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P3728
Long non coding RNA levels in hypertensive patients with heart failure with preserved ejection fraction and their relation to their functional capacity

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Purpose: Long non coding RNAs (lncRNAs) are emerging as important components of regulatory networks underlying cardiovascular development and pathophysiology. They exhibit distinctive roles in modulating tissue-specific epigenomic states that are critical for the transcriptional and epigenetic reprogramming that underpins heart failure (HF) pathogenesis. Our aim was to assess gene expression levels of the lncRNAs CARMEN and FENDRR in peripheral blood mononuclear cells (PBMCs) in hypertensive patients with heart failure with preserved ejection fraction (HFpEF) and to evaluate their association with their exercise capacity.
Methods: We included 45 hypertensive patients with HFpEF (36 women, mean age 67±8 years). Twenty one hypertensive patients without HFpEF (17 women, mean age 66±10 years) were also included as controls. All patients underwent a cardiopulmonary exercise test. PBMCs were isolated and lncRNAs' expression levels were determined by quantitative real-time reverse transcription polymerase chain reaction.
Results: Hypertensive patients with HFpEF showed significantly higher CARMEN (27.93±5.68 versus 7.69±2.82, p=0.021) and FENDRR (45.72±8.88 versus 12.01±4.02, p=0.014) expression levels compared with controls. For hypertensive patients with HFpEF, strong positive correlations were observed between CARMEN expression levels in PBMCs and peakVO2 and (r=0.469, p=0.001), VE/VCO2 (r=0.449, p=0.002) as well as exercise duration (r=0.427, p=0.003). We also observed a weak but significant negative correlation between FENDRR expression levels in PBMCs and VE/VCO2 (r = -0.341, p=0.022).
Conclusions: Our data reveal that CARMEN and FENDRR expression levels in PBMCs are increased in hypertensive patients with HFpEF and may be related to their functional capacity. Further studies are needed to assess their role as potential biomarkers or future therapeutic targets in those patients

P3729
Morphological and functional changes in cardiovascular system in heart failure with preserved ejection fraction

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Introduction: It is perceived that the main pathophysiological aspect of heart failure with preserved ejection fraction (HFpEF) are microcirculation changes in arterioles and capillaries, while age and comorbidities (arterial hypertension (AH), obesity, diabetes mellitus, chronic renal failure (CRF)) initiate these changes.
Aim: To consider microcirculation changes and their role in HFpEF development.
Methods: The study included 152 patients divided into 6 age groups: 20–29 yrs (group 1), 30–39 yrs (gr.2), 40–49 yrs (gr.3), 50–59 yrs (gr.4), 60–69 yrs (gr.5) and over 70 yrs old (gr.6). All patients suffered from AH and class I-IV obesity. Diabetes mellitus was observed in groups 3–6, and CRF – in groups 4–6. Signs of HFpEF were found by the means of Six Minute Walk Test in groups 4–6. Arterial elastic properties were evaluated by oscillometry in muscular arteries. We considered brachial artery compliance (BAC, ml/mm Hg) and vascular compliance (VC, ml/mm Hg). Resistance vessels (arterioles) were evaluated by systemic vascular resistance (SVR, dyn·s/cm5), while precapillary vessels – by specific peripheral resistance (SPR, cu.). Echocardiography was performed on Vivid E9, GE. Parametric and non-parametric statistical methods were applied. The differences were considered significant with $p<0.05$.
Results: Concentric left ventricular (LV) remodeling was found in group 1, while other groups had worsening concentric LV hypertrophy. Increase of LV end-diastolic diameter and severe decrease of vascular wall elasticity was found in groups 4–6. BAC was 1.3±0.2–1,1±0.09 in groups 1 and 2, 0.65±0.5 in group 3, 0.41±0.3 in group 4, 0.32±0.2 in group 5 and 0.16±0.1 in group 6 ($p<0.05$). VC also decreased progressively from group 1 (1.8±0.3) to group 6 (0.9±0.3, $p<0.05$). SVR increased progressively from group 1 (1521±240) to group 6 (2087±270, $p<0.05$), as did SPR: 43.4±14.7 in group 1, 49.4±15 in group 2, 58±11 in group 3, 55.5±10 in group 4, and 57±16 in group 5 and 68.5±7.7 in group 6 ($p<0.05$).
Conclusion: HFpEF is preceded by morphofunctional changes in muscular arteries and microcirculation, which become significant at 40 years and increase over age.

