | MIO -/+ | | MIO -/- | | p | post-hoc |
|---|---|---|---|---|---|---|---|---|
| N (females) | 23 (15) | | 49 (30) | | 47 (24) | | | |
| BSA | 1.61 | ±0.2 | 1.61 | ±0.2 | 1.64 | ±0.2 | 0.6 | |
| Age | 35 | ±8 | 39 | ±8 | 36 | ±6 | 0.006 | |
| Hb | 9.7 | ±0.6 | 9.8 | ±0.8 | 9.7 | ±0.7 | 0.94 | |
| DB T2* (ms) | 14 | ±6 | 33 | ±7 | 37 | ±5 | <.00001 | |
| T1 (ms) | 714 | ±113 | 902 | ±35 | 992 | ±5 | <.00001 | |
| LVEDV i (ml/m²) | 79 | ±16 | 76 | ±15 | 87 | ±17 | 0.004 | §§ |
| LVESV i (ml/m²) | 28 | ±7 | 26 | ±9 | 30 | ±9 | 0.09 | |
| LVEF | 0.65 | ±0.05 | 0.67 | ±0.13 | 0.66 | ±0.05 | 0.44 | |
| Min LAV i (ml/m²) | 22 | ±10 | 26 | ±16 | 22 | ±8 | 0.14 | |
| pAC LAV i (ml/m²) | 32 | ±14 | 35 | ±16 | 31 | ±9 | 0.27 | |
| Max LAV i (ml/m²) | 51 | ±19 | 55 | ±19 | 55 | ±12 | 0.62 | |
| TEV (ml) | 46 | ±17 | 46 | ±15 | 54 | ±13 | 0.01 | § |
| TEF | 0.59 | ±0.10 | 0.54 | ±0.13 | 0.61 | ±0.08 | 0.007 | §§ |
| PEV i (ml/m²) | 19 | ±7 | 19 | ±7 | 24 | ±6 | 0.0009 | **, §§ |
| PEF | 0.37 | ±0.08 | 0.36 | ±0.11 | 0.44 | ±0.08 | 0.0001 | **, §§ |
| PE (%) | 64 | ±10 | 68 | ±12 | 73 | ±9 | 0.0038 | ** |
| AEV i (ml/m²) | 11 | ±6 | 9 | ±4 | 9 | ±3 | 0.18 | |
| AEF | 0.33 | ±0.10 | 0.28 | ±0.14 | 0.30 | ±9 | 0.19 | |
| AE (%) | 36 | ±10 | 32 | ±12 | 27 | ±9 | 0.0038 | ** |

MIO: Myocardial Iron Overload. MIO+/+: T2*<20ms, T1 mapping <950msec; MIO -/+: T2*>20ms, T1 mapping <950msec; MIO -/-: T2*>20ms, T1 mapping >950msec. BSA: body surface area; Hb: hemoglobin; LV: left ventricle; EDV: end-systolic volume; ESV: end-systolic volume; EF: ejection fraction; LAV: left atrium volume; pAC: pre-Atrial Contraction; TEV: Total Emptying Volume (*Max LAV – Min LAV*); TEF: Total Emptying Fraction (*100* TEV /Max LAV*); PEV: Passive Emptying Volume (*Max LAV – pAC LAV*); PEF: Passive Emptying Fraction (*100* PEV /Max LAV*); AEV: Active Emptying Volume (*pAC LAV – Min LAV*); AEF: Active Emptying Fraction (100*AEV/ *pAC LAV*). Significance levels: */**/***: MIO+/- vs MIO-/+ <0.05/<0.01/<.0001; §/§§/§§§: MIO+/- vs MIO-/- <0.05/<0.01/<.0001; #/##/###: MIO-/+ vs MIO-/- <0.05/<0.01/<.0001.

**Methods.** 119 patients with potential iron overload underwent 1.5T CMR with both T2* and T1 mapping (MOLLI). Using normal range cutpoints of T2*<20ms and T1<950ms), Myocardial Iron Overload was classified as MIO+/+ (T2* and T1 low), MIO-/+ (Normal T2*, low T1) and MIO-/- (both normal). MIO+/- rarely occur. Biventricular and LA volumes and function were calculated. For LA, volumes were calculated with a biplane measurement method at 3 time points (maximum, minimum and pre-atrial contraction) to calculate function (reservoir, conduit and emptying phase).
**Results.** As expected (Table 1), 51% of T2* negative patients had low T1. Patients with no iron overload (MIO-/-) had larger ventricles but all had normal ejection fractions. Atrial volumes at all timepoints were the same between groups. However, with iron overload (MIO+/+) atrial function was altered, suggesting increased ventricular stiffness and filling pressures. MIO -/+ also had these abnormalities, and were more like MIO +/+ than MIO -/-.
**Conclusions.** Patients with Thalassaemia Major, overt iron overload but no measurable ventricular dysfunction have impaired atrial function, particularly passive atrial emptying, suggesting ventricular stiffness and increased filling pressures. Around half of patients with no myocardial iron by T2* have apparent iron by T1 mapping. Atrial function in these patients is abnormal suggesting that even mild iron (low T1, normal T2*) is inducing early myopathy changes.

### A758: PRELIMINARY RESULTS OF A DIAGNOSTIC-THERAPEUTIC WORK-UP TO EARLY DETECT CARDIOVASCULAR DISEASE IN HIV POSITIVE PATIENTS

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**Background.** Cardiovascular disease (CVD) in the HIV population accounts for a large proportion of morbidity and mortality and the burden of CVD is expected to rise. As such, CVD has become an important health issue and the ability to identify HIV-infected patients at risk is now an essential component in their management in clinical practice.
**Objective.** To detect CVD in a population of HIV positive patients from a single tertiary care Hospital applying a new diagnostic-therapeutic work-up.
**Materials and methods.** This is a cross-sectional study conducted at the time of the visit. HIV-infected patient in ART aged ≥ 40 years old underwent a comprehensive pre-cardiology evaluation which included ECG, transthoracic echocardiogram (TTE) and, when indicated, advanced cardiovascular imaging modalities such as Cardiac MRI, Cardiac CT and stress Echocardiography. We enrolled all HIV positive patients ≥40 years presenting at least one cardiovascular risk factor. All patients underwent a comprehensive cardiology evaluation which included ECG, transthoracic echocardiogram and, when indicated, advanced cardiovascular imaging modalities such as Cardiac MRI, Cardiac CT and stress Echocardiography. We collected data about age, sex, viro-immunological history and co-infection. hsCRP, Lp(a), IL-6, BNP and D-dimer were tested. Framingham score (FS) was calculated. Logistic multivariate analysis was performed to identify any possible predictive factor for CVD.
**Results.** Since January 2018 we have enrolled 142 HIV positive patients. We focused on 98 who had no prior history of CVD and were asymptomatic. Clinical and demographics characteristics are summarized in Table1. CVD was diagnosed in 45 patients out of 98 (overall prevalence 45.2%): 29 (29,59%) had a non- ischemic heart disease, whereas 16 (16.33%) presented a coronary artery disease (CAD). All patients with CVD were treated with medical therapy. Four out 16 patients with CAD were diagnosed with critical CAD and underwent coronary revascularization (3 percutaneous, 1 surgical). 1 had a silent myocardial infarction with no evidence of myocardial viability. At multivariate analysis only FS > 20 was associated with higher risk of CVD (p=0,06). Nevertheless, 8 (21.5%) patients with FS <10 had a CVD. Levels of hCRP, Lp(a), IL-6 and NT-pro BNP were not significantly associated with CVD.
**Conclusions.** CVD is increasingly common in HIV positive patients. According to our experience FS may underestimate the real cardiovascular risk burden in HIV asymptomatic positive patients. A diagnostic-therapeutic work-up may be useful to unmask CVD in patients with no prior history of cardiovascular accident.

### A759: HEART RATE VARIABILITY IN SARCOIDOSIS AND EFFECT OF OBSTRUCTIVE SLEEP APNEA SYNDROME IN AUTONOMIC FUNCTION ANALYSIS

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**Aims.** The association between sarcoidosis and autonomic dysfunction is demonstrated but poorly known. Heart rate variability (HRV) studies can provide a simple, non-invasive analysis of sympathetic and vagal tone in sarcoidosis. Also, comorbidities such as obstructive sleep apnea syndrome (OSAS), may produce effects on autonomic system due to nocturnal apnea or hypopnea events and need to be evaluated. Despite OSAS is highly prevalent in sarcoidosis, HRV has never been assessed taking such condition into account.
**Methods.** Prospective analysis of 28 patients enrolled in Sarcoidosis Clinic of Policlinico Gemelli hospital. Continuous EKG recording over 24 hours has been performed in patients that have also been recently tested for OSAS with polysomnography. HRV was assessed using time and frequency domain methods.
**Results.** The analysis of the cohort shows a predominance of female gender (20,71.4%) and OSAS was diagnosed in 19 (67.9%) identifying a moderate-to-severe condition in 11 (57.9%). Treatment with CPAP was started only in 5 (45.5%) patients with moderate-to-severe OSAS. Scadding radiological criteria for sarcoidosis revealed 0/1 stage in 14 (50%) and 2/3/4 stage in 14 (50%). Steroid treatment was on course in 13 patients during medical evaluation. HRV analysis did show mean logarithm of low frequency/high frequency ratio (Log LF/HF mean) to be correlated with OSAS diagnosis (ρ:-0.38, p=0.0443) and an even more strong correlation can be noted in Log LF/HF ratio during daytime (ρ:-0.49, p=0.0079). Scadding stage of 0/1 compared to 2/3/4 demonstrated a negative trend of Log LF/HF mean correlation (ρ:-0.35, p=0.0646). Treatment with steroids seems to have an effect on autonomic dysfunction due to alterations in both frequency and time domains: LF mean (ρ: 0.48, p=0.0089); r-MSSD ms (ρ:0.46, p=0.0118); SDNN (ρ:0.43, p=0.0197); pNN50 % (ρ:0.37, p=0.0498). No correlation with CPAP was found.
**Conclusions.** HRV is an effective tool for the autonomic evaluation. Sleep disorders must be considered when HRV is performed in patient affected by sarcoidosis due to the strong correlation between the frequency domain (Log LF/HF mean) and OSAS. Also, treatment with steroids should be took into account and HRV analysis revealed a correlation in both frequency (LF mean) and time (r-MSSD, SDNN, pNN50%) domains.

### A760: CARDIAC REMODELING IN PATIENTS WITH PSORIATIC ARTHRITIS

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**Background.** Systemic inflammatory diseases are associated with increased cardiovascular risk due to the dual presence of classical risk factors and inflammatory mechanisms activated by the immune system. Moreover, there is a load of unfavorable metabolic effects typical of the anti-inflammatory therapy usually used in the treatment of these pathologies. This is also true for patients with psoriatic arthritis, and several studies have found an increased incidence of cardiovascular events in these patients. However, there is still uncertainty about the association with specific cardiac remodeling; for this reason, we evaluated a cohort of patients with psoriatic arthritis.
**Methods.** We retrospectively identified 53 non-hypertensive patients with psoriatic arthritis (APSO), compared with a control group of 48 subjects without rheumatological pathology (C). We assessed clinical, laboratory, and instrumental parameters of the two cohorts.
**Results.** The two populations did not differ by age, gender, systolic (SBP), diastolic (DBP) and average blood pressure (MBP), pulse pressure (PP), heart rate, BMI, BSA, cardiovascular risk, diastolic parameters (E/A ratio and deceleration time), aortic root diameter, RWT and TAPSE. The two groups differed by left ventricular mass indexed to BSA (LVMI: APSO 119.70±4.73 vs C 98.28±2.23 g/m$^2$; p 0.0001), left ventricular mass indexed to height$^{2.7}$ (LVHA: 52.48±3.86 vs 39.59±0.98 g/m$^{2.7}$; p 0.003), end-diastolic interventricular septum thickness (EDIVS: 11.30±0.34 vs 10.46±0.22 mm; p 0.047), end-diastolic left ventricular diameter (EDLV: APSO 48.66±1.03 vs C 45.87±0.52 mm; p 0.02), end-systolic left ventricular diameter (ESLV: 30.09±1.01 vs 27.71±0.56 mm; p 0.006), end-diastolic left ventricular posterior wall thickness (EDPW: 10.14±0.26 vs 9.38±0.27 mm; p 0.04) and left atrium diameter (39.12±0.61 vs 37.14±0.67 mm; p 0.03). Furthermore, considering cutoff to identify left ventricular hypertrophy, 60% of APSO patients were hypertrophic vs 35% of controls (p 0.017). Finally, the APSO group had lower left ventricular ejection fraction (65.09±1.26 vs. 69.23±1.16 %; p 0.018). Analyzing the laboratory parameters, APSO patients showed higher values of alpha1-globuline (0.29±0.01 vs. 0.23±0.01 g/dl; p <0.0001) and LDL (114.56±3.84 vs 100.19±4.64 mg/dl; p 0.02), in the presence of overlapping total cholesterol, triglycerides, and HDL values; moreover, LDL correlated inversely with alpha1-globuline (p 0.03; R2 0.09). As expected, LVMI correlated significantly with SBP (p<0.0001; R2 0.363), PP (p 0.0811; R2 0.252) and age (p 0.0007; R2 0.203), but not with the duration of illness (p 0.1792).
**Conclusion.** Our data show a higher prevalence of left ventricular hypertrophy in patients with psoriatic arthritis compared to controls, associated with lower but non-pathological LVEF values. Therefore, these patients may require specific therapeutic and tight follow-up strategies.

## IMAGING – 6
## Sessione Orale

### A761: CORONARY PLAQUE ASSESSMENT BY CORONARY CT ANGIOGRAPHY MAY PREDICT CARDIAC EVENTS IN DIABETIC PATIENTS: A LONG-TERM FOLLOW-UP STUDY

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**Background.** Despite improvements in diagnosis and treatment, acute coronary syndrome (ACS) incidence is not significantly declining. The aim of the present study is to evaluate whether the advanced coronary atherosclerosis analysis by CCTA may improve the prognostic stratification among diabetic patients who underwent a clinically indicated CCTA for suspected CAD.

**Material and methods.** The study population consisted of 265 consecutive patients with diabetes who presented to our outpatient clinic or were admitted to our hospital for cardiac evaluation because of suspected CAD (new-onset chest pain, abnormal stress test, multiple cardiovascular risk factors including diabetes) between January 2011 and December 2016. For every patients both traditional and advanced, qualitative and quantitative coronary plaque analysis were performed. For the purpose of this study the occurrence of cardiac death, ACS, and non-urgent revascularization were recorded for every subjects

**Results.** Among the 265 patients enrolled, 21 were lost to follow-up, whereas 244 (92%) had a complete follow-up (mean 45±22 months). A total of 63 events were recorded (3 Cardiac Death, 3 NSTEMI, 8 unstable angina, 36 late non-urgent revascularization and 13 non-cardiac death) in 57 different patients. Elevated fibro-fatty plaque volume was the only predictor of events over age, gender and traditional risk factor when ACS and MACE were considered as end-points [HR (95 % CI) 6.01 (1.65-21.87), p=0.006 and 3.46 (2.00-5.97); p<0.001].

**Conclusion.** The present study confirm the prognostic role of advance coronary atherosclerosis evaluation beyond risk factors and stenosis severity even in among diabetic patients.

### A762: 10 YEAR SURVIVAL IN PATIENTS WITH CARDIAC MASSES: ARE PSEUDO-TUMOURS REALLY BENIGN MASSES?

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**Background.** Cardiac masses (CM) include benign (primary tumors and pseudo-tumors) and malignant masses (primary tumors and, more frequently, metastases). So far, clinical presentation and prognosis have been reported only for small and heterogeneous populations, without discriminating the four subtypes. Therefore, we sought to investigate the associations between clinical presentation and long-term prognosis, stratified by histology in the four sub-types of CM.

**Methods.** The study population includes 223 consecutive adult patients from 1999 to March 2018, with suspicion of cardiac mass, confirmed by echo-and/or cardiac-CT/MR. A definitive diagnosis was reached in 185 patients by histologic examination of biopsy or surgical samples or, in cases of thrombi, by radiological evidence of thrombus resolution after adequate anticoagulant treatment. Normal anatomical variants in this group were excluded due to the impossibility of obtaining histological examination. After the diagnostic process, cases were classified into 4 subtypes: pseudo-tumors, primary cardiac benign tumors, primary cardiac malignant tumors and secondary cardiac tumors. The primary endpoint of interest was death from any cause. To analyze survival after diagnosis, Kaplan-Meier curves were estimated, and survival distributions were compared between histological tumor variants using the Breslow (generalized Wilcoxon) test, that weights time points by the number of cases at risk at each time point. A Cox proportional hazards model was then used to compare the hazard ratios adjusted for age and gender among tumor types. Statistical analyses were performed using IBM SPSS, version 25.

**Results.** The median follow-up time was 48 months. A total of 50 patients died during the study period: 15 of 125 benign masses and 35 of 47 malignant ones, with no statistically significant differences between cardiovascular and non-cardiovascular mortality between benign and malignant masses and among the four specific subgroups. The median follow-up duration was 48 months. The mean survival of patients with benign tumors was 108.3 months and that of patients with malignant tumors 34.6 months (median 17 months, 95% CI 10.6-23.4, Breslow test $\chi^2$ =91.56, p<0.001). In the benign masses stratum, pseudo-tumors showed a significantly lower survival than primary tumors (Breslow test $\chi^2$ =5.615, p=0.018), starting from the first four years after diagnosis. In a Cox regression analysis, the hazard ratio of mortality adjusted for age and gender was more than 4-fold higher for pseudo-tumors as compared to primary benign tumors. In the malignant tumor stratum, no difference in survival was found between primary and secondary tumors (Breslow test $\chi^2$=0.247, p=0.619). Finally, in malignant masses group, no difference in survival (Breslow test $\chi^2$ = 0.06, p = 0.807) was found between patients who underwent surgery and those treated with chemotherapy.

**Conclusion.** A histological diagnosis of malignancy is a strong predictor of mortality. Among patients with benign lesions, those with pseudo-tumors have a lower survival, whereas no differences in prognosis are found between primary and secondary malignant tumors.

### A763: LEFT ATRIAL FUNCTION ASSESSED BY LEFT ATRIAL STRAIN IN YOUNG PATIENT WITH ACUTE MYOCARDIAL INFARCTION

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(a) UMG MATER DOMINI CATANZARO

**Introduction.** Myocardial infarction (MI) in the "young" is a significant problem, however there is scarcity of data on cardiac mechanics and left atrial function in young patients presenting with MI. Although left atrium (LA) has played an important role in diastole, ischemic insult of atrium in acute myocardial infarction (AMI) has not been clearly evaluated, especially in young patients. Therefore, aim of the present study was to investigate the behaviour of left atrial reservoir strain in AMI across the age categories.

**Methods.** We identified a cohort of 50 patients presenting with AMI between January 2017 and August 2019 from the Magna Graecia University Institutional Database. We compared those presenting with young MI, defined as presentation with MI aged 50 years or younger (youngAMI), to those aged over 75 years (oldAMI). 50 healthy individuals age- and sex-matched were used as controls (CTRL). Echocardiography was performed to evaluate left ventricular diastolic function, LA volume, and LA function. Systolic (LAS) LA strain was measured using speckle-tracking echocardiography in all the studied patients.

**Results.** Global LAS strain was significantly lower in both the two subgroups of patients with AMI compared to CTRL.

Global LAS strain was significantly lower in old patients with AMI compared to the young ones (20.4 ± 8 %, youngAMI; 27.8 ± 4%; oldAMI, p < 0.05). LA volume index did not differ significantly between old and young AMIs (P = 0.099). Other clinical and conventional echocardiographic parameters, including Doppler measurements, did not differ significantly between the two subgroups of AMI patients.

**Conclusions.** Global LAS strain was higher in young patients with AMI compared to the older ones, without any significant difference in LA volume index.

### A764: MYOCARDIAL PERFUSION MAPPING IN CARDIAC AMYLOIDOSIS: EXTENDING THE PARADIGM FROM INFILTRATION TO MYOCARDIAL ISCHAEMIA

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**Aims.** Cardiac involvement is the main driver of outcome in systemic amyloidosis. The mechanical consequences of interstitial replacement by amyloid may be insufficient to explain the extent of cardiac damage and functional impairment. Preliminary studies support the hypothesis that myocardial ischaemia could contribute to cell damage. We sought to explore the presence of myocardial ischaemia in patients with cardiac amyloidosis compared to healthy controls and the correlation of perfusion mapping parameters to markers of disease severity and prognosis.

**Methods.** Eighty-six patients and twenty healthy volunteers (HV) underwent CMR at 1.5T (Siemens) with standard cine imaging, Phase Sensitive Inversion Recovery Late Gadolinium Enhancement (PSIR-LGE), T1 mapping, T2 mapping, Extracellular Volume (ECV) mapping and adenosine stress. Rest and stress myocardial blood flow (MBF) and myocardial perfusion reserve (MPR) were quantitatively assessed by perfusion mapping technique.

**Results.** Cardiac amyloidosis patients had severe reduction in stress MBF and MPR (1.22±0.70 ml/g/min and 1.62±0.63 ml/g/min respectively) compared to HV (3.21±0.64 ml/g/min, p<0.001 and 4.17±0.78 ml/g/min,

p<0.001 respectively). Rest MBF was also slightly lower in amyloidosis than HV. Cardiac amyloidosis stress MBF (and MPR) inversely correlated with myocardial amyloid burden (measured as ECV, r: -0.715, p<0.001); the transmurality of LGE (mean values across LGE categories - no LGE: 2.24 ml/min/g; subendocardial LGE: 1.16 ml/min/g; transmural LGE 0.81 ml/min/g, p<0.01); systolic dysfunction (ejection fraction, r=0.405, p<0.01) and blood biomarkers (NT-proBNP, r: -0.678, p<0.001 and Troponin T, r: -0.628, p<0.001). There was a correlation between stress MBF and native T1 (r: -0.588, p<0.001) but not with T2 values (p: 0.591). Stress MBF and MPR were also early disease markers, being elevated in patients with early cardiac amyloid infiltration (as defined by raised ECV in the absence of LGE).
**Conclusion.** Myocardial ischaemia is common in cardiac amyloidosis – with stress MBF and MPR reduced when compared to healthy volunteers. The reduction correlates with the degree of amyloid infiltration and markers of adverse prognosis, highlighting the potential role of myocardial ischaemia as a key mechanism in the pathophysiology of cardiac amyloidosis.

