# Poster Session 3

## P666

**Low dietary energy intake is an independent predictor of poor outcomes in patients with heart failure**

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**Topic: Chronic Heart Failure - Other**

**Background:** Low BMI and sarcopenia are caused by various factors including aging, sedentary lifestyle, chronic inflammation, and malnutrition. Heart failure (HF) is often concomitant with malnutrition, leading to cardiac cachexia, a catabolic wasting state with a devastating progress. The imbalance between low energy intake and elevated energy expenditure is a potential mechanism of cardiac cachexia. Little is known about whether the energy intake of HF patients is optimal.

**Purpose:** We investigated the optimal dietary energy intake and its effect on prognosis in patients with HF.

**Methods:** In a multicenter prospective study, we evaluated the dietary patterns of 153 HF patients by use of a self-administered brief diet-history questionnaire (BDHQ). We defined the energy sufficiency rate as the ratio of estimated dietary energy intake (calculated based on the BDHQ data) to the recommended energy requirement, which is decided by gender and age.

**Results:**
The mean age was 67 years old, 68% were men. Most of the patients were NYHA functional class II (90%), and the rest were class III (10%).We divided the patients into two groups based on a 60% cutoff of the energy sufficiency rate. The gender, BMI, etiologies of HF, and skeletal muscle mass assessed by arm and thigh circumferences were comparable between these two groups. The low energy sufficiency rate group (n = 45) was characterized by older age, systolic dysfunction, renal impairment, and advanced NYHA class. A Kaplan-Meier analysis revealed that HF patients with energy insufficiency had worse clinical outcomes including all-cause death and readmission due to HF worsening for 1 year (21% vs. 6%, p<0.05). A multivariate logistic regression analysis identified energy intake inadequacy (OR 3.56, 95%CI 1.03–12.4) and log BNP (OR 1.84, 95%CI 1.08–3.14) as independent predictors of adverse outcomes.

**Conclusions:** Dietary energy intake deficiency is common and associated with poor prognosis in patients with HF. The assessment of energy sufficiency offers a clear therapeutic target for optimizing the energy intake of HF patients.We may be able to suggest the need to enhance the dietary energy intake more than was once thought.

## P667

**A single session of exercise training stimulates the mobilization of endothelial progenitor cells in patients with chronic heart failure**

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**Topic: Chronic Heart Failure - Other**

**Introduction:** Heart failure (HF) deteriorates the vascular endothelium. Endothelial progenitor cells (EPC), which are used as an index of vascular endothelial function, contribute to the regeneration of the inflammatory endothelium and promote neovascularization.

**Purpose:** The purpose of the present study was to evaluate the effect of a symptom limited maximal cardiopulmonary exercise testing (CPET) on the vascular endothelial function in patients with chronic HF and find possible differences in the mobilization of EPC according with their severity.

**Methods:** Forty five patients (38 ♂, 7 ♀) with stable chronic HF [mean ± SD, Age (years): 56±10, EF (%): 32±8, VO2peak (ml/kg/min): 17.7±4.3, VE/VCO2: 34±4] underwent a symptom limited maximal CPET on a cycle ergometer. Venous blood was sampled before and after CPET. Five different cellular populations were quantified by flow cytometry; these were CD34+/CD45-/CD133+, CD34+/CD45-/CD133+/VEGFR2, CD34+/CD133+/VEGFR2, CD34+/CD45-/CD133-, CD34+/CD45-/CD133-/VEGFR2. Patients were divided in two groups of severity according to the median value of peak VO2, predicted peak VO2 and VE/VCO2. EPC values are expressed as cells/million enucleated cells in median (25th, 75th percentiles).

**Results:** An increase in all cellular populations was observed (p<0.01); CD34+/CD45-/CD133+ increased from 68 (43-97) to 107 (78-150), CD34+/CD45-/CD133+/VEGFR2 from 1 (1-3) to 5 (3-9), CD34+/CD133+/VEGFR2 from 10 (7-20) to 14 (8-22), CD34+/CD45-/CD133- from 383 (233-797) to 641 (379-1749) and CD34+/CD45-/CD133-/VEGFR2 from 1 (1-2) to 4 (2-6). There was no difference in the mobilization of EPC between patients with different severity (table, p>0.05).

**Conclusions:** A symptom limited maximal CPET stimulates the mobilization of EPC in patients with chronic HF. This mobilization seems to be similar in all patients irrespective of their severity. The clinical relevance of these findings on the endothelial function and the potential mechanisms need further investigation.

## P668

**IGFBP7 is associated with markers of subclinical myocardial damage in patients with stable ischemic heart disease.**

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**Topic: Chronic Heart Failure - Other**

**Background:** Ischemic heart disease (IHD) is the most common cause of heart failure (HF). Elevated levels of troponin T (TnT) or NT-BNP, even when still in the range of normal values or in patients with normal ejection fraction predict worse prognosis and possible development of heart failure. Recently, more attention has been drawn to the effects of insulin-like growth factor-binding protein 7 (IGFBP7) as a marker of cellular senescence, insulin resistance and atherosclerosis.

**Aim:** The aim of the study was to investigate the associations between IGFBP7 concentrations and concentrations of TnT and NT-BNP in patients with stable IHD.

**Methods:** The IHD group included 88 patients (16 females - 18.2%) with established IHD — approximately a year after myocardial infarction or percutaneous coronary intervention. The population group — without the history of IHD (66 subjects) was chosen based on age and gender from a larger cohort representative for the local population. The concentration IGFBP7 was established with commercially available ELISA kit, whereas for TnI and NT-BNP analysis was performed using electrochemiluminescence method on the Cobas e411 (Roche). In all participants OGTT, blood pressure and antropometric measurements were performed. For statistical analysis STATISTICA software was used. A value of P<0.05 was considered statistically significant.

**Results:** IHD patients presented significantly higher concentration of IGFBP7 than population group (1.76±1 ng/mL vs 1.43±0.44 ng/mL respectively, p=0.019). In both groups there was a significant correlation between IGFBP7 and kidney function (urea concentration r=0.69 p<0.001, creatinine concentration r=0.82 p<0.001) and glucose metabolism (HbA1C r=0.24 p=0.003, c-peptide r=0.28 p<0.001). Interestingly, we have found that patients in IHD group who suffered from typical symptoms of LV heart failure (like sleeping with elevated trunk) also presented higher serum concentration of IGFBP7 than other subjects from the IHD group. Moreover, in IHD group we have found significant correlation between IGFBP7 concentration and markers of heart injury/overload — TnI and NT-BNP (r=0.76 p<0.001 and r=0.72 p<0.001 respectively).

**Conclusions:** Elevated IGFBP7 levels are associated not only with well established risk factors of heart failure like coronary atherosclerosis, kidney function and glucose metabolism disturbances, but also with markers of myocardial damage or overload. It is a new promising marker in cardiovascular medicine and its role should be further investigated not only in respect to vascular changes but also in heart failure and left ventricular dysfunction.

## P669

**Characteristics of exercise oscillatory ventilation differ in chronic heart failure patients stratified by left ventricular ejection fraction**

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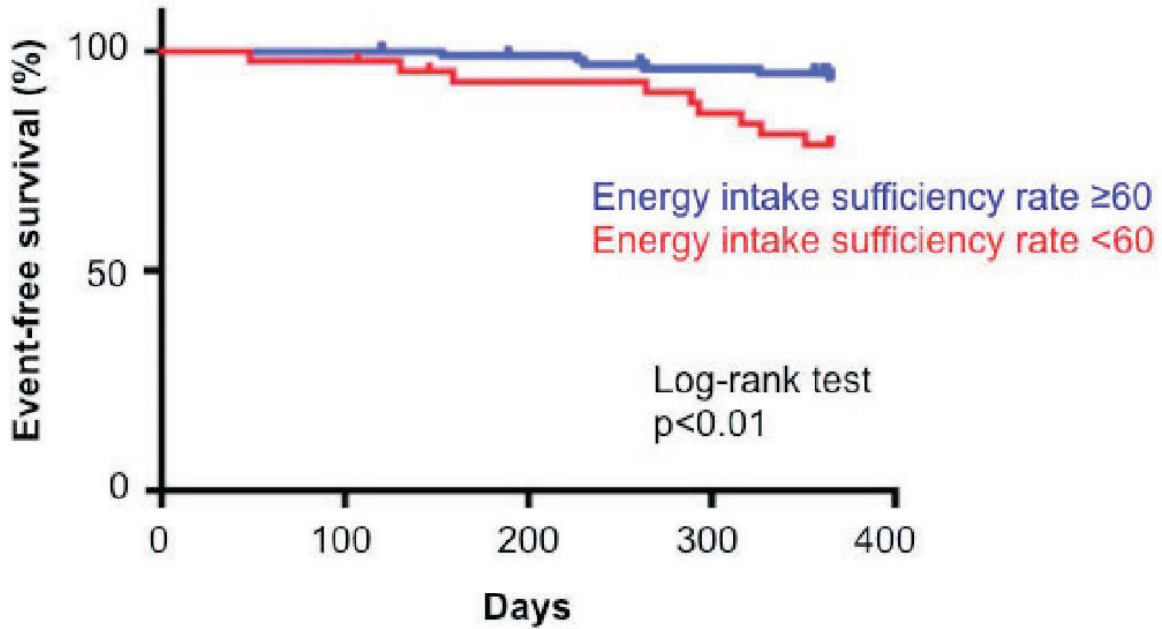
**Topic: Chronic Heart Failure - Other**

**Introduction:** Exercise oscillatory ventilation (EOV) is a non-invasive parameter, which has been detected during cardiopulmonary exercise testing (CPET) in chronic heart failure (CHF) patients with reduced (HFrEF) or preserved (HFpEF) left ventricular ejection fraction (LVEF) and is associated with increased mortality. Recently, EOV has been also detected in CHF patients with mid-range LVEF (HFmrEF).

**Purpose:** Aim of the study was to compare EOV characteristics in CHF patients stratified by LVEF.

**Methodology:** Four hundred twenty-seven consecutive patients with stable CHF (age: 54±13

years, VO2peak: 17.8±6.7 ml.kg-1.min-1) underwent a maximum CPET. Patients were categorised in three groups according to LVEF: HFrEF (<40%), HFmrEF (40-49%) and HFpEF (≥50%). Determination of EOV incidence was based on amplitude of exercise ventilatory cycles ≥15% of the average resting amplitude, lasting ≥60% of total exercise duration. EOV characteristics [duration (d), length (λ) and amplitude (h or h%)] were quantified and compared between LVEF groups. Values are expressed as median (25? -75?).

**Results:** EOV was observed in patients of all groups; 56% in HFrEF, 57% in HFmrEF, 33% in HFpEF (p<0.05). No differences between groups were found for duration (d) and amplitude (h) (p > 0.05) (table 1). Significant differences were observed for length (λ) and amplitude (h%) (p <0.05). In particular, HFrEF exhibited longer λ than HFpEF (p<0.05) and higher h% than HFmrEF (p<0.05). No other significant between-group differences were found (p > 0.05).

