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ÚSTNÍ SDĚLENÍ – LÉKAŘI

ROLE OF ENDOMYOCARDIAL BIOPSY IN DIFFERENTIAL DIAGNOSIS OF NON--ISCHEMIC CARDIOMYOPATHY

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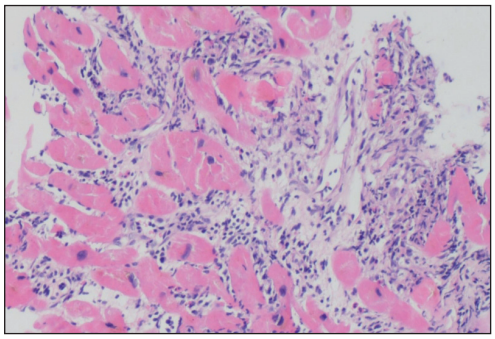
Introduction: Non-ischemic cardiomyopathies are a common cause of heart failure. This is a heterogeneous group that requires very detailed differential diagnosis, which results in targeted therapy of the underlying disease and an effort to improve the prognosis of these patients.
Aim: Assessment of the role of endomyocardial biopsy in the management of patients with non-ischemic cardiomyopathy.
File and methodology: Prospective evaluation of 151 patients who underwent endomyocardial biopsy (EMB), echocardiography, magnetic resonance imaging and basic laboratory tests. In our group of patients, the final diagnosis was determined on the basis of the overall clinical picture in 53% of patients, in 36.4% of patients it was confirmed histologically (predominantly myocarditis, TTR, and AL amyloidosis). The diagnosis of myocarditis was confirmed in 42 cases. The sensitivity and specificity of the EMB in myocarditis were 93.3% and 93.3%, respectively 100%. Amyloidosis was biopsied in 10 cases. In the case of amyloidosis, the sensitivity and specificity of the EMB were 100%. In the group of our patients, we compared the result of magnetic resonance imaging of the heart with a histological finding – a discrepancy was found in 45 cases (32.8%). In 25 cases, specific myocardial involvement was histologically demonstrated and the conclusion of magnetic resonance imaging was negative, on the contrary, in 20 cases without proven specific myocardial involvement, the result of magnetic resonance imaging was positive.
Conclusion: Non-ischemic cardiomyopathies are a very heterogeneous group. Due to this fact, a comprehensive approach to diagnosis is necessary, which combines both imaging and laboratory methods and in indicated cases endomyocardial biopsy. Early diagnosis is necessary to initiate specific therapy and thus influence the prognosis of patients.



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METFORMIN TREATMENT IS ASSOCIATED WITH IMPROVED QUALITY OF LIFE AND OUTCOME IN PATIENTS WITH DIABETES AND ADVANCED HEART FAILURE (HFREF)

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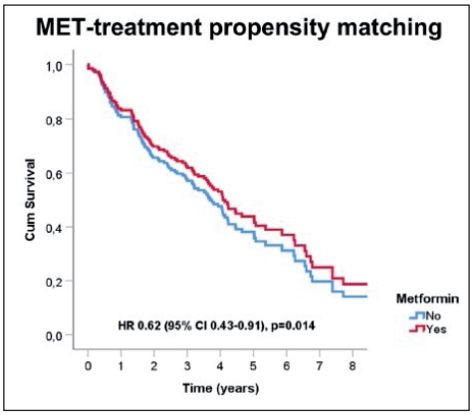
Background: The role of metformin (MET) in the treatment of patients with advanced HFrEF and type 2 diabetes mellitus (DM) is not firmly established. We studied the impact of MET on metabolic profile, quality of life (QoL) and survival in these patients.
Methods: A total of 847 stable patients with advanced HFrEF (57.4±11.3 years, 67.7% NYHA III/IV, LVEF 23.6±5.8%) underwent clinical and laboratory evaluation and were prospectively followed for a median of 1126 (IQRs 410; 1781) days for occurrence of death, urgent heart transplantation or mechanical circulatory support implantation.
Results: A subgroup of 380 patients (44.9%) had DM, 87 of DM patients (22.9%) were treated with MET. Despite worse insulin sensitivity and more severe DM (higher BMI, HbA_{1c}, worse insulin resistance), MET-treated patients exhibited more stable HF marked by lower BNP level (400 vs. 642 ng/L), better LV and RV function, lower mitral and tricuspid regurgitation severity, were using smaller doses

of diuretics (all p <0.05). Further, they had higher eGFR (69.23 vs. 63.34 ml/min/1.73 m^2) and better QoL (MLHFQ: 36 vs. 48 points, p = 0.002).
Compared to diabetics treated with other glucose-lowering agents, MET-treated patients had better event-free survival even after adjustment for BNP, BMI, and eGFR (p = 0.035). Propensity score-matched analysis with 17 covariates yielded 81 pairs of patients and showed a significantly better survival for MET-treated subgroup (p = 0.01, Fig. 1).
Conclusion: MET treatment in patients with advanced HFrEF and DM is associated with improved outcome by mechanisms beyond the improvement of blood glucose control.



SAME DAY DISCHARGE VIA A DEDICATED RADIAL LOUNGE – RESULTS OF 1-YEAR EXPERIENCE DURING THE COVID-19 PANDEMIC

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Background: Same day discharge (SDD) is a validated option for selected patients (pts) undergoing coronary angiography (CAG) and percutaneous coronary interventions (PCI). We analyzed how the COVID-19 pandemic influenced patients' admissions to and discharges from our SDD radial lounge. We focused on safety and complications.
Methods: In 2021, 817 pts (age 65±11 years, 28% female) were admitted to the lounge. CAG was performed in 729 pts, and 176 (24%) underwent ad hoc PCI. Furthermore, 88 pts were admitted for implantable device replacement procedures.
Results: Out of 729 transradial CAGs 621 were performed by using the proximal radial approach (PRA) and 108 (15%) via the distal radial approach (DRA). Ninety % of all these procedures (n = 655) were performed from the nondominant left hand. PRA was associated with one radial artery occlusion (RAO) and longer compression time (92±24 min vs 75±26 min, p <0.05). In the PRA group 23 postprocedural local hematomas <5 cm (3%) and 17 hematomas <10 cm (2%) were observed but did not require specific treatment. DRA was associated with only 4 superficial hematomas <2 cm and no RAO. No other relevant complications occurred in the rest of pts. Ninety % of all pts (n = 732) were discharged home on the same day (≤6 hours after procedures) and none of them was readmitted within the next 24 hours. The remaining 10% of the patients (n = 85) were hospitalized after CAG and PCI, mostly because of severe coronary artery disease findings.
Conclusion: During COVID-19 pandemic, CAG and PCI together with device replacement procedures in our SDD program were associated with a one-year saving of more than 700 overnight stays, minimal complications and 0,1% RAO rate.

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TRANSLATIONAL RESEARCH IN THE FIELD OF INHERITED ARRHYTHMIAS

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Inherited arrhythmias represent relatively rare, but life-threatening cardiac pathologies that are often associated with variants in cardiac ionic channel genes. A translational approach is essential to reveal the underlying arrhythmogenic mechanism and to find an improved treatment in the future.
Since 2016, we have performed functional analysis in selected arrhythmia-associated heterozygous genetic variants, including the patch clamp and microelectrode array techniques and confocal microscopy, either on human ionic channels transfected in a cell line or on hiPSC-derived cardiomyocytes. Detailed analysis was performed in two KCNQ1 variants associated with LQTS. T309I resulted in a complete loss of function in the homozygous setting (impaired channel trafficking) and a dominant-negative effect in the heterozygous setting. In contrast, R562S showed preserved channel trafficking and, in the heterozygous setting, haploin-

sufficiency. The physiologically important beta-adrenergic stimulation was missing in R562S channels. In silico simulations suggested delayed afterdepolarizations as a likely arrhythmogenic mechanism in both variants. Cardiac ionic channel gene variants can be also detected in some patients suffering from the "true" idiopathic VF. We have recently started functional analysis in two probands, the first one carrying two KCNH2 variants (A228V and S1021Qfs*98) and the second one a single RYR2 variant (Y4734C). In Y4734C-RYR2 variant, the pilot data detected an irregular electric activity of the patient-specific cardiomyocytes at specific conditions; a detailed analysis will follow.
Functional analysis is needed to reveal relationship between the identified genotype and phenotype. Identification of provoking circumstances that can result in unmasking of the phenotype in the "true" idiopathic VF could provide clinically-important data.

FUNCTIONAL ASSESSMENT OF MICROCIRCULATION IN TAKOTSUBO CARDIOMYOPATHY – A PILOT STUDY

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Background: Takotsubo cardiomyopathy (TTC) is a severe disorder with an increasing incidence that often mimics acute coronary syndrome. Both of the entities are characterized by systolic dysfunction of the left ventricle myocardium. However, this dysfunction is reversible in most cases of TTC. The pathophysiology of TTC remains unclear. In this study, we aimed to assess the pathophysiology of TTC using the invasive functional testing of coronary microcirculation.
Methods: Ten female patients diagnosed with TTC were included in this pilot study. In all subjects we measured fractional and coronary flow reserve in the left anterior descending and left circumflex coronary arteries, and the index of microcirculatory resistance in the same arteries in addition to acute and late transthoracic echocardiography (TTE). The results of the microcirculatory assessment were statistically compared with normal population values.
Results: Whilst fractional flow reserve was normal in both assessed epicardial artery territories for all patients, both mean values of coronary flow reserve disclosed pathological microcirculatory findings and were pathological in nine out of ten subjects. Index of microcirculatory resistance revealed abnormal values in five out of ten patients for LAD and three out of ten for LCx.
Conclusions: Our pilot study confirmed non-obstructive findings in the epicardial coronary arteries assessed by FFR. On the other hand, the investigation of both CFR and iMR, microcirculatory functional testing, revealed pathological findings in a significant number of evaluated subjects. From this aspect, our study validates further research in the field of microcirculatory functions as a possible mechanism in the origin of TTS. Our study will enroll 40 patients and is anticipated to complete enrollment by the end of 2022.

AN INTERPLAY OF GENETICS AND INFLAMMATION AFFECTING LEFT VENTRICULAR REVERSE REMODELLING IN DILATED CARDIOMYOPATHY

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Recent-onset dilated cardiomyopathy (RODCM) is a disease of heterogeneous etiology including genetic, inflammatory, toxic and metabolic causes. The interplay between genetic background and myocarditis is still poorly understood and could improve risk stratification of patients with RODCM.
We aimed to determine the genetic background of RODCM by whole-exome sequencing (WES), evaluate the inflammation by endomyocardial biopsy (EMB) and correlate these findings with left ventricular reverse remodeling (LVRR) in the 12-month follow-up.
This single-centre prospective observational study enrolled 83 RODCM patients who underwent whole-exome sequencing; EMB and 12-month clinical and echocardiographic follow up. LVRR was defined as an absolute increase in LV ejection fraction and a relative decrease of LV end-diastolic diameter at 12 months. Inflammation was defined according to TIMIC immunohistochemical criteria.
WES identified disease-related gene variants (ACMG class 3–5) in 45 (54%) patients. Majority of the 28 detected genes were represented by variants of titin (TTN) in 9 (11%), other cardiomyopathic genes in 36 (43%) and none in 38 (46%) patients. EMB analysis uncovered inflammation in 28 (34%) cases. LVRR at 12 months occurred in 28 (34%) of all cases. Carriers of non-titin gene variants heralded a lower probability of 12-month LVRR (19%), followed by patients with a negative genetic result (42%). Interestingly, LVRR occurred most often in carriers of isolated TTN variants (56%) $p = 0.041$. In contrast, inflammation positively predicted LVRR ($p = 0.019$). Combination of genetic and EMB findings did not predict LVRR in 12 months.
In conclusion, carriers of non-titin disease-related variants are less likely to reach LVRR, while myocardial inflammation and isolated titin variants predict favorable remodeling in 12 months.

SILDENAFIL INHIBITS PULMONARY HYPERTENSION INDUCED BY LEFT HEART PRESSURE OVERLOAD IN RATS

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Pulmonary hypertension (PH) induced by pressure overload of the left heart has recently attracted attention in clinical practice. No specific treatment of PH is approved for this group of patients. We previously described a simple rodent model of this condition. We used this model to test a hypothesis that sildenafil can be beneficial in PH induced by experimental left ventricle pressure overload induced in adult male Wistar rats by partial intravascular obstruction of the ascending aorta. Three weeks after induction of PH, sildenafil was given (25 mg/kg), by esophageal gavage once a day for the next 2 weeks (group HFS, N = 7). The group HFS was compared to the group of rats with left heart pressure overload lasting for 3 weeks with no additional use of sildenafil (group HF, N = 9) and with the controls (group C, N = 6). Mean pulmonary arterial pressure was significantly lower in the group HFS compared to the group HF (12.9±0.8 mmHg vs. 20.3±1.0 mmHg, p <0.0001, respectively) but was not different from the group C (10.7±1.1 mmHg). Weight of the right ventricle relative to the body weight (RV/BW ratio) as well as right ventricle weight relative to the left ventricle plus septum (RV/LV+S ratio) were significantly lower in the group HFS compared to the group HF (RV/BW ratio: 4.1±0.3.10-4 vs. 6.3±0.8.10-4; p <0.01, respectively and RV/LV+S ratio: 0.23±0.02 vs. 0.41±0.07; p <0.05, respectively) but they were not different in the group HFS compared to the group C in both parameters. The amount of expired nitric oxide, measured by chemiluminescent method on day 10 of the left heart pressure overload, was significantly increased in the group HF compared to the group C (343.0±30.5 pg/min/100 g vs. 239.8±18.2 pg/min/100 g; p <0.05, respectively).
Sildenafil attenuated the developed pulmonary hypertension caused by the left heart pressure overload in the rats.

PREDICTING LONG-TERM SURVIVAL AFTER AN ISCHEMIC STROKE

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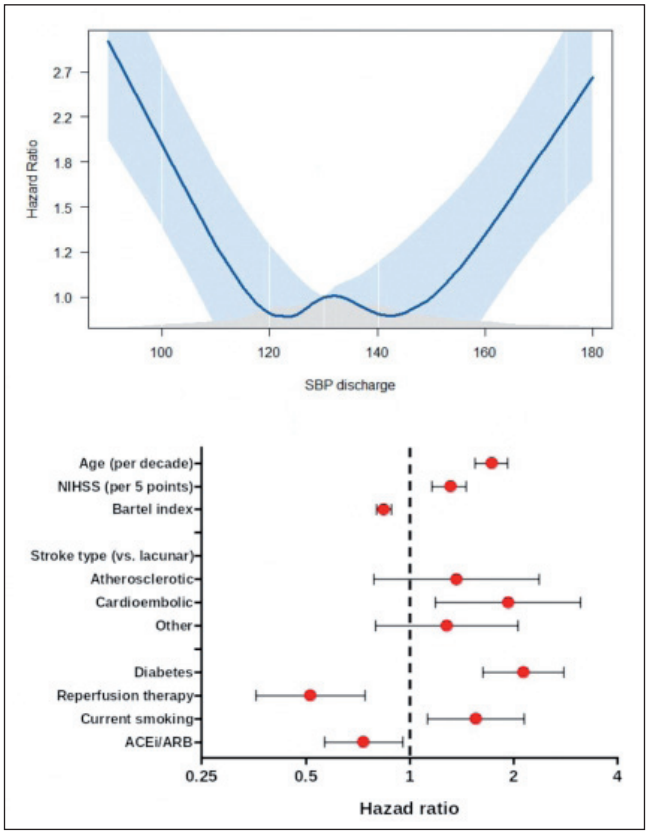
Background: To identify factors influencing long-term survival after ischemic stroke is of utmost importance. The aim of the present study was to analyze long-term survival and to assess factors associated with increased mortality following ischemic stroke.
Design and methods: Consecutive patients hospitalized between March 2009 and January 2012 for their first-ever ischemic stroke in 2 large tertiary hospitals in the Czech Republic were enrolled in this survey.
Results: In total, 736 patients (mean age 66 ±11 years; 58% men) were included in this analysis. The cumulative risk of death at 1, 3, 5 and 10 years was 13.6%, 20.8%, 29.3% and 48.3%, respectively. After adjusting for age and gender, patients with discharge systolic blood pressure between 120 and 140 mmHg showed the lowest mortality risk (Fig. 1). Higher age, higher NIHSS and more severe functional impairment, diabetes and current smoking were associated with higher mortality risk, while the reperfusion therapy, and renin-angiotensin system blockers were associated with a lower mortality (Fig. 2).
Conclusions: Despite several advances in stroke management, the mortality remains high. Timely reperfusion therapy use together with renin-angiotensin system blockers may decrease the risk of mortality.



LONGITUDINAL TRENDS IN BLOOD PRESSURE, PREVALENCE, AWARENESS, TREATMENT, AND CONTROL OF HYPERTENSION IN THE CZECH POPULATION. ARE THERE ANY SEX DIFFERENCES?

Cífková R[1], Bruthans J[2], Wohlfahrt P[3], Krajčoviechová A[4], Jozífová M[5], Linhart A[6], Widimský J[7], Filipovský J[8], Mayer O[9], Lánská V[10]

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Background: Hypertension is the most common CVD increasing CV morbidity and mortality. Despite the broad availability of antihypertensive medication, control of hypertension is not satisfactory worldwide.
Objective: The study aim was to assess longitudinal trends in blood pressure, prevalence, awareness, treatment, and control of hypertension in a representative population sample of the Czech Republic from 1985 to 2016/2017, focusing on sex differences.
Methods: A total of randomly selected 7,606 men and 8,050 women aged 25–64 years were screened for major CV risk factors in seven independent cross-sectional surveys between 1985 and 2016/2017.
Results: Over a study period of 31/32 years, there was a significant decline in systolic and diastolic blood pressure in both sexes, whereas the prevalence of hypertension decreased only in women. There was an increase in hypertension awareness in both sexes over the entire study period with consistently higher rates in women. The proportion of individuals treated with antihypertensive drugs increased significantly in both sexes throughout the study, again with consistently higher rates in women. Control of hypertension increased significantly over the study period with consistently higher rates in women. The age-adjusted trends in blood pressure, prevalence, awareness, and treatment of hypertension were significantly different in men and women, always in favor of women. The age-adjusted trends in control of hypertension in treated patients were equally poor in both sexes.
Conclusions: There are significant differences in longitudinal trends in blood pressure, prevalence, awareness, treatment, and control of hypertension between men and women, always in favor of women except for the control of hypertension in treated patients, where it is equally poor in both sexes.