### A765: LEFT VENTRICULAR EJECTION FRACTION ASSESSMENT USING LONG-AXIS CMR IMAGES IS ACCURATE IN BOTH ISCHEMIC AND NON-ISCHEMIC CARDIOMYOPATHY

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**Background.** Cardiac magnetic resonance (CMR) is the current gold standard for non-invasive assessment of left ventricular (LV) ejection fraction (EF). The standard method for EF evaluation with CMR may be time consuming in terms of both acquisition and post-processing, requiring a complete stack of 10-12 short-axis (SAX) cine images. Alternatively, as with 2D echocardiography, the area-length method can be applied using two orthogonal CMR long-axis (LAX) cine images, providing a faster methodology to assess EF. Yet, the latter method is believed to be less accurate in EF estimation in cardiomyopathy with regional rather than global LV dysfunction. Using SAX-EF as a reference, we aimed to investigate the accuracy of LAX-EF as measured from CMR images in both ischemic and non-ischemic cardiomyopathies.
**Methods.** A group of 107 consecutive heart failure patients was retrospectively enrolled. CMR protocol included complete SAX and LAX cine LV study for volumes and EF evaluation and post-contrast late gadolinium enhancement (LGE) imaging for scar detection. Drawing end-systolic and end-diastolic LV endocardial contours, EF was measured using both SAX and LAX methods, (Figure 1). Inter-observer variability in EF measurements was tested asking two independent readers to perform image analysis in a subgroup of 30 patients.
**Results.** Good reproducibility was obtained for the two SAX-EF and LAX-EF (ICC > 0.9 for both). Correlation between SAX-EF and LAX-EF was strong in the entire cohort (r=0,89; p<0,001). The strength of correlation between SAX-EF and LAX-EF remained high splitting the population in: ischemic (n=46) and non-ischemic (n=61) cardiomyopathy based on clinical referral data (r=0.86 vs. r=0.92, respectively; Fisher's z=0.14, p>0.05); presence (n=72) or absence (n= 35) of LV-LGE (r= 0.93 vs. r= 0.87, respectively; z=1.52, p>0.05 for both); ischemic (n=40) or non-ischemic (n=32) LV-LGE (r=0.85 vs. r=0.89, respectively; z=-0.67, p>0.05).

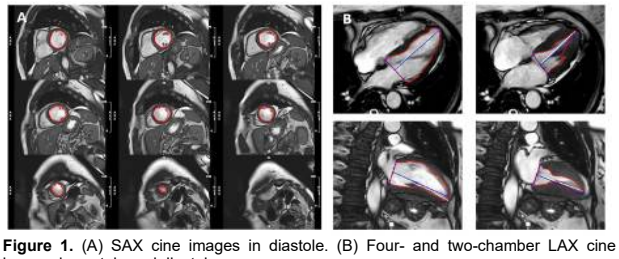

**Figure 1.** (A) SAX cine images in diastole. (B) Four- and two-chamber LAX cine images in systole and diastole.

**Conclusion.** We showed that, using SAX-EF as a reference, LAX-EF is accurate when measured by CMR regardless the etiology of the underlying cardiomyopathy as well as the presence or type of LV-LGE. Therefore, despite the fact that CMR-based SAX-EF remains the accepted gold standard, LAX-EF may be considered to shorten the overall imaging acquisition time and increase feasibility in unstable or non-compliant patients.

### A766: IMAGING CARDIACO IN DUAL SOURCE CT DI SEVONDA GENERAZIONE: CORRELAZIONE TRA QUALITÀ DELL'IMAGING E GESTIONE DELLA DOSE NEI PAZIENTI CON FREQUENZA CARDIACA ELEVATA O INSTABILE.

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**Introduzione.** Nell'imaging CT cardiaco la risoluzione temporale ha sempre avuto un ruolo importante. Nei sistemi TC Dual-Source (DSCT) si raggiunge una risoluzione temporale fino a 83 ms per segmento, trovando applicazione anche in pazienti con frequenza più elevata rispetto a quanto richiesto dai tomografi convenzionali a 64 strati. Inoltre, diverse modalità di acquisizione permettono di gestire al meglio la dose al paziente anche a frequenze elevate, rivelandosi più versatile rispetto ai tomografi MDCT convenzionali.
**Obiettivi.** Discutere le modalità di scansione di Cardio TC in DSCT partendo dalla scelta del modo di scansione e dei presupposti per gestire la dose al paziente con frequenza cardiaca elevata.
**Materiali e metodi.** Sono stati presi in esame 127 pazienti consecutivi sottoposti a TC del cuore, 37 dei quali acquisiti con ECG prospetticamente triggerato, 48 acquisiti con ECG retrospettivo e, infine, 42 acquisiti con ECG prospettico ad alto pitch (Flash mode). La modalità retrospettiva è stata utilizzata per 17 pazienti con frequenza cardiaca (HR) >65 bpm (gruppo A), 12 pazienti HR>75 bpm (gruppo B) e 10 pazienti HR>85 bpm (gruppo C). Di ogni gruppo è stata stimata la media dei valori di dose in mGycm che sono stati correlati principalmente alla frequenza cardiaca.
**Risultati e Conclusioni.** Dall'analisi dei vari gruppi è emerso che nel gruppo A si sono registrati valori dosimetrici con una media di 317 mGycm, il gruppo B una media di 487 mGycm e il gruppo C una media di 600 mGycm. Tali risultati dimostrano la correlazione tra elevata frequenza cardiaca e aumento di dose. Tuttavia, questi dati meritano una discussione più approfondita. Infatti dall'analisi individuale, una forte varianza di frequenza cardiaca o instabilità può influire molto sulla dose. Da un'analisi trasversale, invece, in cui sono stati presi in osservazione esami con stesso DLP ma con frequenze cardiache diverse, è stata osservata una certa varianza o instabilità nella frequenza cardiaca, da cui la necessità di ottenere un range di fase cardiaca (padding) più ampio per un post processing più accurato. In questi casi il pulsing automatico ha mostrato una tendenza a valori di dose più bassa rispetto all'impostazione manuale, ma il rischio di un post processing insufficiente si è dimostrato elevato. Per cui, a frequenze alte o instabili, la qualità dell'imaging è stata direttamente correlata alla dose.

## CARDIOPATIE CONGENITE – 2
## Sessione Orale

### A767: LONG-TERM OUTCOME AND BLOOD PRESSURE PROFILE IN ADULT PATIENTS WITH REPAIRED COARCTATION

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**Background.** Aortic coarctation (CoA) is a congenital narrowing of the proximal descending aorta. Despite improvement in interventional techniques, prevalence of cardiovascular (CV) events and aortic re-interventions is high with an increased prevalence of arterial hypertension (aHT). The aim of this study is to assess the incidence of adverse CV events, defining outcome predictors, and to assess blood pressure (BP) profile in patients (Pts) with repaired CoA.
**Methods.** We retrospectively evaluated adult Pts after CoA-repair by different techniques, who underwent clinical and imaging follow-up. Primary endpoint was defined as a composite of heart failure (HF), atrial fibrillation (AF), cerebrovascular events, coronary revascularization, aortic dissection, re-CoA requiring intervention and pseudoaneurysm formation. Residual aHT was defined as the presence of antihypertensive therapy, or a BP≥140/90 mmHg. Nocturnal dipping was assessed by ambulatory-BP-monitoring (ABPM) (n=141).
**Results.** Overall, 281 Pts (112 females,40%), age 33,7±13,3 years were included in the study. After a mean follow up of 25,6±12,7 years after first CoA repair, primary endpoint occurred in 134 Pts (48%): re-CoA requiring intervention (102;36%), pseudoaneurysm formation (28;10%) with 10 Pts (36% of Pts with pseudoaneurysm; 3,6% of the whole population) requiring re-intervention, AF (20;7%), cerebrovascular events (9;3%), HF (5;2%), coronary revascularization (4;1,4%), aortic dissection (3;1%) and death (1;0.4%). Residual aHT was present in 137 Pts (49%), and 135 Pts (48%) were treated with anti-hypertensive medications: mono-therapy in 38 Pts (28%), dual therapy in 54 Pts (40%), triple therapy in 32 Pts (23%) and 11 Pts are treated with four agents (8%). Impaired nocturnal BP response was found in 45 of 141 Pts (32%), and in 14 normotensive Pts (10%) in the 24-h ABPM. By Cox regression analysis, Pts treated by primary stenting procedure (HR 25.330, 95%CI 12.447-51.548, p<0.001)

and the presence of hypoplastic aortic arch (HR 1.518, 95%CI 1.067-2.158, p=0.02) were predictors of the composite endpoint. At the same time, Pts with an hypoplastic aortic arch (HR 1.683, 95%CI 1.192-2.376, p=0.003) and male Pts (HR 0.547, 95%CI 0.372-0.803, p=0.002) are at higher risk for residual aHT as well as Pts treated with stenting procedure (HR 10.438, 95%CI 5.226-20.846, p<0.001), maybe due to an older age at the time of stenting procedure.
**Conclusions.** Adult Pts with repaired CoA present a high prevalence of residual aHT, which is a driving risk factor for the development of CV disease in older age. Careful clinical and imaging follow-up is needed to address the occurrence of re-CoA or pseudoaneurysm formation and tailor antihypertensive treatment. CoA-Pts treated with stenting procedure are at greatest risk for CV events.

### A768: ADVANCE 3D VISUALIZATION TOOLS IN THE PRE-OPERATIVE ASSESSMENT OF DOUBLE OUTLET RIGHT VENTRICLE

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Giovanni Battista Luciani (a), Kristian Mortensen (b), Jo Wray (b),
Giovanni Biglino (c), Andrew Cook (b), Andrew Taylor (b),
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**Background.** Advance 3D-visualization in congenital heart disease has gained importance in procedural planning, however it is still unclear which 3D-modelling technique represents the most informative tool in the surgical workup.
**Objectives.** We aim to determine if there is additional benefit of 3D-modelling compared to conventional cross-sectional imaging when deciding on surgical strategy in patients with complex double outlet right ventricle (DORV) and to identify the best 3D modality to support procedural planning.
**Methods.** We retrospectively selected ten patients with DORV and complex interventricular communications, who underwent biventricular repair with intracardiac tunnelling. CT or cardiac MRI images were used to reconstruct patient-specific 3D anatomies, which were then presented using different visualisation modalities: 3Dpdf, physical 3D printed models, and virtual reality (VR) models. Two senior paediatric cardiac surgeons reviewed each case blindly and were asked to decide on the suitability of biventricular repair and possibility of performing arterial switch operation (ASO). The abovementioned modalities were used to guide them in their decisions. A comparison was made to actual operation performed.
**Results.** After CT/CMR images review, the two surgeons correctly identified the surgical strategy in 75% of the cases; this improved to 85% after revision of the 3D printed models and to 95% after VR visualisation. 3Dpdf visualisation instead resulted in a reduction of correct identification to 70%. When asked about suitability for ASO the answers were in accordance with actual surgery in 45% after reviewing of CT/cardiac MRI data and 3dpdf; this increased to 55% and 60% after the inspection of the 3D printed and VR model, respectively.
**Conclusions.** 3D printed models and VR can enhance understanding of suitability for biventricular repair in patients with complex DORV.

### A769: AN UNEXPECTED CASE OF PEDIATRIC MYOCARDIAL ISCHEMIA: TRUNCUS ARTERIOSUS COMMUNIS AND CORONARY ARTERY ANOMALIES, A CHALLENGING CASE

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Sara Abbondanza (b), Italo Porto (a), Maurizio Marasini (b)
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**Introduction.** Truncus Arteriosus Communis (TAC) is a rare (incidence of 0.03-0.056/1000 live births) congenital cardiac malformation in which a single common artery arises from the heart by means of a single semilunar truncal valve and supplies the systemic and pulmonary circulations. Pulmonary arteries originate from the common arterial trunk distal to the coronary arteries and proximal to the first brachiocephalic branch of the aortic arch. TAC typically overrides a large outlet ventricular septal defect. TAC is an important cause of death in infancy. This case concerns a patients affected by Type I (or Type A1 according to Van Praagh) TAC, which is anatomically constituted by a short common pulmonary artery segment that arises on the left side of the common trunk just above the truncal valve, that gives rise to separate left and right pulmonary arteries, and by an ascending aorta that arises from the right side of the common trunk.
**Case report.** A 9 y/o girl affected by Di George Syndrome was born with a prenatal diagnosis of TAC type I. In the 1st month of life she underwent surgical correction by positioning a valved conduit between the right ventricle (RV) and the pulmonary arteries (PA). At 4 y/o she developed a severe truncal valve regurgitation associated with a significant left ventricle (LV) dysfunction, and a new operation was performed: a mechanical prothesis was implanted and the conduit changed with a larger one; immediate post-operative course was complicated by low cardiac output syndrome and LV dysfunction; however, her hemodynamic condition and LV function gradually improved and she was discharged 1 month after hospitalization, in treatment with warfarin and ramipril. At 9 y/o during a follow-up visit, an enlarged, globose LV with a slightly reduction of systolic function, septum dyskinesia and hypokinesia of the anterolateral wall, was detected at the transthoracic echocardiography examination (TTE), and she was finally directed to our Centre. A cardiac catheterization was performed showing: normal prosthetic aortic valve function, intra prosthetic pulmonary stenosis that was treated with balloon valvuloplasty, and most of all a diffusely hypolplastic left coronary artery (LCA) with a 70% stenosis, abnormally originating from the anterior sinus of Valsava and presenting a posterior course around the prosthetic aortic valve; the right coronary artery was originating with a separate ostium. Furthermore, a stress TTE was performed, resulting positive for low threshold inducible myocardial ischemia. An uneventful 24 hours Holter EKG was obtained and therapy with propanolol was started. An exercise stress test (EST) was also performed resulting negative for inducible ischemia. Finally, a cardiac MRI documented subendocardial LGE in anterior, anterolateral and lateral LV wall, without evidence of recent myocardial ischemia. Considering the absence of a full convincing invasive myocardial revascularization strategy, type of coronary lesion, past surgical history and that a highly probable new reoperation will be needed also for changing again the RV to PA conduit, the absence of symptoms and signs of inducible cardiac ischemia, the absence of arrhythmias, it was decided to continue follow-up maintaining the patient on medical therapy.
**Conclusion.** Congenital heart malformations can be associated with coronary anomalies, carrying additional risk for sudden cardiac death. In our case, the ratio between benefits and drawbacks of an invasive approach, together with the patient's clinical history and perspectives, brought to the decision to 'wait and see'. Nonetheless, because of the rarity of this association, each patient has a singular path.

### A770: ROLE OF CARDIOVASCULAR MAGNETIC RESONANCE END-SYSTOLIC 3D-SSFP SEQUENCE IN REPAIRED TETRALOGY OF FALLOT PATIENTS ELIGIBLE FOR TRANSCATHETER PULMONARY VALVE IMPLANTATION.

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**Aim.** To evaluate the usefulness of cardiovascular magnetic resonance (CMR) 3D steady state free precession (SSFP) sequence acquired at end-systole (ES) in repaired Tetralogy of Fallot (rToF) patients eligible for percutaneous pulmonary valve implantation (PPVI).
**Methods.** Between 2012 and 2018, 78 rToF patients were selected for pulmonary valve replacement (PVR) according to CMR criteria. CMR protocol included 3D-SSFP sequence used to assess the right ventricle outflow tract (RVOT) diameters at three levels (pulmonary valve remnant, mid-portion, bifurcation) in mid-diastole (MD) or ES, RVOT length and coronary artery anatomy. In 20 rToF patients without indications for PVR (controls), 3D SSFP sequence was acquired at both cardiac phases (MD and ES) to evaluate RVOT dimension throughout the cardiac cycle. Invasive balloon sizing was recorded in patients undergoing PPVI. The 3D-SSFP sequence was performed in MD on 39 patients and in ES on other 39, of whom 26 patients met the criteria for PPVI.
**Results.** PPVI was unsuccessful in ten patients (38%), mainly due (80% of cases) to significant size discrepancy at PV remnant and bifurcation levels ($p = 0.019$ and 0.037 respectively) between the measurements by 3D-SSFP in MD and those by the balloon size in systole. Significant RVOT size difference between MD and ES was present at mid-portion and bifurcation levels in the PVR candidate group, and at all three-levels in the control group (all $p < 0.001$).
**Conclusion.** ES 3D-SSFP sequence is able to quantify RVOT dilation in rToF patients at its maximum expansion, thus improving selection of PPVI candidates.

### A771: PATHOGENIC ROLE OF FOLATES CYCLE RELATED ENDOTHELIAL DYSFUNCTION IN INTERATRIAL DEFECTS LEADING TO CRYPTOGENIC STROKE

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**Aim.** To evaluate the correlation, in terms of severity, between MTHFR genotype, interatrial septum (IAS) phenotype and the degree of

endothelial dysfunction (expressed by L-arginine/asymmetric dimethylarginine (ADMA) ratio) in subject with a history of stroke.
**Methods and Results.** L-arginine, ADMA, homocysteine levels and MTHFR genotype were evaluated. IAS phenotype was assessed by transcranial Doppler coupled with transesophageal echocardiography. Of 57 patients, 10 had a septum integrum (SI), 38 carried a patency of foramen ovale (PFO), and 9 a ostium secundum (OS). 16 patients carried the 677T/T genotype, 13 the 677C/T+1298A/C double heterozygosis, 6 the 677C/T heterozygosis, 5 the 1298C/C mutation, and 15 patients the 1298A/C or wild-type MTHFR. The highest the severity of genotype mutation, the more compromised was the interatrial septum according a spectrum septum integrum->large and short PFO tunnel->tight and long PFO tunnel->ostium secundum defect (Fig. 1). L-Arginine/ADMA ratio differs across septum phenotype ($p < 0.005$ – Graph 2) and was higher in SI than in PFO or OS patients and ($p < 0.05$, $p < 0.01$, respectively). Nonetheless L-Arginine/ADMA ratio differs across MTHFR genotypes ($p<0.0001$ – Graph. 1) and resulted lower in the 677T/T and in the 677C/T + 1298A/C subgroups than in 1298A/C and WT healthiest subgroup ($p <0.0001$, $p < 0.05$, respectively). A negative correlation was found between the L-Arginine/ADMA ratio and the PFO tunnel length/height ratio ($p < 0.05$; $r = - 0.37$; $R2 = 0.14$ – Graph. 3). OS patients carried the most dysfunctional MTHFR genotypes whereas SI patients the least ones; in PFO subjects, the tunnel lenght/height ratio was proportional to the MTHFR-related L-Arginine/ADMA ratio.
**Conclusions.** Impaired activity of MTHFR is associated with low L-Arginine/ADMA ratio; in turn, L-arginine/ADMA ratio correlates with IAS phenotype, along a severity spectrum encompassing SI, PFO with short/large tunnel, PFO with long/tight tunnel, and OS. Genetic MTHFR defects may underlie endothelial dysfunction-related IAS abnormalities, and predispose to cryptogenic stroke.

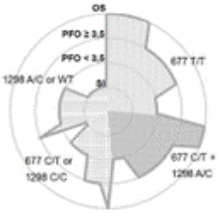
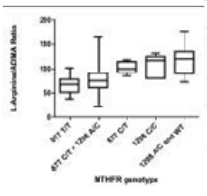
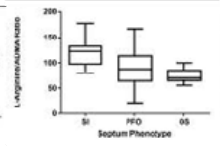


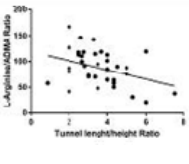

Figure 1




Graph 1




Graph 2




Graph 3

### A772: WHEN YOU SEE IT...

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**Case description.** A 46-year-old man was admitted to our emergency department (ED) for worsening dyspnea and weight gain. His medical history consisted of psoriasis and previous hospitalization for pneumonia complicated by ARDS in 2007. Known cardiovascular risk factors were hypertension, obesity, and history of smoking. Upon arrival to the ED, the patient was tachi-dyspnoic, hypertensive, tachyarrhythmic in atrial fibrillation (AF), with clinical and radiographic signs of pulmonary congestion. ECG: AF with high ventricular rate (155 bpm), no signs of acute ischemia. Transthoracic echocardiography (TTE): severe biventricular dysfunction (left ventricular ejection fraction 25%), no significant mitral regurgitation (MR) or aortic regurgitation (AR), moderate tricuspid regurgitation, severe pulmonary hypertension (sPAP 60 mmHg). The patient was immediately admitted to the Intensive Care Unit; IV diuretic, non-invasive mechanical ventilation, heparin, and digoxin were prescribed. Due to sub-optimal rate-control, once performed transesophageal echocardiography, we preceded to electric cardioversion and restoration of sinus rhythm. After few days, once introduced and up-titrated anti-remodeling medical therapy (metoprolol and ramipril), TTE was repeated: dilated left ventricle with recovery of systolic function, E/E' <12, minimum MR, minimum AR, moderate-severe dilation of the right ventricle and pulmonary trunk, moderate right ventricular (RV) dysfunction, severe pulmonary hypertension. According to these data, we suspected pre-capillary PH, with acute decompensated RV failure during high-rate AF. According to ESC guidelines, we decided to perform computed tomography (CT) scan for lung and heart. CT scan revealed patent ductus arteriosus (PDA), with significant left-to-right shunt. After Heart Team discussion, percutaneous closure of PDA was indicated and performed. An Amplatzer PDA occluder I 20-14-12mm was implanted through femoral approach.
**Discussion.** In patients with PH, correct diagnosis and treatment are keys to improve patient's symptoms and prognosis. Congenital defects are very uncommon in adults without any prior medical history, especially in western countries. Percutaneous approach for grown-up congenital heart disease is very intriguing, since most of the procedures are less invasive than traditional surgery. In our case, percutaneous closure of PDA was technically feasible, and procedural success was achieved. At 3 months follow-up the patient is asymptomatic without reported adverse events.