**Abstract Number: P666**
**Event free survival**



**Abstract Number: P666**
**Correlation between QMT, QEI and peakVO2**
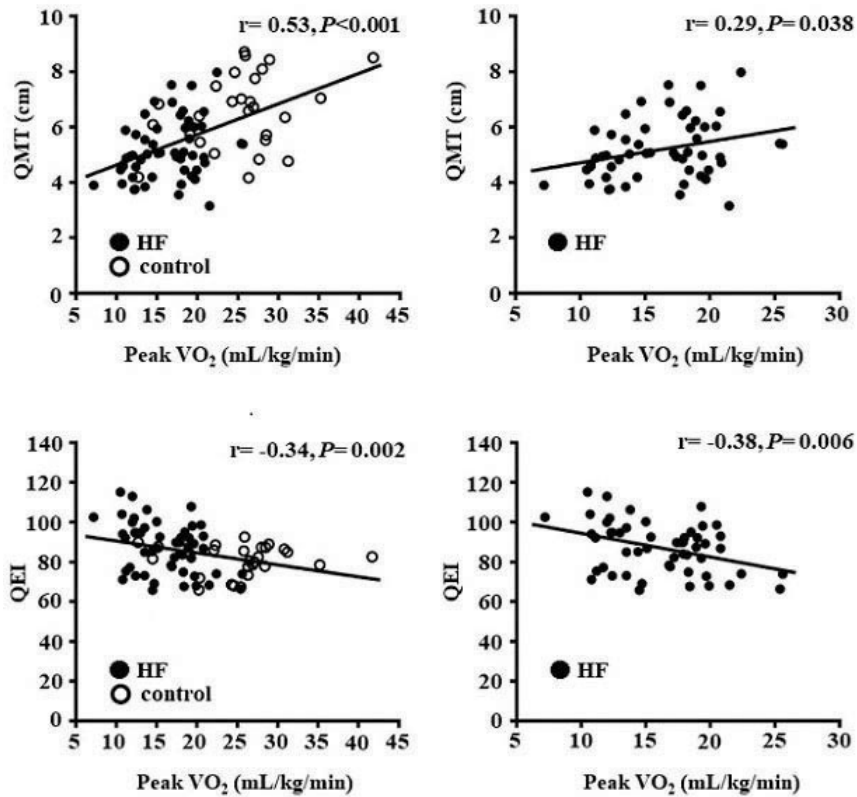
**Abstract Number: P667**

**Number of EPC between severity groups**

| CIRCULATING ENDOTHELIAL POPULATIONS | Peak VO2 (ml/kg/min) | | | | VE/VCO2 | | | |
|---|---|---|---|---|---|---|---|---|
| | <17.6 | | ≥17.6 | | <33 | | ≥33 | |
| | Pre | Post | Pre | Post | Pre | Post | Pre | Post |
| CD34+/CD45-/CD133+ | 91 (61-115) | 114 (85-167) | 55 (24-73) | 106 (67-148) | 85 (66-130) | 120 (86-160) | 51(26-71) | 91 (70-126) |
| CD34+/CD45-/CD133+/VEGFR2 | 1 (1-3) | 6 (3-8) | 2 (1-4) | 5 (2-10) | 1 (1-3) | 6 (3-9) | 2 (1-3) | 5(2-10) |
| CD34+/CD133-/VEGFR2 | 10 (7-15) | 13 (7-21) | 12 (7-22) | 14 (12-23) | 9 (5-16) | 13 (8-17) | 13 (8-22) | 18 (10-25) |
| CD34+/CD45-/CD133- | 289 (192-891) | 434 (258-1814) | 408 (248-1071) | 750 (479-1691) | 305 (193-840) | 641 (393-1633) | 461 (260-1180) | 655 (349-1896) |
| CD34+/CD45-/CD133-/VEGFR2 | 1 (1-3) | 4 (2-6) | 1 (0-2) | 4 (2-6) | 1 (0-2) | 3 (2-6) | 1 (1-3) | 4 (2-6) |

**Conclusions:** EOV appeared in all LVEF groups. However, EOV length and amplitude were increased in HFrEF, possibly reflecting greater ventilatory control abnormalities. These findings warrant further investigation in larger populations.

| Groups | HFrEF | HFmrEF | HFpEF | p |
|---|---|---|---|---|
| Patients | 318/179 | 69/39 | 40/13 | 0.02 |
| total/with EOV (n) | | | | |
| d (%) | 80.0 (70.0-89.0) | 79.0 (69.0-88.0) | 82.0 (69.0-93.0) | 0.67 |
| λ (sec) | 48.0 (41.2-60.0) | 44.3 (38.1-53.3) | 40.0 (35.9-52.1)* | <0.01 |
| h% (%) | 13.8 (10.4-18.4) | 11.2 (8.7-13.8)* | 11.3 (9.8-14.4) | 0.01 |
| h (L.min-1) | 7.9 (6.0-10.5) | 7.1 (5.5-9.6) | 8.1 (4.1-9.6) | 0.48 |
| *compared to HFrEF (p<0.05) | | | | |

Table 1. Differences in EOV characteristics in patients with CHF stratified by LVEF.

**P670**

**Natriuretic peptides as diagnostic marker for the detection of diastolic dysfunction and heart failure with preserved ejection fraction. a systematic review and meta-analysis**

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**Topic: Chronic Heart Failure - Other**

**Introduction:** Early detection of HFpEF is key for prevention and therapeutic intervention. Natriuretic peptides (NPs) could aid in the detection of diastolic dysfunction (DD) and heart failure with preserved ejection fraction (HFpEF), but their diagnostic performance is debated.

**Purpose:** This study aimed to systematically evaluate the performance of NPs as a diagnostic marker of DD and HFpEF.

**Methods:** We performed a systematic literature search (February 5th 2018) according to a pre-specified search string. Studies were included when: 1) they reported a diagnostic performance measure (e.g. area under the receiver operating curve (AUC)), 2) for the detection of DD or HFpEF, 3) with controls without HF or with HFrEF, 4) in a cross-sectional design. Two investigators independently reviewed title, abstract, full text, and assessed risk of bias of the studies according to the QUADAS-2 checklist. For the meta-analysis, we included studies that reported the AUC and 95% confidence interval of NT-proBNP for the detection of HFpEF or DD compared with controls without HF or DD.

**Results:** From 7,353 abstracts, 37 studies were included, of which 14 studies reported the diagnostic performance of NPs for detecting DD and 20 studies for HFpEF. Nine studies reported the AUC of NT-proBNP for the detection of HFpEF compared with controls without HF with a summary AUC estimate of 0.81 (n = 8; 95% CI, 0.74 − 0.89; I2 = 91.61%) (figure 1). Four studies reported the AUC of NT-proBNP for the detection of DD compared with controls without DD with a summary AUC estimate of 0.77 (n = 4; 95% CI, 0.67 − 0.87. I2 = 87.68%). All of the studies included in the meta-analysis had a high risk of bias, mainly caused by the use of a wrong reference standard or the use of a case-control design. Two studies reported the AUC of NT-proBNP for the detection of HFpEF compared with controls with HFrEF. This was not sufficient to perform a meta-analysis, as the appropriate number of studies to include in a meta-analysis was set on a minimum of three.

**Conclusion:** The diagnostic performance of NT-proBNP for the detection of HFpEF or DD in comparison with controls without HF or DD is reasonable. However, due to the high risk of bias of the included studies, evidence to use NT-proBNP for the detection of HFpEF or DD should be used with caution. For future research natriuretic peptides should be combined with clinical characteristics to assess diagnostic performance.

**P672**

**Effects of maximal exercise on the circulating number of endothelial progenitor cells in patients with heart failure**

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**Topic: Chronic Heart Failure - Other**

**Background:** Exercise seems to mobilize progenitor endothelial cells (EPCs) from bone marrow to circulation, hence increasing the potential to repair/regenerate the endothelium and promote angiogenesis. The clinical use of physical exercise to acutely or chronically increase the endothelial health is promising, particularly in patients with heart failure.

**Purpose:** To assess the acute effect of maximal exercise in the number of EPCs, hematopoietic stem cells (HSC) and circulating endothelial cells (CECs) in patients with heart failure.

**Methods:** This study involved 12 patients with heart failure and reduced ejection fraction referred to an outpatient cardiac rehabilitation program. Clinical data, body weight and height were evaluated before a maximal or symptom limited exercise test. Blood samples were collected before and 30 minutes after the exercise test. The quantification of EPCs, HSCs and CECs was performed by flow cytometry. The identification of the cells was based on morphological properties and CD45dim/CD309+/CD34+ or CD45-/CD146+ profile, respectively for EPCs and CECs, and reported as percentage of cells between the leukocytes. Data analysis was performed using descriptive statistics, bivariate correlations and Paired-Sample T Test.

**Results:** The mean age of participants was 68.2 ± 10.0 years old, predominantly men (83.3%) with a mean ejection fraction of 37.9 ± 3.2%. Patients were mostly overweight (BMI, 27.7 ± 3.8 kg/m²) and showed a mean VO2peak of 16.9 ± 4.1 ml/kg/min.
The circulating number of EPCs increased significantly after the exercise test (0.0044433 ± 0.00128778 to 0.0049958 ± 0.00151631%, p=0.02). No significant changes were found in the levels of HSCs (0.0206225 ± 0.00298030 to 0.0231517 ± 0.00718330, p=0.21) and CECs (0.0040808 ± 0.00143593 to 0.0040400 ± 0.00119004, p=0.91). No significant correlation was found between the change in EPCs and aging (p=0.216), body mass index (p=0.980), ejection fraction (p=0.272) or VO2peak (p=0.833).

**Conclusions:** A maximal exercise bout induced an acute increase on EPC numbers, but not a significantly increase on CECs levels (an indicator of endothelial injury/damage) in patients with heart failure and reduced ejection fraction.

**P675**

**Effects of branched chain amino acid supplementation on exercise training during early recovery phase in elderly patients with heart failure and sarcopenia**

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**Topic: Chronic Heart Failure - Other**

**Background and**

**Purpose:** In patients with heart failure (HF), sarcopenia is recognized as a therapeutic target related to the patients' reduced exercise capacity and adverse clinical outcomes. Although exercise training is effective for HF patients with sarcopenia, the optimal nutritional intervention for these patients remains unclear. We examined the effect of branched chain amino acid (BCAA) supplementation on exercise training in HF patients.