CHARACTERISTICS AND OUTCOMES OF PATIENTS ADMITTED FOR ACUTE HEART FAILURE IN A SINGLE CENTRE STUDY

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Aims: Acute heart failure represents a medical condition with a very high mortality. The aim of our study was to characterize real-life patients admitted for acute heart failure in a region with one tertiary medical center and to describe risk factors of mortality.
Methods and results: We performed a retrospective analysis of patients admitted from January 2017 to December 2017 to Department of Cardiology of the University Hospital in Hradec Kralove. We identified 385 patients. The median of age was 74 years (IQR 67.5–80) and 34% of patients were females. The most common comorbidities were arterial hypertension (77.7%), dyslipidemia (67.3%), and coronary artery disease (63.1%). Coronary artery disease (52.7% of cases) and valve disease (28.1% of cases) were the most common etiologies of heart failure. The all-cause in-hospital mortality was 12.7%, 30-day mortality was 14.6% and 1-year mortality was 34%. Among risk factors of in-hospital mortality, the most significant factors were hemodialysis during the hospitalization (OR 15.82, 95% CI 2.96–84.57, $p = 0.0008$), chronic heart failure (OR 4.27, 95% CI 1.66–11.03, $p = 0.001$) and STEMI as a precipitating factor of heart failure (OR 4.19, 95% CI 1.23–14.25, $p = 0.023$). Hemodialysis during the hospitalization (OR 4.28, 95% CI 1.17–15.61, $p = 0.025$) and the comorbidity depression and anxiety (OR 3.49, 95% CI 1.45–8.39, $p = 0.005$) were the most significant risk factors of long-term mortality.
Conclusion: Our study confirms very high mortality rates among patients with acute heart failure underlying poor prognosis of these patients. Comorbidities, precipitating factors of heart failure, complications occurring during the hospitalization and the age of patients should be included in the risk stratification of in-hospital, 30-day and 1-year mortality.

EFFICACY AND SAFETY OF ENDOCARDIAL RADIOFREQUENCY CATHETER ABLATION OF INTERVENTRICULAR SEPTAL HYPERTROPHY IN THE TREATMENT OF HYPERTROPHIC OBSTRUCTIVE CARDIOMYOPATHY, PILOT EXPERIENCES

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Introduction: Endocardial radiofrequency ablation of septal hypertrophy (ERASH) is the new promising intervention method of treatment of patients with hypertrophic obstructive cardiomyopathy (HOCMP). The aim of our study is to prove safety and efficacy of ERASH in treatment of HOCMP.
Methods: Patients with maximal pharmacology treatment of HOCMP and lasting high gradient in left ventricle outflow tract (LVOTG) and limitation by symptoms are indicated to intervention treatment.
Results: From September 2018 up to September 2021 there were 6 patients who underwent ERASH with the average age 58 years. Average rest LVOTG was 99 mmHg and 115 mmHg after Valsava. Resulting average LVOTG after procedure was 21 mmHg in rest and 57,5 mmHg provoked. In 6 months follow up 63 mmHg resting and 72mmHg provoced. In two patients there was periprocedural pericardial effusion presented with pericardial drenage, one due to temporary pacemaker, and one permanent pacemaker implant due to AVB III. degree.
ERASH seems to be a promising new method in interventional treatment of HOCMP with similar efficacy and safety compared to ASA. Higher amount of complications was probably due to previous ASA procedure and learning curve.

LACTATE IN REFRACTORY OUT-OF--HOSPITAL CARDIAC ARREST. THE PRAGUE OHCA STUDY SUBANALYSIS

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Introduction: The prognosis of patients suffering refractory out-of-hospital cardiac arrest (OHCA) remains serious despite the implementation of extracorporeal cardiopulmonary resuscitation (ECPR). Serum lactate (s-Lac) level is an easily measured parameter reflecting the severity of hypoperfusion and tissue hypoxia. We hypothesized, that early lactate levels might be useful in predicting the outcome after OHCA.
Methods: This is a post-hoc analysis of the biochemical data from the randomized clinical trial "Prague OHCA study" comparing invasive (ECPR) and standard approaches in refractory OHCA patients. Patients who have undergone ECPR ("ECPR group") treated with veno-arterial extracorporeal membrane oxygenation, and patients in whom the prehospital ROSC has been achieved ("ROCS group") were analyzed separately and irrespective of randomization schema. The s-Lac level was measured at admission to the hospital and then repeatedly every 4 hours during the first 24 hours. Based on the values, the total area under the curve (AUC) of s-Lac in the first 24hours was calculated for every patient. The best Cerebral Performance Category (CPC) score reached during the 180 days long follow-up after the OHCA event was used to determine favorable (F; CPC 1, 2) and unfavorable outcome (UF; CPC 3, 4, 5).
Results: Out of 92 patients in the ECPR and 82 patients in the ROSC group, F outcome was reached in 24 (26%) and 48 (59%) subjects, respectively. The AUCs of s-Lac levels in the first 24 hours were significantly different between F and UF patients in both ECRP and ROSC groups. More details are in the Tables 1 and 2.
Conclusion: The AUCs of s-Lac levels measured during the first 24 hours after refractory OHCA are significantly different between patients with F and UF long-term neurological outcome regardless the use of ECPR methods.

Table 1 – ECPR group

Outcome	Favorable	Unfavorable	*p*
S-Lac at admission (mmol/L)	11.2 (9.2–13.8)	14.8 (12.1–17.5)	<0.001
S-Lac after 4 h (mmol/L)	4.9 (3.3–8.4)	8.3 (5.0–11.5)	<0.01
S-Lac after 8 h (mmol/L)	4.1 (2.8–5.4)	6.3 (3.5–9.2)	0.03
S-Lac after 12 h (mmol/L)	3.4 (2.1–5.2)	6.3 (3.4–8.5)	<0.001
S-Lac after 16 h (mmol/L)	3.3 (2.0–4.9)	5.7 (3.5–9.1)	<0.01
S-Lac after 20 h (mmol/L)	2.7 (1.8–3.4)	5.1 (3.0–8.7)	<0.01
S-Lac after 24 h (mmol/L)	2.4 (1.6–3.7)	4.8 (2.5–8.2)	<0.01
AUC of s-Lac in the first 24 h	108 (72.8–146)	154 (102.2–207.8)	<0.01

Table 2 – ROSC group

Outcome	Favorable	Unfavorable	*p*
S-Lac at admission (mmol/L)	7.8 (5.7–10.2)	9.7 (7.1–12.1)	0.055
S-Lac after 4 h (mmol/L)	2.5 (1.4–3.3)	3.2 (1.8–7.5)	0.017
S-Lac after 8 h (mmol/L)	1.8 (1.2–2.5)	3.9 (1.4–6.4)	0.02
S-Lac after 12 h (mmol/L)	1.5 (1.1–2.5)	2.4 (1.1–7.4)	0.04
S-Lac after 16 h (mmol/L)	1.5 (1.0–2.4)	2.7 (1.4–7.1)	0.03
S-Lac after 20 h (mmol/L)	1.6 (0.9–3.1)	2.5 (1.4–5.7)	0.07
S-Lac after 24 h (mmol/L)	1.4 (1.1–2.2)	1.9 (1.1–3.7)	0.14
AUC of s-Lac in the first 24 h	57 (46.7–74.7)	68 (50.4–143)	0.04

Data are expressed as median (IQR).

PARAMETERS OF ALLERGIC REACTION AFTER IMPLANTATION OF DIFFERENT PATENT FORAMEN OVALE OCCLUDERS – A PILOT PROSPECTIVE RANDOMIZED STUDY

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Primary endpoint: To compare parameters of the allergic response after transcatheter closure of the patent foramen ovale (PFO) using three different types of nitinol occluders in a pilot randomized trial.
Patient population and methods: 39 patients aged 29–72 (21 women and 18 men) who met institutional criteria for catheter based PFO closure were included in the study. Patients were divided into three groups according to the type of implanted occluder: 1. Amplatzer® (Abbott®) device made of nitinol with wire treatment to reduce nickel excretion and polyester fabric; 2. Figulla® device (Occlutech®) made of titanium oxide-coated nitinol and PET-patch; 3. the Ultrasept® (Cardia®) device which consists of nitinol coated with polyvinyl alcohol. Plasma CRP levels, full blood count including eosinophils, IgE, eosinophilic cationic protein (ECP), fibrinogen and a panel of cytokines were measured at baseline (24 hours before the procedure) and 6 hours, 24 hours, 7 days, 1 month and 6 months after occluder implantation.
Results: Only patients with normal baseline levels of IgE, eosinophils, ECP, and CRP were included for the final analysis (group 1 n = 7, group 2 n = 9, group 3 n = 6). Procedural success was 100% and there were no major complications. No significant changes in plasma levels of IgE and eosinophils were detected during the follow-up among the 3 groups of patients. The ECP values differed statistically among the individual groups 7 days after the procedure (p = 0.025), there were no significant deviations in the other observed times. No measurable increase in interleukins 1 and 6 was detected.
Conclusion: Despite the reported different manufacturing processes of the nitinol PFO occluders, there were no significant differences among the selected parameters of the allergic response immediately after implantation or during the six-month follow-up period.

PULMONARY VEIN MORPHOLOGY IN PATIENTS UNDERGOING CATHETER ABLATION OF ATRIAL FIBRILLATION

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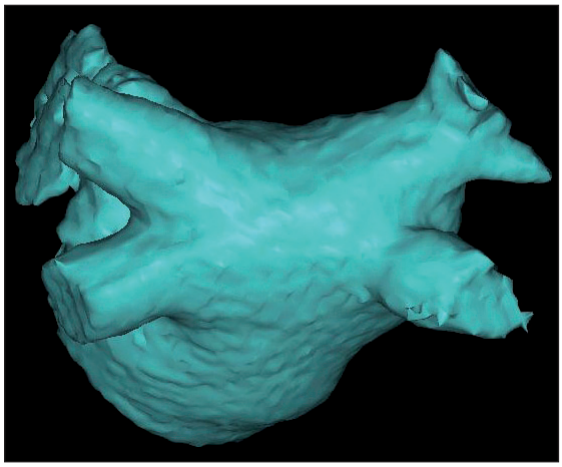
Variations in the anatomy of pulmonary veins (PVs) can influence selection of approaches of atrial fibrillation (AF) catheter ablation. Therefore, preprocedural evaluation and knowledge of PV anatomy is crucial for proper mapping and the successful ablation of AF. The aim of this observational study was to assess CT angiography scans and perform detailed analysis of PV morphology in patients scheduled for catheter ablation of AF. CT angiography was performed in 771 individuals (223 females, 548 males, mean age 58.4±10.7 years). PV anatomy was evaluated using 3D models. The patterns used for evaluation included typical anatomy with four separate PVs, a common left ostium, and various types of accessory veins either alone or in combination with common left ostia. An anatomical variant with common left ostium was observed as the most prevalent anatomy (44%). The typical variant was observed in 34.8% of patients. Accessory PVs were observed predominantly on the right side. The prevalence of anatomical variants did not differ between sexes with the exception of the unclassifiable category U (4.4% vs 9%, p <0.05). Information about a considerable number of atypical anatomies is as important as knowledge and understanding of the anatomical variations of PVs. This may influence the choice of instrumentation.



USAGE OF ULTRA-SHORT-TERM HEART RATE VARIABILITY ANALYSIS DURING HEAD-UP TILT TESTING IN DIAGNOSTICS OF CARDIOINHIBITORY REFLEX SYNCOPE

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Background: Participation of autonomic nervous system activity in origin of neurally mediated reflex syncope is research topic for decades but so far without consensus how to realize autonomic function evaluation during head-up tilt testing.
Purpose: Heart rate variability analysis during head-up tilt testing in ultra-short time period closely surrounding syncope or end of testing.
Methods: Head-up tilt testing (45 min protocol at 60 degrees in standard conditions) in 48 patients with history of syncope divided in group A (REFERENCE) without syncope during testing (24 patients, 14 men, age median 33.7 years) and group B (BRADYCARDIAC) (24 patients, 13 men, median age 40.5 years) with cardioinhibitory reactions during testing, defined according to guidelines. There were no significant differences in age or sex between both study groups.
Heart rate variability parameters: LF (low frequency) in n.u., HF (high frequency) in n.u., LF/HF ratio were evaluated in the last 1 minute time segment with sinus rhythm in tilting position before end of tilting or syncope and in the first minute in recovery supine position. Mann–Whitney U test, Chi-square test *p*-value and Shapiro–Wilkov test were used for statistical data processing with *p*-value significance level 0.05.
Results: The last minute of tilting: Groups A : B median values: LF 84.7 : 74.9 (*p* 0.018), HF 15.3 : 25.2 (*p* 0.018), LF/HF 6.25 : 3.4 (*p* 0.025).
The first minute of recovery in supine position: Groups A : B median values: LF 76.9 : 64.9 (*p* 0.001), HF 23.1 : 35.1 (*p* 0.001), LF/HF 4.4 : 1.85 (*p* 0.0002).
Conclusion: Presented results revealed statistically significant changes indicating vagal predominance before cardioinhibitory syncope in comparison with reference group.

SGC STIMULATOR (BAY 41-8543) FOR THE TREATMENT OF HEART FAILURE WITH REDUCED EJECTION FRACTION (HFREF) AND CARDIO-RENAL SYNDROME

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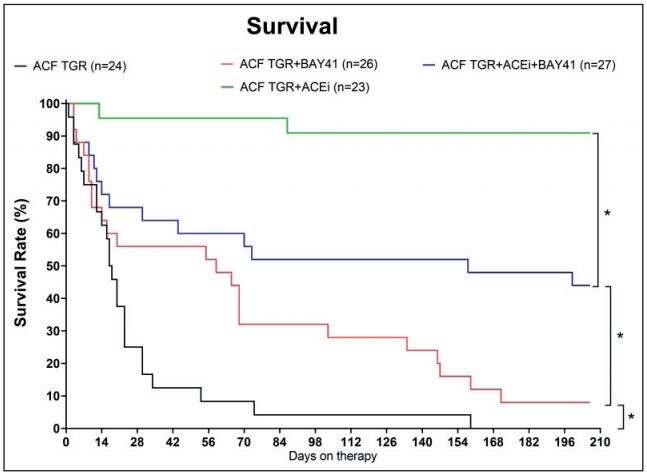
Heart failure with reduced ejection fraction (HFrEF) is considered to be one of the major epidemics of the 21st century. The prognosis and life expectancy is dreadful for patients that develop concurrent impairment of kidney function, so called "cardio-renal syndrome".
In the present study we investigated the activity of NO-independent sGC stimulator, called BAY 41-8543 (BAY41), in ren-2 transgenic hypertensive rats (TGR) with aorto-caval fistula (ACF)-induced HFrEF. The effectiveness of the BAY41 administered alone (3 mg/kg/day) or combined with an ACE inhibitor (ACEi, Trandolapril, 0.25 mg/kg/day) on the survival rate was investigated for 30 weeks. Blood pressure was measured in separate experiments for 2 weeks.
BAY41 significantly improved the survival in comparison to untreated animals with HFrEF. After 60 days the survival rate of ACF TGR treated with BAY41 was still 50%, while in untreated group it was already below 10%. However, after some time the beneficial activity of BAY41 started to decline. Additionally, BAY41 administered together with ACEi decreased the beneficial activity of the ACEi. The telemetry data revealed a transient decrease in blood pressure (–10 mmHg) two days after BAY41 administration, but early on SBP started to rise and by the end of the 2-week observation it was on the same level as in untreated rats (124±2 vs 134±3 mmHg, respectively; NS).
It seems that the sGC stimulation is a promising strategy to treat HFrEF based on improved survival. However, the results in the combination group call for special attention. One hypothesis is that the dose regimen of BAY41 could be improved, *e.g.* higher dosage of sGC stimulator combined with titration protocol should be tested, *i.e.* to avoid the initial hypotension, but to prevent the "escape" from the treatment after long-term administration.



ROSS PROCEDURE PROVIDES SURVIVAL BENEFIT OVER MECHANICAL VALVE IN ADULTS: A PROPENSITY-MATCHED NATIONWIDE ANALYSIS

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Objectives: The choice of optimal surgical treatment for young and middle-aged adults with aortic valve disease remains a challenge. Mechanical aortic valve replace-

ment (mAVR) is generally preferred despite promising recent outcomes of the Ross procedure. We aimed to compare both strategies at a nationwide level.
Methods: This was a retrospective analysis of prospectively recorded data from the National Registry of Cardiac Surgery. Using propensity-score matching, we compared the outcomes of patients undergoing the Ross procedure in two dedicated centers with all mAVRs performed in the Czech Republic between 2009 and 2020.
Results: Throughout the study period, 296 adults underwent the Ross procedure and 5 120 had a mAVR. We found and compared 291 matched pairs. There was no in-hospital mortality and the risk of perioperative complications was similar in both groups. Over the average follow-up of 4.1 vs 6.1 years, the Ross group had a lower all-cause mortality (0.7 vs 6.5 %; p = 0.015). Unlike the Ross group, the mAVR group had significantly lower relative survival when compared with the age- and sex-matched general population at 10 years postoperatively (97.1%, CI 86.8–108.7 vs 93.5%, CI 88.1–99.2). There was no difference in the risk of reoperation (4.5 vs 5.5%; p = 0.66).
Conclusions: The Ross procedure offers a significant mid-term survival benefit over mAVR. Both procedures have a comparable risk of perioperative complications. For young and middle-aged adults with aortic valve disease, Ross procedure should be considered a procedure of choice in dedicated centers.