## IPERTENSIONE POLMONARE
## Sessione Orale

### A773: SHORT TERM EFFECT OF SELEXIPAG IN PULMONARY ARTERIAL HYPERTENSION PATIENTS STARTED ON DOUBLE COMBINATION THERAPY WITH ERA AND PDE-5 INHIBITORS

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(a) DIMES: DEPARTMENT OF EXPERIMENTAL, DIAGNOSTIC AND SPECIALTY MEDICINE

**Background.** The event-driven, phase 3, randomized, double-blind, placebo-controlled GRIPHON trial demonstrated that Selexipag reduces the risk of a composite end point of death or morbidity events in patients with pulmonary arterial hypertension (PAH).
**Purpose.** To evaluate the effects of Selexipag in PAH patients initially started with double-combination therapy with an endothelin receptor antagonist (ERA) and a phosphodiesterase-5 inhibitor (PDE5-I).
**Methods.** We enrolled patients on double combination therapy with ERA + PDE5-I. Selexipag was weekly uptitrated to the maximum tolerated dose or to 1600 µg twice daily. All patients were systematically assessed with WHO-functional class (FC), brain natriuretic peptide (BNP), six minute walk test (6MWT) and right heart catheterization before treatment and 3 months after reaching a stable dose of Selexipag.
**Results.** eleven patients with idiopathic/heritable PAH, 5 patients with connective tissue disease associated PAH and 2 patients with congenital heart disease associated PAH underwent a complete revaluation 6 (5-8) months after starting selexipag. The median dose was 1600 (range 1200-1600) mcg b.i.d. Results are shown in the Table.
**Conclusions.** Selexipag improves haemodynamic profile in patients with PAH already on double combination therapy. This may explain the long term beneficial effect of the drug on the outcome of these patients.

| median (interquartile range) | Pre Selexipag | Post Selexipag | p-value |
|---|---|---|---|
| WHO-FC III/IV (%) | 50 | 39 | 0.157 |
| 6MWT (m) | 456 (300-568) | 475 (339-584) | 0.313 |
| BNP (pg/ml) | 150 (63-449) | 101 (46-202) | 0.074 |
| RAP (mmHg) | 7 (6-10) | 6 (4-9) | 0.096 |
| mPAP (mmHg) | 55 (49-63) | 47 (41-54) | 0.011 |
| CI (l/min/m$^2$) | 2.5 (2.1-2.8) | 2.9 (2.4-3.3) | <0.001 |
| PVR (WU) | 11 (8-13) | 7 (6-10) | 0.001 |
| $SvO_2$ (%) | 67 (60-70) | 66 (62-71) | 0.337 |

CI, cardiac index; mPAP, mean pulmonary arterial pressure; PVR, pulmonary vascular resistance; RAP, right atrial pressure; SvO2, mixed venous oxygen saturation.

### A774: VENTILATORY POWER: A NOVEL CARDIOPULMONARY EXERCISE TESTING PARAMETER FOR THE PREDICTION OF PULMONARY HYPERTENSION

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**Background.** Several cardiopulmonary exercise test (CPET) parameters (peak $VO_2$, $PetCO_2$ and $VE/VCO_2$) emerged as tools for the prediction of pulmonary arterial hypertension (PAH). Less is known on ventilatory power (VP) in patients with suspect PAH.
**Aim.** To ascertain possible correlations between VP derived at CPET and hemodynamic parameters at right heart catheterization (RHC) indicative of PH.
**Methods.** Forty-seven consecutive outpatients with suspect of PAH were assessed by CPET and RHC; VP was defined as peak SBP divided by the minute ventilation-CO2 production slope at CPET and Diastolic Pressure Gradient (DPG), Trans-pulmonary Pressure Gradient (TPG),

mean pulmonary artery pressure (mPAP) and pulmonary vascular resistance (PVR) at RHC were also assessed and compared with VP.
**Results.** VP values were inversely related to mPAP (r -0.427, p 0.003), DPG (r -0.36, p 0.019), TPG (r: -0.43, p 0.004), and PVR (r -0.52, p 0.001).Correlations remained significant even after correction at multivariate analysis for age and gender.VP values below median identified subjects with mPAP≥25 mmHg with an odds ratio of 4.5 (95% confidence interval 1.05-19.36, p<0.05), an accuracy of 0.712 at ROC curve analysis (95% confidence interval 0.534-0.852, p <0.05) and a positive predictive power 82%.
**Conclusion.** In patients with suspected PAH, VP assessed at CPET might provide further information in predicting PAH at RHC. Correlations with PVR and DPG may be helpful in differentiating patients with isolated post-capillary PH from those with combined post-capillary and pre-capillary.

### A775: ADDING RIGHT VENTRICULAR REVERSE REMODELING CRITERIA TO RISK ASSESSMENT SCORES IN PULMONARY ARTERIAL HYPERTENSION

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**Background.** Risk assessment is important for prognostication and therapeutic adjustments in pulmonary arterial hypertension (PAH). However, currently used scores do not include direct assessments of the right ventricle (RV) and most patients are assigned the uncertainty of intermediate risk.
**Objectives.** To evaluate the added value echocardiographic criteria of right heart reverse remodeling (RHRR) in advanced PAH.
**Methods.** 110 consecutive PAH patients started on parenteral prostanoids were followed with periodic clinical, hemodynamic, and echocardiographic assessments. RHRR at 1-year assessment was defined by the combined reductions in right atrial (RA) and RV dimensions and left ventricular eccentricity index.
**Results.** Thirty-six (32.7%) patients had a RHRR at 1-year follow-up. After a mean follow-up of 1375±1359 days, 48 (43.6%) patients died. The European Respiratory and Cardiology Societies guidelines-derived risk score based on WHO class, 6-min walk distance, RA pressure and cardiac index at 1-year predicted long-term survival. The combination of low-risk European score and RHRR was able to improve the prognostic power of the model (c-statistic: 0.83, C.I. 0.75-0.92, vs 0.75, C.I. 0.64-0.86, respectively; p<0.001). Similar results applied to the United States Registry to Evaluate Early and Long-Term PAH Disease Management risk score 2.0. A reduction of pulmonary vascular resistance (PVR) >50% was associated with higher probability of RHRR. Patients with RHRR had greater improvement in WHO class, 6min walk distance and hemodynamics.
**Conclusions.** Echocardiographic RHRR improves risk assessment in advanced PAH under prostacyclin therapy. A reduction in PVR by more than 50 % is associated with a high probability RHRR and improved prognosis.

### A776: PULMONARY HYPERTENSION AND RIGHT VENTRICULAR FUNCTIONAL RESERVE: THE ADDITIONAL INFORMATION PROVIDED BY LOW DOSE DOBUTAMINE DURING RIGHT HEART CATHETERIZATION AND TRANSTHORACIC ECHOCARDIOGRAPHY

Giuseppe Esposito (a), Fabrizio Fumarola (a), Tiziana Leopizzi (a), Nino Camassa (a), Antonia Mannarini (a), Elisabetta De Tommasi (a), Lucrezia De Michele (a), Paolo Colonna (a), Carlo D'Agostino (a)
(a) CARDIOLOGIA OSPEDALIERA-POLICLINICO DI BARI

**Background.** Individuals with pulmonary arterial hypertension (PAH) have reduced resistance to physical exercise proportionate to the degree of impairment of the heart-lung system. In the current guidelines the evaluation of the right heart function as a prognostic index is not codified, therefore our group has started to show interest in this field of research.
**Aim.** We hypothesized that the basal alterations in the right cardiac function and in the pulmonary circulation are not sufficient to correctly stratify the patients affected by PAH; we therefore assumed that the evaluation of the hemodynamic and echocardiographic response to pharmacological stress could better identify patients who, given the same baseline values, show an absence of functional reserve of the right heart and pulmonary circulation. Probably this patient setting, could have a worse prognosis.
**Materials and methods.** We enrolled 23 patients with PAH diagnosis belonging to group 1. They underwent right heart catheterization (RHC) and simultaneously transthoracic echocardiography (ETT) at rest and during pharmacological stress with low-dose dobutamine (BD) (10 mcg / kg / min). The study population was divided into three groups based on baseline cardiac index (CI) and mean pulmonary artery pressure (PaPm) values (Table 1); the main hemodynamic and echocardiographic parameters were collected together with hematochemical (NT-ProBNP), functional (six minute walking test) and echocardiographic (right atrial area) indices currently used to estimate mortality at one year. Subsequently, an analysis of the variance with repeated measures (ANOVA Repeated Measure) (Table 1) and of multiple linear regression models was carried out to verify the existence of correlations between the hemodynamic, echocardiographic and clinical-laboratory indicators.
**Results.** Baseline and stress values of TAPSE and S'TDI were significantly reduced in subjects belonging to group 3 (basal vs dobutamine: TAPSE p-value = 0.003 *; S'TDI p-value = 0.011 *). Furthermore, exclusively for TAPSE, this reduction is also significant in the comparison between groups regardless of pharmacological stress (between subject: TAPSE p-value = 0.009 *). Analogous to the echocardiographic indexes of right cardiac function also the pulmonary resistances (PVR) were significantly increased both in comparison between basal values and during stress (basal vs dobutamine: PVR p-value = 0.009 *), both in comparison to groups (between subject : PVR p-value = 0.015 *). The Tukey Hsd Test showed a statistically difference between the subjects of group 3 and the remaining two groups (Table 2).
**Conclusion.** The use of pharmacological stress in patients with PAH belonging to group 1 during right cardiac catheterization, is a safe test that can evaluate the functional reserve of the pulmonary circulation and the right heart. In this study, patients belonging to group 3 show a reduced functional reserve (higher PVR, lower TAPSE and lower S' TDI) during dobutamine BD. Evaluation of hemodynamic parameters and echocardiographic indexes during pharmacological stress could be effective in identifying the most compromised patients and with a higher risk profile. Further studies are needed to validate these preliminary data and to better define the prognostic role of pharmacological stress in this patient setting.

### A777: CLINICAL AND ECHOCARDIOGRAPHIC FOLLOW-UP IN OUTPATIENTS WITH PULMONARY ARTERIAL HYPERTENSION

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(a) DEPARTMENT OF CARDIOLOGY, UNIVERSITY OF FOGGIA; (b) CIVIC HOSPITAL, CANOSA DI PUGLIA (BAT); (c) ASL FOGGIA, FOGGIA; (d) GVM, SANTA MARIA HOSPITAL, BARI; (e) TATARELLA HOSPITAL, CERIGNOLA (FG)

**Background.** PAH is a progressive, life-threatening disease often requiring hospitalization. This study sought to evaluate the relationship between some echocardiographic and clinical parameters and the hospitalization rate of outpatients with pulmonary arterial hypertension (PAH) already treated with at least one specific PAH drug.
**Methods.** Patients with PAH previously diagnosed with RHC were followed up between September 2018 and January 2019. All patients underwent clinical evaluation, 6MWT, blood analysis (in particular NT-proBNP or BNP, CA 125, renal function test) and conventional and TDI echocardiography in an ambulatory setting under resting conditions, at the beginning and after 6 months of therapy with at least one PAH drug.
**Results.** Twenty-five consecutive PAH outpatients (mean age 66,93 ± 11,22 years, male: 48%, III NYHA class 52%, PAPm 38,76 ± 10,78 mmHg) were enrolled in the study. The following clinical variables were correlated with the number of hospitalization for heart failure: NT-proBNP (r: 0,75, p= 0,000), diastolic eccentricity index (r: 0,52, p= 0,010), degree of tricuspid regurgitation (r: 0,48, p= 0,015), dilated inferior vena cava with reduced respiratory collapse (r: 0,49, p= 0,015) and presence of pericardial effusion (r: 0,64, p= 0,001). The most significant correlations concern the NTproBNP and the diastolic eccentricity index. Furthermore, the severe degree of tricuspid regurgitation was statistically significant associated with a greater number of admissions due to heart failure compared to the moderate one. Also the presence of dilated VCI and with reduced inspiratory collapse and the presence of pericardial effusion compared with their absence, were statistically significant associated with a greater rate of hospitalization due to heart failure.
**Conclusions.** In outpatients with PAH, our study was able to find some clinical and echocardiographic parameters associated with an increased number of re-hospitalizations. Furthermore, it could identify patients who should be treated with multiple medications specific for PAH. However further multicentric studies with larger population are necessary to confirm it.

### A778: PROGNOSTIC ROLE OF LABORATORY PARAMETERS IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION

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(a) DIMES: DEPARTMENT OF EXPERIMENTAL, DIAGNOSTIC AND SPECIALTY MEDICINE

**Background.** Current European pulmonary hypertension (PH) guidelines stratify the risk of patients with pulmonary arterial hypertension (PAH)

using a multiparametric approach and define low, intermediate and high-risk according to the estimated 1-year mortality (respectively <5%, 5-10% and >10%). The risk stratification table includes clinical, functional, exercise, haemodynamic and echocardiographic parameters; the only laboratory parameter included is brain natriuretic peptide (BNP)/NT-proBNP but it is unknown if other laboratory evaluations are important in PAH risk stratification.
**Purpose.** To evaluate the prognostic value of laboratory parameters in patients with idiopathic, heritable and drug-induced (I/H/D)-PAH.
**Methods.** All patients with I/H/D-PAH referred to a single centre were included from 2002 to December 2018. All patients were assessed at baseline with right heart catheterization, BNP plasma levels, 6-min walking distance (6MWD), WHO functional class (FC) and complete laboratory evaluation (assessing, in particular, coagulation, inflammation, auto-antibodies, immunofixation, renal and hepatic function, complete blood count, B and C hepatitis virus profile, lipid profile, thyroid function, iron status and electrolytes, angiotensin converting enzyme, creatine phosphokinase, homocysteine, lactate dehydrogenase levels). All patients were treated according to current guidelines. The prognostic value of each variable was assessed using Cox regression model and a p-value <0.1 was consider for inclusion in the multivariate analysis.
**Results.** Four hundred and seventy-six patients were included (median age 48 years, 60% female, 65% WHO-FC III-IV, median 6MWD 413 m, median right atrial pressure/mean pulmonary artery pressure/cardiac index/pulmonary vascular resistance (PVR)/mixed venous oxygen saturation were, respectively, 7 mmHg/52 mmHg/2.4 l/min/m$^2$/11 WU/64%). The independent predictors of all-cause death at the multivariate analysis were: age (HR 1.042, 95% CI 1.027-1.059, p-value <0.001), male gender (HR 3.165, 95% CI 2.060-4.862, p-value <0.001), BNP (HR 2.008, 95% CI 1.478-2.728, p-value <0.001), PVR (HR 1.03, 95% CI 1.000-1.063, p-value 0.047) and serum sodium levels (HR 0.928, 95% CI 0.863-0.997, p-value 0.043).
**Conclusions.** Our study confirm Literature data according to which age, male gender, BNP levels and PVR are well defined determinants of PAH prognosis. Among laboratory parameters we found that serum sodium level is an independent predictor of death. This underline a parallelism with other organ insufficiencies, such as cirrhosis and left heart failure, in which hyponatremia reflects the neuro-hormonal activation associated with reduced effective volemia that, in patients with PAH, is indicative of a severe disease with peripheral and splanchnic hypoperfusion.

## VALVULOPATIE – 3
## Sessione Orale

### A779: INTERNATIONAL MULTICENTER REGISTRY TO EVALUATE THE PERFORMANCE OF SELF-EXPANDABLE VALVES IN SMALL AORTIC ANNULI

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**Objective.** This study sought to evaluate and compare the outcomes of transcatheter self-expandable prostheses in patients with small annuli.
**Background.** Transcatheter aortic heart valves (THV) appear to have a better performance than surgical valves in terms of prosthesis-patient-mismatch (PPM), especially in aortic stenosis patients with a small aortic annulus.
**Methods.** TAVI-SMALL is a retrospective registry of patients with severe aortic stenosis and a small annulus (CT-scan annular perimeter <72 mm or area <400 mm2) treated with transcatheter self-expandable valves ([SEV] n=859; Evolut R-EvR=397; Evolut PRO-EvPRO=84; Acurate - ACU=201; Portico-POR=177). Primary endpoints were post-procedure mean aortic gradient, indexed effective orifice area (iEOA), and rate of severe PPM.
**Results.** Pre-discharge gradients were consistently low in every group, with a slight benefit with EvR (8.1 mmHg, 95% CI 7.7-8.5) and EvPRO (6.9 mmHg, 95% CI 6.3-7.6) compared to ACU (9.6 mmHg, 95% CI 8.9-10.2) and POR (8.9 mmHg, 95% CI 8.2-9.6) groups (p<0.001). Mean iEOA was 1.04 cm2/m2 (95% CI 1.01-1.08) with a trend for lower value with POR. No significant differences were reported in terms of severe PPM (overall rate: 9.4%, p=0.134), permanent PM implantation (15.6%), and peri-procedural and 1-year adverse events. Pre-discharge more-than-mild PVL were significantly more common with POR (19.2%) and less common with EvPRO (3.6%) compared to EvR (11.8%) and ACU (9%) groups.
**Conclusions.** Transcatheter SEVs showed optimal clinical and echocardiographic results in patients with small aortic annuli, although supra-annular functioning THV seemed to slightly outperform the intra-annular functioning ones. The role of TAVI with SEVs for treatment of aortic stenosis in patients with a small annulus needs to be confirmed in larger trials.

### A780: TAVI FOR LOW-RISK PATIENTS: COMPARISON BETWEEN PATIENTS ENROLLED IN NOTION TRIAL AND IN FLORENCE REAL WORLD REGISTRY

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**Background.** In the randomized NOTION trial at 5 years no significant difference between transcatheter aortic valve implantation (TAVI) and surgical aortic valve replacement (SAVR) was found for the composite rate of death for any cause, stroke and myocardial infarction in lower-risk patients. However, patients were excluded from this trial if they had another severe valve disease or coronary artery disease (CAD) requiring intervention, or previous cardiac surgery, myocardial infarction or stroke, and severe renal failure or severe lung disease.
**Purpose.** To assess long-term clinical outcomes among patients with estimated surgical low risk patients undergoing TAVI in clinical practice, without exclusion criteria adopted in randomized NOTION trial.
**Methods and Results.** This study was a quality improvement registry aimed to evaluate outcomes in patients admitted for TAVI to our tertiary center. From January 2009 to December 2017, 182 consecutive patients who underwent TAVI were categorized according to the Society of Thoracic Surgeons (STS) score into low (<4%; n=78, 43%), intermediate (STS ≥4% and ≤ 8%; n=70, 38.4%), and high risk (STS>8%; n=34, 18.6%). All TAVI cases were discussed and approved by interdisciplinary Heart Team. The transfemoral access was the most common approach adopted (97.8%) for the procedures. Among low risk patients: 4 have history of CABG, 11 mitral valve surgery, 9 chest radiation, 6 cancer, 7 chronic renal failure, 9 chronic lung failure, 1 myasthenia gravis, 12 severe CAD, 3 recent myocardial infarction, 1 recent stroke, 4 porcelain aorta and the remaining 11 patients gave consent only for TAVI procedure. Significant differences were found between the groups (low vs. intermediate vs. high risk) for age (79.2±5.1 yrs vs. 85.2±4.8 yrs vs. 86.5±5.3 yrs, p <.0001), chronic renal failure (7.6% vs. 28.6% vs. 50%, p<.0001), and left ventricular ejection fraction≤40% (15.3% vs. 27.1% vs. 41.2%, p =.015), but not for previous acute myocardial infarction (8.9% vs. 15.7% vs. 17.6%, p=.334), chronic obstructive pulmonary disease (17.9% vs. 14.3% vs. 26.8%, p=.270) and peripheral arterial vascular disease (3.8% vs. 14.3% vs. 14.7%, p=.061). By Kaplan Meier analysis, all-cause mortality at 1-year follow up was significantly lower in low vs. intermediate and high risk group (6.4% vs. 12.8%, vs. 38%, P<0001) and progressively increased during the follow-up (median time 772±717 days) remaining significantly lower in low risk patients (28% vs. 24.3% vs. 55.8%, P<.0001).
**Conclusions.** Our findings suggest that in clinical practice low risk patients, without exclusion criteria, can benefit from TAVI's procedure, showing a long-term mortality rate quite similar to the 27.7% 5-year mortality rate reported in NOTION trial in both TAVI and SAVR groups. However, given the inherent limitations of any registry, results of ongoing large randomized trials are needed before extending the indication to TAVI in low-risk patients.

### A781: NON-INVASIVE MYOCARDIAL WORK IN PATIENTS AFTER TRANSCATETHETER AORTIC VALVE IMPLANTATION.

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**Background.** Transcatheter aortic valve implantation (TAVI) is an effective therapeutic option for severe symptomatic aortic valve stenosis (AS) with intermediate or high surgical risk. Variations of left ventricular (LV) global longitudinal strain (GLS) have been recently investigated in patients with aortic stenosis who underwent TAVI. Non-invasive myocardial work (MW) is an innovative tool, deriving from myocardial strain and incorporating measurements of deformation and load conditions. Therefore, it could be useful in conditions of increased afterload, as aortic stenosis (AS).
**Aim.** We investigated the effect of myocardial work index (MWI), and its derived indices, in patients with AS before and after TAVI.
**Methods.** We retrospectively analysed 85 patients with AS (aortic valve area: <1cm2) who underwent TAVI at the Cardiology Department

(University of Magna Graecia, Catanzaro) from January 2018 to August 2019. Exclusion criteria were: more than mild associated cardiac valve lesion, left bundle branch block, and suboptimal quality of speckle-tracking image analysis. 50 healthy individuals matched for age and sex were used as controls (CTRL). Echocardiographic data were recorded before and 2 weeks after TAVI implantation, including quantification of 2D global longitudinal strain (GLS), global work index (GWI), global constructive work (GCW), global wasted work (GWW) and global work efficiency (GWE).