**Methods and**

**Results:** Twenty-six HF patients aged 65 years or older (73% female, age 81 ± 7 yrs) were enrolled in this prospective study. In the early recovery phase during hospitalization, they were administered 2500 mg/day of BCAA (leucine 1400 mg/day) after combined aerobic and resistance exercise training. Body composition, anthropometric measurements, and biomarkers associated with sarcopenia were evaluated at the beginning of the study and discharge. Coronary artery disease, valvular heart disease, atrial fibrillation, non-ischemic cardiomyopathy and hypertension, were observed in 23%, 42%, 69%, 23%, and 58%, respectively. During the mean 11.9 ± 9.2 days of BCAA supplementation, HF worsening was not observed. The patients' Short Physical Performance Battery (SPPB) scores improved significantly after intervention (from 7.8 ± 3.3 to 8.5 ± 2.8, p<0.05). Significant improvement was not observed

in knee extension strength or the skeletal muscle mass index. Insulin-like growth factor 1 (IGF-1) increased significantly from $79.4 \pm 24.1$ ng/ml to $104.6 \pm 29.6$ ng/ml (p<0.01) whereas growth hormone, testosterone, tumour necrosis factor alpha, vitamin D, high-sensitivity C-reactive protein and interleukin-6 were unchanged. In the patients with sarcopenia (n=15), significant improvement was observed in the SPPB score (from $6.4 \pm 2.9$ to $7.4 \pm 2.3$, p<0.05) and IGF-1 (from $76.4 \pm 24.1$ ng/ml to $108.7 \pm 34.8$ ng/ml, p<0.01); these changes were not observed in the patients without sarcopenia (n=11).

**Conclusions:** BCAA supplementation on exercise training in elderly HF patients with sarcopenia was safe and can be effective in early recovery phase during hospitalization. Further comparative studies are needed.

**P676**

**The increasing skeletal muscle strength but not mass contribute left ventricular reverse remodeling in patients with idiopathic dilated cardiomyopathy.**

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**Topic: Chronic Heart Failure - Other**

**Background:** Although it has been reported that physical exercise training improves the exercise capacity and also quality of life in the patients with idiopathic dilated cardiomyopathy (iDCM), it is unclear that skeletal muscle function such as muscle mass or muscle strength can be contributed to beneficial effect in patients with iDCM.

**Methods:** We conducted a single-center, retrospective observational study which enrolled a total of 45 consecutive hospitalized patients with newly diagnosed as iDCM and evaluated their skeletal muscle function such as skeletal muscle mass or skeletal muscle force at discharge and 5-6 months (M) after discharge. iDCM was defined as (1) left ventricular end-diastolic dimension (LVDd) $\geq$55 mm (2) left ventricular ejection fraction (LVEF) $\leq$40 % (3) no significant coronary artery disease and (4) excluding secondary causes of cardiomyopathy by systemic evaluation. We divided the patients into 2 groups: patients with left ventricular reverse remodeling (LVRR, n = 24) or without LVRR (N-LVRR-, n = 21) at 12 M follow-up. LVRR was defined as an increase in LVEF from >10% to a final value of >35% together with a decrease in the index of LVDd (LVDDi) >10% at follow-up echocardiography.

**Results:** There were no significant differences in patients' backgrounds at admission and discharge including pharmacotherapy. Plasma B-type natriuretic peptide (BNP) at 6M after discharge was significant lower in LVRR group (LVRR vs. N-LVRR = $46 \pm 54$ vs. $222 \pm 211$ pg/ml, p=0.02). There was no significant difference in 6 minutes walking distance (6MD) at 6M follow up between the 2 groups ($460 \pm 92$ vs. $427 \pm 162$ m). Regarding the muscle function, there were no significant differences in the values of skeletal muscle mass indicated by quadriceps circumference at discharge, the values of quadriceps isometric strength at discharge (LVRR vs. N-LVRR = $36.3 \pm 4.7$ vs. $37.1 \pm 3.3$ cm, $30 \pm 13$ vs. $33 \pm 13$ %BW, retrospectively), and the increasing ratio (IR) of muscle mass during 6 M from discharge (LVRR vs. N-LVRR = $0.95 \pm 0.7$ vs. $0.97 \pm 0.6$). Only the IR of muscle strength during 6M from discharge was significant higher in LVRR+ than N-LVRR ($1.3 \pm 0.2$ vs. $1.0 \pm 0.2$, p=0.0004). Multivariate analysis revealed these BNP level at 6M (odds ratio; 0.997; 95% confidence interval (CI) 0.944 to 0.993; p < 0.01) and the IR of muscle strength (odds ratio; 1.14; 95% confidence interval (CI) 1.024 to 1.388; p < 0.01) were independent predictors of LVRR. The Receiver Operating Characteristic curve demonstrated that the IR of muscle strength was a good predictor with an area under curve of 0.76 for LVRR, with the best cut-off value of 1.2, and having a sensitivity of 85% and a specificity of 63%.

**Conclusions:** The skeletal muscle function especially muscle strength, not muscle mass might predict consecutive LVRR in patients with iDCM.

**P677**

**Predictive value of HOMAIR indices for severity of left ventricular diastolic dysfunction**

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**Topic: Chronic Heart Failure - Other**

**Introduction:** Hypertension (HT) and insulin resistance (IR) often coexist as "satellite condition" that aggravates metabolic syndrome. Diastolic dysfunction (DD) identifies hypertensives with high cardiovascular risk independent of LV mass and BP level. Several studies have shown that LV diastolic function is compromised in individuals with IR, and the extent of impairment could be interdependent on the level carbohydrate metabolism's alteration.

**Aim:** to determine if HOMA IR indices could play a predictive role in appreciating severity of LV diastolic dysfunction.

**Methods:** 101 hypertensive patients (mean age $50.11 \pm 0.79$ yrs; 48.51% of men, SBP/DBP: $201.31 \pm 7.41/106.25 \pm 5.54$ mmHg) with DD and IR (HOMAIR > 2.5) were enrolled for the study. Ambulatory blood pressure monitoring (ABPM), transthoracic echocardiography (TE), and HOMAIR were performed at baseline and after 6, 12- months period of treatment. DD patterns were appreciated according to ASE/EACVI 2016 guideline. Correlation analysis was performed using Pearson's test. The correlation coefficient was considered weak at <0.3, medium-0.3-0.7 and strong> 0.7-1.0. Statistical significance was appreciated at a P-value <0.05 and highly significant at a P-value <0.001.

**Results:** The baseline characteristics of bunch are shown in Fig 1. Diastolic dysfunction and

HOMA-IR levels demonstrated a statistically significant correlation (p< 0.001). A more advanced patterns of diastolic dysfunction demonstrated a particularly strong relationship with higher HOMA-IR levels (Fig. 1, Tab. 2,).

**Conclusion:** In hypertensives with increase in insulin resistance, progression of the left ventricle disorder could develop. Insulin resistance is associated with impaired left ventricular diastolic function, and this association appears to have particularly strong relationship with higher HOMA-IR levels. The more advanced patterns of diastolic dysfunction occured, the stronger is the interdependence with higher HOMA-IR levels.

| Mitral inflow patterns | HOMA-IR | | |
|---|---|---|---|
| | 2.6-3.0 | $\geq$3.1 | P-value |
| Delayed relaxation | 0.72 | 0.81 | < 0.001 |
| Pseudonormalisation | 0.74 | 0.85 | |
| Restrictive | 0.77 | 0.89 | |
| | r- value | | |

Table 2. Correlation coefficient between diastolic dysfunction patterns and HOMAIR indices

**Fig. 1**

| Mitral inflow patterns | HOMA-IR | |
|---|---|---|
| | r- value | P-value |
| Delayed relaxation | 0.76 | < 0.001 |
| Pseudonormalisation, | 0.79 | < 0.001 |
| Restrictive, | 0.83 | < 0.001 |
| Age (yrs) | 0.21 | n.s. |
| SBP (mmHg) | 0.33 | n.s |
| DBP (mmHg) | 0.40 | n.s |
| BMI (kg/m²) | 0.36 | n.s |
| LA vol index (mL/m²) | 0.79 | < 0.001 |
| IVRT, ms | 0.84 | < 0.001 |
| DT, ms | 0.81 | < 0.001 |
| E/A ratio | 0.83 | < 0.001 |
| E/é ratio | 0.82 | < 0.001 |

**P678**

**Exercise hemodynamics, metabolisms and related values over timer in heart failure patients after implantation of a left ventricular assist device**

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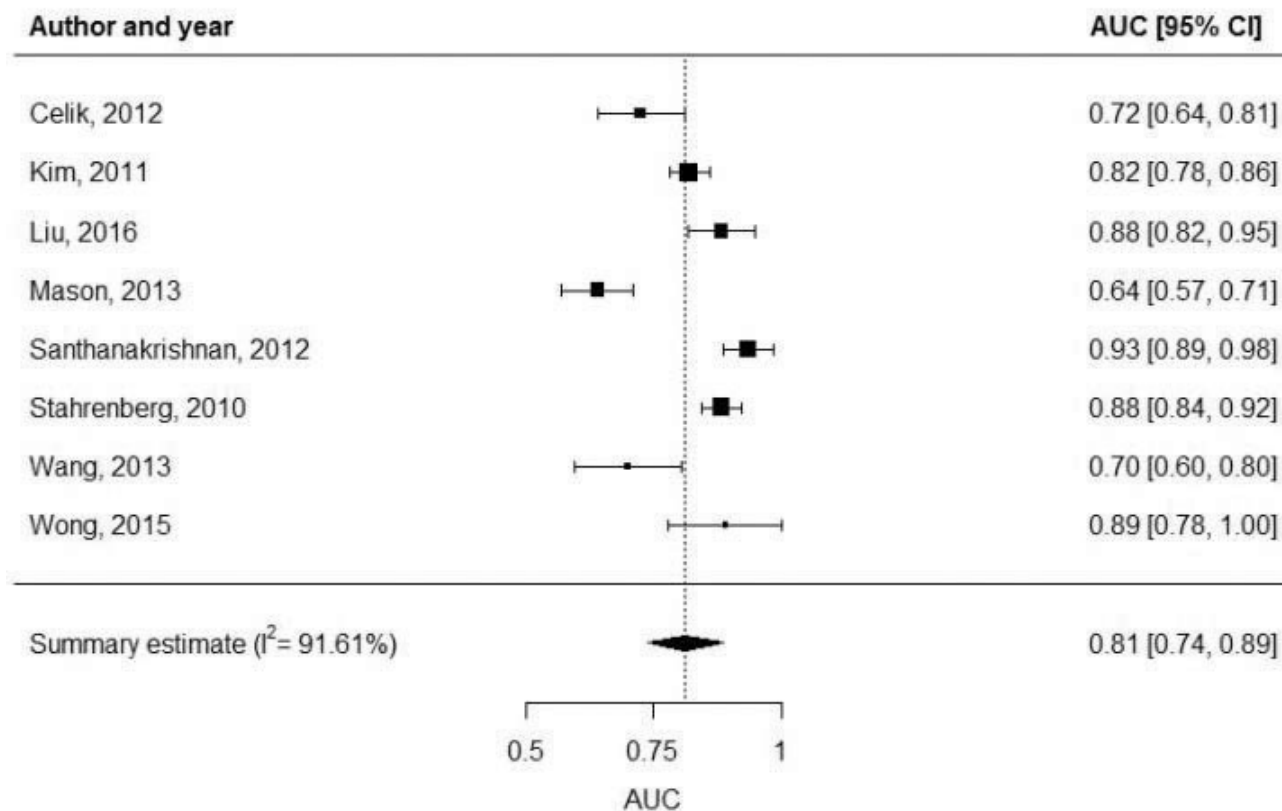
**Topic: Chronic Heart Failure - Other**

**Introduction:** Due to donor shortage the implantation of a left ventricular assist device (LVAD) has been established for the treatment of terminal heart failure. For returning to everyday life and regaining adequate quality of life an optimum build-up of exercise capacity and functional performance is crucial. Exercise related values are essentially dependent on sufficient exercise hemodynamics and metabolisms like total cardiac output (CO) or arterio-venous oxygen difference (avDO2). It was the aim of this study to examine the development over time of exercise hemodynamics and related values more closely in LVAD patients.