CATHETER ABLATION OF PATIENTS WITH NON-PAROXYSMAL ATRIAL FIBRILLATION BY FOCAL AND ROTATIONAL ACTIVITY MAPPING USING CARTO FINDER SOFTWARE

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Introduction: Catheter ablation in patients with non-paroxysmal atrial fibrillation (AF) still doesn't give satisfactory results. One of the last developed methods in AF ablation is the ablation of regions with focal and rotational activities that contribute in maintaining of AF. CARTO Finder module was developed just to highlight the regions of repetitive focal and rotational activities during AF using endocardial high-density mapping. Our aim is to present initial results with the CARTO Finder module in non-paroxysmal AF.
Methods: Patients with symptomatic non-paroxysmal AF who were referred for catheter ablation were included in the study. The regions of focal and rotational activities in the left and right atrium were mapped using Pentarey multipolar catheter and CARTO Finder module. The ablation consisted of pulmonary vein isolation, followed by ablation of highlighted regions of focal and rotational activities. If AF persisted after the ablation, electrical cardioversion was done. Holter recordings were done at 3, 6, 9 and 12 months during follow-up.
Results: A total of 13 patients (5 women), mean age 63.8+8.7 years, weight 93.2+17.6 kg, were included. Mean duration of the procedure was 217.2+39 min, no complication occurred during the procedure. AF was present in all patients at the beginning of the procedure. The left atrial volume was 186.2+22.7 mL. Using the CARTO Finder module, 2.3+1.0 regions of focal, and 0.6+0.7 regions of rotational activity were found. Typical regions of findings were the base of the left atrial appendage and the endocardial side of the CS. Termination to SR or organization to regular atrial tachycardia occurred in only 2 patients, all other patients underwent electrical cardioversion. The mean follow-up time was 205.4+53.1 days, with 7 of 10 patients followed for longer than 6 months (70%) maintained SR.
Conclusion: The acute termination of AF to SR or organization into a regular atrial tachycardia using CARTO Finder module was not frequent. On the other hand, clinical results in terms of SR maintenance were promising in the pilot cohort of patients.

CATHETER ABLATION OF ATRIAL FIBRILLATION/TACHYCARDIA IN PATIENTS WITH PULMONARY HYPERTENSION: A MULTICENTRE RANDOMIZED TRIAL

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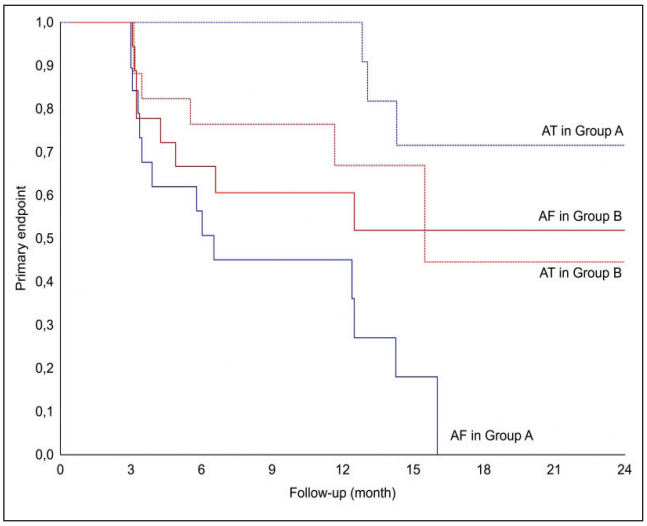
Background: Atrial fibrillation (AF) and related atrial tachycardias (ATs) are common arrhythmias in patients with pulmonary hypertension (PH). The long-term efficacy and safety of radiofrequency catheter ablation (RFCA) for AF/AT in the PH population have not yet been prospectively studied. We investigated the hypothesis of whether extensive RFCA of the arrhythmogenic substrate on top of selective ablation of clinical arrhythmia alone results in superior clinical outcomes in patients with PH and AF/AT.
Methods: Patients with combined post- and pre-capillary or isolated pre-capillary PH and AF/AT indicated to RFCA were enrolled in 3 centers and randomized 1 : 1 into two parallel treatments arms: (A) "Clinical" ablation and (B) "Clinical" plus substrate-based ablation. The primary endpoint of the study was documented arrhythmia recurrence >30 s without antiarrhythmic drugs during the post-blanking period after the index ablation.
Results: A total of 77 patients (71 [61; 75] years; 41 males) were enrolled in the study. 43 (56%) patients had AF and 34 (44%) had AT. The median duration of the follow-up period was 14 (12; 21) months. The primary endpoint occurred in a comparable number of patients in group A and B (17 patients [45 %] vs. 15 patients [42 %]; HR: 1.03; 95% CI 0.51 to 2.06; p = NS). When compared to AF

patients (irrespective to randomization schema), the primary endpoint occurred significantly less frequently in AT group (9 [25%] vs. 23 [61%]; HR 0.3 (95% CI 0.14 to 0.66); $p = 0.003$). The occurrence of the primary endpoint in AF and AT patients according to the randomization group is visualized in Figure.

Conclusion: The trial in patients with PH and AF/AT prospectively demonstrated that more extensive ablation is not associated with improved clinical outcomes. However, better results were achieved in patients with AT. NCT04053361.



NITRIC OXIDE RELEASING PACING LEAD TO PREVENT INFECTION IN CARDIAC PACING

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Background: Effective prevention of pacing lead infection could reduce morbidity and save lives. It has been demonstrated that nitric oxide (NO) can inhibit bacterial adhesion and reduce biofilm formation. We tested a diazeniumdiolated dibutylhexanediamine (DBHD/N2O2, a potent NO donor) coated pacing lead to prevent its bacterial infection.

Methods: Silicone pacing lead was coated with two layers of 25 weight% DBHD/N_2O_2 in Carbosil and topped with one layer of plain Carbosil. The NO release profile of the coated lead is measured with an ozone chemiluminescent method at 37 °C in phosphate buffered saline (PBS, pH = 7.4). In a bioreactor the lead is then exposed to bacterial cultures of *S. aureus* and *P. aeruginosa* and its antibacterial capacity evaluated by biofilm homogenization and plating on agar for CFU counting of viable bacteria per surface area. Complete pacing system with the DBHD/N_2O_2 coated pacing lead is then implanted in small animal model (rabbit) and tested for function and durability.

Results: Initial NO flux of DBHD/N_2O_2 coating was 0.8±0.1 [× 10^{10} mol/min/cm^2] and stayed between the effective range >0.5 flux unit for seven days. Preliminary results on coated catheter surfaces demonstrated almost 95% decrease of biofilm formation: 89±9.7 vs. 5.2±1.1 × 10^3 CFU (p <0.001). In-vivo, cardiac pacing was properly functional in all subjects for over 6 months with mean impedance of 750 Ohm, average bipolar ventricular sensing of 9.2 mV (min 7.4, max 12) and pacing threshold of 1.7 V@0.4 ms (min 0.2, max 2.7).

Conclusion: Presented pacing lead with DBHD/N_2O_2 coating demonstrated a potent antibacterial effect while retaining optimal pacing parameters. This effective elimination of biofilm formation can likely prevent potential clinical infection especially in complex pacing procedures or immunocompromised patients.

POSTPROCEDURAL ULTRASOUND EVALUATION OF PROXIMAL AND DISTAL RADIAL ARTERY AFTER CATHETERIZATION USING DISTAL RADIAL ACCESS

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Distal radial access (DRA) becomes now more and more popular among interventional cardiologists. It is well known that utilization of DRA effectively spares proximal radial artery in terms of minimizing the rate of the radial artery occlusion (RAO). The aim of our study was to evaluate patency not only of proximal radial artery, but also of distal radial artery using ultrasound (US) as the most reliable method. We evaluated 115 patients who underwent catheterization via distal radial access (dTRA). Following the procedure and after successful hemostasis, arterial patency and diameter at conventional transradial access (cTRA) and distal puncture sites (either in the anatomical snuffbox or the dorsal distal RA) were assessed. No RAO were found in the proximal or distal RA and there were no significant other complications including hematomas >2 cm. The mean diameter of the radial artery at conventional puncture site was 2.86±0.49 mm and at distal puncture site 2.31±0.47 mm (p <0.001). Postprocedural compression time of dTRA was very short (80±36 min). In conclusion distal radial access was associated with the absence of early arterial occlusion, and other relevant complications.

Work was supported by the Charles University Research program „Cooperatio – Cardiovascular Science" and by MH CZ-DRO (Faculty Hospital in Pilsen – FNPl, 00669806).

COMPARISON OF SIX DECISION AID RULES FOR DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION IN ELDERLY PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT WITH ACUTE CHEST PAIN

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Objective: This study aimed to evaluate the accuracy and effectiveness of different strategies for the diagnosis of acute myocardial infarction (AMI) in the elderly in real-life clinical practice.
Methods: Patients older than 70 years presenting to the emergency department with chest pain were included. The performance of six decision aid rules (T-MACS, HEART, EDACS, TIMI, GRACE, and ADAPT) and solo troponin T strategy for diagnosing AMI was evaluated by calculating sensitivity, specificity, odds ratios, negative and positive predictive values.
Results: A total of 250 patients, with a mean age of 78.5 years, were enrolled. Forty-eight patients (19.2%) had an acute myocardial infarction in a 30-day follow-up period. The sensitivity for ruling-out AMI was 100% for T-MACS, HEART, and ADAPT; 97.9% for EDACS, 93.8% for TIMI, and 81.3% for GRACE and solo TnT strategy. For ruling-in AMI, the specificity was 97.5% for T-MACS, 95% for TIMI, 83.2% for HEART, 81.7% for GRACE, and 46% for ADAPT.
Conclusion: T-MACS decision aid had the best performance for rule-out and rule-in diagnostics of AMI. Risk stratification of patients with suspected acute coronary syndrome based on decision aid rules can be used in real-life practice, even in the population of the elderly.

MYOCARDIAL INVOLVEMENT DETECTED USING CARDIAC MAGNETIC RESONANCE IMAGING IN PATIENTS WITH SYSTEMIC SCLEROSIS – A PROSPECTIVE OBSERVATIONAL STUDY

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Introduction and objectives: Cardiac involvement in systemic sclerosis (SSc) patients affects mortality. Cardiac magnetic resonance (CMR) is capable of detecting structural changes, including diffuse myocardial fibrosis that may develop over time. Our aim was to evaluate myocardial structure and function changes using CMR in patients with SSc without known cardiac disease during a 5-year follow-up and find possible correlations with selected biomarkers.
Methods: A total of 25 patients underwent baseline and follow-up CMR examinations according to a pre-specified protocol. Standard biochemistry, five biomarkers (hsTnI, NT-proBNP, Galectin-3, sST2, and GDF-15), and disease-specific functional parameters enabling classification of disease severity were also measured.
Results: After five years, no patient suffered from manifest heart disease. Mean extracellular volume (ECV) and T1 mapping values did not change significantly ($p \geq 0.073$). However, individual increases in native T1 time and ECV correlated with increased Galectin-3 serum levels ($r = 0.56$; $p = 0.0050$, and $r = 0.71$; $p = 0.0001$, respectively). Progression of skin involvement assessed using Rodnan skin score and a decrease in diffusing capacity of the lungs were associated with increased GDF-15 values ($r = 0.63$; $p = 0.0009$, and $r = –0.51$; $p = 0.011$, respectively).
Conclusions: During the 5-year follow-up, there was no new onset of heart disease observed in patients with SSc. However, in some patients, CMR detected progression of sub-clinical cardiac fibrosis that significantly correlated with elevated Galectin-3 levels. GDF-15 values were found to be associated with disease severity progression.

FAMILIAL HYPERCHOLESTEROLEMIA MUTATIONS IN CZECH POPULATION AND IN CZECH PATIENTS WITH ACUTE CORONARY SYNDROME

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Introduction: Familial hypercholesterolemia (FH) is the most common monogenic disease associated with increased risk of atherosclerotic cardiovascular disease (ACVD). FH is caused by mutations in the LDL-receptor or in the Apolipoprotein B (ApoB); changes in other genes occur rarely. Carriers of these mutations usually have high cholesterol levels, but the quantification of the relationship between these mutations and cholesterol levels in FH patients with ASCVD and in the general population has not yet been analyzed in detail. We investigated the presence of these mutations in the Czech population and in patients with ASCVD and analyzed the relationship of these mutations with cholesterol levels.
Methods: We analyzed the presence of the three most common Czech mutations in the genes for the LDL receptor (*Asp266Glu* and *Gly592Glu*) and for apoB (*Arg3527Gln/Trp*) in 6 012 individuals from the post-MONICA study (age 49.7±11.2 years; 53% women) and in 3 097 patients with acute coronary syndrome (ACS) (age 57.6±8.7 years; 100% men).
Results: A total of 38 FH mutation carriers were detected. The prevalence of LDL-R mutations did not differ between patients with ACS and controls (3.0‰ vs. 2.5‰). APOB mutations were significantly more frequent in patients than in the population (3.5‰ vs. 0.5‰; $p < 0.0005$; OR [95% CI] = 7.1 [2.0–25.5]). Only 1/3 of carriers of the screened mutations had significantly elevated total cholesterol (values in the upper decile of the population distribution – above 7.5 mmol/L).
Conclusion: We described the prevalence of carriers of the most common mutations in LDL receptor and APOB

in the Czech population and in Czech patients with ACS. It is not unconditionally true that the presence of the mutation is associated with above-average total or LDL cholesterol values.

DRUG-ELUTING BALLOON COMPARED TO DRUG-ELUTING STENT TREATMENT IN DES RESTENOSIS

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Introduction: One of the possible complications after drug eluting stent (DES) implantation is in-stent restenosis (ISR). There are two main recommended treatment methods – using a drug-eluting balloon (DEB) or implantation of another DES. Our aim was to compare long-term outcome of the patients with ISR according to the method used.
Sample and methodology: Monocentric retrospective data analysis. Between 2013 and 2018, there were 116 consecutive patients with ISR in previously implanted DES. One of two recommended treatment methods was used – either another DES implantation or a drug-eluting balloon dilatation (DEB). The first group of 71 patients was treated with an implantation of another DES (DES+) and the second group of 45 patients was treated with DEB (DEB+). The primary endpoint was composite of cardiovascular (CV) mortality, rehospitalization for CV related diagnosis, and target lesion revascularization (TLR) in more than 3 years follow-up period.
Results: In a follow-up period, no significant difference was found between DES+ a DEB+ group in composite endpoint (27 [38% of DES+ group] vs. 18 [40% of DEB+ group]; *p*-value = 0,885), nor in a relative frequency of and individual events.
Conclusion: Only few randomized trials have focused on DES-ISR. We present real-life data with a long follow-up of events. Despite the follow-up period length, statistical significance of events difference wasn't found. Hypothetically, using intravascular imaging (IVI) to get more information about ISR (its nature, plaque burden, tissue characteristics, possible mechanical problem in original stent) might be helpful for treatment and decision making. However, routine use of IVI in ISR therapy needs to be verified by larger randomized trial.

TRANSOESOPHAGEAL ECHOCARDIOGRAPHY FINDINGS IN YOUNG PATIENTS WITH CRYPTOGENIC ISCHEMIC STROKE

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Background and purpose: The cause of ischemic stroke (IS) remains often unclear in young patients. Relevant structural heart abnormities with known embolic potential may represent cause of IS also in young population. The use of transesophageal echocardiography (TEE) allows reliable detection of most relevant structural pathologies. The aim was to assess frequency and spectrum of relevant cardiac abnormities in young IS patients.
Subjects and methods: The study set consisted of young acute IS patients <50 years enrolled in the prospective HISTORY (Heart and Ischemic STrOke Relationship studY) study, registered on ClinicalTrials.gov NCT01541163. In all patients, the brain ischemia was confirmed on CT or MRI. Admission ECG, serum specific cardiomarkers, TEE, 24-hour and 3-week ECG-Holter were performed in all patients.
Results: Out of 1284 patients enrolled in the HISTORY study, 135 (73 males, mean age 40.2±8.1 years) were <40 years. The relevant TEE abnormities were present in 47 (35%) of these patients. Patent foramen ovale (PFO) with evident left to right shunt was detected in 38 (28%) patients, with significant right to left shunt in 25 (19%) patients, and other atrial septal defect with clinically significant bidirectional flow in 4 (3%) patients. Significant valvular heart disease was present in 2 (1%) patients (1 bicuspid aortic valve with moderate aortic regurgitation, 1 chronic severe mitral regurgitation), and 4 (3%) patients severe left ventricular (LV) systolic dysfunction (LFEF ≤35%) due to idiopathic dilated cardiomyopathy. Left atrial myxoma was detected in 1 patient.
Conclusion: The relevant structural abnormities with embolic potential were detected using TEE in 35% of young IS patients. Routine use of TEE to elucidate the causes of IS, has a role especially in young patients who present with IS and no cardiovascular risk factors.

A SINGLE CENTRE PROSPECTIVE STUDY COMPARING THE 0/1H AND 0/3H RULE OUT/RULE IN ALGORITHMS FOR MYOCARDIAL INFARCTION IN REAL CLINICAL PRACTICE OF UNIVERSITY HOSPITAL EMERGENCY DEPARTMENT

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Background: High-sensitivity cardiac troponin (hs-cTn) is a key biomarker used in the assessment of patients presenting with chest pain. The European Society of Cardiology (ESC) recently changed recommendations in favor of using the ESC 0/1 h instead of the ESC 0/3 h algorithm if a hs-cTn assay with a validated algorithm is available.
Aim: To evaluate the diagnostic performance of both ESC rapid rule out/rule in algorithms in real clinical practice.
Methods and results: We prospectively enrolled 672 patients presenting with symptoms of acute coronary syndrome without ST elevation to the emergency room of the university hospital. Safety was compared using the negative predictive value (NPV) for the rule-out group, and accuracy using the positive predictive value (PPV) for the rule-in group. The final diagnosis was decided by 2 independent cardiologists using all available information, including cardiac catheterization and non-invasive imaging. Patients were contacted 3 months after discharge by telephone calls. Among 672 patients AMI was the final diagnosis in 152 (21%). NPV for rule-out was higher in 0/1h algorithm (99.5%) than in 0/3h algorithm (98.9%). PPV was comparable between both algorithms (60.4% versus 60.3%). No death occurred in the rule-out group during three months of follow-up.
Conclusion: Both 0/1h and 0/3h algorithms were comparable in diagnostic accuracy for rule-in. The 0/1h algorithm in our study was revealed to be safer than the 0/3h algorithm.