**Results.** Patients with AS had higher systolic ($p<0.05$), increased LV wall thickness, mass index ($p<0.001$) compared to controls. Greater indexed left atrial volume, E/e' and trans-tricuspid gradient were also observed in the AS group ($p<0.001$). Speckle tracking analysis revealed significant lower GLS in AS than in control group ($p<0.001$). Increased values of MWI, MCW and MWW (respectively, $p<0.001$) were observed in patients with AS compared to CTRL. Interestingly, an early improvement of LV GLS was observed 2 weeks after TAVI implantation ($p < 0.001$) together with a significant reduction of MWI, MCW and MWW (respectively, $p < 0.05$).

**Conclusion.** In patients with AS, GLS reduction is accompanied by an increase of GCW, GWI and GWW. Our results indicate that significant improvement of LV GLS and a significant reduction of MWI, MCW and MWW can be observed in patients undergoing TAVI.

Therefore, non invasive Myocardial work could be an interesting, effective and promising tool in order to evaluate cardiac work and wall stress, and it would represent an indirect parameter for estimating the improvement of LV systolic function after TAVI.

### A782: MID-TERM OUTCOMES OF TRANSFEMORAL TRANSCATHETER AORTIC VALVE IMPLANTATION USING THE NEW GENERATION ACURATE NEO DEVICE: EXPERIENCE OF A SINGLE CENTRE

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**Background.** The Acurate Neo transfemoral (TF) is a new generation self-expanding device for transfemoral transcatheter aortic valve implantation (TAVI) that demonstrated to have excellent early outcomes. Nevertheless, data on mid-term outcomes are scarce. The aim of this study was to assess 2-year outcomes of TAVI with Acurate Neo TF valve.

**Methods and results.** One-hundred forty six consecutive patients underwent transfemoral TAVI with the Acurate Neo device from July 2015 to January 2018. They had a mean age of 81.4 ± 4.7 years and a mean STS Mortality score of 3.7 ± 2.4 %. Device success was achieved in 140 patients (96%). Mean transaortic gradient post TAVI was 8.6 ± 4.6 mmHg. More than mild paravalvular regurgitation (PVR) was reported in 2.25 % of patients. 30-day all cause death rate was 3.4%. Life-threatening bleeding was reported in 2.7% of patients. No cases of disabling stroke were reported. New pacemaker implantation was required in 5 patients (3.4%). At 2 year, all-cause mortality was 9.6% (14 patients), no disabling stroke occurred, while permanent pacemaker implantation was performed in 9 patients (6,1%). Valve performance remained stable.

**Conclusions.** Transfemoral TAVI with Acurate Neo TF demonstrated to be safe with excellent clinical outcomes up to 2 years and low complication rates.

### A783: FEVER AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION: HOPE FOR THE BEST, BUT EXPECT THE WORST

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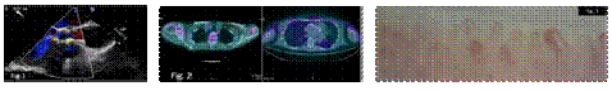
An 84-year-old woman was admitted to our Institution due to a three months history of aching and morning stiffness of neck, shoulder and pelvic girdles radiating distally to elbows and knees in association with recent onset of low-grade fever, malaise and shivering at night time. The patient had undergone transcatheter aortic valve implantation (TAVI) with Acurate prosthesis (Boston Scientific, Marlborough, USA) and subsequent Ensura MRI (Medtronic, Minneapolis, USA) dual-chamber pacemaker implantation five months earlier. She was also known for non-surgical abdominal aortic aneurysm, Raynaud phenomenon since many years, diverticulosis and polypectomy for a recent episode of gastrointestinal bleeding. The 42 kg by 156 cm woman was asymptomatic for dyspnea or angina at rest, the pacemaker pocket had no signs of ongoing infection, lungs were clear, a mild systolic murmur was audible on aortic focus, and bilateral knee swelling and right pre-patellar erythema were present. White blood cells were 11640/mm3, relative neutrophil count 78%, haemoglobin 8.6 g/dL, while erythrocyte sedimentation rate 109 mm/hour, C-reactive protein 10.35 mg/dL and procalcitonin 0.39 ng/mL. Cardiac enzymes were within range, admission EKG showed sinus rhythm, and chest X-ray excluded pulmonary infiltrates. The patient's history posed her at high risk for late prosthetic valve infective endocarditis (IE) or pacemaker-related infection; on the other hand, immunologic causes or concomitant osteoarthritic phenomena could not be excluded. Due to the strong prognostic implications of prosthetic valve IE, an extensive diagnostic work-up was performed to exclude this condition. No evidence of vegetations affecting aortic bioprosthesis or pacemaker leads was present at transesophageal echocardiography (Figure 1). Fluorodeoxyglucose-positron emission tomography (FDG-PET) computed tomography (CT) fusion imaging showed diffuse tracer hyper-accumulation in various joints, while none was evident at cardiac level (Figure 2). Finally, blood and urine cultures resulted negative. As part of an extensive screening, high titer ANA were identified (>1:320 centromeric; >1:320 homogeneous), while the following tests resulted negative: anti-CCP, rheumatoid factor, anti-DNA, anti-ENA, p-ANCA and c-ANCA, anti-streptolysin, anti-HIV, anti-HCV, anti-HBs, anti-HBc IgG, HBsAg and quantiferon. Degenerative osteoarthritis was revealed on cervical spine X-ray, while knee radiography disclosed bilateral partially confluent morular heterotopic calcifications; these findings, alongside with joint inflammation suggested by FDG-PET/CT, led to a working diagnosis of a rheumatic disease. Medium-dose steroid therapy (prednisone 25 mg/die) was initiated, with quick symptomatic amelioration. Symptoms were absent at three-month follow-up while on low-dose prednisone. Elevated C-reactive protein (1.44 mg/dL) and erythrocyte sedimentation rate (64 mm/hr) persisted; moreover, post-dismissal capillaroscopy, performed in light of anti-centromere antibody positivity, revealed scleroderma pattern, with mild edema, numerous vessel ectasias and one giant capillary (Figure 3), in the absence of hand ulcers or erythema. En masse, such evidence, together with history of Raynaud phenomenon and soft tissue calcinosis, yielded a diagnosis of very early systemic sclerosis.



### A784: TRANSCATHETER AORTIC VALVE IMPLANTATION WITH CORE VALVE PROSTHESIS: FIVE YEAR DURABILITY

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**Background.** Transcatheter aortic valve implantation (TAVI) has emerged as a valid option for patients with severe aortic stenosis (SAO) who are at intermediate or high/prohibitive surgical risk. Multiple trials are currently evaluating TAVI for treating patients who are at low surgical risk. However, the treatment of younger patients with longer life expectancies has raised questions regarding valve durability, due to the biological tissue that is prone to structural valve degeneration (SVD).

**Purpose.** We sought to evaluate five-year durability of TAVI using the current technology of self-expanding CoreValve prosthesis.

**Methods.** All consecutive patients with SAO who underwent TAVI with the third generation 18-F CoreValve device in our centre were prospectively included in a quality improvement registry of our Hospital. In this registry we included all consecutive patients (n=182) treated from January 2009 to December 2017. All TAVI cases were discussed and approved by interdisciplinary Heart Team. SVD and all outcomes were reported according to VARC (Valve Academic Research Consortium)- 2 criteria.

**Results.** Overall, at average time of 772±717 days all-cause mortality was 34% (62/182 patients); the neurological event rate was 4.9% (1 case fatal stroke); 94 (52%) patients were re-hospitalized for cardiovascular reason: 73 (40.1%) patients for recurrent heart failure (HF) and 21 (11.6%) patients for permanent pacemaker implantation. Two patients underwent upgrade from bicameral to biventricular pacing due to symptomatic HF associated with large QRS. All causes mortality rates at 1, 2, 3, 4, and 5-year completed follow-up (93 patients) were 20.4%, 47.3%, 59.1%, 62.3%, and 65.5%, respectively. On echocardiography, mean trans aortic gradients decreased from 54 ± 13.9 mm Hg (pre-TAVI) to 11.2 ± 9.4 mm Hg (5-year post-TAVI) ($p< 0.001$). Late non SVD occurred in 2 patients (2.15%); among these, surgical replacement of aortic valve was successfully carried out in 1 patient presenting with recurrent symptoms of heart failure due to a prosthesis migration, determining an aortic pseudo-aneurysm. The second case of non SVD did not undergo further invasive interventions. Late SVD was found in 3 patients (3.2%) showing mild stenosis with a mean trans aortic gradient ranging from 20 to 40 mm Hg by echo, in one case combined with moderate aortic regurgitation. None patients with SVD needed re-intervention. Throughout follow-up, prosthetic valve thrombosis or late valve embolization were not observed.

**Conclusions.** Using CoreValve for TAVI procedures, a 3.2% low rate of SVD was observed in our registry, none of them requiring reintervention. These findings appear reassuring in term of TAVI 5-year durability. However, results of ongoing large randomized trials with long-term follow-up are needed before extending the indication to TAVI for low-risk young patients.

## ARITMIE – 10
## Sessione Orale

### A785: POSTOPERATIVE ATRIAL FIBRILLATION: RISK PREDICTORS AND CLINICAL IMPACT

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**Introduction.** Postoperative atrial fibrillation (POAF) can manifest after surgical procedures, varying its incidence according to the type of intervention carried out. It affects more than 3% of all over 45 year old patients undergoing non cardiovascular surgery, around 30% of patients undergoing thoracic surgery and 40% of those experiencing cardiovascular surgery. POAF is associated to a higher risk of stroke and mortality. The pathophysiological mechanisms of POAF are not entirely understood, however oxidative stress, systemic and local inflammation are thought to play a role in this condition.
**Aim.** The primary endpoint of our study was to assess independent risk factors for POAF incidence. The secondary endpoint was to evaluate possible predictors of major cardiovascular events (MACE). We considered MACE the following endpoints: non-fatal stroke, non-fatal myocardial infarction (MI), transient ischemic attack, decompensated acute heart failure and cardiac-related death.
**Methods.** Retrospective observational study including all patients attending our cardiology clinic for a preoperative assessment from the 1st of January 2017 to the 31st of December 2017. For each enrolled patient we reviewed the clinical data referring to the period of their surgery and took note of all cases of POAF and MACE. All clinical characteristics of the patients and treatment carried out were also registered.
**Results.** A total of 523 patients were enrolled (335 men, age 72.1±12.2). 12 cases of POAF (2.3%), 2 cases of non-fatal MI (0.4%) and 4 cases of acute heart failure (0.8%) were registered. 2.4% of patients developing POAF were male. Thyroid dysfunction was and independent predictor of POAF [HR 6.17 (95% CI 1.89-20.13)] as well as underweight (p=0.025). In terms of our secondary endpoint the two risk factors which proved themselves to be statistically significant were, again, an history of thyroid dysfunction [HR 3.28 (1.12-9.56)] and a BMI<18.5 (consistent with underweight) [HR 0.96 per Kg (0.91-0.99)].
**Conclusions.** Thyroid dysfunction and underweight proved themselves to be independent risk factors for both POAF and MACE. Moreover, we found that widespread pre-operative screening such as the one used in the present paper is not cost-effective. Detecting a single episode of postoperative AF cost 1575.54 euros, a single episode of heart failure 4726.61 euros and a single non-fatal MI 9453.22 euros. Therefore, a more selective and patient-tailored process for assessing surgical risk should be introduced.

### A786: PREVALENCE OF PATIENTS WITH ATRIAL FIBRILLATION AT RISK FOR OBSTRUCTIVE SLEEP APNEA SYNDROME: PRELIMINARY RESULTS USING TWO SPECIFIC CLINICAL SCORE

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**Introduction.** The prevalence of Obstructive Sleep Apnea Syndrome (OSAS) is about 5-7% in the general population, while it is significant higher in patients (pts) with atrial fibrillation (AF). Several studies attributed this association to a higher prevalence of traditional risk factors for AF among OSAS pts, while others support OSAS as an independent risk factor for AF. Even though several studies have focused on the risk of AF in patients with OSAS, few of them have highlighted the prevalence of OSAS in outpatients with AF and a careful screening test.
**Aim.** The aim of this study was to estimate the prevalence of pts at risk for sleep-related disorders in an outpatient population with AF and to evaluate the impact of the STOP-BANG questionnaire and of the Epworth Scale.
**Methods.** Consecutive pts followed in our arrhythmia outpatient clinic, of both sexes, > 18 years, with diagnosis of atrial fibrillation were screened. Patients aged <18 years or > 80 years and with a history of OSAS or otorhinolaryngological pathologies were excluded from the study. The enrolled patients were subsequently evaluated through the STOP-BANG questionnaire (which includes questions related to Snoring, Tiredness, Observed Apnea, Pressure, BMI, Age, Neck Circumference and Gender) and the Epworth scale (which evaluates the subject's daytime sleepiness during different daily activities). Patients with a STOP-BANG score ≥5 and/or with an Epworth scale score ≥10 were at high risk of OSAS and then referred to further evaluation.
**Results.** Ninety-eight patients were screened and 24 of them (24%, 19 males/5 females, mean age 63,4 ± 11 years; 46% with paroxysmal form, 54% with persistent form) were found to have a STOP-BANG score ≥5 (mean 5,3 ± 0.8); 7 of them had also an Epworth scale score ≥10 (mean 13,1 ± 4.1). Main characteristics of the pts are summarized in the Table. Most of them were obese (10/24, 42%), hypertensive (18/24, 75%), dyslipidemic (14/24, 58%), and between the two group of pts there was no statistically significant difference in each of the considered clinical variable except for dyslipidaemia (p=0,02).
**Conclusions.** Our study showed that the risk of OSAS (assessed by the two type of scores) is almost one fourth in outpatients with AF and that obesity, hypertension and dyslipidaemia are the most common risk factors. The routine use of these simple and inexpensive screening tools should be promoted in order to offer the best management in this patient population.

**Table.** Main characteristics of the pts.

| | 74 pts with STOP-BANG < 5 and/or Epworth scale <10 | 24 pts with STOP-BANG ≥5 and/or Epworth scale ≥10 | P value |
|---|---|---|---|
| Age (mean ± SD, y.o.) | 68,7 ± 11 | 63,4 ± 11 | 0,19 |
| Sex (M/F) | 41/33 | 19/5 | 0,05 |
| BMI (kg/m$^2$) | 26,3 ± 4,0 | 29,9 ± 5,1 | 0,39 |
| Hypertension n (%) | 46 (62%) | 18 (75%) | 0,25 |
| Obesity n (%) | 16 (22%) | 10 (42%) | 0,053 |
| Smoke (past/current) n (%) | 16 (22%)/2 (3%) | 5 (21%)/1 (4%) | 1/1 |
| Diabetes n (%) | 6 (8%) | 2 (8%) | 1 |
| Dyslipidaemia n (%) | 24 (32%) | 14 (58%) | 0,02 |
| Type AF (paroxysmal/persistent) | 33 (45%) /41 (55%) | 11 (46%) /13 (54%) | 1/1 |

Pts: patients; SD: standard deviation; BMI: body mass index; AF: atrial fibrillation.

### A787: LESION TRANSMURALITY IN AF ABLATION AS A GOLD STANDARD FOR PV ISOLATION: COMPARISON BETWEEN ABLATION INDEX AND LESION INDEX

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**Purpose**. Introduction of contact force-sensing catheters technology has improved outcomes in pulmonary vein isolation (PVI) for atrial fibrillation (AF) ablation. In order to better achieve lesion transmurality and standardize procedure, Ablation Index (AI, CARTO3, Biosense) and Lesion Index (LSI, TactiCath™, Abbott) which include force, time and power, have been recently developed. Previous studies have shown that AI- and LSI-guided pulmonary vein isolation (PVI) could improve efficacy of AF ablation by reducing the incidence of PV reconnection.
The purpose of this study was to explore AI- and LSI- guided PVI relative performance in terms of AF recurrences.
**Methods.** We retrospectively enrolled 24 patients with paroxysmal atrial fibrillation who underwent Ablation index- or Lesion Index-guided RF ablation procedure with an electro-anatomical mapping system. Redo AF ablations were excluded. As compared to LSI group, procedures in the AI group were performed by less experienced operators. AF recurrences were evaluated at 6 months after PVI procedure.
**Results.** A total of 14 patients with AI-guided PVI and 10 patients with LSI-guided PVI were included in the study (mean age 58 years, 21 males). Mean Ablation Index was 360 at posterior wall and 470 at anterior wall. Mean overall Lesion Index was 5.4. Short term procedural success rates were 86% and 90% in the AI- and LSI-guided group respectively.
**Conclusions.** Our exploratory data analysis suggested a low incidence of AF recurrences both with AI- and LSI-guided PVI. Furthermore, although AI targets lower than 400 have been reached in the posterior wall, this could be reasonably acceptable as a compromise between safety and good clinical outcomes.

### A788: ADDITIVE PREDICTIVE POWER OF THE CHA2DS2-VASC AND HAS BLED SCORES FOR MORTALITY IN PATIENTS WITH ATRIAL FIBRILLATION

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**Background and ojectives.** Atrial fibrillation (AF) is associated with increased mortality, which may derive from both ischemic and bleeding

events due to enacted therapies. Mortality predictors in AF are poorly characterized. We therefore investigated the predictive power of the $CHA_2DS_2$-VASc score, used to assess the risk of stroke in comparison with the HAS-BLED score, currently used to predict bleeding, for mortality in patients with AF in a large contemporary registry.
**Methods.** Individual patient data were pooled from the PREvention oF thromboembolic events–European Registry in Atrial Fibrillation (PREFER AF), a prospective real-world registry with a 12-month follow-up, with a total of 7243 patients enrolled from 461 hospitals and 7 European countries (Austria, France, Germany, Italy, Spain, Switzerland, and United Kingdom) conducted. Categorical variables are expressed as frequency and percentages (n, %), continuous variables are expressed as means and standard deviations (SDs). Logistic regression was here used to analyze the relationship between the $CHA_2DS_2$-VASc and HAS-BLED scores and outcome events, including mortality, at one year. The predictive ability of the scores was analyzed by comparing c-statistics.
**Results.** The study sample consisted of 5,209 AF patients with complete information on both scores. Mean age was 71.8 ± 10.46 years; 3145 subjects (60.4%) were male. The average 1-year mortality was 3.1%. We found strong gradients between all examined outcomes (mortality, stroke and systemic embolic events (SSE) and major bleeding) for both the $CHA_2DS_2$-VASc and the HAS-BLED risk scores. Both scores had broadly similar c-statistics; for $CHA_2DS_2$-VASc: 0.637, 0.656 and 0.616 for models predicting mortality, SSE and major bleeding, respectively; for HAS-BLED: 0.620, 0.647, and 0.627, respectively. When including the individual components of both scores separately, c-statistics increased to 0.715, 0.694 and 0.636 with $CHA_2DS_2$-VASc, and to 0.681, 0.697 and 0.680 with HAS-BLED. The predictive power with both scores combined, removing overlapping components, was higher, with a c-statistic of 0.74, 0.73 and 0.70 for mortality, SSE and major bleeding, respectively.
**Conclusion.** Both the $CHA_2DS_2$-VASc and the HAS-BLED score predict mortality similarly in AF, and a combination of all the components of the scores increases prediction significantly. Such combination may thus be clinically useful.

### A789: SERUM CARDIAC-SPECIFIC BIOMARKERS AND ATRIAL FIBRILLATION IN MYOTONIC DYSTROPHY TYPE 1

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**Introduction.** The aim of the present study was to evaluate the role of high-sensitivity cardiac troponin I (hs-CTnI), N terminal pro-B-type natriuretic peptide (NT-proBNP), creatine kinase-MB mass concentration (CK-MB mass) and copeptin (CP) in predicting incident atrial fibrillation (AF) in myotonic dystrophy type 1 (DM1) patients.
**Materials and methods.** The study enrolled 60 consecutive DM1 patients (age 50.3 ± 7.3 years, 34 male) who underwent pacemaker implantation for cardiac rhythm abnormalities and 60 PM recipients whose age and sex matched served as control group. All DM1 patients underwent 12-lead electrocardiogram, 2D color Doppler echocardiogram, biomarkers measurements and device interrogation at implantation, one month after and every six months thereafter for a minimum of 2-year follow-up.
**Results.** The study population was divided into 2 groups according to the presence of AF (AF Group vs non- AF Group). The AF group was older (47.3± 8 vs 38.6± 7 years, P=0.03) and showed higher serum levels of NT-proBNP (151± 38.4 vs 107.3 ± 24.2 pg/mL, P<0.001) and CP (18.9± 4.5 vs 7 ± 2.3 P<0.001) than non-AF Group. NT-proBNP (P< 0.001) and CP (P< 0.001) were found to be independent predictor of AF. Based on the ROC curve analysis, the cut-off value for NT-Pro BNP that best predicted AF event in DM1 patients was 123 pg/ml (sensitivity of 83.3 % and specificity of 86.5%); the cut-off value for CP that best predicted AF event in DM1 patients was 9 pmol/L (sensitivity of 89% and specificity of 87%).
**Conclusions.** NT-proBNP and Copeptin represent two independent predictors of AF onset in DM1 population with conduction disturbances underwent PM implantation.