P3730
criteria derived from end-systolic pressure-volume relation applied to the study of heart failure

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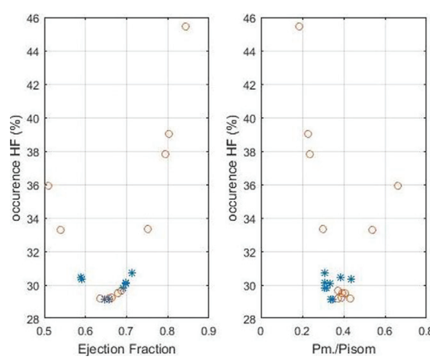
Introduction: The theory of large elastic deformation was applied to the myocardium in a way to obtain a mathematical expression for the pressure-volume relation (PVR) as well as for the end-systolic pressure-volume relation (ESPVR) in the heart ventricles. The ESPVR is the relation between ventricular pressure Pm and ventricular volume Vm near end-systole when the cardiac muscle reaches its maximum state of activation. Several relations between the ejection fraction (EF) and the parameters describing the ESPVR were derived.
Purpose: A relation between EF and percentage of heart failure (HF) has been extended in a way to obtain new relations between percentage of HF and the parameters describing the ESPVR, these relations give new insight into the problem of heart failure with preserved ejection fraction (HFpEF).
Methods: Numerical calculation has been carried out on data obtained in a non-invasive way, which is possible when ratios of pressures are used. In the example shown in the figure a relation between percentage of HF and EF (left side) has been used to calculate the relation on the right side between percentage of HF and the ratio Pm /Pisom (left ventricular pressure/peak isovolumic pressure generated by the myocardium). Values of EF and Pm/Pisom were calculated from data measured on patients by echocardiography.
Results: The study shows the possibility to classify ventricular function into normal state (EF $\approx$ 2/3, Pm /Pisom $\approx$ 1/3); mildly depressed state (EF $\approx$ 0.5, Pm /Pisom $\approx$ 0.5) and severely depressed state the state (EF $<$0.5, Pm /Pisom $>$0.5). The figure shows that the normal cases (*) appear around the bottom of the curve on both sides, and that the cases of aortic stenosis (o) appear scattered into three subgroups. Low values of EF correspond to high values of Pm /Pisom or low values of (Pisom -Pm) /Pisom. High values of EF corresponds to low values of Pm /Pisom or high values of (Pisom -Pm) /Pisom. Diastolic dysfuntion usually results in lower values of Pisom as a consequence of the Frank-Starling mechanism, and enhanced values of EF are often observed in cases of aortic stenosis.



HF versus EF and Pm/Pisom

Conclusion: The interaction of these results with the flow velocity and the impedance of the aortic track remains to be done. The accuracy of the numerical procedure used to calculate the ESPVR is important. Various applications to clinical data published in the medical literature have shown the consistency of the mathematical formalism used. The results obtained show that bivariate (or multivariate) analysis gives better classification of data for the purpose of clinical diagnosis.

P3731
Albumin, lymphocyte count, and prognostic nutritional index in heart failure with preserved ejection fraction-related to obesity paradox

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Background: Obesity as a detrimental physical state is paradoxically associated with better prognosis in heart failure with preserved ejection fraction (HFpEF).
Purpose: We aimed to investigate the prognostic implication of nutritional state beyond the obesity paradox in HFpEF.
Methods: We consecutively studied 1,120 HFpEF patients in a retrospective manner. Prognostic implication of nutritional state (serum albumin [SA], lymphocyte count [LN], and PNI) and body mass index (BMI) were assessed.
Results: During a mean follow-up of 4 years, increased BMI independently associated with a reduced risk of mortality (HR: 0.956, [95% CI: 0.928 to 0.984]). A decreased risk of mortality is observed in higher SA concentration (HR: 0.671, [95% CI: 0.531 to 0.849]), LN (HR: 0.931, [95% CI: 0.868 to 0.998]), and PNI (HR: 0.970, [95% CI: 0.954 to 0.987]). Patients with high PNI and high BMI were associated with best prognosis. A decrease survival rate was observed in patients with high PNI and low BMI (HR: 2.351, [95% CI: 1.643 to 3.366]) as well as those with low PNI and high BMI (HR: 2.417, [95% CI: 1.553 to 3.762]). Patients with