21 YEARS FOLLOW-UP OF LIVER FUNCTION IN PATIENTS AFTER FONTAN OPERATION

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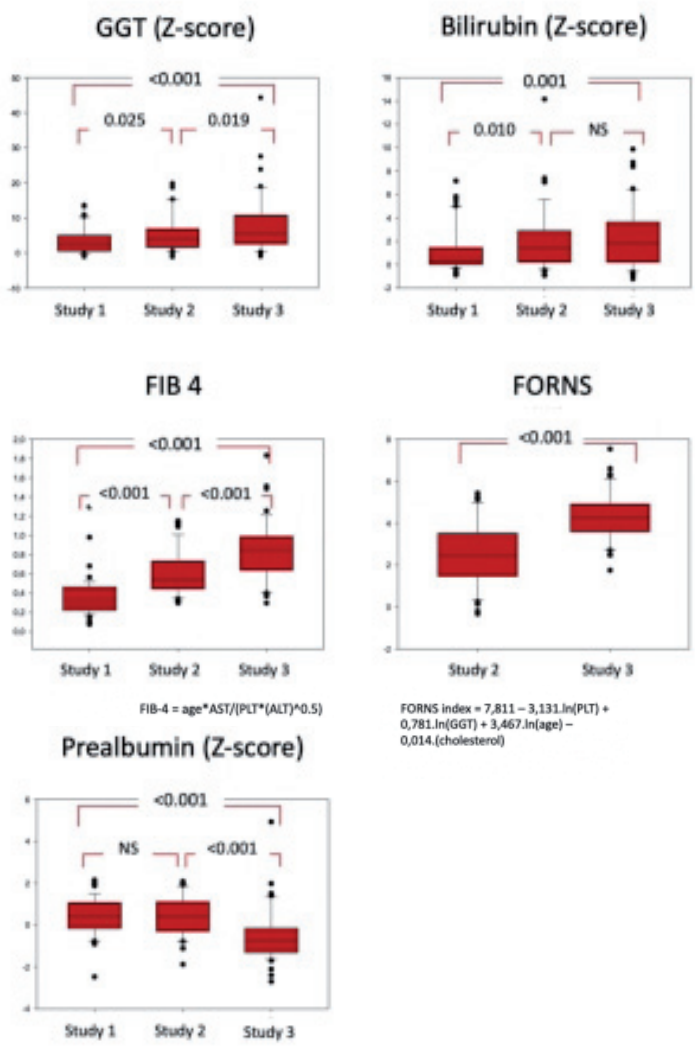
Introduction: Fontan circulation is associated with suboptimal outcome due to chronic venous congestion. The aim of this longitudinal study was to analyze the influence of long-term venous congestion on liver function in patients with univentricular circulation after total cavopulmonary connection (TCPC).
Methods: 47 patients (22 women) who underwent TCPC at median (IQR) age of 4 (3–6) years were repeatedly examined during subsequent follow-up Studies 1–3 at 5 (3–6), 13 (11–14) and 21 (20–22) years after TCPC, respectively. Cardiac function was semiquantitatively evaluated by echocardiography, liver function was examined by a panel of biochemical and hematological tests. Moreover, liver elastography, enhanced liver fibrosis test (ELF) and quality of life were evaluated in Study 3.
Results: Progressive impairment of liver function was found between the Studies. There was a significant increase in levels of gamma glutamyl transferase (p <0.001), bilirubin (p = 0.001), the FIB-4 (p <0.001) and Forns index (p <0.001); and decrease in levels of prealbumin (p <0.001). In Study 3 abnormal ELF score (>7.7) was found in 95% of patients and abnormal elastography (>7.2 kPa) in all subjects. Good systolic ventricular function was present in 83% subjects. 17% of patients rated their health as excellent, 51% as very good, 23% as good, 9% as fair and none as poor. There was no correlation between the liver tests and ventricular function nor the subjective quality of life.
Conclusion: Progressive impairment of liver function occurs during long-term follow-up majority of patients after TCPC despite preserved single ventricle function and good quality of life.



LONG-TERM CARDIOVASCULAR OUTCOME IN PATIENTS AFTER PPCI FOR STEMI. WHAT IS THE RISK PROFILE FOR CARDIOVASCULAR MORTALITY?

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Background: Long-term cardiovascular mortality (CM) after primary percutaneous coronary intervention (pPCI) for ST-elevation myocardial infarction (STEMI) is poorly evaluated.
Methods: Retrospective, academic, two-centre analysis of all consecutive patients presenting with acute STEMI from March 2008 to December 2019. 5263 patients were evaluated. Cardiovascular risk factors and comorbidities were evaluated using medical histories obtained at the initial presentation. Patients were followed-up up for 12 years after STEMI. Mortality data was acquired from the State Institute of Health Information and Statistics of the Czech Republic.
Results: The mean follow-up duration was 5.1 years and the mean age at presentation was 63.9 years. Men were presented in 70.7%. The mortality associated with cardiovascular diseases was approx. 65%. Myocardial infarction (MI) was the cause of death in 27.2% of cases. Patients with CM were significantly older (73.7 years) opposite to remaining patients (61.9 years). CM was significantly higher in women opposite to men (24.3% to 14.3%) and women were significantly older (77.2 to 71.2 years). The most often cause of death was coronary heart disease and heart failure, strokes and pulmonary embolism were in the minority. According to the univariate analysis of CM, risk factors for adverse cardiovascular outcome were identified as age, sex, arterial hypertension, stroke, renal insufficiency, diabetes mellitus, MI, heart failure, active smoking, Killip class, STEMI localization, single- or multivessel disease, pPCI success and left ventricle ejection fraction. The strongest predictors were renal insufficiency and stroke.
Conclusion: CM was the leading cause of death in the 5-year outcome after pPCI. Focus on the compensation of identified risk factors could be a suitable way to reduce cardiovascular morbidity and mortality.

RETROSPECTIVE COMPARISON OF AORTIC VALVE ANNULUS EVALUATION IN PATIENTS WITH SEVERE AORTIC STENOSIS IN PATIENTS PLANNED FOR TAVI PROCEDURE

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Aim of study: To compare aortic annulus evaluation using echocardiography 2D or 3D reconstruction versus MDCT examination using dedicated 3 mensio software.
Cohort and methods: We examined 55 patients (28 female, 27 male) aged 53–95 years who were scheduled for TAVI procedure on behalf of severe aortic stenosis diagnosed before. All patients were interrogated by TEE and most of them with TOE using i33 Philips echocardiographic equipment and with Siemens Somatom Definition Flash MDCT hardware. We compared results of aortic annulus diameter calculated from aortic annuli perimeter measurement and determination of aortic annular eccentricity index defined as 1-Dmin/Dmax. Values >0.25 were considered significant as a risk factor for residual postprocedural aortic regurgitation after TAVi.
Results: Aortic annulus diameter obtained from 2D echocardiography were on average 1.6±1.98 mm smaller in comparison to MDCT measurement using 3 mensio dedicated software. Values of aortic annulus eccentricity index were significantly underestimated when we compared 3D echocardiography reconstruction on average by 0.13±0.068. Using 3D reconstruction no severe eccentricity index was reached – MDCT results were from this point of view different
Conclusion: 2D echocardiography underestimated results of aortic annulus size in comparison with MDCT examination with dedicated, when software 3 mensio was used. 3D TOE significantly underestimates annular eccentricity index calculation in patients with severe aortic stenosis.

FFR VERSUS IFR IN ASSESSMENT OF LESION HEMODYNAMIC SIGNIFICANCE AND EXPLANATION OF THEIR DISCREPANCIES. INTERNATIONAL, MULTICENTER AND PROSPECTIVE TRIAL – THE FIGARO STUDY.

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Background: Prospective registry of FFR/iFR discrepancy.
Methods: FR/iFR were analyzed using a Verrata wire, and coronary flow reserve (CFR) was analyzed using a Combomap machine (both Philips-Volcano). The risk polymorphisms for endothelial nitric oxide synthase (ENOS), and for hemooxygenase-1 (HO-1) were analyzed.
Results: In total, 1884 FFR/iFR measurements from 1564 patients were included. The FFR/iFR discrepancy occurred in 393 measurements (20.9%): FFRp (positive) / iFRn (negative) type (264 lesions, 14.0%), and FFRn/iFRp (129 lesions, 6.8%) type. CFR was measured in 343 lesions, correlating better with iFR (R = 0.56, p <0.0001) than FFR (R = 0.36, p <0.0001). The CFR value in FFRp/iFRn lesions (2.24±0.7) was significantly higher compared to both FFRp/iFRp (1.39±0.36), and FFRn/iFRn lesions (1.8±0.64, p <0.0001).

Multivariable logistic regression analysis confirmed: 1. sex, age, and lesion location in the right coronary artery as predictors for FFRp/iFRn discrepancy; 2. hemoglobin level, smoking, and renal insufficiency as predictors for FFRn/iFRp discrepancy.
The FFRn/iFRp type of discrepancy was significantly more frequent in patients with both risk type of polymorphisms (ENOSr+HO-1r): 8 patients (24.2%) compared to FFRp/iFRn type of discrepancy: 2 patients (5.9%), $p = 0.03$.
Conclusions: Predictors for FFRp/iFRn discrepancy were sex, age, and location in the right coronary artery. Predictors for FFRn/iFRp were hemoglobin level, smoking, and renal insufficiency. The risk type of polymorphism in *ENOS* and *HO-1* genes was more frequently found in patients with with FFRn/iFRp type of discrepancy.

LV SIZE NEEDS TO BE INCORPORATED IN LV FUNCTION ASSESSMENT IN HFREF PATIENTS

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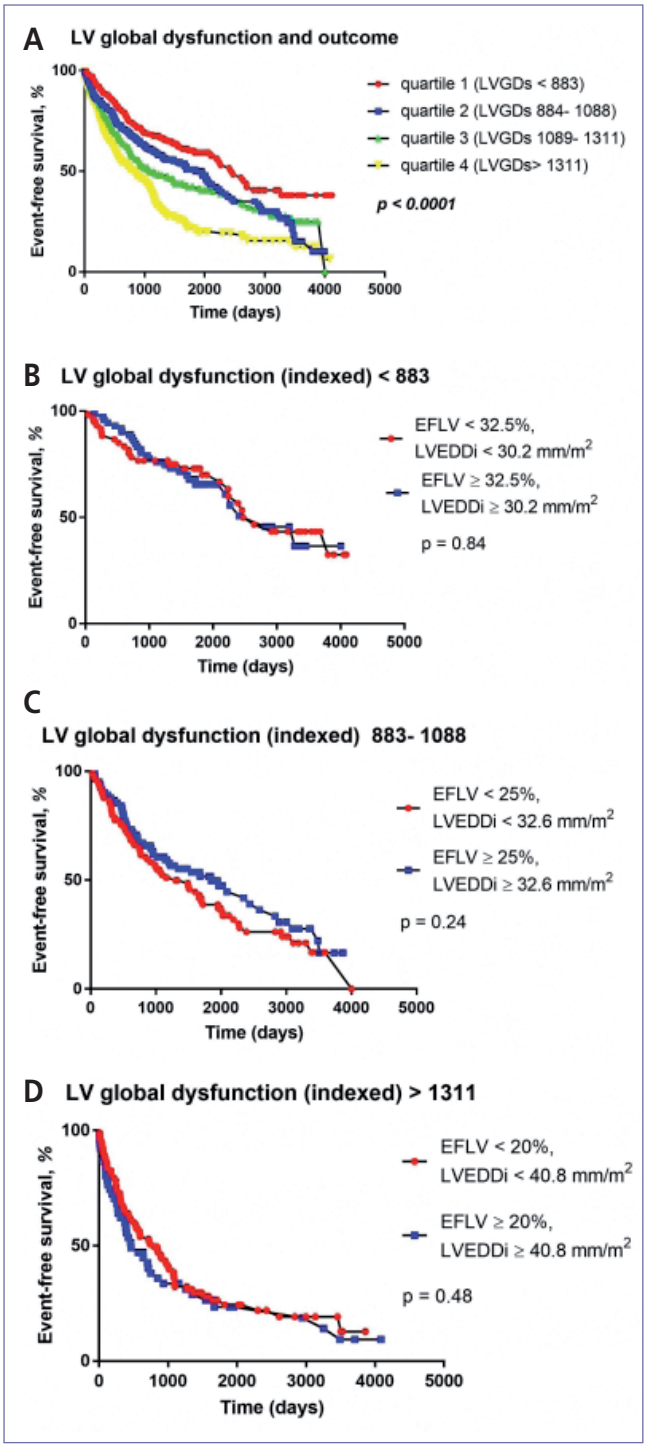
Background: Left ventricular (LV) size is associated with outcome in HFrEF patients, but neglected in the assessment of LV performance. We have aimed to develop and test the new parameter integrating the information about both LV function and size.
Methods and results: A group of 844 stable patients with advanced HFrEF (57.9±11.3 years, 67.9% NYHA III/IV, LVEF 23.6±5.8) underwent an echocardiographic evaluation and were prospectively followed for a median of 1110 days (IQRs 407, 1780 days) for the occurrence of an adverse outcome (death, urgent heart transplantation or mechanical circulatory support implantation) that was observed in 512 patients (60.7%). LV size (LV-end-diastolic diameter indexed for body size, LVEDDi) was associated with adverse outcome even when adjusted for LV ejection fraction (HR 1.04, 95% CI 1.02–1.06, $p = 0.0001$). In order to integrate LV size and function into one score parameter, we have developed a parameter called missing LV-ejection fraction (calculated as 55% LVEF) and LV-global dysfunction score (LVGDs), defined as missing EF times LVEDDi. LVGDs showed a superior prognostic role compared to LVEF (ΔAUC ≥2.2 in four defined time points, $p < 0.05$). When subdivided into quartiles according to LVGDs, in each quartile patients with better LVEF but more dilated LV had similar outcome as those with worse LVEF but smaller LV size ($p > 0.23$).
Conclusion: LV dilatation is a manifestation of LV dysfunction in HFrEF patients. Integrating both LV size and LVEF into one parameter provides more accurate information about the degree of LV disease and prognosis.



CATHETER THROMBECTOMY FOR ACUTE ISCHEMIC STROKE IN CARDIOLOGY CATH LAB: 10-YEAR RESULTS

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Background and aim: Acute ischemic stroke is a devastating disease with high mortality and frequent permanent severe functional disability. Catheter thrombectomy is traditionally performed in neuroradiology centers; however, they are not widely available and thus unable to meet the population needs. This study investigated whether this gap can be filled by involving interventional cardiologists.
Methods: Study was initiated in 2012 as a prospective single arm study testing these questions: Whether catheter thrombectomy can be performed safely and effectively in cardiology Cath Lab and achieve results comparable to neuroradiology centers, whether direct thrombectomy can be an alternative to bridging thrombolysis followed by thrombectomy. Additional question was added to the protocol in 2018: What are the outcomes of patients in whom thrombectomy is done between 6–24 hours after stroke onset.
Inclusion criteria: NIHSS ≥6, <6 (24) h from symptoms onset.
Exclusion criteria: Inability to start intervention within 60 minutes after hospital arrival, intracranial bleeding, any chronic severe disease limiting prognosis.
Results: Between October 2012 and May 2022, a total of 507 patients with moderate-to-severe acute ischemic stroke were enrolled. Table contains main results. Other observations included: short learning curve for experienced interventional cardiologists, worse outcomes of posterior circulation strokes, high number of rehospitalizations (most related to concomitant diseases, not to the treated stroke).
Conclusion: Catheter thrombectomy in cardiology Cath Lab is feasible and safe and may achieve results similar to those of neuroradiology centers. Direct thrombectomy offers results comparable to bridging thrombolysis followed by thrombectomy. Cardiologists should be involved in stroke teams to provide treatment to broad patient populations.

Endpoint	Rate	Comparable data from HERMES metaanalysis
Primary endpoint (mRs 0–2 at 90 days, i.e. functional neurologic independence after stroke) in the entire cohort	47%	N.A.
Primary endpoint among patients with anterior stroke (n = 421)	48.9%	46%
Complete neurologic recovery (mRs = 0)	20%	10
7-day all-cause mortality	16.6%	N.A.
3-month all-cause mortality	31.2%	15.3%
Symptomatic intracranial hemorrhage	6.5%	4.4%
Distal embolization to another territory with clinical impairment	3.7%	N.A.
Arterial dissection or perforation	3.7%	N.A.
Long-term follow-up	997±571 days	N.A.
Mean number of rehospitalizations per patient during follow-up	3±3.3	N.A.

BIOMECHANICAL RUPTURE RISK ASSESSMENT IN MANAGEMENT OF PATIENTS WITH ABDOMINAL AORTIC ANEURYSM IN COVID-19 PANDEMIC

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Background: The acute phase of the COVID-19 pandemic requires a redefinition of healthcare system to increase the number of available intensive care units for COVID-19 patients. This leads to the postponing of elective surgeries including the treatment of abdominal aortic aneurysm (AAA). The probabilistic rupture risk index (PRRI) recently showed in another experimental project its advantage over the diameter criterion in AAA rupture risk assessment. Its major improvement is in increased specificity and yet has the same sensitivity as the maximal diameter criterion. The objective of this study was to test the clinical applicability of the PRRI method in a quasi-prospective patient cohort study.
Methods: Nineteen patients (14 males, 5 females) with intact AAA who were postponed due to COVID-19 pandemic were included in this study. The PRRI was calculated at the baseline via Finite Element Method models. If a case was diagnosed as high risk (PRRI >3%), patient was offered priority in AAA intervention. Cases were followed until September 10th 2021 and a number of false positive and false negative cases were recorded.
Results: Each case was assessed within 3 days. Priority in intervention was offered to two patients with high PRRI. There were 4 false positive (higher PRRI value without consequent AAA rupture) cases and no false negative (low PRRI value with consequent AAA rupture) cases classified by PRRI. In three cases, the follow up was too short to make any conclusion.
Conclusion: Integrating PRRI into clinical workflow is technically and logistically possible. Longitudinal validation of PRRI showed auspicious results and it may lead to more precise diagnostic evaluation in comparison to maximal diameter criterion and subsequent personalization of therapeutic approach to patients with AAA.