### A790: FACTORS THAT AFFECT OUTCOME OF CRYOENERGY BALLOON ABLATION OF ATRIAL FIBRILLATION

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**Introduction.** Ablation of atrial fibrillation (AF) has gone through several advancements in last recent years. Currently, pulmonary vein (PV) ablation represents a class I indication for paroxysmal or persistent AF patients who failed antiarrhythmic drug (AAD) therapy. The aim of this study was to evaluate the outcomes of PV isolation with cryoballoon energy (CBE), for shedding light on standardization of such technique in long-standing persistent AF patients.
**Materials and methods.** Our study included 14 consecutive patients with symptomatic AF in spite of AAD. Subjects had either paroxysmal AF or long-standing persistent AF (mean age 58.1±8.9 years; 85.7% men; mean CHA2DS2-VASc score 1.7±1.2). Echocardiographic parameters were assessed before procedure showing preserved left ventricular ejection fraction but dilated atrial chambers (mean LVEF 56.8±2.9%; mean LAVi 37.7±2.9 mL/m2; LAD 42.4±5.5 mm; mean LA strain 15.2±6%). CBE ablation required second generation cryoballoon device together with an octapolar spiral mapping catheter for monitoring and recording of potentials to guide real-time PV isolation. A deflectable quadripolar catheter was used for either differential atrial pacing or pacing in the superior vena cava to capture the right phrenic nerve. The lowest temperature achieved during each CBE application was recorded (mean nadir temperature -53.4±12.1 °C). In order to evaluate the pattern of energy delivery during cryoablation, a plot of freezing temperature over procedural time was obtained off line for each case; more in detail, three consecutive segments were chosen, each consisting of three points, namely: first segment (beginning of ablation, intermediate point, beginning of decrease); second segment (beginning of decrease, intermediate down, the nadir); the final (upslope, intermediate point, end of ablation).
**Results.** We divided the patients into three groups: i) five patients in which temperature never reached -40 °C or lower; ii) three patients in whom the threshold of -40 °C was reached for less than 80 seconds; iii) six patients in whom the lowest temperature (below -40 °C) was kept for 80 seconds or more. At a mean follow-up duration of 6.9 months, 78.6 % of the patients were arrhythmia-free and a substantial reduction of EHRA score was obtained (from 2.1±0.5 to 1.2±0.4, p<0.05), leading to a significant improvement in quality of life. The occurrence of relapse was 21.4%, related to all patients with long-standing persistent AF and classified in the group who kept the freezing temperature for the longest time. Finally, the LA strain analysis of the two sub-groups showed that the mean strain was significantly lower in the patients with recurrence than in those without recurrence (11±5 % vs. 16.4±6 %).
**Conclusions.** CBE had high rate of success in paroxysmal AF, but efficacy was reduced in long-standing persistent AF in our cohort. The cumulative plot analysis shows that the combination of low temperature and long duration of application might not be beneficial, and trigger relapses. Further studies are needed to understand whether the long time of the application associated with very low temperatures during cryoablation might cause additional injury on the LA, according to the LA strain.

## ESERCIZIO FISICO E CARDIOLOGIA DELLO SPORT
## Sessione Orale

### A791: IMPATTO ACUTO DI UNA ULTRAMARATONA SUL CUORE DESTRO: UNO STUDIO ELETTROCARDIOGRAFICO

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**Introduzione.** Gli effetti sul cuore di una gara di ultra-endurance sono ancora molto dibattuti e controversi, soprattutto per quanto riguarda le sezioni destre. Lo scopo di questo studio è quello di analizzare gli effetti acuti di una gara di ultramaratona, comparando le caratteristiche di ECG a 12 derivazioni acquisiti prima e subito dopo la gara.
**Metodi.** Sono stati arruolati 301 atleti (età media 48±9 anni) che partecipavano ad una competizione di ultramaratona della lunghezza totale di 50 km. Le acquisizioni di ECG a 12 derivazioni sono state realizzate il giorno prima della competizione e subito dopo l'arrivo al traguardo. Nel rispetto delle leggi italiane, gli atleti erano ammessi alla gara solo dopo aver ottenuto l'idoneità a competizioni agonistiche, secondo il rispettivo protocollo di screening.
**Risultati.** Dopo la gara, è stato osservato un incremento significativo del voltaggio (p<0,001) e della durata (p<0,001) dell'onda P rispetto ai dati ottenuti prima della gara, con un maggior numero di atleti i cui ECG soddisfacevano i criteri di ingrandimento atriale destro (dal 3% al 17%, p<0,001). La presenza di ingrandimento atriale destro dopo la gara presentava una correlazione diretta con età, ore di allenamento a settimana ed anni di allenamento ed una correlazione inversa con il tempo di arrivo al traguardo e la posizione finale in classifica. È stato inoltre osservato un incremento significativo dell'ampiezza e delle onde T e R (p<0,001) e della durata dell'intervallo QTc (p<0,001) dopo la gara. Non sono state riscontrate differenze in termini di aritmie sopraventricolari e ventricolari.
**Conclusioni.** Un numero considerevole di atleti partecipanti ad una

competizione di ultramaratona di 50 km ha presentato segni ECG di sovraccarico destro in assenza di aritmie. Questi dati supportano l'ipotesi che attività sportive di ultra-endurance possano indurre un sovraccarico transitorio delle sezioni cardiache destre.

### A792: BIOCHEMICAL ROLE OF LIPOPROTEIN SCREENING IN PATIENTS WITH PREMATURE MYOCARDIAL INFARCTION AND IN ELITE ATHLETES

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Elevated concentrations of lipoprotein(a) [Lp(a)] have been shown to be an independent risk factor for atherosclerotic disease. However, evidence for its clinical role in patients with premature coronary artery disease remains limited. Moreover, physical activity has been shown to improve lipoprotein metabolism reducing the risk of coronary artery disease.

We aimed to elucidate the role of the Lp(a) screening in patients with premature myocardial infarction and in elite athletes to assess its impact on the clinical decision-making and patients' management and also to define the biochemical role of this protein and clarify the influence of physical activity on the Lp(a) profile.

We prospectively screened for Lp(a) 105 consecutive patients (age <50 years old) admitted to division of Cardiology – University of Campania "Luigi Vanvitelli" for premature myocardial infarction and 30 elite basket athletes (age <28 years old) admitted to division of Sport Medicine of AORN Santobono-Pausilipon. All patients were treated according to European guidelines recommendations. Samples for Lp(a) measurement with ELISA were collected during follow-up, in stable clinical conditions. Lp(a) concentration ≥30 mg/dL was considered elevated.

In our premature myocardial infarction population, Lp(a) resulted elevated (≥30 mg/dL) in the 28.5% (n=30) of all subjects. Moreover, the 12.3% (n=13) of patients had a Lp(a) value ≥70 mg/dL, with a clinical indication for Lp(a)- specific apheresis. All patients with high levels of Lp(a) were on optimal medical therapy and with well-controlled risk factors, according to European guidelines.

In our elite athletes, Lp(a) resulted elevated (≥30 mg/dL) in the 23% (n=7) of all subjects and the 13% (n=4) of patients had a Lp(a) value ≥70 mg/dL. Elevated levels of Lp(a) are highly prevalent in young patients presenting with myocardial infarction. In our very preliminary study on elite athletes also we found elevated levels of Lp(a). A systematic screening for Lp(a) might intensify the control of traditional risk factors in young population and in elite athletes.

### A793: ATHLETES AND PREMATURE VENTRICULAR COMPLEXES: FRIENDS OR FOES?

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**Background.** Premature ventricular complexes (PVCs) are a common clinical problem and a critical issue with regards to sports eligibility in sportsmen. Although PVCs can be considered a benign feature of the athlete's heart adaptive phenotype, they may also be the only clinical manifestation of a concealed heart disease, potentially heralding sudden cardiac death (SCD) during sports activity. The optimal diagnostic evaluation of athletes with PVCs is currently uncertain.

**Methods.** We examined all consecutive athletes presenting for evaluation at our institutions because they were disqualified from participating in sports due to PVCs. PVCs were either identified on baseline 12-lead ECG or during stress test. These athletes underwent a baseline non-invasive diagnostic protocol with transthoracic echocardiogram and gadolinium enhanced cardiac magnetic resonance imaging (cMRI). Subsequently, an invasive diagnostic evaluation was performed, including electrophysiology study (EPS) with programmed electrical stimulation in order to assess arrhythmia inducibility, electroanatomic mapping (EAM) in order to evaluate the cardiac substrate's electrical properties and EAM-guided endomyocardial biopsy (EMB) if deemed necessary. When clinically indicated, catheter ablation was performed. Sports eligibility status was re-assessed at 6 months' follow-up.

**Results.** 129 athletes were included in the present analysis (30.1±13.8 years-old, 81.3% male). Most of them were competitive athletes (82.8%) and, remarkably, 4 were professional sportsmen. The most common reason for sports disqualification were PVCs at rest (N=115; 89.8% of cases), whereas 13 subjects (10.2%) had PVCs during stress test. Apart from PVCs, 12-lead ECG showed abnormalities in 17 cases (13.3%), most commonly T wave inversion. 32 athletes (13.3%) had abnormal echocardiograms, whereas 115 (89.8%) had abnormal cMRI exams. Of note, in none but 1 case the abnormalities found on echocardiogram were not confirmed on cMRI. EPS was performed in 106 subjects (82.8%) and sustained ventricular arrhythmias were induced in 4 cases (3.8%). EAM was performed in 96 athletes (75%) and in 21 of them (21.9%) there were abnormally low-voltage areas, reflecting a pathological myocardial substrate. EMB samples were obtained in 17 cases (13.2%). After diagnostic evaluation, 25 subjects (19.4%) had a diagnosis of heart disease. On multivariate logistic-regression analysis, abnormalities on ECG (OR 47.96) or on echocardiogram (OR 11.93) and low-voltage areas on EAM (OR 8.25) were significantly associated with diagnosis of a concealed cardiac disease, whereas either cMRI or EPS were not. Catheter ablation was performed in 67 subjects (51.9%). After 6 months, 74 athletes (57.4%) were judged eligible to participate in competitive sports and 26 subjects (20.2%) were deemed eligible to participate in non-competitive sports.

**Conclusions.** Approximately 1/5 of athletes presenting with PVCs have a concealed heart disease. 12-lead ECG, echocardiogram and EAM abnormalities are predictive of heart disease's detection. Therefore, these diagnostic tests should be included in the routine evaluation of athletes with PVCs. More than ¾ of subjects were judged eligible to participate in sports at 6 months' follow-up.

### A794: THE DIET AND EXERCISE MOTIVATION STUDY - DEMOS: DIET AND PHYSICAL EXERCISE WITH REMOTE PSYCHOLOGICAL MOTIVATION TO IMPROVE FITNESS AND CARDIO-METABOLIC PARAMETERS IN PRIMARY CARDIOVASCULAR PREVENTION SUBJECTS AT HEIGHTENED RISK

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**Background.** Lifestyle changes are likely to be the most effective measures for the prevention of cardiovascular disease. Combined with pharmacological therapies, diet and physical exercise are important correlates of protection against cardiovascular events, thus being proposed and prescribed as the ideal risk-reduction strategy for both primary and secondary prevention programs. However, the lack of individual motivation is a main limitation to the feasibility and efficacy of current recommendations in terms of cardiovascular prevention and maintenance of benefits over time.

**Methods.** In a prospective, randomized, open-label study (Diet, Exercise and Motivation Study – DEMOS), we evaluated the effectiveness of a lifestyle improvement strategy in individuals at heightened cardiovascular risk in a primary prevention setting. The primary study endpoint of Phase 1 of DEMOS was the documentation of a significantly greater improvement in physical performance, based on the increase in maximum oxygen consumption (peak $VO_2$), in an intensive vs standard treatment group. The final primary endpoint of the study, still ongoing, will be the documentation of better maintenance of improvements achieved in Phase 1, through a psychological motivation strategy based on remote smartphone messaging. Additional endpoints are the documentation of improvements in cardio-metabolic parameters, as well as the maintenance of benefits over time, subjects' acceptance, and cost-effectiveness of the motivational support, on trends of cardiovascular health parameters in the active treatment compared with the control group. All subjects also underwent a basal CT scan for coronary calcium evaluation and repeated cardiopulmonary exercise test (CPET) for peak $VO_2$ calculation. We here report on the changes in physical performance parameters in the initial "acute" phase 1 of the study.

**Results.** After a run-in phase of 2 months, 60 male subjects aged between 40 and 60 years were randomly assigned to an intensive or a standard treatment in a 1:1 ratio. At baseline, there was no significant difference between the two groups in peak $VO_2$ values (p=0.953). After 3 months, there was still no significant between groups difference in the occurrence of the primary endpoint (p= 0.201). However, the subgroup of patients with good adherence to the intensive treatment (>75% of the scheduled activity) showed a significant increase of peak $VO_2$ compared to less compliant individuals. The overall adherence to the protocol was significantly higher in the intensive treatment group with motivational support.

**Conclusions.** An intensive lifestyle intervention in subjects at moderate

cardiovascular risk is not superior to standard treatment in terms of physical performance improvement at 3 months, unless an important adherence to the intensive protocol is assured. Patient compliance is likely to be a major determinant of treatment response, and a psychological motivation of subjects enrolled in such complex protocols of global lifestyle changes is likely to be key for the protocol success.

### A795: THE EFFECTS OF ADHERENCE TO PHYSICAL EXERCISE ON CARDIOVASCULAR EFFICIENCY IN BREAST CANCER SURVIVORS

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**Background.** In breast cancer patients, the effect of long-term adjuvant endocrine therapy on cardiovascular (CV) parameters and outcomes is still under investigation. On the contrary, physical exercise (PhE) seems to act as a crucial tool to ameliorate or prevent the development of cardiotoxicity and further CV diseases, acting on chronic inflammatory status, CV risk factors and treatment-related side effects. Moreover, PhE can be beneficial in terms of both quality of life and rate of recurrences in breast cancer survivors (BCS).
**Aim.** To assess the effect of a short term PhE-protocol and the impact of the PhE-adherence on CV efficiency in a population of BCS women after adjuvant endocrine therapy.
**Methods.** In 2016-17, a total of **57** BCS-women (mean age 53±6.3 years) underwent a 3-months moderate-intensity PhE protocol, training twice a week (74±21% of attendance). They were randomized to sustain Aerobic Training (AT) (n=31, 55%) [Nordic Walking (NW) (n=14, 25%) and Walking (W) (n=17, 30%)] or Resistance Training (RT) (n=26, 45%). All the participants underwent 2-D echocardiography before (T0) and after training (T1), including ventricular-arterial coupling (VAC) and speckle-tracking left ventricle global longitudinal strain (GLS) analysis. We grouped the final sample into three groups, based on tertiles of adherence to the PhE-program.
**Results.** After training, we observed a significant improvement in the mitral annular plane systolic excursion (MAPSE, T0: 15.3±2.1; T1: 16.4±2.6, p=0.021), GLS (T0: 22.2±3.5, T1: 26.2±3.3, p<0.001) and VAC (T0: 1.6±0.9, T1: 1.2±0.4, p=0.002). The highest tertile group of adherence showed the best gain in GLS (p=0.034) and VAC (p=0.004), with a significant reduction both in heart rate (p<0.001) and systolic blood pressure (p=0.04). At the sub-group analysis, RT-group experienced the best improvement in VAC (Delta change: RT 0.45±0.21 vs AT 0.33 ±0.35, p=0.047). At the multivariable analysis, after adjusting for age, BMI, and BSA, the GLS showed a positive correlation with the highest adherence tertile (coeff. 0.15, 95% CI: 0.01, 0.32; p=0.006), with no interaction-terms between adherence and type of PhE program. On the contrary, the VAC variations were found positively correlated with RT (coeff. 0.21, 95% CI: 0.01, 0.41; p=0.035), with a significant interaction between adherence and type of PhE program (coeff. 0.33, 95% CI: 0.04, 0.62; p=0.026).
**Conclusions.** In BCS, a short term PhE-training was able to ameliorate both myocardial contractility and CV efficiency, in terms of GLS and VAC. Higher adherence to PhE was positively correlated with GLS and VAC variations, while a significant interaction was found between the adherence and type of PhE program on VAC improvement.

### A796: IL MIGLIORAMENTO FUNZIONALE DOPO RIABILITAZIONE CARDIOLOGICA NON È CORRELATO AL MIGLIORAMENTO DELLA FRAZIONE DI EIEZIONE DEL VENTRICOLO SINISTRO

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**Introduzione.** La riabilitazione cardiologica (RC) migliora la capacità funzionale e la prognosi dei pazienti con coronaropatia. Scopo del nostro studio era quello di analizzare la relazione tra il miglioramento funzionale (valutato con il test del cammino – 6MWT) e il miglioramento della Frazione di Eiezione (FE) del ventricolo sinistro dopo la Riabilitazione Cardiaca.
**Metodi.** Abbiamo valutato 260 pazienti che avevano effettuato RC dopo aver avuto una sindrome coronarica acuta. Il miglioramento funzionale dopo CR era espresso come Δ tra i metri percorsi al 6MWT finale ed iniziale, normalizzato per i valori iniziali. L'FE era calcolata all'ecocardiogramma trasntoracico eseguito all'inizio e alla fine della RC.
**Risultati.** Nell'intera popolazione il miglioramento funzionale era del 44.07% (6MWT basale 421.22 m vs follow-up 6MWT 597.28 m, p= <0.05), mentre il miglioramento di FE era del 2.48 % (basale 53.37% vs follow-up EF 55.91%, p= <0.05). Non è stata trovata nessuna correlazione significativa tra il Δmeter normalizzato ed il ΔEF. Quando i pazienti venivano divisi secondo i valori di FE pre-riabilitazione (≥55, 40-55 and <50%), la distanza percorsa al 6MWT basale era più breve nel secondo e nel terzo gruppo, con un miglioramento migliore solo nel secondo gruppo (40 vs 50 vs 43% rispettivamente, p=0.001). Non è stata trovata nessuna correlazione significativa tra il Δmeter normalizzato e il ΔEF neanche quando l'analisi era ripetuta nei gruppi divisi per FE.
**Conclusioni.** I nostri dati confermano che la CR determina miglioramento funzionale significativo.

## ASSISTENZA INFERMIERISTICA E TECNICA IN CARDIOLOGIA

### A797: IL RUOLO E LE COMPETENZE DELL'INFERMIERE CASE MANAGER NELLA PRESA IN CARICO SECONDO LE RECENTI NORMATIVE DELLA REGIONE LOMBARDIA

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Dall'assistenza ambulatoriale al paziente cardiaco cronico: il ruolo e le competenze dell'infermiere Case Manager nella Presa In Carico secondo le DGR X/6164/2017, DGR X/6551/2017 e DGR XI/412/2018 Regione Lombardia.
Il 01/01/2016 è entrata in vigore la LR 23/2015 che ha riformato il Sistema Sanitario Regionale lombardo introducendo un nuovo assetto con l'istituzione di ATS e ASST. Con la LR 23/2015 la presa in carico del soggetto con fragilità e/o con patologie croniche ha assunto un ruolo prioritario nella programmazione degli interventi sociosanitari.
Nel 2017 la DGR X/6164/2017 ha ridisegnato il quadro di riferimento della Presa in Carico attraverso l'analisi della domanda, la definizione dell'offerta e la modalità di coinvolgimento della popolazione, per poi arrivare nel 2018 all'avvio operativo della Presa in Carico del paziente cronico (DGR XI/412/2018).
Gli attori della PiC sono: la Direzione Generale Welfare, le ATS, i Gestori, gli Erogatori. Tra le varie funzioni e responsabilità il gestore deve garantire l'attivazione, il coordinamento e l'integrazione tra i diversi nodi della rete necessari per dare attuazione agli interventi previsti nel PAI. Deve pertanto assicurare una valutazione multidimensionale del bisogno (VMD), l'istituzione di un case management e la definizione della gestione clinica. La figura del Case Manager svolge una funzione di coordinamento di natura principalmente gestionale-organizzativa sulle attività assistenziali di uno o più persone in carico, garantendo la continuità del percorso e l'armonia degli interventi quando sono coinvolti molteplici soggetti erogatori e/o diverse modalità assistenziali. Il Case Manager è la figura di riferimento per il paziente, la sua famiglia ed il care-giver e rappresenta colui in grado di gestire in maniera efficace ed efficiente la presa in carico del paziente. Si tratta di un operatore esperto in grado di orientarsi sia rispetto al percorso assistenziale previsto, sia rispetto all'offerta del territorio, di interfacciarsi con l'assistito e il suo contesto e di rapportarsi con le istituzioni e gli enti erogatori.
La relazione descrive il ruolo del Case Manager nella presa in carico del paziente cardiopatico cronico, mettendo in evidenza le disomogeneità applicative già in essere. Verranno presentati:

- 10 modelli organizzativi realizzati in Regione Lombardia a decorrere dall'inizio del 2018, analizzando i seguenti ambiti: 1) Processo di presa in carico del paziente cronico 2) Formazione e Funzioni del Case Manager 3) Criticità emerse nell'applicazione del modello
- due strumenti organizzativi quali la job description (ed in particolare il ruolo del Case Manager e la sua collocazione organizzativa, le funzioni e principali attività del Case Manager, la formazione necessaria a ricoprire il ruolo di case manager) e la relativa mappatura delle competenze dell'infermiere case manager elaborata in riferimento alle linee guida dell'EFN Competency Framework.