**Methods:** Prospectively single-center study: 7 LVAD Patients (61 yrs, 100% male, BMI 28.2; LVEF 15%, Intermacs 2.8, 100% HeartWare) underwent at the end of cardiac rehabilitation (CR) and during two subsequent ambulatory visits (AV) extensive hemodynamic measurements using the inert gas rebreathing (IGR) method (Innocor, Innovision, Denmark) during exercise conditions. According to the literature an individualized 4 minutes step protocol was used based on the results of a previous cardiopulmonary exercise test. Spirometric data were measured continuously breath by breath. During the third minute of each step mean arterial pressure (MAP) was measured manually using Doppler ultrasound at arteriae radialis and lactate concentration at hyperemic earlobe. During the last minute total CO and avDO2 measurements were conducted using IGR method. Beside IGR ergometry also a 6MWT was performed for assessment of functional capacity. Test protocol was approved by the local ethics committee.

**Results:** Measurements took place $39 \pm 3$ (end of CR), $290 \pm 28$ (AV1) and $488 \pm 76$ (AV2) days after Implantation. Between end of CR and AV1 significant increases were reached in 6MWD

**Abstract Number: P670**
**Figure 1**

## Meta-analysis of the diagnostic performance of NT-proBNP for the detection of HFpEF with controls without HF

| Author and year | AUC [95% CI] |
|---|---|
| Celik, 2012 | 0.72 [0.64, 0.81] |
| Kim, 2011 | 0.82 [0.78, 0.86] |
| Liu, 2016 | 0.88 [0.82, 0.95] |
| Mason, 2013 | 0.64 [0.57, 0.71] |
| Santhanakrishnan, 2012 | 0.93 [0.89, 0.98] |
| Stahrenberg, 2010 | 0.88 [0.84, 0.92] |
| Wang, 2013 | 0.70 [0.60, 0.80] |
| Wong, 2015 | 0.89 [0.78, 1.00] |
| Summary estimate ($I^2$ = 91.61%) | 0.81 [0.74, 0.89] |

AUC

(p<0.05), peak load (p<0.01) and peak VO2 (p<0.01) without further improvements between AV1 and AV2. At hemodynamics and metabolisms side there could be likely an increase in total CO between end of CR and AV1 observed (p<0.05) whereas the other parameters (LVEF at rest, LVAD flow, avDO2, heart rate increase, MAP amplitude, lactate concentration) remained statistically unchanged. Over time a considerable weight gain (p<0.01) and an increase in hemoglobin concentration (p<0.01) were also conspicuous.

**Conclusion:** The observed improvements in exercise values can most likely be explained by an increased hemoglobin concentration and an improved neuromuscular function. Similarly, improved metabolic processes can be expected (an increase at anaerobic threshold is already known), although peak avDO2 does not improved due to its initial high level. The increase in total CO could be as a result of long-term changes in peripheral vascular resistance caused by the modern continuous-flow devices and did not affect LVAD flow due to pump characteristics. For an improved understanding of the special hemodynamic situation after LVAD implantation further investigations are highly desirable.

**P680**
**Leptin secretion and cardiac natriuretic peptides levels in overweight and obese patients with chronic heart failure**

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**Topic: Chronic Heart Failure - Other**

Introduction and scope. Nowadays obesity has become a common finding in patients with heart failure. Obese patients have several particularities in terms of heart failure's diagnosis and prognosis. Cardiac natriuretic peptides represent important diagnostic, therapeutic and prognostic tools in heart failure patients. But, their concentrations are influenced by several conditions, such as obesity, age, atrial fibrillation or renal function. The adipose tissue has a central role in heart failure's development by secreting several adipokines. Leptin is a bioactive mediator with important implications in the metabolic pathway of heart failure. The aim of the study was to investigate the relationship between leptin secretion and NT-proBNP and MR-proANP levels, respectively, in obese heart failure population.

Material and methods.

We recruited 88 patients with overweight or obesity, with a mean age of 69 ± 9 years, 51% were females, hospitalised for worsening heart failure. We categorised participants according to their body mass index (BMI). Clinical history, ECG, laboratory data, echocardiography and current medications were recorded. Blood samples for laboratory assessments were obtained from the patients on the day of the arrival. Leptin and MR-proANP levels were measured using the ELISA method. NT-proBNP levels were determined using the chemiluminescence method. A multivariable analysis was performed. A two-sided P-value of < 0.05 was determined to be statistically significant.

**Results:** Median BMI was 36 (27–48) kg/m2. The main aetiology of heart failure in patients was ischaemic (52.27%). Mean serum leptin levels were 33.6 ± 33.3 ng/mL and the median value was 25 ng/mL. Leptin levels were higher in women in comparison with men: 40.311 ±38.296 vs 27.038 ±26.219, but without a statistical significance, p = 0.06. A positive correlation (r = 0.347, p = 0.001) was found between leptin concentrations and BMI. NT-proBNP mean values value was 2410 ± 2676 pg/mL and the median was 1342 pg/mL (923-3076 pg/mL) and MR-proANP mean value was 590 ± 840 pmol/L and median value was 246 pmol/L. We

found an inverse relationship between NT-proBNP and BMI (r = -.3, p = 0.04). MR-proANP levels were not significantly influenced by BMI (p = 0.8). NT-proBNP and MR-proANP levels did not significantly vary with leptin serum levels: correlation (Spearman R) = -0.101, p = 0.35 and correlation (Spearman R) = -0.002, p = 0.987.

We found no significant correlation between left ventricle ejection fraction and leptin levels: correlation (Spearman R) = 0.183, p = 0.089.

**Conclusion:** There is no relationship between leptin secretion and cardiac natriuretic peptides levels in overweight and obese patients with chronic heart failure. So, in this subgroup of patients leptin may not be an accurate tool for heart failure's diagnosis and prognosis.

**P681**

**Tromboembolic complications in patients with LVNC**

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**Funding Acknowledgements:** The reported study was funded by RFBR according to the research project #17-04-00521

**Topic: Chronic Heart Failure - Other**

**Background:** Left ventricular noncompaction cardiomyopathy (LVNC) is a rare, heterogeneous disease, which is based on a two-layer structure of the myocardium. The main causes of disability in patients are thromboembolism, progressive heart failure and arrhythmias.

**Purpose:** determination of the frequency and risk factors of thrombosis and thromboembolic complications in patients with LVNC.

**Methods:** Retrospective analysis of medical records and complex instrumental examination data (ECG, echocardiography, 24--hours Holter monitoring of ECG, heart MRI) of 54 patients (mean age 39 years (25-75 percentile: 30-52 years), men/women 23/31) with LVNC(echocardiography criteria Chin, Jenni, Stollberger, MRI criteria Petersen).

**Results:** It was found that 22 patients (41% of the total group of patients) had LV thrombosis and/or thromboembolic complications in history. Of these, 23% (n = 5) at the time of the study had only thrombosis of the left ventricle. At the same time, 14% (n = 3) had the appearance of new LV thrombosis. Embolism in the main arteries was observed in 59% (n = 13) of cases, including embolic myocardial infarction was diagnosed in 18% (n = 4) of patients. In 59% (n = 13) had TIA/stroke. In 14% (n = 3) of cases there was an embolism in a small circle. Embolic events in 18% (n = 4) of cases occurred during anticoagulant therapy (enoxaparin sodium), in two patients with acetylsalicylic acid 100 mg / day, in 68% of cases (n = 15) patients did not receive antithrombotic therapy. When comparing the group of patients with thrombosis and/or thromboembolic complications and the group of patients without the above complications (n = 32). Were found that these groups of patients significantly differ in such parameters as: sex (in the first group 73% ( = 16) are men compared to 23% ( = 7) in the group without thromboembolism, p<0.05); the presence of myocarditis (27%, n = 6 compared to 6%, n = 2, p = 0.046); the presence of atrial fibrillation (55%,n = 12, compared to 13%, n = 4, p = 0.002); left ventricular systolic dysfunction (LV FV in the first group: median - 24% (25-75 percentile: 14-35%, compared with 46% (41-57% -25-75 percentiles) in the group without embolism, p<0.05). There were no statistically significant differences between the groups by such parameters as age and hypertension (p > 0.05).

**Conclusions:** LVNC is associated with a high risk of left ventricular thrombosis and thromboembolic complications. Possible risk factors are atrial fibrillation, left ventricular systolic dysfunction, male sex, the presence of myocarditis.

**P682**

**Hemodynamic profile of reduced ejection fraction heart failure patients evaluated through impedance cardiography in the six-minute walk test**

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**On Behalf of:** CardioEX

**Funding Acknowledgements:** FIPE/HCPA and CNPq

**Topic: Chronic Heart Failure - Other**

**Background:** Heart failure (HF) patients shown high ratio of hospitalization and mortality. The six-minute walk test (6MWT) evaluates exercise tolerance and estimate prognostic in HF with reduced ejection fraction (HFrEF). Signal Morfology Impedance Cardiography (SM-ICGTM) evaluates cardiac hemodynamics non-invasively in real time.

**Purpose:** To investigate the behavior of hemodynamic parameters pre, during and post 6MWT through Physioflow® in patients with HFrEF and to compare with healthy controls (HC) paired for age.

**Methods:** Cross-sectional study. Heart rate (HR), cardiac output (CO), stroke volume (SV) and cardiac Index (CI) were evaluated through Physioflow® in 27 individuals, 13 with HFrEF (NYHA II/III) - HFG; and 14 HC (HCG). The hemodynamics parameters were recorded over 6 minutes of rest (pre), during the 6MWT and six minutes at recovery (post).

**Results:** Mean age was similar (61±10 years: HFG; 60±10 years: HCG). The HFG walked 395±88 meters and the HCG 560±61 meters at 6MWT (p=0.01). Pre and peak HR was similar between groups, but they were different at recovery. CO, SV and CI were different intra- and inter- groups at baseline, peak and during recovery.

**Conclusion:** This is the first study that evaluated in real time the noninvasive hemodynamic behavior of patients with HFrEF pre, during and after a 6MWT. HFG patients double the

SV, triple CO and triple CI. As expected, these patients walked significantly less and presented an attenuated SM-ICGTM profile in comparison to the HCG.