LONG-TERM CLINICAL OUTCOMES AND LEFT VENTRICULAR REVERSE REMODELING IN PATIENTS WITH RECENTLY DIAGNOSED UNEXPLAINED DILATED CARDIOMYOPATHY

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Background: Left ventricular reverse remodeling (LVRR) and favorable prognosis of patients with recently diagnosed dilated cardiomyopathy (DCM) have been documented in studies with short-term follow-up. The aim of our study was to assess the long-term clinical course and stability of LVRR in these patients.
Methods: We prospectively studied 133 patients with recently diagnosed unexplained DCM, with heart failure symptoms lasting < 6 months and LV ejection fraction <40% persisting after at least one week of therapy. All had endomyocardial biopsy (EMB) at the time of diagnosis and serial echocardiographic and clinical follow-up over five years.
Results: LVRR was observed in 46% patients at one year, in 60% at two years and 50% at five years. Additionally, 2% of patients underwent heart transplantation and 12% experienced heart failure hospitalization. In multivariate analysis, baseline right atrial size, BNP level, and PR interval were independently associated with mortality (p <0.05 for all). The number of macrophages in EMB was associated with overall survival in univariate analysis only. LVRR at one year of follow-up was associated with lower rate of mortality and heart failure hospitalization (p = 0.025).
Conclusions: LVRR occurs in over half of patients with recent onset unexplained DCM during first two years of optimally guided heart failure therapy and then remains relatively stable during five-year follow-up. The reversion of the process of adverse LV remodeling corresponds to a low rate of mortality and heart failure hospitalizations during long-term follow-up.

THE SECURE STUDY, A TRIAL WITH SIGNIFICANT CONTRIBUTION FROM THE CZECH REPUBLIC

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Backgrounds: A polypill with key medications associated with improved outcomes (aspirin, ACE inhibitor, and statin) has been proposed as a simple approach to the secondary prevention of cardiovascular (CV) death and complications after myocardial infarction (MI). This strategy was tested in the SECURE trial which results were recently presented. The Czech Republic was a part of the consortium of 11 European research institutions conducting the trial.
Methods: Patients with MI within the previous 6 months were assigned to a polypill-based strategy or usual care. The polypill arm consisted of aspirin (100 mg), ramipril (2.5, 5, or 10 mg), and atorvastatin (20 or 40 mg). The primary composite outcome was CV death, nonfatal type 1 MI, nonfatal ischemic stroke, or urgent revascularization. The secondary endpoint was a composite of previous except urgent revascularization.
Results: 2499 patients were followed for a median of 36 months. The Czech Republic enrolled 174 subjects in the trial from 9 participating centers. A primary-outcome event occurred in 118 of 1237 patients (9.5%) in the polypill group and in 156 of 1229 patients (12.7%) in the usual-care group (HR, 0.76; 95% CI; p = 0.02). The secondary-outcome occurred in 8.2% in the polypill group and 11.7% in the usual-care group (HR, 0.70; 95% CI, p = 0.005). Medication adherence was higher in the polypill group. Comparison of the Czech cohort to other countries did not show significant difference in all prespecified outcomes.
Conclusions: Treatment with a polypill after MI resulted in a significantly lower risk of major adverse CV events. We are happy that the Czech Republic was an active part of this trial and was able to significantly contribute to its positive results.

Ref.: Castellano JM et al. Polypill Strategy in Secondary Cardiovascular Prevention. N Engl J Med 2022;387:967–977.

IN VITRO ASSESSMENT OF ANTI-INFLAMMATORY AND CYTOTOXICITY PROPERTIES OF COLCHICINE

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Inflammation plays a substantial role in the process of atherosclerosis. The key players are monocytes transformed to macrophages and coronary artery endothelial cells. Limited anti-inflammatory drugs are currently available – antibodies for IL-1 (CANTOS) and colchicine (COLCOT, LoDoCo-2 trial). Here, we describe the molecular mechanism of colchicine downregulation of inflammation processes in connection to its cytotoxic effects on treated cells.
Human coronary artery endothelial cells (HCAEC) were polarized toward M1 pro-inflammatory phenotype responsible for production of IL-6. The production of IL-6 was negated by addition of colchicine in dose-dependent manner. 13.4±0.8 mg/L of colchicine decreased the production of IL-6 by 50% in HCAEC cells.
Similarly, human monocytic cell line THP-1 was differentiated into macrophages by incubation in the pres-

ence of phorbol-12-myristate-13-acetate, which leads to a macrophage-like phenotype characterized by changes in morphology and adhesion. In concentrations higher than 7.5 mg/L, colchicine significantly increased the production of TNFα and IL-6 indicating induction of stress conditions and production of inflammatory markers by macrophages.
Colchicine did not show direct cytotoxicity against HCAEC or THP-1 (24h treatment) even at the highest tested concentration of 100 mg/L, but induced the expression of nephrotoxic markers in human renal tubular epithelial kidney cells.
In summary, our in vitro results show the potential of colchicine to reduce inflammation in coronary artery endothelial cells, but at the same dose, colchicine induces stress conditions and an inflammatory environment in monocytes. At the same time, it is necessary to draw attention to the nephrotoxic effects of colchicine.

ROLE OF MYOCARDIAL DEFORMATION ANALYZED BY 3D ECHOCARDIOGRAPHY IN FABRY DISEASE

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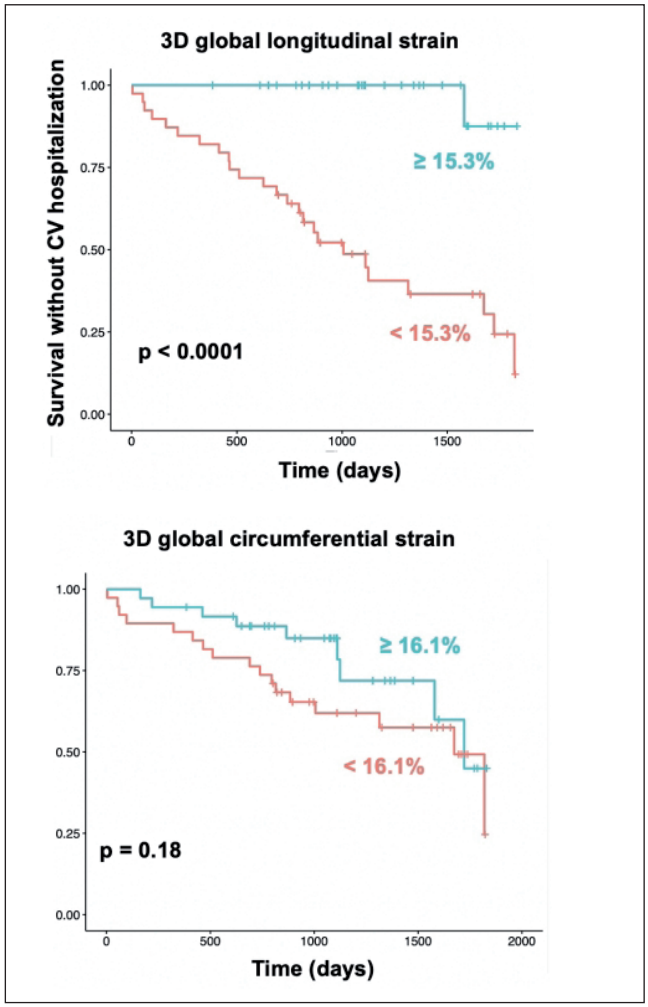
Introduction: Fabry disease is a multisystemic lysosomal storage disorder caused by a defect in the gene coding the alpha-galactosidase A enzyme. Cardiac involvement typically manifests as a phenocopy of hypertrophic cardiomyopathy. Three-dimensional echocardiography can analyze myocardial deformation of the LV in both circumferential and longitudinal dimensions. Our goal was to assess the role of 3D deformation in relation to heart failure severity and long-term prognosis.
Methods: We analyzed data from 75 patients. 3D echocardiography was acquired using GE Vivid 9 and E95 machines. Death and all-cause cardiovascular hospitalizations over a median follow-up of 3.1 years were assessed.
Results: Average age was 47±14 years and 44% of patients were male. Overall, 51% of patients had hypertrophy or concentric remodeling of the LV. Average EF was 65±6% and two patients had EF <50%. Average value of 3D GLS and GCS was 15±5 % and 16±4%, respectively.
A stronger correlation was observed for NT-proBNP with 3G GLS (r = 0.49, p <0.0001) while correlation with 3D GCS was also significant, but weaker (r = 0.38, p <0.001). Ejection fraction by 3D was weakly correlated with NT-proBNP (r = 0.25, p = 0.036).
In the long-term follow-up, 3D GLS was significantly associated with long-term outcome (HR 0.79, CI 0.72–0.87, p < 0.0001, log rank p < 0.0001) while 3D GCS was borderline associated and only as a continuous variable (HR 0.87, CI 0.77–0.98, p = 0.0183, log rank p = 0.18). 3D EF was not associated with long-term outcome (p = 0.42 and 0.92).
Conclusion: 3D GLS was strongly associated with HF severity measured by natriuretic peptides and long-term prognosis. Only borderline association of 3D GCS and no association of EF with prognosis was observed. Longitudinal deformation analysis remains important for assessment of LV function in Fabry disease.



ABSENCE OF HEART RATE VARIABILITY CHANGE DURING FOLLOW-UP AFTER COVID-19 DOESN'T SUGGEST DIRECT CARDIOVASCULAR IMPACT

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Objective: To evaluate the need for cardiac monitoring of unselected patients recovered from COVID-19 and to estimate the risk of development of arrhythmias after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).
Results: Presence of significant pathology detected was rare (one paroxysmal atrial fibrillation in 73-year-old woman with dilated left atrium; 71-year-old man

with atrioventricular blockade with indication for implantation of the pacemaker, when cardiac MRI didn't find any signs of myocardial inflammation. After evaluation both were not related to previous SARS-CoV-2 infection.
During one-year follow-up after COVID-19 infection there was no change in heart rate variability evaluated by SDNN (V_1 vs V_3 156.6±40.6 vs 156,0±38.0; p = 0.855), rMSSD (V_1: 33±13.95 to 30.6±12.89; p = 0.175) and triangle (V_1: 28.5±7.8 to 29.5±8.8; p = 0.488). Dividing heart rate oscillations into low-frequency (LF), and high-frequency (HF) bands, we have found statistically significant changes between V_1 a V_3 for LF (718±433.7 to 646±361; p = 0.024) and HF (341.5±335 to 268.0±266; p = 0.032). These parameters are mostly affected by breathing rate and are representing possible autonomic dysregulation (HF/LF ratio).
Conclusion: Despite many information regarding cardiac impairment of SARS-CoV2 our study does not suggest an increased risk of development of arrhythmias after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) even in a population with high proportion of ongoing symptomatology. Some findings may suggest autonomic dysfunction after COVID-19. Based on our results the routine ECG monitoring is currently not recommended after COVID-19 recovery.

TUMOR NECROSIS FACTOR-RELATED APOPTOSIS-INDUCING LIGAND (TRAIL) IS ASSOCIATED WITH CARDIAC INJURY AND STROKE SEVERITY IN PATIENTS AFTER ACUTE ISCHEMIC STROKE

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Stroke is accompanied by pathological disturbances leading to autonomic dysfunction and systemic inflammation. Tumor necrosis factor-related apoptosis-inducing ligand (TRAIL) is a protein involved in several pathological conditions including cardiovascular diseases. We aimed to assess TRAIL level dynamic changes and its relation to stroke severity, impact on short-term outcome and association with markers of cardiac injury in patients after acute ischemic stroke (AIS).
In our study 104 patients after AIS were enrolled. Blood samples were obtained from patients at the time of admission, 24 and 48 hours later to determine level of TRAIL, NT-proBNP, and hs-TnI. Twelve lead ECG at admission, 24, 48 hours later were obtained. Neurological examination including NIHSS at admission and modified Rankin Scale (mRS) at 90 days following the patient's discharge from the hospital were performed.
In the results we observed association between lower TRAIL and NT-proBNP elevation at admission, after 24 and 48 hours of hospitalization and there was negative association between TRAIL and hs-cTnI at admission. Moreover, we observed a connection between lower TRAIL and stroke severity evaluated by NIHSS on first day. Lower TRAIL showed significant association with severe disability and death evaluated by mRS at 90 days both after 24 and 48 hours of hospitalization. Lower TRAIL was associated with the occurrence of PVCs and prolonged QTc interval.
Our study showed that lower TRAIL is associated with stroke severity, unfavorable functional outcome and short term mortality in patients after acute ischemic stroke. Moreover, we described association with markers of cardiac injury and ECG changes. It is necessary to distinguish whether these abnormalities presenting in stroke patients are caused by coexisting ischemic heart disease or by brain injury directly.

ACUTE SEVERE HEART FAILURE IMMEDIATELY REDUCES HEART RATE VARIABILITY: AN EXPERIMENTAL STUDY IN PORCINE MODEL

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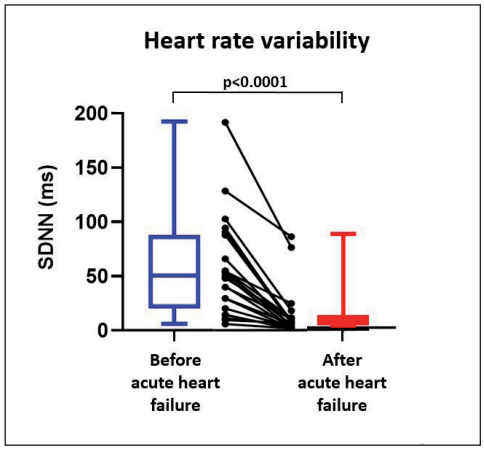
Background: There are substantial differences in autonomic nervous system activation among heart failure (HF) patients and immediate effect of acute HF on autonomic function is not fully understood.
Objective: The aim our study was to assess the effect of experimental acute HF on heart rate variability (HRV).
Materials and methods: Twenty-four female swine of mean body weight 45 kg were used. Acute severe HF was induced by global myocardial hypoxia. In each subject,



two 5-minute electrocardiogram segments were analyzed and compared: before the induction of myocardial hypoxia and >60 min after the development of severe HF. HRV was assessed by time-domain, frequency-domain and nonlinear analytic methods.
Results: Induction of acute HF led to significant decrease in cardiac output, left ventricular ejection fraction and rise in heart rate. Development of acute HF was associated with a significant reduction of standard deviation of intervals between normal beats (50.8 [20.5–88.1] ms vs. 5.9 [2.4–11.7] ms, $p < 0.0001$) – Figure 1. Highly significant a uniform reduction of HRV was observed also in other time-domain and main nonlinear analytic methods. Similarly, frequency-domain HRV parameters were significantly changed.
Conclusion: Acute severe HF induces an immediate reduction in HRV.

EXCESS ISCHEMIC TACHYARRHYTHMIAS TRIGGER PROTECTION AGAINST MYOCARDIAL INFARCTION IN HYPERTENSIVE RATS

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Increased level of C-reactive protein (CRP) is a risk factor for cardiovascular diseases, including myocardial infarction and hypertension. Here, we analyze the effects of CRP overexpression on cardiac susceptibility to ischemia/reperfusion (I/R) injury in adult spontaneously hypertensive rats (SHR) expressing human CRP transgene (SHR-CRP). Using an in vivo model of coronary artery occlusion, we found that transgenic expression of CRP predisposed SHR-CRP to repeated and prolonged ventricular tachyarrhythmias. Excessive ischemic arrhythmias in SHR-CRP led to a significant reduction of infarct size (IS) compared with SHR. The proarrhythmic phenotype in SHR-CRP was associated with altered heart and plasma eicosanoids, myocardial composition of fatty acids in phospholipids, and autonomic nervous system imbalance before ischemia. To explain unexpected IS-limiting effect in SHR-CRP, we performed metabolomic analysis of plasma before and after ischemia. We also determined cardiac ischemic tolerance in hearts subjected to remote ischemic perconditioning (RIPer) and in hearts ex vivo. Acute ischemia in SHR-CRP markedly increased plasma levels of multiple potent cardioprotective molecules that could reduce IS at reperfusion. RIPer provided IS-limiting effect in SHR that was comparable with myocardial infarction observed in naïve SHR-CRP. In hearts ex vivo, IS did not differ between the strains, suggesting that extra-cardiac factors play a crucial role in protection. Our study shows that transgenic expression of human CRP predisposes SHR-CRP to excess ischemic ventricular tachyarrhythmias associated with a drop of pump function that triggers myocardial salvage against lethal I/R injury likely mediated by protective substances released to blood from hypoxic organs and tissue at reperfusion.