### A798: IL VISSUTO DEL PAZIENTE AFFETTO DA SINDROME CORONARICA ACUTA: DAI RACCONTI ALLA PERSONALIZZAZIONE DELL'ASSISTENZA

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**Introduzione.** Le sindromi coronariche acute sono la causa più frequente di mortalità e morbilità nel mondo. La letteratura dimostra che i fattori di rischio, i quali possono essere suddivisi in modificabili e non, svolgono un ruolo fondamentale nella patogenesi di tali quadri clinici. Nonostante l'implementazione di numerosi progetti preventivi, gli studi hanno evidenziato la loro inefficacia nel ridurre l'incidenza dei fattori di rischio e

quindi le recidive di malattia. Risulta dunque necessario individuare nuove strategie preventive. A proposito di ciò gli studi dimostrano ormai che un paziente attivo, coinvolto nelle decisioni relative al proprio piano terapeutico e in grado di mettere in atto comportamenti di autocura, riporta migliori risultati per quanto riguarda il suo stato di salute e il livello di soddisfazione rispetto alle cure ricevute. Nasce quindi la necessità di ideare programmi di educazione terapeutica che siano "patient-centred", cioè personalizzati e adattati ai personali bisogni del singolo. Per promuovere una pianificazione assistenziale personalizzata risulta fondamentale innanzitutto comprendere il vissuto, l'esperienza e la percezione del paziente rispetto alla malattia e comprendere l'impatto che essa può avere sulla sua vita futura. Al fine di raggiungere tale risultato è stata condotta un'indagine presso l'unità operativa di Cardiologia di un ospedale torinese. È stato utilizzato lo strumento della narrazione; l'approccio della medicina narrativa infatti arricchisce le cure attraverso l'attenzione e l'utilizzo, anche in senso terapeutico, dei racconti dei pazienti; valorizzando in particolare la prospettiva e la visione della malattia del soggetto.
**Obiettivo.** L'obiettivo è di descrivere, al momento della dimissione, il significato dell'esperienza di malattia vissuta dalle persone affette da sindrome coronarica acuta al fine di favorire l'aderenza al trattamento terapeutico e la personalizzazione del percorso di cura.
**Materiali e metodi.** Lo studio è di tipo qualitativo, basato sull'approccio fenomenologico. Sono state condotte delle interviste narrative semi-strutturate, previo consenso, ai pazienti rientranti nei criteri di inclusione: età ≥18 anni, diagnosi di sindrome coronarica acuta (IMA STEMI, IMA NSTEMI e angina instabile), stabilità clinica. I criteri di esclusione sono stati invece: pazienti ricoverati per recidiva di SCA, bassa comprensione della lingua italiana, patologie o deficit che interferiscono con l'eloquio. Le interviste sono state audio-registrate e successivamente trascritte. I dati saranno, in seguito, analizzati attraverso il metodo Colaizzi. Al termine dell'analisi emergeranno le categorie di significato che permetteranno la sistematizzazione dei dati ottenuti. Data la differenza di esordio e dell'intensità dei sintomi, i dati verranno stratificati per diagnosi di dimissione (angina instabile, infarto NSTEMI ed infarto STEMI).
Le interviste sono ancora in corso di realizzazione per cui non è possibile indicare ad oggi la numerosità del campione; i risultati saranno disponibili a partire da fine settembre.

### A799: ASSISTENZA AL PAZIENTE SOTTOPOSTO A CONTROPULSAZIONE AORTICA

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La contropulsazione aortica (IABP) è una metodica utilizzata per differenti motivazioni quali le stenosi coronariche, l'insufficienza mitralica massiva, shock cardiogeno. Il contropulsatore aortico viene posizionato in sala di emodinamica attraverso l'arteria femorale. Consta in un pallone riempito di elio che si gonfia e sgonfia ritmicamente col ciclo cardiaco in modo da portare benefici a livello coronarico, di circolo e di funzione di pompa cardiaca. Il paziente sottoposto a contropulsazione aortica può riscontrare numerose problematiche dovute al trattamento. Un esempio di questi possono essere gli ematomi e i sanguinamenti nella sede di inserzione dello IABP o a livello retroperitoneale. Ciò è anche direttamente connesso alla necessità di scoagulazione del paziente.
Lo sposizionamento dello Iabp o il suo malposizionamento possono comportare un non successo dei benefici possibili e anche creare delle problematiche quali una bassa perfusione a livello renale e quindi a una possibile IRA. Ciò comporta una necessità di stretto monitoraggio della diuresi (anche a causa della molto probabile disfunzione ventricolare).
Ulteriore problematica che si può presentare è l'ischemia dell'arto inferiore. L'infermiere esperto deve possedere le capacità e conoscenze per meglio gestire e organizzare l'assistenza al paziente in modo da evitare qualunque problematica annessa alla terapia.
A seguito del posizionamento dello IABP il paziente deve essere scoagulato e a causa dell'introduttore deve mantenere una posizione supina. La contropulsazione può durare anche svariati giorni prima di arrivare allo svezzamento e ciò porta all'apertura di problematiche connesse all'allettamento.
La volontà del mio abstract è quella di andare ad analizzare le conoscenze e le capacità necessarie ad un infermiere per meglio gestire questo dispositivo ed ottenerne i migliori benefici possibili per il paziente.

### A800: IMPLANTATION OF DUAL CHAMBER DEFRIBRILLATOR IN A PATIENT WITH LOW LEFT VENTRICULAR EJECTION FRACTION AND USE OF IMPELLA DEVICE FOR HIGH-RISK PERCUTANEOUS CORONARY INTERVENTION OF LM CORONARY BIFURCATION, LAD AND LCX

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It has already been reported that non-compliant patients who refuse the ICD implantation result in higher risk of death. The MADIT II study, indeed, showed that ICD implantation improves survival in patients with prior myocardial infraction and advanced left ventricular dysfunction - ejection fraction (EF) below 30%.
We describe in the following a case of a 69-year-old female patient, who referred to our institution for a follow-up visit. She was about to refuse ICD implantation again, but right after the end of the visit she presented with syncope with lost of consciousness and cardiac arrest. Cardio-pulmonary resuscitation and advanced cardiac life support maneuvers were immediately and successfully performed.
Although strongly recommended, the patient initially refused to undergo invasive coronary angiography (ICA) but she approved dual chamber ICD implantation. The latter, was finally implanted six days after the acute event. Three days later, the patient finally accepted the ICA assessment that showed severe coronary artery disease involving the left main coronary bifurcation and both the LAD and the LCX.
Due to the high-risk setting, successful multivessel percutaneous coronary intervention (PCI) was performed with left ventricle support by using the Impella CP. The day after, the Impella was removed but, few hours later, the patient presented with hemodynamic instability and ventricular fibrillation successfully treated with the ICD- shock. The lady was finally discharged 10 days after the PCI.
The reported case confirms both (i) the relevant role of the ICD in patients with prior myocardial infraction and advanced left ventricular dysfunction and (ii) the effectiveness and safety of the Impella for performing high-risk coronary interventions. Furthermore, this case reports about the difficult management of non-compliant patients with whom protocols and guidelines are difficult to follow.

### A801: DETERMINANTI NEL TEMPO DELLA DILATAZIONE DELLA RADICE AORTICA NEI PAZIENTI IN TRATTAMENTO ANTI-IPERTENSIVO: IL NETWORK CAMPANIA SALUTE

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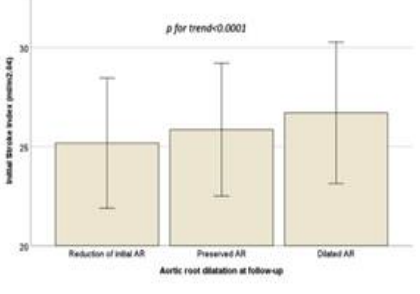
**Background.** Abbiamo dimostrato che la dilatazione della radice aortica, valutata mediante differenza standardizzata tra valori osservati e quelli previsti, è presente in circa il 30% dei pazienti ipertesi in trattamento ed è un dato che predice eventi cardiovascolari indipendentemente dall'ipertrofia ventricolare sinistra.
**Scopo.** Abbiamo valutato se potesse esistere un fenotipo cardiovascolare predittore di dilatazione della radice aortica durante il follow-up dei pazienti in trattamento con anti ipertensivi.
**Metodi.** Sono stati studiati 5301 pazienti ipertesi (età 53±11, 42% donne) senza specifiche patologie cardiovascolari e con normale funzione sistolica (EF ≥50%). Le dimensioni della radice aortica sono state misurate utilizzando la finestra parasternale asse lungo a livello dei seni di Valsalva in tele-diastole, usando il metodo leading-edge to leading-edge al primo ed ultimo ecocardiogramma disponibile. Lo z-score della dimensione della radice aortica (AOz) è stato formulato sulla base della differenza tra i valori misurati e quelli predetti della radice aortica secondo equazione standardizzata.
**Risultati.** La AOz iniziale esibiva una normale distribuzione e si correlava positivamente con età, sesso maschile, pressione arteriosa sistolica e diastolica, BMI, glicemia a digiuno e filtrato glomerulare (GFR, con EPI-CKD), e negativamente con la pressione differenziale e i livelli di colesterolo (tutti $0.03<p<0.0001$). In analisi di regressione multipla, lo stroke index (SVi) era considerato la variabile più specifica di AOz al basale, subito dopo il BMI (entrambi $p<0.0001$) ed indipendentemente dall'età, sesso, pressione arteriosa diastolica, profilo lipidico e GFR. Rispetto ai valori iniziali, all'ultimo ecocardiogramma (5.5 anni; IQR=3.1-9.6 anni), 417 pazienti (8%) presentavano una chiara dilatazione aortica (>75$^{th}$ percentile della distribuzione della AOz). Come al basale, la SVi iniziale ed il BMI restavano i parametri determinanti la AOz finale (entrambi $p<0.0001$), indipendentemente dall'effetto di parametri quali sesso maschile, alta pressione diastolica, BMI, SVi, bassa pressione differenziale e bassi livelli di colesterolo HDL. Il VIF era <2 in entrambi i modelli di regressione. L'immagine mostra la SVi iniziale in relazione alla dimensione della radice aortica durante il follow-up.
**Conclusioni.** Abbiamo dimostrato che sia il volume (SVi) sia il carico pressorio (PA diastolica) influenzano la dimensione della radice aortica nel tempo; la dilatazione della radice aortica è prevedibile nei pazienti di sesso maschile obesi con ipertensione diastolica ed altri concomitanti disturbi metabolici.



### A802: L'ANZIANO IN UNITÀ DI TERAPIA INTENSIVA CARDIOLOGICA: DESCRITTORI, PROCEDURE, COMPLICANZE ED ESITI.

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**Background.** Il progressivo invecchiamento della popolazione e la riduzione del tempo di permanenza in unità di terapia intensiva cardiologica (UTIC) dell'infarto miocardico acuto (IMA) in epoca di angioplastica primaria ha ampiamente modificato la tipologia dei pazienti di UTIC. Il paziente anziano con cardiopatia acuta o cronica riacutizzata è frequentemente preso in carico dall'UTIC anche per la disponibilità di procedure interventistiche dedicate. Il grado di complessità di questi pazienti, spesso gravati da multiple comorbidità, rende la loro gestione estremamente gravosa. Scopo di questo studio è caratterizzare la popolazione ultraottuagenaria ricoverata in UTIC di una cardiologia di terzo livello.
**Risultati.** Nel 2018 sono stati accolti presso la nostra UTIC 1060 pazienti. Questi pazienti avevano un'età media di 70 anni (range 33-99; DS±12.7), il 26% erano donne e il 74% uomini, avevano una degenza media di 3.4 giorni e le diagnosi di ricovero più frequenti erano NSTEMI (32%) e STEMI (23%). Il 19.8% (210) dei pazienti ricoverati nel 2018 aveva un'età superiore uguale a 80 anni, con età media di 84 (range 80-99; DS±12.7). Le principali cause di ricovero erano: NSTEMI (21%), STEMI (21%), procedure di interventistica valvolare percutanea (19%), aritmie (18%) o scompenso cardiaco (8%). La degenza media è stata di 2.2 giorni. Relativamente alle comorbidità, il 24% era diabetico, il 10% broncopatico cronico, l'11% aveva insufficienza renale cronica e il 6% era arteriopatico. Il 13% di questi pazienti ha accusato un episodio di delirium, il 3% ha avuto necessità di trasfusioni, l'8% di ventilazione non invasiva in corso di insufficienza respiratoria, il 10% ha avuto almeno un episodio di scompenso cardiaco acuto durante il ricovero (EPA o shock cardiogeno) e il 42% aveva almeno un presidio invasivo o veniva sottoposto a procedure. Il 18% veniva sottoposto a PTCA primaria in corso di STEMI e l'11% ad angioplastica coronarica urgente. La mortalità in UC è stata del 3%. Il 15% è stato dimesso presso centri Spoke, mentre l'82% è stato trasferito presso altri reparti.
**Conclusioni.** La gestione intensiva del paziente cardiologico acuto ultraottuagenario è una problematica emergente. Il ricorso a presidi ad elevata intensità di cure e a procedure interventistiche in questi pazienti è in rapido incremento, consentendo tuttavia ricoveri in terapia intensiva di durata contenuta e tassi di sopravvivenza soddisfacenti.

### A803: DELIRIUM IN UNITÀ DI TERAPIA INTENSIVA CARDIOLOGICA: STUDIO DESCRITTIVO SULL'INCIDENZA E LE CARATTERISTICHE DEI PAZIENTI.

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**Background.** Il delirium rappresenta una complicanza frequente nei pazienti degenti nelle unità di terapia intensiva. Nei pazienti critici non cardiologici, il delirium è la disfunzione d'organo più comune, con incidenza che arriva fino all'80% nei pazienti ricoverati in terapia intensiva medica o chirurgica e sottoposti a ventilazione meccanica ed è un predittore indipendente di outcome sfavorevole. Nelle moderne Unità di Terapia Intensiva Cardiologica (UTIC) la gravità delle patologie e le comorbidità dei pazienti sono in aumento, così come l'età media dei pazienti ammessi. Il delirium rappresenta pertanto una problematica frequente, che tuttavia è stata poco esplorata nel setting specifico dell'UTIC. In questo studio ci siamo proposti di valutare incidenza del delirium in una UTIC di terzo livello, così come di valutare le caratteristiche dei pazienti e le ripercussioni sulla prognosi.
**Risultati.** Nel periodo tra il 01/01/2017 e il 31/12/2018 sono stati ricoverati presso la nostra UTIC un totale di 2126 pazienti. L'età media era di 68 anni (range 12-99; DS±13), il 68% erano uomini e il 32% donne e avevano una degenza media di 2.5 giorni (range 0-35). Il 7% dei pazienti ha avuto almeno un episodio di delirium nel corso del ricovero. Questi pazienti avevano età media di 76.8 anni (range 44-94; DS±13), il 64% erano maschi e 36% donne, con una degenza media di 4.5 giorni (0-29); mentre i pazienti non incorsi in delirium avevano età media di 67.6 anni (range 12-99; DS±13) e durata media della degenza di 2 giorni (0-35). La diagnosi di ricovero più frequente era NSTEMI (31% di chi non ha avuto delirium, 22% di chi ha avuto delirium). Durante il ricovero il 12% dei pazienti incorsi in delirium ha sviluppato un episodio di scompenso cardiaco acuto (edema polmonare o shock cardiogeno) e il 25% era in terapia con inotropi. Il 17% veniva trattato con ventilazione non invasiva. Relativamente all'età, nei pazienti con età ≤65 anni (782 pazienti) i casi di delirium sono stati < 2% mentre nei pazienti con età ≥ 80 anni, il 16.7% ha avuto almeno un episodio di delirium nel corso del ricovero in UTIC. Eventi segnalati e correlati al delirium sono stati: sanguinamento o ematoma dopo la rimozione di introduttori femorali, autorimozione di catetere vescicale con sanguinamento, cadute, autorimozione di TR band o contropulsatore aortico. La mortalità nei pazienti con delirium è stata del 4.5%, mentre nei pazienti che non hanno avuto delirium è stata dell'1.8%.
**Conclusioni.** Il delirium rappresenta una complicanza frequente del ricovero in UTIC, in particolare nei pazienti di età ≥ 80 anni e può influire negativamente sulle complicanze e sulla mortalità durante il ricovero.

### A804: MODELLO INTEGRATO DI GESTIONE MEDICO-INFERMIERISTICA DEL DIABETE MELLITO IN UNITÀ DI TERAPIA INTENSIVA CARDIOLOGICA.

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(a) STRUTTURA COMPLESSA DI CARDIOLOGIA, DIPARTIMENTO AD ATTIVITÀ INTEGRATA CARDIOTORACOVASCOLARE, AZIENDA SANITARIA UNIVERSITARIA INTEGRATA DI TRIESTE

**Background.** Le malattie cardiovascolari sono la principale causa di mortalità e morbilità nei pazienti affetti da diabete. La patologia coronarica causa da sola il 60% delle morti nei diabetici e la presenza di diabete è un fattore predittivo indipendente di mortalità a breve e a lungo termine dopo un infarto miocardico acuto. La somministrazione endovenosa d'insulina è attualmente considerata il metodo più efficace per il controllo glicemico nei pazienti ricoverati in unità di terapia intensiva e recenti studi clinici ne hanno dimostrato l'importanza in termini di morbilità e mortalità. Esistono diversi protocolli per l'infusione endovenosa d'insulina, alcuni dei quali validati anche all'utilizzo in setting acuto; molti di questi sono stati implementati integrando l'attività medico-infermieristica allo scopo di riportare i valori glicemici dei pazienti il più vicino possibile ai quelli di riferimento. Scopo di questo studio è descrivere le caratteristiche dei pazienti che presentano iperglicemia o diabete noto all'accesso in Unità di Terapia Intensiva Cardiologica (UTIC), considerarne la gestione ed analizzare gli esiti.
**Risultati**. Nel 2018 sono stati accolti presso la nostra UTIC 1060 pazienti. Il 21% era diabetico noto o presentava iperglicemia all'ingresso (glicemia>140 mg/dl). Questi pazienti avevano un'età media di 70 anni (range 33-99; DS±12.7), il 26% erano donne e il 74% uomini, avevano una degenza media di 3.4 giorni e le diagnosi di ricovero più frequenti erano NSTEMI (32%) e STEMI (23%); il 16%, inoltre, aveva una glicemia >250 mg/dl alla prima rilevazione in UTIC. I pazienti con diabete noto erano l'88.3% mentre il 3.6% ha ricevuto una diagnosi di diabete di nuovo riscontro e nel 7.2% dei casi è stata diagnosticata un'iperglicemia da stress. Il 13.5% dei pazienti è stato sottoposto a infusione endovenosa d'insulina secondo un protocollo integrato medico-infermieristico che prevede l'avvio dell'infusione nei casi di glicemie ≥ a 180 mg/dl, controlli glicemici orari e modulazione dell'infusione da parte degli infermieri secondo il protocollo e sulla base delle glicemie orarie. Episodi di ipoglicemia (<70 mg/dl) durante il ricovero si sono verificati nell'1.3% dei casi, rappresentando la percentuale minore rilevata negli ultimi 3 anni. A 24h dall'ingresso in UTIC solo il 4.9% dei pazienti aveva ancora una glicemia mal controllata (≥180 mg/dl) con un trend in riduzione rispetto ai dati rilevati negli ultimi anni (10.3% nel 2015, 7% nel 2016 e 8% nel 2017). All'88.8% dei pazienti è stata determinata l'HbA1 tramite prelievo ematico; per quanto riguarda i pazienti con diabete noto nel 61% dei casi è risultata <7%, nel 16% tra 7 e 7.5% mentre nel 23% era >7.5%.
**Conclusioni.** Le diagnosi di ricovero più frequenti nei pazienti che presentano iperglicemia all'ingresso in UTIC sono STEMI o NSTEMI. L'utilizzo di un protocollo per l'infusione endovenosa d'insulina ha permesso, negli ultimi anni, di migliorare la gestione dei casi di iperglicemia riducendo le ipoglicemie e la percentuale di glicemie mal controllate a 24h dal ricovero in UTIC.

### A805: PROFILI DI AFFERENZA E PERFORMANCE DI DEGENZA IN UNITÀ DI TERAPIA INTENSIVA CARDIOLOGICA HUB.

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**Background.** Il modello organizzativo Hub & Spoke permette di fornire le

migliori cure possibili ottimizzando efficacia ed efficienza centralizzando i servizi medici più avanzati in un singolo centro e quelli di base nei centri periferici. In tale contesto organizzativo il centro Spoke è impegnato nella selezione, canalizzazione dei pazienti in fase acuta verso il centro Hub e nel follow-up post-fase acuta. Scopo dello studio è descrivere quali sono i profili di afferenza, le performance di degenza e gli esiti del ricovero dopo la centralizzazione dei pazienti in UTIC Hub.
**Risultati**. Nel 2018 sono stati accolti presso la nostra UTIC 1060 pazienti. Questi avevano un'età media di 70 anni (range 33-99; DS ±12.7), il 26% erano donne e il 74% uomini, avevano una degenza media di 3.4 giorni e le diagnosi di ricovero più frequenti erano NSTEMI (32%) e STEMI (23%). Il 22.4% dei pazienti ricoverati nel 2018 (238 pazienti) proveniva da centri Spoke, con età media di 66.3 anni (range 18-90; DS ±12.7); il 26% erano donne e il 74% uomini. Le diagnosi di ricovero più frequenti erano NSTEMI (108; 45%), STEMI (85; 36%) e scompenso cardiaco (24; 19%). Il 29% dei pazienti è stato trattato con PTCA emergente in corso di STEMI (il 30% di questi in orario notturno e il 40% nell'orario pomeridiano) e il 19% ad angioplastica coronarica urgente. Il 5% dei pazienti proveniente da centri Spoke è stato sottoposto a contropulsazione aortica, il 7% a ventilazione non invasiva, il 9% a terapia con inotropi. La degenza media è stata di 2.5 giorni (range 0-14); il 34% dei pazienti è poi stato dimesso dall'UTIC verso i centri Spoke di provenienza, un paziente è deceduto, mentre il 65% sono stati trasferiti presso altri reparti all'interno del centro Hub.
**Conclusioni.** Nel sistema organizzativo Hub & Spoke, l'UTIC Hub è chiamata a ricoverare e dimettere in tempi brevi pazienti complessi. I pazienti provenienti da centri Spoke vengono centralizzati principalmente per diagnosi di NSTEMI o STEMI e sono sottoposti a procedure invasive in emergenza o urgenza, monitoraggio, supporto farmacologico e/o meccanico delle funzioni vitali; più della metà dei pazienti ricoverati in UTIC vengono poi trasferiti in altri reparti del centro Hub prima della dimissione.