**P684**

**How does left ventricle affect left atrium in obese patients with atrial fibrillation and heart failure and preserved ejection fraction?**

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**Topic: Chronic Heart Failure - Other**

According to the multiple, studies atrial fibrillation (AF) is driven by the overlapping of inflammation, atrial remodeling, and oxidative stress that accompany obesity, however the role of the left ventricle (LV) structure and function remains unclear in particularly this group of patients (pts).

**Purpose:** To assess the impact of LV structure and function changes, on the development of AF in obese patients with heart failure and preserved ejection fraction (HFpEF).

Materials and methods. We examined pts with clinical signs and symptoms of HFpEF NYHA II-III; and divided them into 4 groups: 1st group (gr) - with body mass index (BMI)<30 kg/m2 and sinus rhythm (SR) and AF; 2nd – BMI ≥ 30 kg/m2 and SR; 3rd - BMI<30 kg/m2 and AF; 4th - BMI ≥ 30 kg/m2. Echocardiography with tissue Doppler was performed to all of pts, levels of N-terminal prohormone of brain natriuretic peptide) NT-proBNP were measured. Ventricular-arterial coupling (Ea/Es) was calculated using arterial and ventricle elastance ratio.

**Results:** 87 pts (49 pts with SR and 38 pts with AF) formed 4 groups (30 vs 19 vs 19 vs 20 pts relatively) that didn't differ (all p>0,05) in age (66,7±9,9 vs 63,5±11,8 vs 68,4±13,4 vs 63,9±7,3), gender (19 (63,3%) vs 11 (55%) vs 15 (78,9%) vs 14 men (70%)), LV EF ( 56,6±6,6 vs 54,5±4,3 vs 55,2±4 vs 52,7±5,5) and had evenly distributed compensated non-cardiac comorbidities. We obtained statistically significant differences in investigated parameters between patients with SR and AF, with more severe impairments in presence of latter together with obesity. The correlation between Ea/Es and LAVI was found in the 3rd and 4th gr, and between LVMMI and LAVI in the 4th gr. The results are shown in the table.

**Conclusions:** Obese patients with AF and HFpEF have more significant LV hypertrophy and impairment of LV diastolic function in comparison to patients with SR. Impaired ventricular-arterial coupling ratio inversely correlates with LAVI in pts with AF, independently on BMI and stroke volume index (SVI); and LVMMI directly correlates with LAVI in obese pts with AF, independently on SVI, that make it possible to assume the leading role of LV DD in development of AF in pts with HFpEF.

**Results of examinations**

| Parameter | Group 1 | Group2 | Group 3 | Group 4 | P value |
|---|---|---|---|---|---|
| LAVI | 38,3±4,1 | 41,2±5,3 | 52,2±7,4 | 44,8±9,7 | p<0,001# |
| SVI | 39,9±5,4 | 40,6±4,7 | 37,4±13,2* | 43,3±7,4** | p<0,05 |
| LVMMI | 155,3±22,9 | 157,1±26,5 | 160,1±26,7 | 178,8±35,6**§ | p<0,05 |
| Ea/Es | 0,75±0,21 | 0,75±0,12 | 0,85±0,25§ | 0,86±0,21**§ | p<0,05 |

*- differences with gr 1; **- gr 2; ***- gr 3; #- multiple comparisons; §-direct and †-inverse correlation with LAVI;

**P685**

**Evaluation of the hemodynamic effects of cardiac rehabilitation measured by CPET combined with exercise echocardiography**

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**Topic: Chronic Heart Failure - Other**

**Background:** The benefits of cardiac rehabilitation (CR) on exercise tolerance in chronic heart failure with reduced ejection fraction (HFrEF) patients are well known. The specific effects of CR on hemodynamic parameters and peripheral oxygen extraction are poorly studied. The objective of the study is to determine the effects of CR on hemodynamic parameters and peripheral oxygen extraction in HFrEF patients.

**Methods:** we included 33 HFrEF patients referred for a CR program (85 % males, age : 56± 12 years, LVEF : 31 ± 9 %). We used cardiopulmonary testing (CPET) combined with exercise echocardiography before and after CR (21 sessions, mixed interval and continuous exercise training). CPET parameters and stroke volume and cardiac output (VTI method) are assessed at rest, VT1 and peak exercise. Peripheral oxygen extraction is estimated by VO2/CO.

Results : We found an improvement in VO2 max (16.1 ± 4.6 to 20.2 ± 5.8 ml/kg/min, p< 0.001), VO2 at VT1 (10.4 ± 2.9 to 13.3 ± 3.3 ml/kg/min, p< 0.001), VE/VCO2 slope (40.4 ± 9.5 to 37.0 ± 8.4, p= 0.004). Circulatory power and ventilatory power are also significantly improved.

For the hemodynamic parameters, we found an increase of the stroke volume index at rest, at VT1 and at peak exercise (28±9 to 43±21, 26±12 to 51±23 and 31.3±9.3 to 56.3±23.1 ml/m² respectively; p< 0.005). Similarly, our results shows a statistically improvement on cardiac output at VT1 (3.2±1.4 to 3.6±1.8 l/min, p =0.007) and at peak exercise (4.4±1.7 to 4.9±1.7 l/min, p= 0.03). However, our data does not shown significant changes on peripheral oxygen extraction.

**Conclusion:** A short, but intensive mixed protocol of CR improves exercise tolerance mainly by increasing central hemodynamic parameters.

**P686**
**Immune response following an acute exercise challenge - alterations in heart failure**
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**Topic: Chronic Heart Failure - Other**
**Introduction:** Long-term exercise training reduces the systemic inflammatory load in patients with cardiovascular diseases. Acutely, however, an exercise challenge can trigger pro-inflammatory responses. The underlying cardiac abnormalities may also influence the response of the adaptive and innate immune system to an acute exercise challenge. We compared the acute response to a standardized cardiopulmonary exercise test (CPET) in patients with heart failure with reduced ejection fraction (HFrEF) and age matched controls.
**Methods:** Patients with HFrEF (n = 5; left ventricular ejection fraction [LVEF] $\leq$ 40%) and controls (n = 7, LVEF $\geq$ 50%) participated in a CPET. Blood samples were taken before, immediately after and 2 hours after the test. Quantitative and morphological changes in leukocyte subpopulations, and formation of leukocyte-platelet aggregates were assessed in fresh blood samples by flow cytometry. Results are given as median and inter-quartile range (IQR).
**Results:** HFrEF (mean LVEF: 34%) and controls (mean LVEF: 57%) were 59 (range: 41 to 80) and 57 (range: 50 to 65) years old, respectively. In both groups acute exercise increased total leukocytes per mL of blood (control: 1.37-fold [IQR: 1.16 to 1.49]; HFrEF: 1.24-fold [IQR: 1.20 to 1.32]), relative abundance of circulating NK cells (controls: 2.11-fold [IQR: 1.30 to 3.13]; HFrEF: 1.67-fold [IQR: 1.56 to 1.71] and NK-T cells (control: 1.69-fold [IQR: 1.52 to 3.60]; HFrEF: 1.62-fold [IQR: 1.60 to 2.53]). Contrarily, only in HFrEF patients CD4+ (control: 1.15-fold [IQR: 0.84 to 1.54]; HFrEF: 1.45-fold [IQR: 1.10 to 1.98]) and CD8+ T cells (control: 1.33-fold [IQR: 1.01 to 1.68]; HFrEF: 1.70-fold [IQR: 1.25 to 2.15]) were augmented. Circulating monocyte and neutrophil numbers did not change in response to CPET. Aggregation of thrombocytes with monocytes (control: 0.86-fold [IQR: 0.78 to 1.49]; HFrEF: 1.59-fold [IQR: 1.05 to 7.30-fold]), T-lymphocytes (control: 1.27-fold [IQR: 1.05 to 1.68]; HFrEF: 1.49-fold [IQR: 1.03 to 2.64]) and neutrophils (control: 1.08-fold [IQR: 0.87 to 1.25]; HFrEF: 2.13-fold [IQR: 1.62 to 2.19]) increased 2 hour post-exercise in HFrEF patients, but not in controls.
**Conclusion:** Patients with HFrEF show a differential leukocyte response to an acute exercise challenge, with an increase in T-lymphocyte abundance, a degranulation response in the intermediate monocyte subpopulation and an increased formation of neutrophil-platelet-aggregates compared to control subjects. Our data suggest differences in release and organ-homing of innate versus adaptive immune cells, thus underlining the importance of inter-organ communication in the acute adaption to physical exertion in HFrEF.

**P688**
**Clinical and demographic predictors of cardiohepatic syndrome and acute kidney injury in patients with decompensated heart failure**
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On Behalf of: Podzolkov V. I., Dragomiretskaya N.A., Shtempelevskaya E.
**Topic: Chronic Heart Failure - Other**
**Introduction:** Even a small transient increase in serum hepatic markers and creatinine presents the elevated risk of all-cause mortality. KDIGO classification is a simple way for physician to decide contacting with nephrologist for initiating RRT or to amend in a medical disposal. Purpose. To study the clinical and demographic predictors of cardiohepatic syndrome (CHS) and acute renal injury (AKI) in patients with decompensated HF. Methods. 93 patients with decompensated HF were enrolled in the study (35 men and 58 women; mean age 71.04±9.5 years; mean BMI 32.2±6.5 kg/m2). CHS was defined as an increase of any liver enzyme in the absence of other causes of its damage. CKD-EPI GFR was calculated on the 1 and 7 day of hospitalization. The AKI degree was evaluated according to KDIGO 2012. Results. CHS was disclosed in 51 patients (55%). The following laboratory syndromes were found: hepatocellular insufficiency (AST, ALT), cholestasis (total bilirubin, GGT), decrease of the synthetic ability (thrombocytopenia). There was an increase of 1, 2, 3 and 4 hepatic markers in 36 (39%), 8 (9%), 5 (5%) and 2 (2%) cases, respectively. Patients had GFR: in 3 cases (3.3%) - 80-60 ml/min/1.73m2, in 90 cases (96.7%) - below 60 ml/min/1.73m2. 40 patients (43%) were eligible for AKI: 1 degree in 27 (67.5%), 2 degree in 11 (27.5%), 3 degree in 2 (5%) cases. After 7 days of treatment signs of AKI persisted in 36 (80%) patients with previously diagnosed AKI. In 8 patients progression of the severity of renal damage was noted. In 7 patients (7.5%), a decrease of the serum creatinine level with reduction of the AKI stage was observed. During the hospitalization signs of AKI were absent in 50 patients (53.8%), among them patients with less severe CHF prevailed. A decrease of GFR related with therapy was observed in 8 (8.6%) patients, among which patients with NYHA 3-4 prevailed (7 patients), the average age of this subgroup was higher (74.12±10.4 years) and the average BMI was lower (31.45±4.65 kg/m2) than the average for the total set. Improvement of kidney function was noted in 12 (12.9%) patients, with a younger average age of 66.25±15.15 years and a significantly higher average BMI than in the total set (34.04±6.04 kg/m2, p<0.05). The combination of CHS and AKI was detected in 19 cases (20%) among them patients NYHA 3-4 predominated. Conclusions. CHS was identified in 55% of patients with decompensated HF,

which is a predictor of poor prognosis according to several studies. In our study no correlation was found between CHS and BMI, gender or age. In 43% of this patients signs of AKI were identified. It makes possible to consider CHF decompensation as a risk factor for AKI development. Younger age and higher BMI are predictors of kidney function improvement, while older age and lower BMI are risk factors for reducing GFR during active diuretic therapy. The results of our study showed the wide spread of CHS and AKI among patients with decompensated HF.