IDENTIFICATION OF PLASMATIC MICRORNAS ASSOCIATED WITH PULMONARY EMBOLISM IN PATIENTS WITH ACUTE-ONSET DYSPNEA – PILOT RESULTS

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Introduction: Acute-onset dyspnea represents one of the most common reasons for evaluation of the patient at the emergency departments. Differential diagnostics of acute-onset dyspnea requires thorough physical and paraclinical examination. To establish the diagnosis of pulmonary embolism (PE), there is currently no enough sensitive and specific biomarker and diagnosis needs to be confirmed by CT pulmonary angiography (CTPA). Circulating microRNAs (miRNAs, miRs) represents an intriguing group of biomarkers that were shown to be altered between healthy individuals and PE patients. Aim of the current study was to identify miRNAs distinguishing dyspneic patients with and without PE.
Methods: 28 consecutive patients with acute onset dyspnea suspected of having PE based on clinical exam and lab testing were enrolled. Patients underwent CTPA to confirm (n = 17) or exclude (n = 11) PE. Prior CTPA, all patients signed informed consent and then underwent blood sampling into EDTA tubes. Plasma was separated and total RNA was isolated using miRNeasy Serum/Plasma Kit®. Seven samples were used for next-generation sequencing on Illumina NextSeq 550 (n = 4 CTPA-confirmed PE and n = 3 CTPA-excluded PE). Sequencing data were analyzed in R with DESeq2 and EdgeR packages.
Results: 975 miRNAs were identified in the plasmatic samples. Levels of 50 miRNAs were shown to be altered between patients w/o PE (unadjusted *p*-value <0.05). Out of

these, five miRNAs presented total number of reads >200 and the fold change >0.5, which makes them potential PE biomarkers: miR-155-5p, -625-3p, -7-5p, -29a-3p, and -361-3p.
Conclusion: We have identified a group of 5 plasmatic miRNAs whose levels differ between patients with acute onset dyspnea with CTPA confirmed or excluded PE. Validation on independent large set of patients is now pending to confirm their potential diagnostic utility.

L-LACTATE AND ISCHEMIA-MODIFIED ALBUMIN AS MARKERS OF INTESTINAL ISCHEMIA AFTER ABDOMINAL AORTIC SURGERY

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Introduction: Postoperative intestinal ischemia (PII) is a severe complication in abdominal aortic surgery. Early diagnosis is needed to commence the treatment while the ischemia is reversible. The aim of the study was to evaluate the diagnostic accuracy of L-lactate and ischemia-modified albumin (IMA) for PII detection.
Methods: We have conducted a prospective non-randomized observational cohort study in eighty patients (62 men and 18 women) with a mean age of 68.0±8.4 years undergoing elective aortic surgery. We took blood samples at precisely defined time points in relation to the surgical procedure. The primary method for intestinal ischemia detection was contrast-enhanced magnetic resonance enterocolography.
Results: We recorded six cases of PII (7.5%). Both markers had different postoperative kinetics. L-lactate was the more accurate marker in all clinically relevant postoperative time points. Postoperative kinetics showed that we must always consider the blood sampling time in relation to the procedure for proper interpretation. L-lactate proved the highest accuracy, sensitivity, and negative predictive value 24 hours after the declamping of the reconstruction. However, specificity and positive predictive value were lower. The combination of the most accurate timepoints of both markers led to an increase in specificity and positive predictive value.
Conclusion: Based on our results, the postoperative levels of L-lactate might help to detect PII if proper time points are used. IMA is a worse marker compared to L-lactate. Its value might be in the combination with other markers to improve the accuracy of prediction. Our data must be confirmed in larger studies.
This study was supported by the Ministry of Health of the Czech Republic, grant no. 17-29701A.

STRESS PULMONARY CIRCULATION PARAMETERS IN PATIENTS AFTER A HEART TRANSPLANT AND CANCER SURVIVORS: A CARDIOVASCULAR MAGNETIC RESONANCE STUDY

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Background: Pulmonary circulation parameters such as pulmonary transit time (PTT), heart rate corrected PTT (PTTc) and pulmonary transit beats (PTB) can be evaluated using several methods, including the first-pass perfusion from cardiovascular magnetic resonance. Up to 58% of patients after HTx have diastolic dysfunction detectable only in stress conditions. By using adenosine stress perfusion images, stress analogues of the mentioned parameters can be assessed. By dividing stress to rest biomarkers, potential new ratio parameters (PTT ratio and PTTc ratio) can be obtained.
The objectives were to provide more evidence about stress pulmonary circulation biomarkers, present stress to rest ratio parameters, and assess these biomarkers in patients with presumed diastolic dysfunction after heart transplant (HTx) and in childhood cancer survivors (CCS) without any signs of diastolic dysfunction.
Methods: In this retrospective study, 48 patients after HTx, divided into subgroups based on echocardiographic signs of diastolic dysfunction (41 without, 7 with) and 39 CCS were enrolled.
Results: PTT in rest conditions were without significant differences when comparing the CCS and HTx subgroup without diastolic dysfunction (4.96±0.93 s vs. 5.51±1.14 s, p = 0.063) or with diastolic dysfunction (4.96±0.93 s vs. 6.04±1.13 s, p = 0.13). However, in stress conditions, both PTT and PTTc were significantly lower in the CCS group than in the HTx subgroups, (PTT: 3.76±0.78 s vs. 4.82±1.03 s, p <0.001; 5.52±1.56 s, p = 0.002). PTT ratio and PTTc ratio were below 1 in all groups.

Conclusions: Stress pulmonary circulation parameters obtained from CMR showed prolonged PTT and PTTc in HTx groups compared to CCS, which corresponds with the presumption of underlying diastolic dysfunction. The ratio parameters were less than 1.

EFFECT OF VENOARTERIAL EXTRACORPOREAL MEMBRANE OXYGENATION ON LEFT VENTRICULAR FUNCTION IN CARDIOGENIC SHOCK WITH AORTIC STENOSIS OR MITRAL REGURGITATION: AN EXPERIMENTAL STUDY IN PORCINE MODEL

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Background: Venoarterial extracorporeal membrane oxygenation (VA-ECMO) is widely used in the treatment of cardiogenic shock (CS). However, increased VA-ECMO blood flow (EBF) may significantly impair left ventricular (LV) performance. The objective of the present study was to assess the effect of VA-ECMO on LV function in acute CS with concomitant severe aortic stenosis (AS) or mitral regurgitation (MR) in a porcine model.
Methods: Eight female swine underwent VA-ECMO implantation and acute CS was induced by global myocardial hypoxia. Subsequently, severe AS was simulated by obstruction of the aortic valve, while severe MR was induced by mechanical destruction of the mitral valve. LV performance variables were measured at different rates of EBF rates (ranging from 1 to 4 L/min), using LV pressure-volume catheter. Data are expressed as median (interquartile range).
Results: In severe AS, increasing EBF from 1 to 4 L/min was associated with a significant elevation in mean arterial pressure (MAP), from 33.5 (24.2–34.9) to 56.0 (51.9–73.3) mmHg (p <0.01). However, LV volumes (end-diastolic, end-systolic, stroke) remained unchanged, and LV end-diastolic pressure (LVEDP) significantly decreased from 24.9 (21.2–40.0) to 19.1 (15.2–29.0) mmHg (p <0.01). In severe MR, increasing EBF resulted in a significant elevation in MAP from 49.0 (28.0–53.4) to 72.5 (51.4–77.1) mmHg (p <0.01); LV volumes remained stable and LVEDP increased from 17.1 (13.7–19.1) to 20.8 (16.3–25.6) mmHg (p <0.01).
Conclusion: Results of this study indicate that the presence of valvular heart disease may alleviate negative effect of VA-ECMO on LV performance in CS. Severe AS fully protected against LV overload, and partial protection was also detected with severe MR, although at the cost of increased LVEDP and, thus, higher risk for pulmonary edema.

CARDIAC TOLERANCE TO ISCHEMIA: DEVELOPMENTAL AND SEX DIFFERENCES

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Keywords: Neonatal heart, female heart, ischemia/reperfusion injury, cardiac ischemic tolerance, mitochondrial permeability transition pore

Age and sex play essential role in the cardiac tolerance to ischemia/reperfusion (I/R) injury: cardiac resistance significantly decreases during postnatal maturation and female heart is more tolerant as compared with the male myocardium.[1] The mechanisms of the high tolerance of the neonatal and female hearts have not yet been satisfactorily clarified. Some recent data indicate that mitochondria could play an important role in this effect. It is widely accepted that mitochondrial dysfunction and particularly mitochondrial permeability transition pore (MPTP) opening plays a major role in determining the extent of cardiac I/R injury. We have observed that the MPTP sensitivity to the calcium load differs in mitochondria isolated from neonatal and adult myocardium as well as from adult male and female hearts. Neonatal and female mitochondria are more resistant both in the extent and in the rate of mitochondrial swelling induced by high calcium concentration. Our data further suggest that age- and sex-dependent specificity of the MPTP is not the result of different amounts of ATP synthase and cyclophilin D (CypD): neonatal and adult hearts, similarly as the male and female hearts contain comparable amount of MPTP and its regulatory protein CypD.[2,3] We can speculate that the lower sensitivity of MPTP to the calcium induced swelling may be related to the higher ischemic tolerance of both neonatal and female myocardium.[4]

HOME BLOOD PRESSURE TELEMONITORING (HBPTM) WITH CONCURRENT MEASUREMENT OF PHYSICAL ACTIVITY COMPARED TO DAYTIME AMBULATORY BLOOD PRESSURE MONITORING (ABPMD) – HOW ARE THE RESULTS OF APPLIED RESEARCH USED?

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Objective: Despite the comparability of both methods in majority of cases (ESH 2021), physicians do not trust their patients to measure their BP correctly. The aim of this study was to ascertain that the BP measurements (BPM) are consistent and reliable.
Design and method: We enrolled 144 treated patients with essential hypertension aged 24–85 years (60% males) – all considered by their physicians as well controlled. The therapy was not changed during this study.
Mean week cycle systolic BP (SBP) of HBPTM (BP monitor Fora P30+, mobile phone for data transfer) at the beginning and end of 3 months study (triplets of BPM in morning and evening) and mean SBP of ABPMD (SEIVA TonoTrack) were compared. The required 5 minutes of physical inactivity before BPM were checked in by Xiaomi MiBand 2 smart wristbands. BP and HR values were accessible to patients and their physicians on a secure server. The data were evaluated using a linear mixed model.
Results: The values of SBP in both HBPTM and ABPMD remained steady during the trial. The mean SBP of ABPMD was consistently higher by approximately 3 mmHg compared to the mean SBP of HBPTM both at the beginning (134.5±10.6 vs. 130.7±9.4 mmHg) and the end (133.0±11.0 vs. 129.7±10.6 mmHg), p <0.001.
Diani telemedicine system enables recording of all BPM with the marked insufficient rest before BPM, a calculation of week total, morning and evening mean BP with export of logbook in pdf, a day profile with BPM each hour to detect hypotension. It is easy to browse through week cycles of HBPTM, to record patient troubles and therapy changes. The system reports occurrence of arrhythmia by e-mail and voice evaluation of actual BPM.
Conclusions: Our results suggest that HBPTM is comparable to ABPMD. HBPTM is suitable for long-term BP follow-up and is technically sound. Questions around regulations and financing remain to be resolved.

DUAL CARDIOMYOCYTE CLUSTER ARRHYTHMIAS DETECTED BY ATOMIC FORCE MICROSCOPY

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Single cardiomyocytes (CMs) present unstable beating patterns, partially compensated in a clustered syncytium. We have proposed and tested a novel biosensor utilizing two clusters of cardiomyocytes for advanced detection of cardiac arrhythmias and subsequent drug testing.
Methods: hESC's clusters were differentiated into spherical CMs syncytium. Two such spheres were seeded on adherent plates in the vicinity and within four days spontaneously formed electrically connected syncytium resembling the human myocardium and its conductive system. Contraction of twin clustered spontaneously synchronized by day 4. The Atomic Force Microscope (AFM) vertical deflection enabled measurement and calculation of absolute cardiomyocyte contraction force,[1] while lateral force measurement was tracking synchronized or independent contraction behavior of twin clusters.[2] Caffeine induced arrhythmia as a model drug.[3] After its administration subsequent beating patterns were monitored by AFM lateral force recording and calcium fluorescence imaging as a reference method for describing non-synchronized contractions of cardiomyocytes. Caffeine increased the beat rate of the syncytium. This was reflected by both the change in vertical and lateral deflection. A significant increase in standard deviation was observed immediately after caffeine injection for both the lateral and the vertical deflection.
Results: Caffeine affected the synchronization of vertical and lateral displacement of the AFM cantilever, characteristic of independent lateral and vertical deflections, interpreted as defects in signal spreading through the bridge resulting in the irregular beat of the two clusters.

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DUCHENNE MUSCULAR DYSTROPHY: CARDIAC PHENOTYPE AS A RESULT OF DNA DAMAGE-INDUCED CHANGE OF STEM CELL FATE

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Duchenne muscular dystrophy (DMD) is caused by impaired dystrophin. Majority of the DMD patients suffer from cardiomyopathy, arrhythmias, and heart failure is the predominant cause of death. However, many works showed the molecular mechanisms leading to the DMD cardiomyocyte death during recent decades, and the delayed onset of progressive cardiomyopathy is still unclear. Recently the involvement of progenitor population failure destabilizing muscle homeostasis was implicated and inducing progressive muscle wasting. DMD patient-specific induced pluripotent stem cell model and human embryonic stem cells with dystrophin mutation introduced by CRISPR/Cas technology (DMD hPSC for both models) were used to uncover the involvement of cardiac progenitor cells (CPCs) depletion and its mechanism in humans to cardiac failure. The absence of dystrophin in DMD hPSC resulted in dysregulation of nitric oxide synthase (NOS), which in turn spiked the excessive release of reactive oxygen species (ROS). We show that ROS are associated with increased DNA damage and elevated mutant frequency in DMD hPSCs. Scavenging the ROS and/or inhibition of NOS resulted in DNA damage reduction. Contrary to WT mouse hearts was observed a dramatic increase in CPCs population in young adult (2–3 months) MDX mice hearts is followed by a steep decrease in mature animals. CPCs depletion in MDX animal hearts is associated with elevated nuclear DNA damage.
The elevated proliferation of CPCs together with NOS induced-ROS mediated-genomic instability leads to CPCs depletion, and subsequently to limited ability to maintain homeostasis of the heart muscle.

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THE USE OF TELEMEDICINE IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION – A PILOT STUDY

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Background: Pulmonary arterial hypertension (PAH) is a rare disease whose treatment is concentrated in specialized treatment centers. The severity of the disease and the specific pharmacotherapy used require the need for intensive monitoring of health status and ongoing treatment. Telemedicine solutions open the way to new possibilities for monitoring patients and optimizing treatment to improve quality of life and prognosis. The available evidence for the application of telemedicine in PAH is still limited.
Study design and methods: A total of 24 patients with pulmonary arterial hypertension were enrolled in a prospective, non-randomized study. Patients were divided 1:1 to standard care and use of telemedicine intervention. The telemedicine intervention included regular use of a dedicated mobile phone/tablet app with measurement of vital signs by an external device (blood pressure, heart rate, oxygen saturation, body weight), as well as the possibility of use video consultation, messaging, sending photos and other files. After 6 months of intervention, the incidence of rehospitalization for worsening PAH, natriuretic peptides (NT-proBNP) levels and quality of life measured by questionnaires (LPH, GSE, Beck scale) were compared.
Results: In the telemedicine group, there was a trend towards a nonsignificant decrease in natriuretic peptide levels (NT-proBNP: –135.7 ng/l in telemedicine group vs. +100.87 ng/l in control group; p = 0.25) and a significant improvement in quality of life parameters assessed by the questionnaire (LPH: –18 vs. +2; p <0.05; GSE +8 vs. 0; p <0.05). No difference in rehospitalizations was observed between the two groups.
Conclusions: This study demonstrated the feasibility of telemedicine intervention in patients with pulmonary arterial hypertension and the improvement of quality of life parameters using this intervention.

GENDER DIFFERENCES AND SURVIVAL AFTER OUT OF HOSPITAL CARDIAC ARREST

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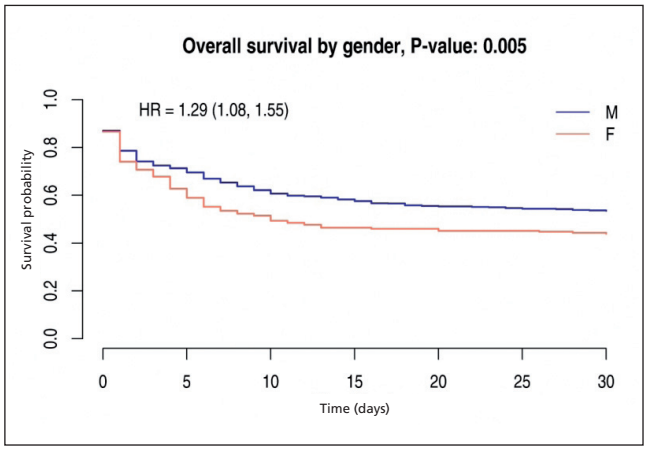
Background: Published evidence regarding the effect of gender on outcome after out of hospital cardiac arrest (OHCA) is inconsistent. We aimed to investigate the association of gender to outcome and resuscitation characteristics in OHCA patients admitted to the cardiac arrest center.
Methods: In this analysis of registry data, all patients admitted for OHCA were included. The influence of gender on 30-day survival and good neurological outcome (cerebral performance category of 1 or 2) were examined using Kaplan–Meier estimates and multivariable logistic regression.
Results: In total, 932 patients were analyzed (239 women, 26%). Women were older (64 vs 60 years, p <0.001) and less commonly had a shockable rhythm (47% vs 65%,



p <0.001) compared to men. Women were less likely to have a cardiac cause of arrest (54% vs 75%, p <0.001), received less therapeutic hypothermia (74% vs 86%, p <0.001) and coronary angiography (63% vs 79%, *p* <0.001). The overall 30-day survival was lower for women (45% vs 53%, log-rank *p* = 0.005) as well as good neurological outcome (37% vs 46%, *p* = 0.008). However, according to the multivariate logistic regression, gender was not associated with survival (OR 0.98, 95% CI 0.65–1.50, *p* = 0.94) nor with good neurological outcome (OR 0.91, 95% CI 0.59–1.40, *p* = 0.67).
Conclusions: Women admitted for OHCA to a cardiac center had a different cause of arrest that had a different treatment and outcome compared to men. Survival and good neurological outcome were lower in women; however, after adjusting for baseline characteristics, gender was not associated with survival nor neurological outcome.