### A806: LA GESTIONE DELL'INFEZIONE DELLA TASCA ICD-BIV. IL CONTRIBUTO DEL WOUNDCARE NURSE

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L'infezione della tasca del generatore è attualmente considerata la complicanza più temibile post-impianto di defibrillatore. Di fatto, all'evoluzione tecnica che ha permesso negli ultimi vent'anni di realizzare sofisticati defibrillatori impiantabili, utili nella prevenzione secondaria della morte improvvisa, è seguito un aumento delle complicanze settiche post-impianto, con un notevole impatto sulla qualità di vita del paziente, oltre che sull'aumento dei costi sanitari. Tra le variabili che incidono sulle infezioni risultano l'età, la malnutrizione, l'obesità, i farmaci corticosteroidi, l'uso improprio di antibiotici, le patologie croniche come il diabete, le malattie vascolari ed immunologiche. Viceversa, fra i fattori che riguardano la tecnica chirurgica, sono da considerare il grado di contaminazione, la durata dell'intervento e il tempo dell'ospedalizzazione. Le evidenze cliniche suggeriscono che il trattamento del processo infettivo richieda prevalentemente due approcci: rimozione dell'intero sistema (device ed elettrocateteri) e terapia antibiotica specifica. In linea con le evidenze, presso la nostra UOC di Cardiologia Interventistica, in presenza di sepsi tardiva, viene rimosso l'intero sistema e successivamente reimpiantato da un altro sito d'ingresso. In tale situazione clinica, le migliori condizioni interventistiche e chirurgiche, la cura delle lesioni cutanee e l'antibioticoterapia, sono considerate la chiave del successo. Il presente lavoro intende focalizzare la fase del protocollo di cura della lesione cutanea e sottocutanea messo in atto dal team infermieristico dedicato (wound care nurse) dopo l'estrazione del generatore/elettrocatetere in un caso clinico unico (case report). Il trattamento avanzato per la cura delle ferite, in associazione alla terapia antibiotica, ha richiesto durante la degenza ospedaliera l'applicazione della pressione topica negativa (NPWT) per rimuovere l'essudato e preparare il letto della ferita alla chiusura. In un secondo tempo, invece, presso l'ambulatorio infermieristico woundcare, l'utilizzo di medicazioni a base di alginato di calci/ioni argento, di acido iauloronico e matrice lipidocolloidale hanno agevolato la granulazione tissutale e, quindi, favorito il processo di guarigione. Durante questo periodo e fino al nuovo impianto di defibrillatore sottocutaneo il paziente ha indossato un defibrillatore esterno (Life Jacket). La nostra esperienza clinica è stata certamente positiva, essendo riusciti con questa terapia ad ottimizzare la cura del paziente riducendo nel contempo i tempi di degenza e i costi di gestione.

### A807: RELAZIONE TRA PREPARAZIONE, ANSIA, DEPRESSIONE E QUALITÀ DI VITA NEI CAREGIVERS DI PAZIENTI AFFETTI DA SCOMPENSO CARDIACO

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**Background.** I caregiver informali dei pazienti con scompenso cardiaco (SC) hanno un ruolo chiave nella gestione della malattia e nel miglioramento degli esiti della stessa. Tuttavia, sono esposti a livelli elevati di ansia e depressione che, a loro volta, riducono la loro qualità di vita sia a livello fisico sia emotivo. In diversi studi condotti su altre popolazioni di caregiver è stato riscontrato che una migliore preparazione del caregiver sia associata ad una riduzione dell'ansia, della depressione e al miglioramento della qualità della vita dello stesso caregiver, ma fino ad oggi questa relazione non è stata esplorata nei caregiver di persone con SC.
**Scopo.** Lo scopo di questo studio è stato di testare l'influenza della preparazione del caregiver su ansia, depressione e qualità di vita fisica e mentale dello stesso caregiver. Sono state testate le seguenti ipotesi: 1) una migliore preparazione del caregiver è associata a più bassi livelli di ansia e depressione; 2) livelli più bassi di ansia e depressione del caregiver sono associati a una migliore qualità di vita fisica e mentale; 3) l'ansia e la depressione del caregiver mediano tra la preparazione del caregiver e la sua qualità di vita fisica e mentale.
**Metodi.** È stato utilizzato un disegno di studio trasversale. I caregiver di pazienti con SC sono stati arruolati in 12 province italiane: 116 in contesto ospedaliero, 250 in ambulatorio o in comunità. I dati sono stati raccolti con la Caregiver Preparedness Scale, la Hospital Anxiety and Depression Scale e lo Short-Form 12 (SF-12). I dati sono stati analizzati con statistiche descrittive ed un modello di path analysis.
**Risultati.** La maggior parte dei 366 caregiver arruolati erano donne (73,3%) coniugate (69,6%). L'età media dei caregiver era di 58.6 anni (DS 15.66) e l'età media dei pazienti era di 71.9 anni (DS 12.70). La maggior parte dei pazienti era in classe NYHA II (61,3%). Il modello di path analysis ha mostrato eccellenti indici di fit: $\chi 2 = 35,90$ (29), $p = 0,23$; CFI = 0.99; TLI = 0,97; RMSEA = 0,029 (90% CI = 0,002 - 0,056); SRMR = 0.076. Le relazioni significative del modello sono risultate le seguenti: una migliore preparazione del caregiver era associata a una depressione del caregiver più bassa; livelli più bassi di depressione ed ansia erano associati ad una migliore QOL fisica e mentale; la depressione è risultata essere un mediatore significativo tra la preparazione del caregiver e la QOL mentale del caregiver stesso.
**Conclusioni.** I nostri risultati hanno mostrato che la preparazione del caregiver di pazienti con SC abbia un'influenza importante sulla depressione e sulla qualità di vita fisica e mentale del caregiver. Gli interventi volti a migliorare la preparazione del caregiver hanno il potenziale per ridurre la depressione e la qualità di vita del caregiver stesso.

### A808: ASSISTENZA INFERMIERISTICA NELLA CRIOABLAZIONE

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Il trattamento della fibrillazione atriale ha una notevole importanza sulla qualità di vita per il rischio di trombosi e di ictus, tanto che anche L'American Heart Association consiglia un trattamento aggressivo della patologia indipendentemente dai suoi sintomi. Il nostro centro di elettrofisiologia ha sempre trattato la FA attraverso ablazioni transcatetere e più specificatamente con l'utilizzo della termoablazione. Da alcuni mesi abbiamo introdotto anche un sistema di ablazione a freddo, la CRIOABLAZIONE. Per adeguare le conoscenze al nuovo sistema il personale infermieristico ha seguito un percorso formativo sia presso altre strutture che in-site. Con questo lavoro si intende rappresentare la nostra esperienza e le criticità notate sia in fase di formazione che in fase operativa. La complessa gestione del paziente e l'uso di apparecchiature estremamente sofisticate, pone l'infermiere di fronte ad uno scenario tecnico assistenziale che richiede un'elevata competenza professionale.

### A809: LA PRESENZA DEI FAMILIARI IN CORSO DI RIANIMAZIONE CARDIOPOLMONARE: IL PARERE DELLA POPOLAZIONE

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Il concetto di assistenza infermieristica negli anni ha assunto una visione olistica, con il coinvolgimento dei familiari all'interno dei processi assistenziali. Tale presupposto li condurrebbe a ricoprire un ruolo cardine in quasi tutte le attività svolte con/per il paziente. Nelle situazioni in cui vengono eseguite manovre complesse che possono indurre un coinvolgimento emotivo maggiore, quali la Rianimazione Cardiopolmonare, la chiusura del personale ai parenti è categorica con un netto "no" (pari all'88%) (1), ma anche in questo caso differisce considerevolmente la risposta proveniente dall'ambiente ospedaliero rispetto a quello extraospedaliero, dove è presente un'apertura maggiore pari al 43% (1). La presenza della famiglia durante la rianimazione cardiopolmonare (RCP) di un paziente, riuscita o meno, rimane controversa. Sebbene sempre più raccomandata dalle società scientifiche, il personale sanitario si oppone spesso a questa pratica. I risultati suggeriscono che la pratica di offrire la possibilità di assistere alla rianimazione ha un effetto protettivo emotivo di fronte a un evento potenzialmente traumatico (2). Questo dibattito acquisisce maggiore rilevanza alla luce della recente normativa sulle Disposizioni Anticipate di Trattamento (DAT).
**Obiettivo.** Descrivere il parere della popolazione in merito al desiderio di potere presenziare alle manovre di rianimazione cardiopolmonare per sé

o per un proprio caro in seguito alla pubblicazione della recente normativa sulle Disposizioni Anticipate di Trattamento (Art. 4 LEGGE 22 dicembre 2019, n. 219).
**Materiali e metodi.** Lo studio di tipo descrittivo osservazionale si svolgerà nei mesi di Giugno e Luglio 2019 presso l'area urbana di Torino. Le persone saranno reclutate tenendo conto della fascia di età e del genere, in modo da riuscire a rappresentare una gamma di categorie di cittadini il più ampia possibile. Il reclutamento si svolgerà durante i giorni lavorativi, in orari variabili a seconda della sede. Lo studio si avvarrà di un gruppo unico composto da professionisti sanitari e da popolazione non sanitaria, che ha già compiuto la maggiore età. Verranno somministrati questionari contenenti domande a risposta multipla e a risposta aperta. L'elaborazione dei dati statistici sarà effettuata attraverso l'utilizzo del pacchetto statistico on line JsStat (4), liberamente fruibile, mentre l'analisi dei risultati emersi dalle domande aperte attraverso la tecnica della costruzione di categorie a posteriori (5).

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### A810: INDAGINE CONOSCITIVA SULLA CAPACITÀ DEGLI OPERATORI DI ESEGUIRE CORRETTAMENTE L'ELETTROCARDIOGRAMMA E DI SAPERNE RICONOSCERE LE ALTERAZIONI

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**Background.** In Europa, ogni anno vengono registrati più di 300 milioni di ECG: nonostante lo sviluppo di nuove tecnologie, esso rimane l'esame diagnostico non invasivo più comunemente eseguito per la diagnosi di malattia cardiovascolare (Rowlands & Philip, 2014) e per valutare una vasta gamma di patologie quali l'infarto del miocardio, aritmie, cardiomiopatie, ipertrofia ventricolare, sindrome di morte cardiaca improvvisa, anomalie metaboliche e squilibri elettrolitici. Tuttavia, è stato evidenziato in numerosi studi che il personale medico, infermieristico e gli studenti di medicina spesso hanno scarse conoscenze e capacità di esecuzione e interpretazione elettrocardiografica a causa della mancanza o inadeguata formazione (Richley, 2013; Bojsen, et al., 2015). Lo scopo di questo studio è di descrivere e valutare le capacità di infermieri, medici e specializzandi nell'eseguire correttamente la procedura dell'ECG e nel saper analizzare, riconoscere ed interpretare le alterazioni che mettono in pericolo la vita del paziente.
**Materiali e metodi.** Il disegno dello studio è di tipo osservazionale, descrittivo-trasversale e monocentrico. L'indagine è suddivisa in due parti: la prima parte prevede l'osservazione degli operatori durante la procedura elettrocardiografica utilizzando una scheda di raccolta dati, mentre la seconda parte consiste nella raccolta dati attraverso l'utilizzo di un toolkit, il quale comprende uno strumento per valutare le conoscenze (ECG-KAT), uno strumento di autovalutazione della sicurezza (ECG-SES) e uno strumento per valutare le competenze (ECG-SAT) (α-Cronbach: ECG-KAT= 0,89; ECG-SAT= 0,93; ECG-SES= 0,98; e validità di contenuto <0,94). Per lo studio osservazionale sono state arruolate 40 unità tra infermieri, medici e specializzandi in un arco di tempo di 6 mesi nei reparti di Chirurgia d'Urgenza, Ematologia trapianti, Stroke Unit e PS, mentre per l'indagine conoscitiva sul riconoscimento di un tracciato è stato selezionato un campione di 51 operatori da Maggio ad Agosto 2017, al PS, nell'Area di Terapia Intensiva (Stroke Unit, TIPO, Terapia Intensiva Cardio-Chirurgica, Terapia Intensiva e Terapia Intensiva DEA) e Area di Cardiologia del Policlinico di Tor Vergata. I dati raccolti sono stati analizzati mediante la statistica descrittiva, le misure di dispersion e con frequenze e percentuali per le variabili categoriali.
**Risultati.** Il campione non risulta proporzionale tra i vari gruppi (82,5% infermieri; 7,5% medici; 10% specializzandi). La media generale del campione nella "perfetta esecuzione della procedura" è di 103,8. L'errore di posizionamento degli elettrodi più frequente (7,35%) è stato l'inversione delle derivazioni aVL e aVR; nonostante una buona media (3,8) riguardante "il posizionamento del paziente" sono stati identificati 11 casi in cui il paziente non è stato posizionato correttamente (frequenza maggiore negli infermieri). La TV e la FV sono state riconosciute dal 70-80% dei medici, dal 90% degli specializzandi e dall'83-90% degli infermieri; 3 operatori non hanno riconosciuto le due aritmie, così come alcuni di essi pur riconoscendo l'aritmia non hanno ritenuto necessario l'utilizzo del defibrillatore. L'IMA è stato individuato dal 77% degli infermieri, l'80% degli specializzandi e il 90% dei medici. Maggiori difficoltà sono state riscontrate nell'individuazione del Flutter Ventricolare e del BAV di II grado di tipo Mobitz 2.
**Conclusioni.** I risultati ottenuti dallo studio osservazionale e dalla somministrazione del toolkit hanno individuato complessivamente una buona capacità interpretazione e di esecuzione della procedura ECG, nonostante i vari mal posizionamenti degli elettrodi.

### A811: L'INFERMIERE DI CARDIOLOGIA

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Descrizione della multidisciplinarietà dell'infermiere di Cardiologia. Descrizione del piano formativo dell'infermiere di cardiologia all'interno dell'asst-santipaolo carlo polo San Paolo. Il passaggio dal reparto di Cardiologia alla terapia intensiva UTIC. La gestione della presa in carico dei pazienti cardiologici, dai pazienti scompensanti con l'attivazione dell'ambulatorio infermieristico aiutati dalla telemedicina, alla gestione della presa in carico dei pazienti in terapia con i NAO. L'acquisizione delle competenze per un interscambio continuo tra UTIC e Cardiologia, con un approccio di tipo collaborativo con l'equipe infermieristica dell'emodinamica. L'attivazione di una reperibilità condivisa tra infermiere dell'emodinamica ed infermiere della Cardiologia. Gestione delle competenze e della trunistica.

### A812: DETERMINANTI SOCIODEMOGRAFICI E CLINICI DEL SELF-CARE E DEL CONTRIBUTO DEL CAREGIVER AL SELF-CARE NEI PAZIENTI ANZIANI CON MALATTIE CARDIOVASCOLARI E MALATTIE CRONICHE MULTIPLE

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**Introduzione.** Le Malattie Croniche Multiple (MCM) risultano altamente prevalenti in tutto il mondo, particolarmente nei pazienti affetti da malattie cardiovascolari. Pazienti e caregiver contribuiscono al self-care delle MCM. Il self-care è definito come il processo di mantenimento della stabilità della malattia (self-care maintenance), di monitoraggio (self-care monitoring) e di gestione (self care management) dei sintomi quando compaiono. I determinanti del self-care rimangono sconosciuti nelle popolazioni affette da MCM.
**Obiettivo.** Identificare i determinanti sociodemografici e clinici del self-care nei pazienti con MCM e del contributo del caregiver al self-care da parte dei loro caregiver.
**Metodi.** È stato condotto uno studio descrittivo trasversale nel quale il self-care e il contributo del caregiver al self-care sono stati misurati in 340 diadi paziente-caregiver, arruolati da setting ambulatoriali e dalla rete sociale. I pazienti sono stati inclusi nello studio se presentavano un'età uguale o maggiore di 65 anni, una diagnosi di scompenso cardiaco o diabete mellito o broncopneumopatia cronica ostruttiva, e almeno un'altra malattia cronica, assistiti da un caregiver informale maggiorenne. Sono stati esclusi i pazienti con demenza e/o neoplasia. Il self-care è stato misurato tramite il Self-Care of Chronic Illness Inventory (SC-CII) e il Caregiver Contribution to Self-Care of Chronic Illness Inventory (CC-SCCII). Entrambi gli strumenti, psicometricamente validi e affidabili, misurano le dimensioni di self-care maintenance, self-care monitoring e self-care management. Gli score sono standardizzati da 0 a 100 e un punteggio <70 indica un inadeguato self-care. Per identificare i determinanti di self care e di contributo del caregiver al self care e per controllare per l'interdipendenza delle variabili del paziente e del caregiver è stata effettuata un'analisi multilivello.
**Risultati.** La maggior parte (54.1%) dei pazienti (età media 76.65 anni, SD ±7.27) e la maggior parte (72.1%) dei caregiver (età media 54.32, SD ±15.25) erano di genere femminile. Più di un terzo dei pazienti (34,15%) era affetto da scompenso cardiaco. Il self-care dei pazienti risultava inadeguato nelle dimensioni di self-care maintenance (65.90, SD ±19,67) e self-care management (66.39, SD ± 18.02). Il contributo del caregiver al self-care era inadeguato solo nella dimensione di self-care monitoring (57.76, SD ±13.55). I determinanti di un miglior self-care sono risultati essere un'età più avanzata, il genere femminile, un'alta percezione di reddito e un elevato numero di farmaci assunti, mentre uno stato cognitivo maggiormente compromesso e una diagnosi di diabete mellito predicevano un peggiore self-care. I determinanti di un miglior contributo del caregiver al self-care sono risultati essere il genere femminile, un elevato numero di ore settimanali di assistenza e un alto livello di burden del caregiver, mentre la presenza di un caregiver secondario prediceva un peggiore contributo del caregiver al self-care.
**Conclusioni.** Nel contesto delle MCM, il genere influenza il self-care sia nei pazienti che nei caregiver. Nei pazienti, le caratteristiche cliniche sono importanti e nei caregiver, le responsabilità assistenziali influenzano il contributo al self-care.

### A813: L'INFLUENZA DELLA DEPRESSIONE SUI COMPORTAMENTI DI SELF-CARE NEI PAZIENTI ANZIANI CON MALATTIE CARDIOVASCOLARI E MALATTIE CRONICHE MULTIPLE

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**Introduzione.** Le Malattie Croniche Multiple (MCM) risultano altamente prevalenti nei pazienti con patologie cardiache. Gli individui affetti da MCM presentano più frequentemente sintomi di depressione rispetto alla popolazione generale. Il Self-care si è dimostrato in grado di migliorare gli outcome in un certo numero di malattie croniche, ma poco si sa dell'influenza della depressione su tali comportamenti nelle MCM. Il Self-care è definito come l'insieme dei comportamenti messi in atto per mantenere la stabilità della malattia (self-care maintenance), monitorare segni e sintomi (self-care monitoring) e rispondere ai segni e sintomi di riacutizzazione della malattia cronica (self-care management).
**Obiettivo.** Valutare l'influenza della depressione sui comportamenti di self-care attuati dai pazienti con MCM.
**Metodi.** È stato effettuato uno studio descrittivo trasversale. I pazienti sono stati arruolati in setting domiciliari e/o ambulatoriali e inclusi se presentavano un'età uguale o maggiore di 65 anni, diagnosi di scompenso cardiaco, diabete mellito o broncopneumopatia cronica ostruttiva, e almeno un'altra malattia cronica; sono stati esclusi pazienti con demenza e/o neoplasia. Per misurare il livello di depressione è stato usato il Patient Health Questionnaire-9 (PHQ-9)_e per misurare i comportamenti di self-care (self-care maintenance, self care monitoring, self care management) è stato usato il Self-Care of Chronic Illness Inventory (SC-CII). L'influenza della depressione sui comportamenti di self-care è stata valutata mediante MANOVA, analisi discriminante e regressione lineare.
**Risultati.** Il campione (N=366), risultava prevalentemente di genere femminile (54,2%), con un'età media di 76.4 (± 7.26), e il 34,3% era affetto da scompenso cardiaco. I pazienti presentavano un punteggio medio di 6.7 (± 4) al PHQ-9, e il 65.6% presentava sintomi di depressione. La MANOVA ha mostrato un'influenza significativa della depressione su tutte le dimensioni di self-care; $\wedge$ =.89, $F$ (3, 362) = 15.31 $p$ <.001. L'analisi discriminante ha mostrato una funzione canonica in grado di differenziare significativamente i due gruppi (depressi e non depressi); $R^2$ canonico =.11, $\wedge$ =.89, $\chi^2(3, N=366) = 43.30$, $p$ = <.001. La dimensione di self-care maintenance ha presentato una correlazione più alta ($r$ =.99) sulla funzione canonica, rispetto alle altre due dimensioni. Nella regressione lineare, la depressione ha predetto significativamente il self-care (self-care maintenance, $F$ (1,364) = 810.96, $p$ <.001; self-care monitoring, $F$ (1,364) = 138.07, $p$ <.001; self-care management, $F$ (1,364) = 220.03, $p$.001).
**Conclusioni.** I risultati mostrano che la depressione influenza tutte le dimensioni di self-care nei pazienti affetti da MCM. I comportamenti di self-care maintenance (es. l'adesione ad un'adeguata attività fisica ed alla terapia farmacologica) possono essere influenzati in misura maggiore dalla depressione rispetto alle altre due dimensioni di self-care.