**P689**
**Effect of comorbidity on annual mortality of patients with chronic heart failure**
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**Topic: Chronic Heart Failure - Other**
Chronic heart failure (CHF) is one of a major cause of mortality in the structure of cardiovascular disease in the world. Comorbidity determines the high mortality of patients with cardiovascular disease. The aim of this study was to investigate comorbidity and prognosis of patients with CHF.
**Methods:** 203 patients with CHF (130 males and 73 females, mean age was 61,8±9,6 years) were studied. CHF was defined according to ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure, 2016. Charlson comorbidity index (CCI) was calculated. When CCI was calculated, "moderate, severe kidney disease" was supplemented with the criterion "chronic kidney disease", while the number of points for the "kidney" parameter was left unchanged. Glomerular filtration rate (GFR) was calculated using CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) formula and chronic kidney disease (CKD) was defined according to Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease, KDIGO 2012. Group of chronic cardiorenal syndrome (CRS) was included patients with CHF GFR <60 mL / min / 1,73 m2. Patients were followed up for 1 year.
**Results:** Charlson comorbidity index for age was 5,0±2,1 points. 89 (43,8%) patients had CKD with GFR <60 mL / min / 1,73 m2. CKD was the most frequent component in the structure of comorbidity of patients with CHF. However, if we excluded CKD from Charlson comorbidity index. patients with CRS had a higher comorbidity (CCI $\geq$ 6 points) (4.3±1.8 vs 3.8±1.7 points, resp.; p=0.01). Relative risk of death of patients with high comorbidity was 1.68 (95% CI 1.35-2.09) compare with patients with low comorbidity. When we used the parameter "moderate, severe kidney disease" according to CCI (patients with serum creatinine > 265.2 $\mu$mol / l, on hemodialysis, with a kidney transplant and with uremia) the correlation between CCI and the annual mortality of patients with CHF was r = -, 2523, p = 0.0003, if we used complemented parameter "chronic kidney disease" - r = -, 2800, p <0.0001.
Conclusion. High comorbidity in patients with CHF is associated with an increase in all-cause mortality. When using the complemented parameter "kidney disease" criterion "chronic kidney disease" increases the accuracy of predicting the risk of death in patients with CHF after discharge from hospital.

**P690**
**Non- invasive evaluation of exercise hemodynamics changes after cardiac rehabilitation in heart failure patients.**
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**Topic: Chronic Heart Failure - Other**
**Background:** In heart failure patients, exercise training enhances exercise capacity as a result of ventilatory, hemodynamic and muscular peripheral improvements. The exercise hemodynamic changes after an exercise training program were poorly studied. Cardio-impedance technique may be used to have a continuous monitoring of hemodynamic parameters during the effort.
**Purpose:** to evaluate the changes on stroke volume (SV) and on cardiac output (CO) through a non-invasive impedance technique after a cardiac rehabilitation program.
**Methods:** 37 chronic heart failure patients (male: 78%, age: 56 ± 14 years; ischemic aetiology: 46%; LVEF: 29 ± 11%) are included. All of patients are evaluated by a rest Doppler echocardiography and a cardiopulmonary exercise test (CPET) coupled with cardiac impedance, before and after 18 ± 7 exercise training sessions. Heart rate, blood pressure (BP), workload, VO2, stroke volume and cardiac output were recorded at rest, at VT1 and at maximal exercise.
**Results:** are displayed in table
**Conclusion:** Cardio-impedance is a non-invasive, feasible and valuable tool to study exercise hemodynamic response to exercise. Exercise training in heart failure patients improves both CPET parameters and cardiac hemodynamic response. This technique may be useful to determine different types of cardiac adaptations to exercise training in heart failure patients.

| | Before CR (n = 37) | After CR (n = 37) | p |
|---|---|---|---|
| Rest Echocardiography | | | |
| LVEF (%) | 30.1 ± 11.8 | 34.5 ± 12.4 | 0.0001 |
| E/e' | 9.9 ± 3.4 | 10.3 ± 3.8 | ns |
| sPAP (mmHg) | 46.1 ± 25.0 | 40.8 ± 20.5 | ns |
| CPET | | | |
| rest HR (b/min) | 80.4 ± 16.0 | 73.0 ± 11.7 | 0.001 |

| | | | |
|---|---|---|---|
| max HR (b/min) | 111.8 ± 22.7 | 111.3 ± 30.9 | ns |
| max sBP (mmHg) | 143.0 ± 42.3 | 146.7 ± 38.0 | ns |
| maximal workload (watts) | 83.0 ± 38.0 | 103.8 ± 48.0 | 0.00000 |
| Peak VO$_2$ (ml/kg/min) | 15.0 ± 4.3 | 17.0 ± 6.0 | 0.00003 |
| Cardioimpedance | | | |
| rest SV-index (l/min/m$^2$) | 32.1 ± 11.6 | 35.1 ± 10.5 | 0.03 |
| max SV-index (l/min/m$^2$) | 46.9 ± 15.8 | 53.8 ± 16.2 | 0.04 |
| rest CI (l/min/m$^2$) | 2.6 ± 0.9 | 2.5 ± 0.6 | ns |
| max CI (l/min/m$^2$) | 5.2 ± 2.1 | 6.1 ± 2.5 | 0.01 |

## P691

### Prospective memory and self-care in chronic heart failure

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**Topic:** Chronic Heart Failure - Other

**Background:** Cognitive impairment is common in patients with chronic heart failure (CHF) and affects memory, executive function, psychomotor speed and attention, which in turn impact on quality of life and self-care. A preliminary study indicated deficits in prospective memory (PM) in people with CHF but this requires confirmation.

**Objectives:** To confirm in a sample of CHF patients the existence of PM deficits, compared to healthy-matched control participants.

**Methods:** Fifty two patients (67% male) aged 20-90 (mean 62) years with a diagnosis of CHF (ejection fraction <45%) were matched to 41 healthy controls. The majority of CHF patents (79%) had NYHA classification II. Participants completed a battery of cognitive tests and a computerised board game, Virtual Week, to assess for PM at baseline and 3 months.

**Results:** Data were analyzed with a $2 \times 2 \times 2$ mixed analysis of variance (ANOVA) with the between-subjects variable of group (CHF, control), and the within-subjects variables of PM task (regular, irregular) and PM cue (event-based, time-based). A significant 3-way interaction was identified (F(1, 91) = 4.60; p = .035; ηp2 = .048). Overall, CHF patients (M = .57; SD = .23) performed significantly worse than the controls (M = .75; SD = .23) on measures of prospective memory (F(1, 91) = 12.85; p = .001; ηp2 = .124).

**Conclusion:** These findings confirm preliminary findings that PM deficits are likely to contribute to poor self-care in CHF patients. We recommend strategies to increase self-care adherence within the CHF population include PM training.

## P692

### Low Concordance Between the NYHA Class and Cardiopulmonary Exercise Test Variables in Heart Failure Patients

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**Topic:** Chronic Heart Failure - Other

**Background:** Peak oxygen consumption (VO2peak) evaluated by cardiopulmonary exercise test (CPET) is the gold standard to determine functional capacity, which is an important prognostic tool in heart failure (HF). However, subjective NYHA classification is most often used for this purpose. Also, VE/VCO2slope, Oxygen Uptake Efficiency Slope, heart rate recovery, PEtCO2and their combination in CPET scores can be utilized.

**Purpose:** To analyze the agreement between NYHA classification with: Weber classes (VO2peakbased); ventilatory classes - VC (VE/VCO2based) and CPET score.

**Methods:** HF patients who were submitted to CPET were classified according to NYHA, Weber classes, VC and the CPET score. Kappa index was calculated for NYHA versus Weber, VC and CPET Score.

**Results:** 219 patients, 74% male, mean age 56±14 years and mean ejection fraction 36.4±10.6%. HF etiology was Ischemic in 44%, followed by idiopathic in 23%. NYHA class I, II, III, IV distribution was: 32; 33, 33 and 2%, respectively. Mean VO2peakwas 20±7 ml.kg-1.min-1and Mean VE/VCO2 Slope 40±12. The agreement between NYHA and Weber class was Kappa 0.267 (p<0.01); NYHA and VC Kappa -,025 (p=0,503); NYHA and CPET score: Kappa 0.063 (p=0.212).

**Conclusion:** There was a low agreement between NYHA and Weber class and no agreement between NYHA and VC or the CPET score. Future studies with clinical follow up comparing each of these classifications are warranted.

## P693

### Can frailty syndrome be a predictor of level of capability of self-care of patients with heart failure treated with ICD?

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**Topic:** Chronic Heart Failure - Other

Treatment patients with heart failure (HF) include improving their clinical status, exercise capacity and quality of life, preventing hospitalizations and a reduction in all-cause mortality. Aim was to assess the effect of the method of the therapy for HF on adherence to the therapeutic recommendations and self-care in patients with HF treated high energy therapy.

**Methods:** The study included 180 consecutive patients that were hospitalized due to heart failure. Depending on the treatment that was being used, the patients were divided into three groups:

- group I – heart failure being treated conservatively by pharmacological and lifestyle changes (treated conservatively) – 51 patients; 28.33%
- group II – heart failure being treated with the implantation of a cardioverter-defibrillator (ICD) – 47 patients; 26.11%
- group III – heart failure being treated with the implantation of a cardiac resynchronization system (CRT) – 82 patients; 45.56%

In all of the patients that were included in the study, the Polish version of three validated instruments in: the nine-item European Heart Failure Self-care Behavior Scale (EHFScBS-9), Acceptance of Illness Scale (AIS) and The Tilburg Frailty Indicator (TFI) were used.

**Results:** Positive correlations were found between the capability for self-care and frailty syndrome and its components: general frailty vs the capability for self-care: r = 0.4449, p = 0.0000; physical frailty components vs the capability for self-care: r = 0.3974, p = 0.0000; emotional frailty components vs the capability for self-care: r = 0.2831, p = 0.0001; social frailty components vs the capability for self-care: r = 0.2180, p = 0.0032. Exact results are presented in the table below.

**Conclusion:** In patient treated with ICD in two components of frailty (emotional and social) there is no relations with level of capability of self-care.

## P694

### Uptake and Impact of cardiac rehabilitation in heart failure after cardiac resynchronization

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**Topic:** Chronic Heart Failure - Other

**Introduction:** Cardiac rehabilitation (CR) is an important component in the continuum of care for individuals with cardiovascular disease. Despite the formal recommendation of CR expressed in European guidelines on heart failure (HF) management, referral uptake and adherence are often suboptimal, especially in heart failure patients with devices.