HEART FAILURE IN FABRY DISEASE REVISITED: APPLICATION OF CURRENT HEART FAILURE GUIDELINES AND RECOMMENDATIONS

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Aims: Fabry disease (FD) is often associated with heart failure (HF). However, data on HF prevalence, prognosis, and applicability of echocardiographic criteria for HF diagnosis in FD remain uncertain.
Methods: We evaluated patients with FD for symptoms and natriuretic peptides indicating HF. Then we analyzed the diagnostic utility of the currently recommended echocardiographic criteria for HF diagnosis and their relationship to natriuretic peptides. Finally, we examined the association between HF and echocardiographic criteria with clinical events during follow-up.
Results: Of 116 patients with FD, 47 (41%) had symptomatic HF (58±11 years, 62% male). HF with preserved ejection fraction (HF-pEF) was diagnosed in 43 (91%) patients. Left ventricular mass index (LVMi) had the highest diagnostic utility (sensitivity 71% and specificity 83%) for HF diagnosis, followed by E/e' >9 (sensitivity 76% and specificity 78%) and global longitudinal strain (GLS) <16% (sensitivity 54% and specificity 88%). Natriuretic peptides correlated significantly with LVMi (r = 0.60), E/e' (r = 0.54), and GLS (r = 0.52) (all Ps < 0.001). During follow-up (mean 1208 ± 444 days), patients diagnosed with HF had a higher rate of mortality and worsening HF (33% vs. 1.5%, *p* <0.001). Abnormal LVMi, E/e' >9, and GLS <16% were all associated with higher all-cause mortality and worsening HF.
Conclusions: This study found a high prevalence of HF in FD. HF-pEF was the dominant phenotype. LVMi, E/e', and GLS yielded the highest diagnostic utility for HF diagnosis and were correlated with natriuretic peptides levels. Echocardiographic criteria proposed by current guidelines apply to Fabry patients and predict future events. Fabry patients with HF had high event rates and significantly worse prognosis than patients without HF.

FEASIBILITY OF EVALUATION OF POLAR H10 CHEST-BELT ECG IN PATIENTS WITH A BROAD RANGE OF HEART CONDITIONS

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Background: The chest-belt can be used to obtain a 1-lead ECG. It was validated for the determination of heart rate and for the possibility to detect atrial fibrillation (AF) compared to ECG-Holter on a short ECG recording in selected patients. Validation of the possibility to evaluate long ECG recordings in patients with heart diseases has not been done.
Methodology and results: 54 hospitalized patients, 53 outpatients and 54 healthy controls were enrolled in the study (n = 161 in total). Using a Polar H10 chest-belt, 1–2 hours of ECG were recorded in all patients (1 153 229 heartbeats, average heart rate 76.6/min, 86.3% in sinus rhythm, 13.7% with atrial fibrillation, 0.46% atrial premature beats, 0.49% ventricular premature beats). The presence of noise was 2.16% (A: 2.31%; B: 1.95%; C: 2.20%). 1 128 319/1 153 229 were evaluated as easy to interpret. Using ECG from the belt, the basic rhythm was reliably determined by the physician in majority of patients (51/54, 94.4% in hospitalized patients; in 100% of outpatients and healthy controls) when compared to 12-lead ECG. 3 cases were evaluated as unclear; in all of these cases, all QRS complexes were stimulated by a pacemaker. In hospitalized patients, real-time ECG from the belt was comparable to telemetric ECG monitoring (match in 53/54, 98.1%).
Conclusion: The ECG obtained from the chest-belt in hospitalized patients, outpatients and healthy con-

trols is usable for evaluation of baseline rhythm, atrial fibrillation and premature contractions with a minimal proportion of difficulties to interpret recordings due to artefacts. Caution should be exercised in interpretation of the ECG in patients with stimulated rhythm and in patients with atrial flutter. The chest belt can be used as a means for continuous monitoring of ECG, evaluation of rhythm and screening for atrial fibrillation.

COMBINED STRATEGY FOR LARGE-BORE ARTERIOTOMY CLOSURE AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION

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Background: The vascular complications remain relevant following transcatheter aortic valve implantation (TAVI). They are frequently associated with vascular closure device failure (VCD). Their incidence depends on different factors with reported rate between 4–19%. Vascular complications affect morbidity and mortality. The most commonly used VCDs include the suture-based ProGlide and the plug-based MANTA. The MANTA device was not superior to the use of 2 ProGlides in their direct comparison in terms of access site-related vascular complications. The alternative but less frequently used strategy is intentional combination of one suture-based VCD – ProGlide with small-bore plug-based VCD AngioSeal. The data supporting this approach are very limited, but showing lower rate of additional endovascular interventions when compared with vascular closure using two suture-based VCDs.
Methods: Retrospectively analyzed comparison of two strategies: use of two suture-based ProGlides (SB group) vs intentional combination of one ProGlide with plug-based AngioSeal 8F (CB group). The primary endpoint was occurrence of access site-related vascular complications at 30-days.
Results: We compared 71 consecutive patients treated between Aug/2020 and May/2021 with 95 consecutive patients treated between May/2021 and Apr/2022. There wasn't significant difference in patient's characteristics (SB vs. CB group): mean age 81 vs 79 years, females 54.9% vs 52%, STS score 3.47% vs 3.46%, oral anticoagulation 38.6% vs 40.1%. Lower rate of vascular complication was observed in CB group 3.1% vs 7.1%.
Conclusion: The combination of one suture-based VCD with one plug-based VCD is effective and safe. This strategy was associated with lower rate of vascular complication compare the use of 2 suture-based VCDs in our patient's cohort following TAVI.

GDF-15 LEVEL CHANGES IN EARLY AND LATE PERIOD AFTER CATHETER ABLATION OF ATRIAL FIBRILLATION

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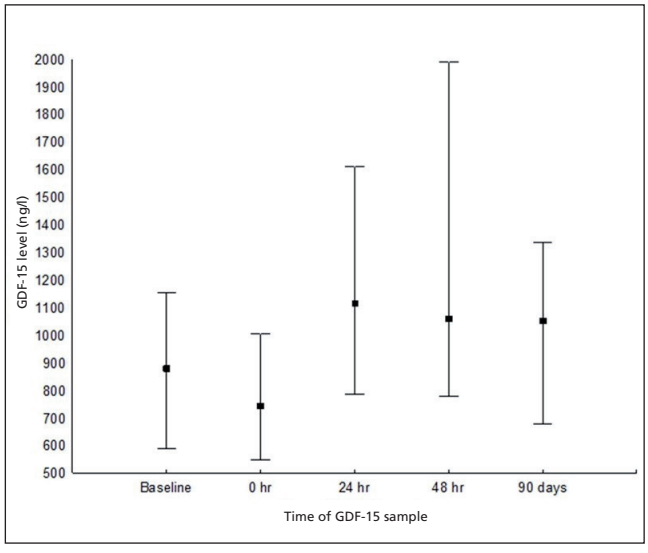
Introduction: GDF-15 (growth differentiation factor 15) is protein from transforming growth factor β (TGF-β) cytokine family. In patients with atrial fibrillation (AF) GDF-15 is a potent marker of bleeding adverse events in anticoagulated patients and a predictor of overal mortality. Aim of the study was to describe how catheter ablation of atrial fibrillation affects GDF-15 levels in early and late period.
Methods: We enrolled 18 patients (median 58 [50; 67] years, 56 % males) undergoing radiofrequency catheter ablation (RFCA) of AF who underwent 5 sequential blood takes (before RFCA – baseline, right after RFCA [0 hr], 24 and 48 hours after RFCA and 90 days after RFCA) to analyze GDF-15 level.
Results: Out of all patients, 9 patients (50%) had paroxysmal and 9 (5 %) persistent AF. Mean (IQR) radiofrequency time was 48 (36; 60) minutes. The dynamics of GDF-15 levels is visualised in Figure. GDF-15 level peak was registered 24 hours after ablation with median (IQR) 1115 (794; 1549) ng/l. After 90 days from ablation there still persisted higher GDF-15 levels in relation to input levels (p <0.05 in all comparisons). Weak corelation (r = 0.6; p <0.05) between peak GDF-15 values and peak NT-proBNP was found.
Conclusion: Even though GDF-15 is considered as a nonspecific biomarker reflecting general condition of patient, the levels are significantly affected by RFCA of AF.



Dynamics of GDF-15 values (median; IQR).

THE HEMODYNAMIC EFFECT OF SIMULATED ATRIAL FIBRILLATION ON LEFT VENTRICULAR FUNCTION

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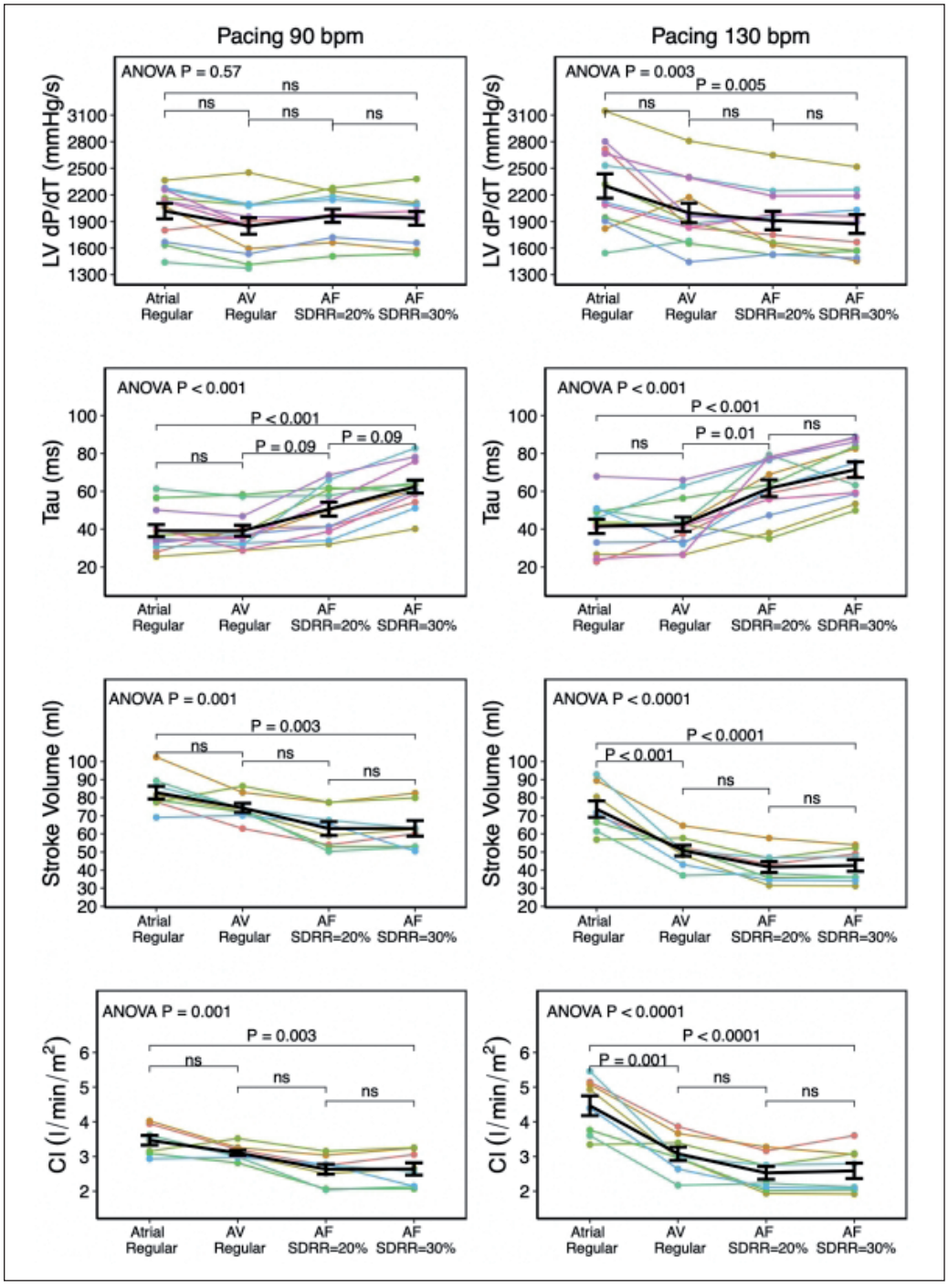
Background: Atrial fibrillation (AF) is the most common sustained arrhythmia in humans. The onset of the arrhythmia can significantly impair cardiac function. This hemodynamic deterioration has been explained by several mechanisms such as the loss of atrial contraction, shortening of ventricular filling, or heart rhythm irregularity. This study sought to evaluate the relative hemodynamic contribution of each of these components during in-vivo simulated human AF.

Methods: Twelve patients undergoing catheter ablation for paroxysmal AF were paced simultaneously from the proximal coronary sinus and the His bundle region according to prescribed sequences of irregular R-R intervals with the average rate of 90 bpm and 130 bpm, which were extracted from the database of digital ECG recordings of



AF from other patients. The simulated AF was compared to regular atrial pacing with spontaneous atrioventricular conduction and regular simultaneous atrioventricular pacing at the same heart rate. Beat-by-beat left atrial and left ventricular pressures including LV dP/dT and Tau index were assessed by direct invasive measurement; beat-by-beat stroke volume and cardiac output (index) were assessed by simultaneous pulse-wave doppler intracardiac echocardiography.
Results: Simulated AF led to significant impairment of left ventricular systolic and diastolic function. Both loss of atrial contraction and heart rate irregularity significantly contributed to hemodynamic impairment. This effect was pronounced with increasing heart rate.
Conclusion: Our findings strengthen the rationale for therapeutic strategies aiming at rhythm control and heart rate regularization in patients with AF.

LEFT BUNDLE BRANCH PACING OF PROXIMAL LEFT BUNDLE BRANCH AND SEPTAL FASCICLE PRODUCES MORE PHYSIOLOGICAL ACTIVATION COMPARED TO PACING OF THE ANTERIOR FASCICLE

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Background: Left bundle branch pacing is defined as the pacing of the trunk or its proximal fascicles. It is unknown, whether a difference between captures with normal or deviated axes and proximal vs distal locations exists.
Objective: To study ventricular activation during nonselective LBB pacing (NSLBBp) in different QRS axes and proximal vs. distal pacing positions using ultra-high-frequency ECG (UHF-ECG).
Methods: NSLBBp captures were classified as superior (–30°; –90°), normal (–29°; 60°), or inferior (61°; 120°) QRS axis and proximal LBBp (LBBpo to ventricular EGM ≥25 ms) vs fascicular LBBp (LBBpo-V <25 ms and corresponding axes for anterior, septal and posterior fascicle). UHF-ECG electrical dyssynchrony parameters: e-DYS (difference between the first and last ventricular activation), local depolarization durations in precordial leads (V_1–V_8d), and their mean value (Vdmean) were calculated.
Results: No difference in any parameters was found in the axes comparison. NSLBBp of anterior fascicle had longer Vd_{mean} (50±2ms) compared to septal and posterior fascicle (45±2ms and 46±1ms with p <0.05 and p = *NS,* respectively) and proximal LBBp (44±1ms; p <0.015).
Conclusion: Although NSLBBp of proximal left bundle branch or septal fascicle produces slightly more physiological activation compared to pacing of the posterior and anterior fascicle, the clinical relevance of this finding is yet unclear.

This work was supported by the Charles University Research program 260530/SVV/2020.

HYPERTRIGLYCERIDEMIC GENE SCORE IN PATIENTS WITH *APOE2/E2* GENOTYPE AS A POSSIBLE PREDICTOR OF FAMILIAL DYSBETALIPOPROTEINEMIA

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Introduction: Familial dysbetalipoproteinemia (FD) is an autosomal recessive (rarely dominant) inherited disorder that is almost exclusively associated with the apolipoprotein E gene (*APOE*). However, only a small proportion of patients with the typical *APOE2/E2* genotype develop phenotype – the mixed dyslipidemia (DLP) – in the context of other metabolic or as yet undescribed genetic factors.
Methods: We screened 71 FD patients and 90 controls (all *APOE2/E2* homozygotes, according the rs429358) for 18 single nucleotide polymorphisms (SNPs) in genes involved in triglyceride metabolism.
Results: Two SNPs were significantly associated with the FD phenotype (rs439401 within APOE and rs964184 within APOA5). An unweighted gene risk score (GRS; sum of risk alleles) was analyzed as a genetic predictor of FD development in patients with the *APOE2/E2* baseline genotype. The unweighted GRS constructed from the 5 strongest SNPs (within the *APOE, APOA5, CFT1, LPL*, and *TYW1B* genes) reliably discriminated between FD and controls (OR 4.97; CI [2.24–11.06], p <0.00003).
Conclusions: Several SNPs, i.e., individual additive genetic factors, were found to influence the development of FD. Thus, unweighted GRS clearly improves the prediction of FD development in *APOE2/E2* homozygotes.