### A814: L'ACCANIMENTO TERAPEUTICO IN PAZIENTI CON SCOMPENSO CARDIACO

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**Introduzione.** L'autodeterminazione è un diritto di ciascun individuo che si realizza, nel campo biomedico, con la scelta di decidere le cure cui sottoporsi, e può comprendere anche l'ordine di non rianimazione. Sovente si tende a considerare il principio del prolungamento della vita anche se ciò va a discapito della qualità della stessa. Ruolo fondamentale viene giocato dai familiari e dalle persone che vengono scelte dal paziente che possono essere garanti, o ostacolanti, delle volontà espresse dalla persona assistita. L'imprevedibilità del decorso di malattia della persona con scompenso cardiaco spesso non permette previsioni prognostiche sull'andamento della patologia, esitando talvolta nelle forme dell'accanimento terapeutico.
**Materiali e metodi.** È stata realizzata una revisione bibliografica consultando le banche dati Medline, Cinhal, Psychinfo e Cochrane. Gli articoli selezionati sono relativi alla pubblicazione degli ultimi dieci anni, del paziente adulto, di lingua inglese e italiana.
**Risultati.** Sono stati reperiti 10 articoli che rispondevano al quesito di ricerca. Le pubblicazioni rappresentano la realtà nordamericana, nordeuropea, dell'America Latina e italiana, sei articoli costituiscono revisioni della letteratura.
**Discussione.** La persona affetta da scompenso cardiaco ha minori possibilità di accesso alle cure palliative e al comfort assistenziale rispetto ad altre categorie di pazienti, in particolare coloro che presentano deterioramento cognitivo, cancro e ictus. L'analisi della letteratura fa emergere la necessità di migliorare il processo comunicativo con le persone assistite al fine comprendere le loro preferenze riguardo ai trattamenti terapeutici, compresi la sospensione delle cure e l'ordine di non rianimazione. Sono fondamentali il supporto spirituale, psicologico, fisico e sociale offerto ai pazienti e quello psicologico offerto alle équipe sanitarie e ai caregivers, che svolgono un ruolo assistenziale con importanti implicazioni cliniche ed etiche.

### A815: USO DEL RENAL GUARD DURANTE LA PTCA

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Il danno renale acuto dal mezzo di contrasto è un potente predittore di esito sfavorevole dopo l'angioplastica coronarica. Il sistema Renal Guard è stato progettato per essere il primo dispositivo approvato dalla FDA per proteggere il paziente da CI-AKI (nefropatia da mezzo di contrasto).L'uso del Renal Guard consente di ottenere un' elevata velocità di filtrazione mantenendo il volume intravascolare e previene lo sviluppo di una lesione renale acuta indotta dal contrasto.
Descriviamo il paziente in esame, maschio, 70 anni, affetto da ipertensione arteriosa e insufficienza renale cronica, ricoverato in urgenza presso il nostro centro per stemi inferiore.
In prima istanza è stata eseguita PTCA sul ramo circonflesso (lesione culprit) e successivamente è stata programmata Staged PCI sul ramo dell'inteventricolare anteriore. Per quest'ultima, inoltre è stata posta indicazione all'ultilizzo del Renal Guard, vista la presenza di IRC e la complessità procedurale. In dimissione, il risultato ottenuto è stato un inalterato valore della Creatinina e della Velocità di filtrazione, nonostante la somministrazione di 620 ml di mezzo di contrasto complessivi tra le due procedure in emodinamica.
Il Renal Guard si è dimostrato quindi, essere una terapia sicura ed efficace nel monitorare i valori della velocità di filtrazione.

### A816: IL RICONOSCIMENTO DEI SINTOMI DELL'INFARTO DEL MIOCARDIO E LA RIDUZIONE DEL RITARDO EVITABILE: LA CREAZIONE DI UN VIDEO INFORMATIVO

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**Introduzione.** Le malattie cardiovascolari costituiscono le principali cause di morte a livello globale negli ultimi 15 anni. Nonostante le campagne educative e le iniziative che promuovono stili di vita sani, ad oggi l'infarto miocardico acuto (IMA) risulta essere ancora tra le principali cause di morte soprattutto nel mondo occidentale. Laddove non sia presente un controllo dei fattori di rischio da parte della persona, è di fondamentale importanza riconoscere in breve tempo i sintomi di un IMA, riducendo così quello che è definito come ritardo evitabile (RE), al fine di aumentare le possibilità di sopravvivenza dei pazienti, e/o di cercare di garantire una migliore qualità di vita. La percentuale di sopravvivenza in questi casi diminuisce notevolmente con il passare del tempo, vale a dire con un ritardo nella riperfusione coronarica, soprattutto nei casi di STEMI (infarto miocardico acuto ST sopraslivellato). L'obiettivo di questo progetto è quello di creare un video informativo sul riconoscimento precoce dei sintomi dell'IMA in accordo alle più recenti evidenze scientifiche, indirizzato a tutte quelle persone con pregresso IMA, le persone consapevoli di avere fattori di rischio ma anche a semplici cittadini che si avvicinano per la prima volta all'argomento.
**Materiali e metodi.** Nella prima fase dello studio sono state consultate le principali banche dati biomediche, monografie e siti web. Nella seconda fase è stata creata la sceneggiatura, sono state effettuate le riprese ed infine è stato eseguito il montaggio video.
**Risultati.** Sono state costruite due tabelle riassuntive, (una relativa agli uomini e una alle donne, suddivisi per età) nelle quali sono riportati i sintomi più frequenti che si presentano negli studi considerati. Gli uomini di tutte le età sembrano manifestare una sintomatologia più tipica e più facilmente riconoscibile rispetto alle donne, nelle quali vi è spesso assenza di dolore toracico. Nelle donne anziane, oltre all'assenza di dolore toracico sembrano essere frequenti epigastralgia e disturbi digestivi. A causa dell'atipicità dei sintomi, il RE risulta essere maggiore nelle donne, nella popolazione anziana e nella popolazione afro e latino americana. È stato elaborato un video informativo sui sintomi dell'IMA più e meno comuni in uomini e donne, preceduto da una semplice spiegazione che sottolinea l'importanza del fattore tempo in un quadro patologico simile. L'elaborato finale ha una durata di circa 15 minuti. Il video è stato pubblicato sul canale YOUTUBE "Videoteca di Infermieristica" del Corso di Laurea in Infermieristica di Torino.
**Conclusioni.** Tutti i sintomi trattati nella discussione e riscontrati in letteratura, sono sintomi che potrebbero essere suggestivi per IMA, ma non si può fornire una certezza che si ripetano nelle stesse modalità e con la stessa frequenza in tutti gli individui. Questo lavoro non si propone di diffondere allarmismo ma nemmeno superficialità di fronte a un quadro clinico in cui la vita di una persona è messa in gioco; viceversa si vuole considerare la persona come essere autonomo in grado di analizzare in maniera critica il tipo di sensazioni che percepisce, alla luce di quelli che sono i propri fattori di rischio e la propria anamnesi.

### A817: LA DOCUMENTAZIONE INTEGRATA COME GARANTE DELLA CONTINUITÀ ASSISTENZIALE ALL'INTERNO DI UN'EQUIPE MULTIPROFESSIONALE E MULTIDISCIPLINARE NELLA GESTIONE DEL PAZIENTE CARDIOLOGICO COMPLESSO

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Nel nostro Policlinico a partire dal 2007 è stato realizzato ed implementato il progetto della documentazione clinico-assistenziale *Magda,* curato dai coordinatori delle attività cliniche che ha permesso di elaborare una serie di strumenti condivisi e certificati che favoriscono l'identificazione dei bisogni di assistenza del paziente attraverso i modelli funzionali di M. Gordon. La finalità è di raccogliere le giuste informazioni in modo da pianificare ed attuare interventi a garanzia della sicurezza e della continuità assistenziale. Questo lavoro presenta la scheda integrata medico/infermieristica giornaliera in uso dal 2009 nella UOS di Terapia Intensiva Cardiologia (UTIC). La scheda è stata creata da un gruppo di lavoro multi-professionale guidato dal coordinatore clinico dell'area cardiologica, dopo un'attenta revisione della letteratura, in particolare dei modelli anglosassoni adattati alla nostra realtà lavorativa ed è stata sperimentata per un periodo di tempo congruo prima di essere certificata. La scheda, certificata dal Sistema Gestione Qualità e revisionata sistematicamente, è composta da 4 pagine. Permette di registrare quanto realizzato ed accaduto all'assistito nel corso di ogni turno di servizio, riportando gli elementi essenziali di valutazione continua che favoriscono la comunicazione e confronto fra le professionalità che per competenze diverse sono coinvolte nel processo di cura. La prima pagina riporta: i dati anagrafici del paziente, il motivo del ricovero, la presenza del braccialetto identificativo, le procedure eseguite, le precauzioni d'isolamento e le allergie/intolleranze. È caratterizzata dalla presenza di una sagoma corporea per favorire il management dei device intravascolari e dei presidi medico-chirurgici e per segnalare eventuali alterazioni dell'apparato tegumentario. Nella prima pagina è indicata la metodologia di compilazione e la legenda degli acronimi. La seconda pagina è dedicata alla terapia farmacologica. Il medico prescrive i farmaci e appone la propria firma così come l'infermiere appone la propria al momento della somministrazione, si possono tracciare così le modificazioni terapeutiche nell'arco della giornata. La firma di ogni infermiere è depositata presso la Direzione Infermieristica come previsto dal Sistema Gestione Qualità. La terza pagina è per il monitoraggio di alcuni parametri vitali, per i test di aderenza a specifici farmaci e per documentare l'uso di eventuali supporti meccanici alla funzione circolatoria, respiratoria e renale. La quarta pagina è destinata al bilancio idrico orario e giornaliero. La nostra organizzazione prevede, che l'infermiere del turno notturno predisponga le nuove schede che verranno poi aggiornate ed integrate nella giornata seguente dall'infermiere responsabile dei singoli pazienti e dal cardiologo per la parte delle prescrizioni farmacologiche. Conclusioni: Il nostro desiderio è stato quello di rendere visibile, misurabile ed evidente tramite registrazione il processo assistenziale, agevolare tutto il personale nella compilazione della documentazione, al fine di avere dati utili a tracciare il percorso della persona assistita, soprattutto nei casi più critici e complessi in cui si richiede l'intervento, oltre che del cardiologo e dell'infermiere di UTIC, anche di altri professionisti, quali l'anestesista, il nefrologo, l'infettivologo, il cardiochirurgo, il tecnico della perfusione, l'epatologo, il chirurgo vascolare, il radiologo, lo specialista in wound care, il neurologo, il fisioterapista, il nutrizionista. L'introduzione della scheda integrata medico/infermieristica ha per la nostra UTIC un interesse primario; consente di definire le esigenze di specificità delle prestazioni cardiologiche con le esigenze di coerenza degli interventi all'assistito, focalizzando sulla tracciabilità e sulla sicurezza.

### A818: EFFICACIA DI UN INTERVENTO INFERMIERISTICO RIVOLTA AI PAZIENTI CON SCOMPENSO CARDIACO PORTATORI DI DEFIBRILLATORE IMPIANTABILE: UNO STUDIO PILOTA

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**Background.** Lo scompenso cardiaco (SC) è ormai da anni un'emergenza endemica, la cui mortalità è estremamente elevata ma le attività di self-care (comportamenti atti a mantenere stabile la malattia e rispondere ai sintomi quando si verificano) possono migliorare gli outcomes della malattia. Nei pazienti più esposti a rischio di morte cardiaca improvvisa le linee guida internazionali suggeriscono l'impianto di un defibrillatore (ICD), rispetto all'uso esclusivo della terapia antiaritmica. Questo necessita però di un'educazione specifica al self-care, ed attualmente la letteratura europea non fornisce evidenze in merito. L'obiettivo di questo studio pilota è di implementare e valutare l'efficacia dell'educazione terapeutica ai fini di un migliore self-care, e di conseguenza migliore percezione della qualità di vita e riduzione delle riospedalizzazioni, nei pazienti con SC portatori di ICD.
**Metodi e risultati.** Sono stati esaminati complessivamente 35 pazienti con scompenso cardiaco sottoposti ad impianto di ICD, di cui 25 provenienti dall'Ospedale Policlinico SS. Annunziata di Chieti e 7 provenienti dalla ASL TO3 Rivoli. Mediante processo di randomizzazione e in doppio ceco, il campione è stato suddiviso in 14 pazienti per il gruppo controllo (GC) e 18 pazienti per il gruppo sperimentale (GS). Tutti i pazienti sono stati sottoposti a valutazione medico-infermieristica in 4 tempi (T0: a 7-10 giorni; T1: a 3 mesi; T2: a 6 mesi; T3: a 12 mesi), che prevedeva l'esecuzione di elettrocardiogramma ed esami di controllo unitamente alla valutazione della capacità di self-care. I pazienti arruolati avevano un'età media di 69.36 anni (GC) e 64.28 anni (GS), erano prevalentemente di sesso maschile (GC 71.43%, GS 77.78%) ed avevano una media μ 2 riguardo l'appartenenza alla classe NYHA al T0. Per i pazienti del gruppo sperimentale è stato valutato e supportato il cambiamento positivo dello stile di vita e lo sviluppo della capacità di self-care (SCHFI) nei vari step di follow-up. Il gruppo controllo, non educato, non ha manifestato miglioramenti nei punteggi. Ai follow-up, è stata rilevata la capacità di riconoscere la comparsa e l'evoluzione dei sintomi dello SC, attuare comportamenti adeguati e valutare l'efficacia degli stessi. Inoltre,sono stati interrogati i database dei centri di riferimento per rilevare eventuali ricoveri successivi all'impianto di ICD. Dall'analisi dei dati è emerso che il gruppo sperimentale, rispetto al gruppo di controllo, mostrava un incremento significativo della percezione della qualità di vita (p value <0,05), espresso in percentuale. L'analisi di contesto, volta ad esplorare la compliance fra entourage familiare e paziente e il suo grado di autonomia, indicava un ambiente socio-familiare con margini di miglioramento per entrambi i gruppi al T0 (GC μ 18.28, DS ±4.12; GS μ 20.17, DS ±6.46; p value >0.05), con esiti positivi al T3 per il gruppo sperimentale (GC μ 22.27, DS ±3.90; GS μ 27.5, DS ±2.98; p value <0.05). Il gruppo sperimentale ha avuto esiti altrettanto positivi in merito alla riduzione dei ricoveri, sensibilmente diminuiti, in seguito all'intervento educativo (T0: GC 83.3%, GS 93.7%; T3: GC 22.2%, GS 6.6%).
**Conclusioni.** Questo studio ha mostrato che l'educazione terapeutica potrebbe costituire un intervento efficace per migliorare la percezione della qualità di vita, la compliance famiglia-paziente, il suo grado di autonomia e la conseguente riduzione di riospedalizzazioni. È pertanto auspicabile la conduzione di un trial su larga scala, al fine di comprendere meglio l'efficacia dell'educazione terapeutica multidisciplinare.

### A819: LA PRESENZA DEI FAMILIARI DURANTE LE MANOVRE DI RIANIMAZIONE CARDIOPOLMONARE

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**Introduzione.** La presenza dei familiari nelle situazioni di emergenza, come durante una RCP, è una tematica controversa e molto dibattuta.
Nel nostro Paese, solitamente, gli operatori sanitari chiedono ai familiari di allontanarsi dalla scena perché credono che osservare le manovre rianimatorie costituisca un evento traumatico e che la famiglia possa ostacolare le procedure richiedendo un supporto emotivo agli operatori, cosa che può generare distrazione con aumento del rischio di errore, mentre dall'analisi della letteratura emergono evidenze contrarie, ovvero che la presenza dei familiari durante una RCP avrebbe effetti positivi su molti aspetti. La ricerca, svolta presso le postazioni 118, si è posta l'obiettivo di descrivere le potenzialità e/o debolezze della prassi dal punto di vista dei medici.
**Materiali e metodi.** Studio pilota di tipo descrittivo osservazionale. I dati sono stati raccolti attraverso la somministrazione, ai medici di emergenza territoriale 118 di Torino e Provincia, di un questionario anonimo auto compilabile a risposte chiuse e aperte.
**Risultati.** Dall'analisi dei dati rilevati tramite i 52 questionari, emerge che la presenza dei familiari in corso di RCP è una pratica utilizzata da gran parte del personale 118 intervistato, infatti molti medici risultano essere a conoscenza dei benefici e dei vantaggi. Gli svantaggi individuati dai medici per i parenti, i pazienti e gli operatori sono congruenti con la letteratura. In merito all'applicazione della legge 219/17 il 42% non risponde, il 31% dichiara di non sapere, e il restante del campione ipotizza nuovi scenari o esprime opinioni in merito.
**Discussione e conclusioni.** L'opinione dei medici, omogenea sull'utilità di garantire la presenza dei familiari, fa emergere delle eccezioni (adeguatezza degli spazi, sicurezza della scena e atteggiamento del familiare nel contesto) che rappresentano il risultato di analisi derivanti da una esperienza elevata in materia. Le proposte emerse dagli intervistati, come l'inserimento di una figura professionale dedicata al supporto dei familiari, permettono di pensare a una evoluzione dell'agito professionale in relazione al rispetto delle DAT dei cittadini. *Limiti della ricerca*: scarsità di letteratura relativa al panorama italiano con cui confrontare i dati, normativa sulle DAT troppo recente per valutare i risvolti nella pratica clinica. *Ulteriori sviluppi di ricerca*: confronto con i medici ospedalieri, con i parenti e con i pazienti.

**A820: IL RUOLO DEL TECNICO DI CARDIOLOGIA NELLA GESTIONE DEL PAZIENTE SCOMPENSATO PORTATORE DI ICD-CRT E SEGUITO CON MONITORAGGIO A DISTANZA**

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Nello scompenso cardiaco cronico il ruolo della terapia elettrica si è modificato negli anni. I dispositivi impiantabili per la resincronizzazione cardiaca (CRT) giocano un ruolo importante nella gestione dello scompenso cardiaco. In particolare, l'utilizzo degli ICD-CRT è in grado di ridurre le morti secondarie a tachiaritmie maligne nei pazienti in classe funzionale NYHA avanzata (III e IV).

Il crescente impiego di tali device ha significato un forte aumento della spesa sanitaria relativa ai frequenti follow-up per il paziente scompensato. Il monitoraggio remoto offre pertanto l'opportunità di ottimizzare il flusso di lavoro intraospedaliero, riducendo tempi e costi e migliorando la prognosi dei pazienti.

Il monitoraggio continuo consente di individuare tempestivamente malfunzionamenti del device o eventi clinici visibili, con il tradizionale controllo ambulatoriale, soltanto in un periodo compreso tra 3 – 12 mesi.

La figura del tecnico di elettrofisiologia e cardiostimolazione può diventare il punto cardine dell'intero sistema. Quest'ultimo deve essere in grado di eseguire un corretto screening dei dati visionati, di dare risposta alle problematiche tecniche e cliniche evidenziate dalla revisione delle trasmissioni, oltre che essere l'attore principale per l'educazione e il supporto dell'assistito e dei familiari nel controllo delle tecnologie utilizzate. Un approccio di questo tipo alla gestione dell' "ambulatorio virtuale" può favorire il miglioramento e una maggiore efficacia del flusso di lavoro, avendo un impatto positivo sull'outcome a lungo termine del paziente seguito.

**A821: IL RUOLO DEL TECNICO DI FISIOPATOLOGIA CARDIOCIRCOLATORIA E PERFUSIONE CARDIOVASCOLARE NELLA HOME CARE DELL'INSUFFICIENZA CARDIACA**

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L'insufficienza cardiaca (IC), da qualche anno, è la prima causa di ricovero ospedaliero, avendo da poco superato i numeri di ricovero per parto. L'IC rappresenta una vera pandemia, che ha una prevalenza del 2% nella popolazione generale e del 10% oltre i 70 anni.

Nelle fasi avanzate l'IC è gravata da un elevato numero di ospedalizzazioni nei ¾ dei casi evitabili e da una prognosi infausta, peggiore di quella della maggior parte dei tumori. Esiste nell'immaginario collettivo l'idea che "morire di cuore" sia un evento fatale finale auspicabile, ma non è noto che un numero crescente di pazienti, anziché soccombere agli attacchi di cuore e morire per arresto cardiaco, riesce a sopravvivere per anni, talvolta anche per decenni, confrontandosi con la cronicizzazione della malattia, che resta comunque costellata di crisi e relative ospedalizzazioni. Questo risultato è dovuto al complessivo miglioramento delle terapie mediche e ai dispositivi impiantati (angioplastica, bypass, pacemaker, defibrillatori) che sostengono il cuore dei pazienti sempre più a lungo.

La gestione del ricovero ospedaliero dell'IC è insostenibile, sia a livello di risorse, che come impatto sulla qualità di vita del paziente. Si è visto che ad ogni ricovero la prognosi peggiora. Il 4-5% dei pazienti non sopravvive al primo episodio e la mortalità a 1 anno è del 30%. La "Home Care", già ampiamente adottata negli USA e nel Nord Europa, favorisce la prognosi, perché permette di seguire e curare il paziente, monitorandolo mentre vive tra le mura domestiche, insieme ai propri famigliari, agli oggetti della sua quotidianità, chiamandolo a un controllo medico solo quando necessario.

Presso il nostro Ospedale Universitario stiamo progettando una "Home Care", che rappresenta il primo passo per la realizzazione di una vera e propria "Virtual Clinic". Il compito del Tecnico di Fisiopatologia Cardiocircolatoria e Perfusione Cardiovascolare, è quello di monitorare a distanza i segnali trasmessi da sensori capaci di registrare e trasmettere via Wi-Fi o bluetooth l'elettrocardiogramma, la frequenza cardiaca, la frequenza respiratoria, la pressione arteriosa, la saturometria, la temperatura. Il sistema da noi in acquisizione, a tal fine, e di cui mi occuperò personalmente è un piccolo device già in commercio, marcato CE, che si applica con un patch al torace dei pazienti, e che in modo totalmente non invasivo registra i parametri vitali, trasmettendoli a un software dedicato, in modalità di telemedicina. I paramentri saranno inviati in real time al nostro centro e condivisibili con il MMG. Il secondo step del nostro progetto consiste nello sviluppo, in collaborazione con il Dipartimento di Ingegneria della nostra Università, di un sistema analogo, sempre non invasivo, in grado di rilevare anche la congestione polmonare mediante un impedenziometro.

Se il progetto vrrà approvato, sarà testato sui pazienti con IC, con il fine ultimo, attraverso finanziamenti mirati, di creare una vera "Clinica Virtuale".