**Purpose:** The aim of this study was to assess the uptake and impact of exercise-based CR on mortality, hospital admissions and morbidity of HF patients after CRT in real life.

**Methods:** Prospective observational study including consecutive HF patients (class II-IV NYHA), different etiologies, undergoing structured cardiac rehabilitation program (CRP) after cardiac resynchronizer implant. The CRP included 6 months of exercise training, aerobic and strength exercise, individually prescribed, 3 times a week, 60 minutes sessions. Clinical, electrocardiographic, and echocardiographic characteristics were evaluated prior to cardiac resynchronizer implant and all the variables were re-evaluated at 6 months after onset of CRP. Clinical events (mortality, hospitalization, arrhythmia) were evaluated at 6 months of follow-up. Results were compared between patients who underwent CRP and those who did not perform exercise (control group).

**Results:** The population sample included 166 HF patients submitted to CRT (66.5% male, mean age 68±14). Of these patients, 15% performed a structured CRP after cardiac resyn-chronizer implant. Reasons for not performing CRP were mostly, living far away from the CR hospital centre, economic problems and professional reasons. There were 24 patients included in CRP (75% male sex, mean age 69±14), 17% in class II NYHA and 79% in class III. Etiology of heart failure was ischemic in 42% patients and dilated cardiomyopathy in 50%. Mean left ventricular ejection fraction (LVEF) at baseline was 26 ± 6%. The baseline char-acteristics of the control group were similar to the CR group.

At 6 months of follow-up, there was a significant improvement in LVEF (37 ± 13%, p <0.005) and in NYHA class (2,8±0.5 to 1,4±0.5; p<0.005), however comparing to the control group the difference was not significant.

During the follow-up, 1 patient died (4.2%), 7 patients (29.2%) were re-hospitalised for any cause and 1 patient (4.2%) was re-hospitalised for decompensated heart failure (group control

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**Exact results**

| | Frailty General | Frailty physical components | Frailty emotional components | Frailty social components |
|---|---|---|---|---|
| Group I | r = 0.4223p = 0.0020 | r = 0.2637p = 0.0615 | r = 0.4845p = 0.0003 | r = 0.3412p = 0.0143 |
| Group II | r = 0.3963p = 0.0002 | r = 0.4596p = 0.0001 | r = 0.0931p = 0.4055 | r = 0.1241p = 0.2665 |
| Group III | r = 0.6367p = 0.0001 | r = 0.5720p = 0.0001 | r = 0.3941p = 0.0061 | r = 0.2059p = 0.1649 |

8.4%, 29.4%, 4.2%, respectively). The event rate was lower in the study group although not statistically significant, possibly related to the sample size.

**Conclusion:** Cardiac Rehabilitation uptake was low in this population sample of heart failure patients with CRT. Clinical improvement and less cardiac events were more frequent in patients submitted to CR, although without statistical significance, probably due to the small sized group. Benefits of cardiac rehabilitation program in these patients probably are beyond the impact on ventricular remodelling, but larger studies are needed.

## P695
**Assessment of the risk of decrease of the quality of life in patients with stable coronary artery disease complicated by chronic heart failure**

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**Topic: Chronic Heart Failure - Other**

**Introduction:** Coronary artery disease (CAD) is one of the main causes of high mortality and disability of the population in many industrialized countries, which is a serious a medical, social and economic problem. Purpose : to verify the clinical and instrumental indices associated with a decrease of life quality in patients with stable coronary artery disease complicated by chronic heart failure. Materials and methods: To analyze received data there was used a statistical matrix that included 113 patients with stable coronary artery disease (CAD) complicated by chronic heart failure (CHF) stage C for ACCF/ANA II and III functional class (FC) by NYHA. The average age of patients was $60.0 \pm 0.74$ years old. All studies conform to the principles of the Declaration of Helsinki of the World Medical Association. Inclusion criteria for participation in the study were: 1) the presence of stable CAD, complicated by CHF II and III NYHA FC; 2) age $\leq 75$ years old. Exclusion criteria: 1) CAD without CHF or with CHF I or IV NYHA FC; 2) age ?75 years; 3) moved myocardial infarction or stroke within the last 3 months; 5) severe comorbid conditions; 6) severe violations of heart rhythm and conduction. All patients were provided with a comprehensive clinical examination, which included assessment of anamnestic data, physical examination, evaluation of instrumental and laboratory indexes (a total of 87 parameters). Life Quality (LQ) indicators were evaluated by survey using MLHFQ. Identification of risk factors for the reduction of LQ in patients with stable CAD, complicated by CHF was performed using nonparametric correlation analysis of Kendall and multiple linear step-by-step regression between the parameters of LQ (initial parameters of the analysis) and various clinical and instrumental indices.

**Results:** Among the analyzed clinical, laboratory and instrumental options in patients with stable CAD, complicated by CHF, the risk of LQ reduction was most associated with the level of Nt-proBNP $\geq 2.414$ pg/ml (odds ratio (OR) $= 8.6$), the index of left ventricular mass $\geq 190$ g/m2 (OR $= 4.2$), the duration of ischemic history $\geq 12$ years (OR $= 3.0$), the presence of a permanent form of atrial fibrillation (OR $= 2.9$).

**Conclusions:** The greatest importance in predicting the risk of decrease of life quality in patients with coronary artery disease, complicated by chronic heart failure stage C by ACCF/ANA II and III functional class by NYHA has Nt-proBNP level, to a lesser extent⁻ the left ventricular myocardial mass index, the duration of ischemic anamnesis and the presence of a permanent form of atrial fibrillation.

## P696
**Dynamic balance and mobility is the physical fitness component that better predicts quality of life in HFpEF patients**

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**Topic: Chronic Heart Failure - Other**

**Background:** Patients with heart failure and preserved ejection fraction (HFpEF) are often characterized by a limited prognosis and poor quality of life due to the lack of effective therapy.Physical fitness is multicomponent construct and was suggested to be a major determinant of quality of life in these patients.However,it remains to be explained how thedifferent components of physical fitnessrelate with the specific dimensions of quality of lifein these patients.

**Purpose:** The aims of the present study were twofold: i)to evaluate the association between the different components of physical fitnessand dimensions of quality of lifein HFpEF patients, and ii) to examined which physical fitnesscomponents are independently related to quality of life.

**Methods:** Twenty-fourpatients with HFpEF were assessed for physical fitness [dynamic balance and mobility (8-feet-up-and go test), upper body strength (handgrip), cardiorespiratory fitness (CRF) (6-minute-walking test) and body composition (body mass index)]and for quality of life (Minnesota Living With Heart Failure Questionnaire). Partial correlation, adjusted for age, gender and NYHA class, was used to verify the association between physical fitness-components and dimensions of quality of life. The determination of independent predictor dimensions of quality of lifewas computed through stepwise multivariate linear regression analysis.

**Results:** Our results showed that both CRF and dynamic balance and mobility are significantly associated with total score and physical dimensions of quality of life($p < 0.05$), but only dynamic balance and mobility was concomitantly associated with the emotional dimension ($r = 0.597$; $p = 0.004$). Dynamic balance and mobility was independently associated with total score ($b = 0.651$; $r2 = 0.424$; $p = 0.001$), physical ($b = 0.570$; $r2 = 0.324$; $p = 0.04$) and emotional ($b = 0.611$; $r2 = 0.373$ $p = 0.002$) dimensions of quality of life.

**Conclusion:** In conclusion,our data suggests that dynamic balance and mobility better capture quality of life in HFpEF patients than CRF. Whether interventions specifically targeting the improvement of dynamic balance and mobility will differently impact on quality of life is still unknown.
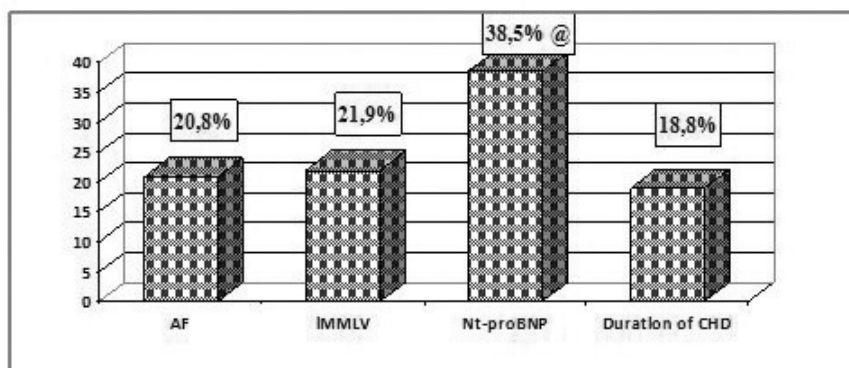
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Fig. Strength of the influence of leading risk factors on the quality of life index by MLHFQ.

Note. The sign "@" shows the reliability of the difference % relative to all other factors by the criterion $\chi 2$ (p <0.0001).

**P697**

**Factors influencing the development of heart failure in patients after miocardial infarction**

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**Topic: Chronic Heart Failure - Other**

**Purpose:** to study the factors affecting the development of heart failure (HF) in patients after myocardial infarction.

Materials and methods. 88 patients with myocardial infarction in history more than 1 year old were examined, the average age was 54.17±1.23 years, 30 patients of them had heart failure NYHA class II-III. The patients was divided into 2 groups according to the presence and absence of heart failure. The first group included patients with heart failure, the mean age in the group was 55.07±1.45 years. The second group included 58 patients without HF, the mean age in the group was 53.27±1.01 years.

The significance of differences between samples was assessed using student's t-test. To identify predictors, the calculation of the odds ratio (OR) was used, the reliability was calculated using 2x2 contingency tables, with the calculation of the two-side version of the Fisher exact test. The differences at p<0.05 wer e considered significant. The calculations used the statistical programs "Statistica 10.0" and "Excel 2013".

**Results:** The groups did not differ by sex and age. The analysis of the revealed predictors by means of contingency tables and calculation of odds ratio (OR) of HF development showed the following results. Patients with myocardial infarction with a Q wave of the anterior wall (OR = 4.38, p<0.05), who had a myocardial infarction with a Q wave regardless of the affected wall (OR = 2.78, p<0.05), who had a reinfarction (OR = 15.43, p<0.05), night myocardial infarction (OR = 27.0 p<0.01), who had diabetes mellitus (OR = 10.18, p<0.01), and also had a high risk of heart failure overweight (BMI ≥ 25 kg/m2) (OR = 2.95, p<0.05). At the same time, such prognostic negative factors as smoking, arterial hypertension in our study did not show an additional negative risk on the development of heart failure. In our studies, there was no prognostic adverse effect of such factors as gender, old age and prior myocardial infarction angina.

**Summary:** Thus, according to our data, the important factors in the development of heart failure in patients after myocardial infarction are, in particular, the time of occurrence of myocardial infarction (at night during sleep) and metabolic disorders (diabetes and obesity), and also the size of the lesion and localization of myocardial infarction.