VENTRICULAR ARRHYTMIAS IN PATIENTS WITH IMPLANTED ICD: A POST HOC ANALYSIS OF PRAGUE OHCA TRIAL

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Background: Implantable cardioverter defibrillators (ICD) or cardiac resynchronization therapy (CRT-D) devices are

routinely implanted as a secondary prevention of sudden cardiac death, however, the number and characteristics of ventricular arrhythmias after the secondary prevention implantation has been analyzed rarely. No data are available in patients after refractory out-of-hospital cardiac arrest (OHCA) treated with extracorporeal cardiopulmonary resuscitation (ECPR) methods.
Purpose: The aim is to specify cumulative incidence of malignant arrhythmias during follow-up in survivors of refractory OHCA partially treated with ECPR with later ICD/CRT-D implantation.
Patients and methods: We performed a post-hoc analysis of the ICD interrogation records of patients after refractory OHCA who were originally randomized to either standard care of invasive care (intra-arrest transport, ECPR and invasive assessment) within Prague OHCA trial, and were referred to ICD or CRT/CRT-D implantation.
Results: A total of 31 patients were included in post-hoc analysis. Of these, 17 were randomized to invasive group and 14 to standard resuscitation care. The mean age of the patients in the invasive and standard groups was 55 and 53 years, respectively. 93% and 81% were males with follow-up for 43 and 49 months. 7 and 11 patients had non-sustainable ventricular tachycardia in invasive and standard group (p = 0.09). ICD or CRT-D shocks were observed in 3 patients in the invasive group and in 6 patients in the standard care group (p = 0.12).
Conclusion: Among patients who were randomized to Prague OHCA trial and later underwent ICD or CRT-D implantation, ventricular arrhythmias seemed to be more frequently detect

COMPARISON OF ANGIOGRAPHIC EVALUATION AND HEMODYNAMIC MEASUREMENT OF THE SIGNIFICANCE OF NON INFARCT-RELATED RESIDUAL STENOSIS IN STEMI PATIENTS – SINGLE CENTER EXPERIENCE

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Introduction: Up to 50% of patients with STEMI have >50% stenosis in a major non-infarct related artery. Several studies have evaluated the prognostic value of completion of revascularization using selection based on angiographic evaluation, invasive hemodynamic measurement with fractional flow reserve (FFR) or combined approach.[1–5] In our single center study, we compared subjective angiographic evaluation with invasive hemodynamic measurement.
Methods: We examined 51 patients (62.7±10.2 years) with acute STEMI who had at least one residual (50–90%) stenosis in non infarct-related major coronary artery (excluding left main coronary artery). Overall 65 stenoses (67,9±10,7%) were evaluated angiographically during primary PCI and were recommended for either completion of revascularization or conservative approach taking into consideration stenosis severity, localization of stenosis (proximity) as well as the supplied vascular territory. During subsequent rehospitalization, invasive measurement of hemodynamic significance using FFR was performed and guided the final revascularization strategy (FFR value of ≤0.80 considered significant).
Results: Based on angiographic evaluation, a total of 44 stenoses were recommended for treatment, whereas only 31 stenoses were revascularized based on FFR measurement. Moreover, subjective evaluation and hemodynamic measurement were discrepant in 27 out of 65 (41.5%) stenoses.
Conclusion: We observed weak correlation between subjective angiographic evaluation and invasive hemodynamic measurement. More stents would be used based on angiographic evaluation compared to FFR measurement.

Supported by MH CZ – DRO (FNOl, 00098892).

RADIOFREQUENCY CATHETER DENERVATION OF SINUS NODE BY TARGETTING THE RIGHT ANTERIOR GANGLIONATED PLEXUS: TOWARDS MINIMIZING THE LESIONS SET

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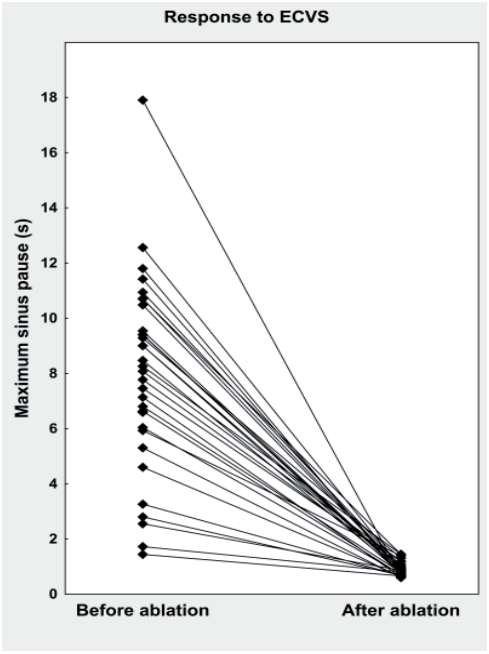
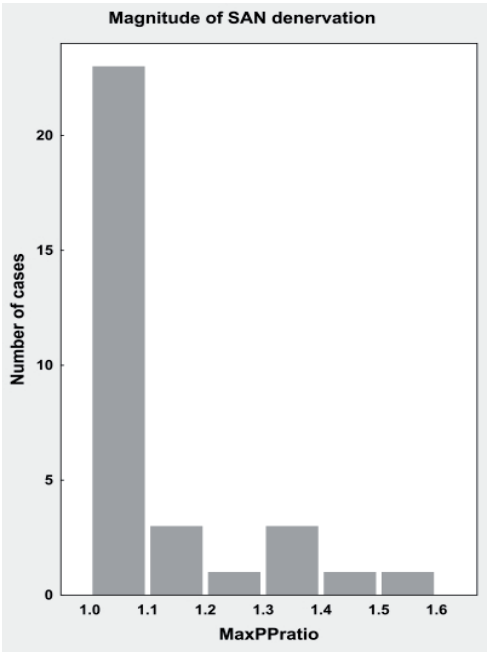
Background: Radiofrequency catheter (RF) ablation of the superior ganglionated plexus (RAGP) that modifies parasympathetic innervation of the sinus node (SAN) is used for the treatment of functional bradyarrhythmias. The RAGP is usually targeted from the endocardial aspect of both the right and left atria.
Objective: To investigate the acute effect of a minimized biatrial set of ablation lesions aimed at denervating the SAN.
Methods: In patients with cardioinhibitory reflex syncope (n = 25) or symptomatic functional sinus bradycardia (n = 7), a minimum of 2 – 2 and a maximum of 2 × 3 RF lesions (at the discretion of the operator) were created from both sides of the superior interatrial septum with a setting of 30 W/30 s and strictly contralateral configuration. The response to extracardiac vagus nerve stimulation (ECVS) was assessed before and after ablation. This response was quantified by the ratio of the maximum induced P-P interval and the cycle length of the current sinus rhythm (MaxPPratio).
Results: In 32 patients (41±13 years, 56% men), ablation of RAGP (2×3 and 2×2 lesions in 23 and 9 patients, respec-





tively) resulted in attenuation of the response to ECVS from 7.9±3.5 s to 0.9±0.2 s (Fig., left panel). After ablation, only 9 patients had MaxPPratio >1.1 and none of the patients had MaxPPratio >1.6 (Fig., right panel). In 6 patients with MaxPPratio >1.3, the extension of original lesions easily suppressed the residual responsiveness of SAN to ECVS.

Conclusion: Biatrial RAGP ablation with a total RF time of 2–3 minutes resulted acutely in virtually complete SAN denervation in 72% of patients. Highly significant, but incomplete SAN denervation in remaining patients was successfully treated by extension of original ablation clusters. The long-term durability of SAN denervation associated with this ablation strategy remains to be investigated.

DETECTION OF ARRHYTHMIAS IN PATIENTS WITH CARDIAC AMYLOIDOSIS USING IMPLANTABLE ECG RECORDERS

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I. interní klinika, FN Olomouc, Olomouc

Introduction: Cardiac amyloidosis frequently results in congestive cardiac failure and arrhythmias,
Methods: 112 transthyretin amyloidosis (TTR) patients with completed underlying diagnosis including 99mTc-DPD scan, genetic testing and endomyocardioal biopsy (27%) without documented arrhythmias were randomized to standard clinical follow-up including arrhythmias or implantation of an ECG loop recorder (ILR). The classic FU took place in a heart failure clinic, and the group of patients with ILR was monitored by remote control with automatic daily report of the occurrence of arrhythmias by an independent organization. If an arrhythmia was detected, the patient was contacted immediately. The mean follow-up time for both groups was 17±7 months.
Results: The results are summarized in Table 1.

Standard FU (n = 56)	Intensive FU (ILR) (n = 55)	*p*
AF 11 (19.6%)	AF 19 (49%)	<0.05
AV block 6 (10.7%)	AV block 11 (20%)	<0.05
Non sust. VT 8 (14.2%) non. sus.	VT 27 (49%)	<0.05
Sust. VT 0	Sust. VT 6 (10.9%)	<0.05
VF 0	VF 1 (1.81%)	<0.05
AT 1 (1.8%)	AT 4 (7.3%)	<0.05

Conclusions: Currently, there is no consensus on the absolute benefit that ICDs in patients with cardiac amyloidosis. When non-sustained VT and syncope are captured and documented, ICD implantation for prevention of SCD in CA is most likely a reasonable approach. However, intensive monitoring of arrhythmias in patients with CA using ILR can lead to accurate and early detection of ventricular arrhythmias in particular and early initiation of ICD treatment as a prevention of SCD. Documentation of ventricular arrhythmias in CA patients was significantly higher by ILR (p <0.005) and was a clear predictor of patient survival (HR 2.51).

BIMODAL DISTRIBUTION OF QRS COMPLEX DURATION IN PATIENTS WITH DILATED CARDIOMYOPATHY UNDERGOING AN ICD IMPLANT PROCEDURE

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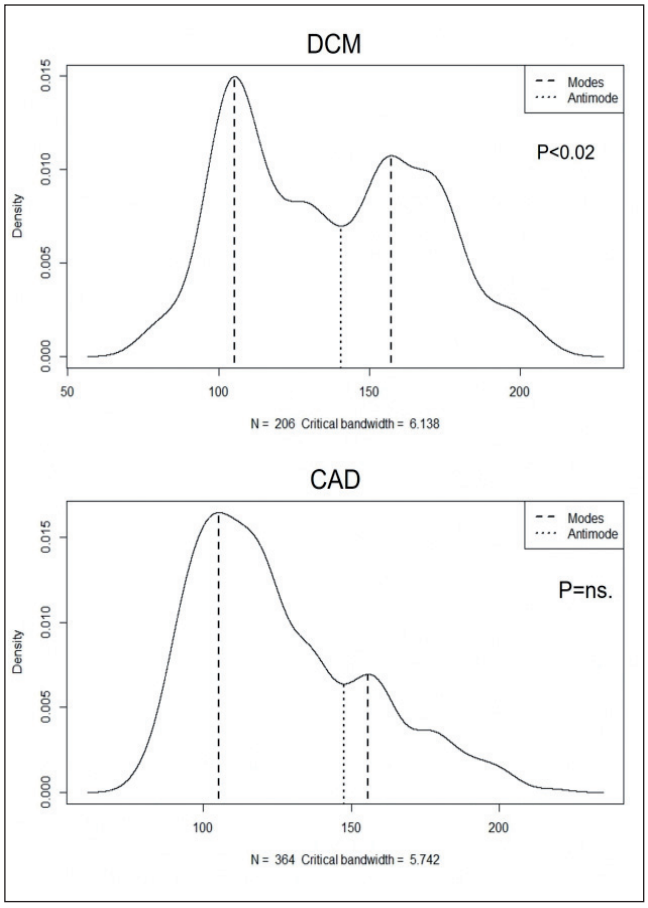
Background: In patients with heart failure with reduced ejection fraction (HFrEF), QRS duration is of the utter-



most importance. Substantial proportion of patients with HFrEF and sufficiently prolonged QRS complex, especially those with left bundle branch block may significantly benefit from cardiac resynchronization therapy. The aim of the study was to analyse the distribution of the QRS durations in patients with HFrEF undergoing ICD implant procedure to better understand the phenomenon of QRS prolongation.

Methods: All patients with HFrEF caused by coronary artery disease (CAD) or dilated cardiomyopathy (DCM) undergoing the implant procedure in our center between January 2013 and December 2021 were analyzed for the inclusion into the study. The exclusion criteria were (1) coincidence of CAD with DCM, (2) upgrade from any other cardiac rhythm management device, (3) unavailability of the ECG recording on ECG recording on Mortara ELI350 or ELI380 (4) more than one ventricular premature beat in the recording. The study used automatically measured QRS duration using the EKG machine.

Results: The study included 570 patients, 206 with DCM and 364 with CAD. All patients taken together had tendency to bimodal distribution of QRS duration ($p = 0.052$). In CAD patients, the distribution was unimodal (p = ns.), whereas the DCM group had bimodal distribution ($p < 0.02$). The border zone between both distributions was at 134–137 ms (no patient with QRS 135–136 ms). The bimodality was even more pronounced in women with DCM ($p < 0.002$).

Conclusions: Bimodal distribution of QRS duration values in patients with DCM supports the idea of sudden change of bundle conduction rather than slow progression of local changes. In CAD, scars and other local impairments in conduction may hide these changes and no clear border zone can be set.

COMPARISON OF NEURON-SPECIFIC ENOLASE, TAU-PROTEIN, AND NEUROFILAMENT LIGHT CHAIN VALUES FOR EARLY PROGNOSTICATION IN CARDIAC ARREST SURVIVORS

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Introduction: Early prognostication in cardiac arrest survivors remains challenging despite multimodal approach. Currently, the only guidelines recommended biomarker for early prognostication is neuron-specific enolase (NSE).

Objectives: The aim of our study was to compare prognostic values of NSE with novel biomarkers serum tau protein (Tau) and neuro-filament light chain (Nfl) at different timepoints after cardiac arrest.

Methods: Eligible patients were out-of-hospital cardiac arrest survivors. Blood samples for the measurements of NSE, Tau and Nfl levels were drawn at 24 hrs (D1), 48 hrs (D2), 72 hrs (D3), and 96 hrs (D4) after hospital admission. Thirty-day neurological outcomes according to the Modified Rankin Scale (mRS) were evaluated as clinical endpoints, poor outcome was defined as mRS 4–6.

Results: We enrolled 43 patients in our study. The area under the ROC curve (AUC) for NSE was 0.776, $p < 0.001$ at D1, 0.911, $p < 0.001$ at D2, 0.982, $p < 0.001$ at D3, and 1.0, $p < 0.001$ at D4. The AUC for Tau was 0.823, $p < 0.001$ at D1, 0.893, $p < 0.001$ at D2, 0.938, $p < 0.001$ at D3, and 0.980, $p < 0.001$ at D4. The AUC for Nfl was 0.614, $p = 0.232$ at D1, 0.782, $p = 0.001$ at D2, 0.969, $p < 0.001$ at D3, and 0.990, $p < 0.001$ at D4. The comparison of ROC curves revealed trend to lower AUC for Nfl at D1 in comparison to NSE ($p = 0.151$) and Tau ($p = 0.077$) with comparable values at D2, D3 and D4. The highest sensitivity for the prediction of poor prognosis with 100% specificity was detected for Tau values at D1 (33.3%) or D2 (70.0%) and for NSE values at D3 (92.9%) or D4 (100%).

Conclusions: Our results indicate that the novel biomarkers Tau and Nfl have comparable predictive value for clinical outcomes as NSE at 48 to 96 hrs after cardiac arrest. At the first day after admission the highest predictive value has Tau followed by NSE.

NATION-WIDE SCREENING OF FABRY DISEASE IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY IN THE CZECH REPUBLIC (BY DRY BLOOD SPOT METHOD)

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Aims: Fabry disease (FD) is a rare X-linked genetic disorder caused by a-galactosidase A (AGALA) deficiency. While "classic" variant has multisystemic manifestation, the more recently described "later-onset" variant is characterized by predominant cardiac involvement that often mimics hypertrophic cardiomyopathy (HCM).
Methods and results: Consecutive unrelated patients with HCM were screened for FD in 16 (out of 17) cardiac centers in the Czech Republic covering specialized cardiology care from June 2017 to December 2018. AGALA activity and globotriaosylsphingosine (lyso-Gb3) levels were measured in all subjects using the dry blood spot method. FD was suspected in male patients with AGALA activity <1.2 μmol/h/L and in females with either low AGALA activity or lyso-Gb3 >3.5 ng/mL. Positive screening results were confirmed by genetic testing. We evaluated 589 patients (390 males, 66%) with HCM (mean maximal myocardial thickness 19.1±4.3 mm). The average age was 58.4±14.7 years. In total, 17 patients (11 males, 6 females) had positive screening results and subsequently six of them (4 males and 2 females) had a genetically confirmed pathogenic variant (total prevalence of 1.02 %). Five of these patients were carrying the p.N215S mutation known to cause a typical later-onset cardiac FD.
Conclusion: We confirmed the prevalence of FD repeatedly reported in previous screening programs (approximately 1 % irrespective of gender) in a non-selected HCM population in Central Europe. Our findings advocate a routine screening for FD in all adult patients with HCM phenotype including both genders. The dry blood spot method used led to identification of clearly pathogenic variants.

ALVEOLAR MACROPHAGES DO NOT CONTRIBUTE TO THE DEVELOPMENT OF HYPOXIC PULMONARY HYPERTENSION BY CONTRIBUTING TO RADICAL TISSUE INJURY

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We have shown previously that alveolar macrophages (AM) are involved in the development of hypoxic pulmonary hypertension (HPH). Since it was demonstrated that one aspect of HPH development is an increase in radical tissue damage, and AM represent an important source of reactive oxygen species, we hypothesized that AM contribute to the development of HPH in this way. We used liposome-encapsulated clodronate (CL) to eliminate AM in male Wistar rats (200–250 g). Control groups received either pure liposome (without clodronate; L) (both Encapsula, à 300 μl, 1st, 5th, 10th days intratracheally) or no medication (C). Animals were kept in normoxia (N, n = 18) or exposed to 15-day isobaric hypoxia (FiO_2 0.1) (H, n = 19). After the end of the exposure, bronchoalveolar lavage and lung tissue were collected. Oxidative damage was tested by determining the concentration of nitrotyrosine and malondialdehyde in lung tissue extracts. Furthermore, superoxide production was measured using vanadate-dependent chemiluminescence. In all groups, exposure to hypoxia resulted in an increase in concentrations of nitrotyrosine (N: CL 20.2±1.2, L 19.8±3.0, C 18.2±1.7, H: CL 28.8±2.6, L 27.2±0.9, C 29.9±2.0 ng/mg of protein) and malondialdehyde (N: CL 5.5±0.9, L 6.2±0.6, C 5.6±1.6, H: CL 16.7±3.8, L 15.4±0.7, C 9.4±2.3 mmol/mg of protein). However, administration of pure liposomes or liposomes containing clodronate had no effect on nitrotyrosine and malondialdehyde concentrations compared to the control group. Moreover, exposure to hypoxia attenuated superoxide production in AM (H 3.7±0.6, N 13.5±1.4 relative units per cell). We conclude that AMs are not involved in the development of HPH directly through their contribution to radical tissue damage.