**P699**

**Benefits of ivabradine and betablockers combination in the management of heart failure**

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**On Behalf of:** ESSENTIEL Study group

**Topic: Chronic Heart Failure - Other**

Introduction : Several studies confirm the benefit of combining ivabradine with beta-blockers in order to reduce heart rate more effectively in patients with heart failure than beta-blockers alone.

Materials and methods : A prospective study conducted on an open cohort in Morocco cardiology clinical practice, included 193 patients with chronic heart failure with reduced ejection fraction (HFREF) treated by ivabradine in combination with beta-blockers. The primary outcome is to evaluate HR and NYHA classification in 1 and 4 months. LVEF was considered as a secondary outcome.

Results : the mean age was 65,6±11,7 years, with male predominance (67,4%), mean HR was 89,9±15,2bpm, with a LVEF of 39,6±10,9. For the type of beta-blockers, 59,7% were receiving carvedilol, 23,6% bisoprolol, 8,9% atenolol and 7,8% other BB. For the dose, 13,4% were treated with less than initiation beta-blockers dose, 37,4% were at initiation dose, 38% were at half of recommended dose and 11,2% were at recommended dose. After 4 months, the mean HR showed a significant reduction of 26±14,5bpm (p<0,0001) and no statistical significant difference (p = 0,68) observed between beta-blockers doses which was respectively 28,7±1,4, 25,2±2,9, 29,1±2,4 and 27,7±1,6 for initiation, recommended, less than initiation and half of recommended dose. A 16,3% (p<0,0001) improvement of the LVEF was observed. For symptoms, 34% of patients became NYHA I, 50% NYHA II, only 16% were NYHA III and no patient remained NYHA IV regardless of the BB dose.

A sub analysis was performed on patients treated by carvedilol. The mean HR was 93,1±15,2bpm, with a LVEF of 37,6±9,8. The NYHA classification at baseline was 13% NYHA II, 64,8% NYHA III and 22,2% NYHA IV. After 4 months, the HR showed a reduction of 27,3±15,4bpm (p<0,0001), while the LVEF showed an increase of 15,2% (p<0,0001). For symptoms, 36% of patients became NYHA I, 46% NYHA II, 17% NYHA III and only 1% remained NYHA IV.

The investigators rated safety on a scale from 0 to 5 (where 0 represents poor tolerance and 5 excellent tolerance) at 4,65±0,6 to ivabradine safety profile. The rate of adverse events was 0,5%.

Conclusion : This study demonstrated that ivabradine was effective in reducing HR in CHF patients over a period of 4 months irrespective of the dose of beta-blockers. There was an improvement of LVEF, with a marked shift from higher to lower NYHA classes indepensently of the BB administred dose. The combination of ivabradine and carvedilol showed the same positive results, which makes it an interesting subpopulation for further investigations.

**P700**

**Implantation of a CRT system in a patient with congenital heart malformation**

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**Topic: Chronic Heart Failure - Other**

Treatment of patients with physiology of functionally single ventricle is possible through surgical corrections, called "Fontan surgery". The corrections create two separate blood circulations by the function of the single ventricle. Patients are not cyanotic but are at a high risk of development HF. CRT implantation is an option for improvement of the functional class and the ejection fraction. A surgical correction is performed on the background of different variations of complex cyanotic cardiac anomalies to create a physiology of functionally single ventricle. The correction creates two separate blood circulations by the functionin of the single ventricle. The prognosis is better in cases of morphological left ventricle. Patients are at a high and prolonged risk of low cardiac output, development of heart failure and atrial arrhythmias. Even in the most successful cases of the corrections late heart failure is developed. The problems with hemodynamics are in correlation basically with the functioning of the single ventricle, lack of preloading as well as existence of vessel resistance

We would like to present a case of a 31- year old female with congenital heart malformation of a functionally single ventricle and pulmonary atresia that was implanted with a CRT system. Potts shunt was performed, (anastomosis between the Aorta Desc. and the left pulmonary artery. At the second stage Fontan palliation (atrial-pulmonary connection) has been performed. Due to a complete AV block a pacemaker has been implanted. 10 years after the patient came to the clinic with symptoms of severe HF- IV functional class according to NYHA classification and the EF was 20%. A CRT system was implanted in order to improve the pumping function and to reduce the HF. Anatomically; the venous system of the functionally single ventricle is represented by only one target vessel, defined as anterior-lateral branch. A bipolar left ventricle lead was implanted in anterior-lateral branch of the coronary sinus (CS). A multisite stimulation was created between the epymiocardial and the endocardial lead with programmed V-V time of 15 ms. Significant decrease of the QRS duration was registered and the EF of the functionally single ventricle has improved. X-ray of the leads for multisite stimulation of the functionally single ventricle was performed on the 7th year of the CRT implantation. Improvement of the pumping function of was proved up to 38 % and these values are preserved for 3 years and the functional class according to NYHA was improved to II. 7 years after the EF worsened and the patient came to the clinic with severe symptoms of HF. Dysfunction of the epymiocardial lead was found- exit block (high stimulation threshold with no ventricle capture).

Due to the rarity of these cases and their heterogeneity the clinical experience worldwide is not enough for general conclusions. This is one of the reasons for the lack of consensus and guidelines for such patients.

**P701**

**Predictors of poor outcomes in diabetic patients with heart failure, is there anything we can do?**

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**Topic: Chronic Heart Failure - Other**

**Introduction:** Among patients with heart failure, diabetic patients are a group with worse prognosis. The therapeutic management of these is often a challenge due to their multiple comorbidities, being antidiabetic treatment a topic of growing interest.

**Purpose:** The aim of our study was to identify predictors of poor prognosis in this population.

**Methods:** We analyzed diabetic patients with heart failure and reduced left ventricular ejection fraction (FEVI) ≤35% admitted to our cardiology department during a period of 16 months and subsequent follow-up. A multivariate COX regression analysis was conducted including those variables that were significant in the univariate analysis and those clinically relevant.

**Results:** From 630 diabetics admitted, a total of 122 patients were included. Baseline characteristics are shown in Table 1. Independent risk factors of mortality and heart failure hospitalizations identified by multivariate analysis were age: Hazard ratio (HR) 1.08 95% confidence interval (CI) (1.01-1.16) p = 0.021, treatment with insulin: HR 6.32 95% CI (1.46-27.30) p = 0.014 and renal function: at higher glomerular filtration rate, less mortality and hospitalizations HR 0.95 CI 95% (0.91-0.98) p = 0.006.

**Conclusions:** -In diabetic patients with heart failure and reduced ejection fraction, age, insulin treatment and renal function were independent risk factors of mortality and heart failure hospitalizations.

-Insulin treatment might be a modifiable factor impacting on this group prognosis.

**Table 1**

| Baseline characteristics | |
| --- | --- |
| Age ( years) mean± SD | 71.7±11.1 |
| Women n(%) | 30, 24.7 |
| Hypertension n(%) | 105, 86.1 |
| Dyslipidemia n(%) | 99, 77.0 |
| Smokers n(%) | 25, 20.5 |
| Ischemic cardiopathy | 93, 76.2 |
| FEVI % mean± SD | 29.7±7.1 |
| metformin n(%) | 77, 66.1 |
| insuline n(%) | 47, 38.5 |
| SGLT2 inhibitors n(%) | 21, 17.2 |
| another antidiabetics n(%) | 31, 25.4 |

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| | Less than initiation dose | | Initiation dose | | Half of recommended dose | | Recommended dose | |
|---|---|---|---|---|---|---|---|---|
| | V0 | V2 | V0 | V2 | V0 | V2 | V0 | V2 |
| **NYHA I** | 0% | 4.8% | 0% | 10.2% | 0% | 16.3% | 0% | 3% |
| **NYHA II** | 2.8% | 6% | 2.2% | 20.5% | 9% | 15.7% | 2.8% | 7.2% |
| **NYHA III** | 8.4% | 2.4% | 24.7% | 5.4% | 24.2% | 6.6% | 7.3% | 1.2% |
| **NYHA IV** | 1.7% | 0% | 10.7% | 0.6% | 5.1% | 0% | 1.1% | 0% |

Table 1: Evolution of NYHA classification between V0 and V2 as per BB dose(n=166)

## P704

**Case report of training with a VAD patient bridge to transplant running half marathon**

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**On Behalf of:** sportcardiology Bad Oeynhausen
**Topic: Chronic Heart Failure - Other**

**Introduction:**

VAD systems are implanted for several reasons. This case report of a female 47 year old former elite handballplayer shows the effect of physical training after implantation of a LVAD Heartmate III system.

The patient A.M was supported with VAD in cause of myocarditis as a bridge to transplant. 63 months post implantation A.M. underwent othotopic heart tranplantation.

**Aim:**

Our patient was a high motivated person who only needs support and supervising in his sport activities. He wanted to attain optimal condition until the HTX. Due to the long period of waiting for a donor organ he started running, to improve his physical and mental condition.

**Implementation:**

In 3/2015 A.M. was discharge out of hospital Training with an individual training programme.

He started 44 years old, 98 kg, 1,92m VO$^2$at 14ml/kg, VO$^2$peak 24,07 ml/kg

In 2/2018 a driveline infection  forced the inpatient situation. M.A. was listed HU for transplantation.

Initial we restarted training our 47 year old M.A. with a weight 97 kg, 1,92m, VO$^2$at 14ml/kg, VO$^2$peak 19,8 ml/kg. His IVC was 7,47l

The physical acitivities we supported were :

Dayly power walk 1600m

5 times/week moderate strength training using barbells on a moderate Level

3 to 5 times/week intervall ergometertraining

In 5/2018 our M.A weight 92kg, 1,92m, VO$^2$at 21,82ml/kg, VO$^2$peak 25,26 ml/kg.

**Results:**

In his out of hospital period our patient  took part at several local running Events.

Half marathon time was: 2h47'25", a 10km finishing time was 1'15''.

Sport activities in VAD Patients is safe and useful in a subgroup of highly self-motivated individuals.

**Progress in VO2 measures**

| Age | Weight | Height | BMI | HR Rest | HR Max | Vo2at | Vo2peak |
|---|---|---|---|---|---|---|---|
| 44 | 98 | 1,92 | 26,6 | 74 | 140 | 14 | 24,07 |
| 47 | 97 | 1,92 | 26,3 | 57 | 139 | 14 | 19,83 |
| 47 | 92 | 1,92 | 25,0 | 55 | 138 | 21,8 | 25,26 |

Age, weight, BMI, heartrate and VO2 in a halfmarathon running VAD Patient

## P705

**Clinics differences between patients with or without atrial fibrillation escort thyroid disorders in patients admitted by an episode of heart failure**

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**Topic: Chronic Heart Failure - Other**

**Objective:** Asses whether clinical or demographic differences among patients with atrial fibrillation who have thyroid disorders compared to those who do not.

Design and

**Method:** Discharge reports of patients admitted to an internal Medicine and Cardiology Hospital tercer level section of heart faillure cardiology and General plant in the period from 1 october,  2010 were reviewed to 31 december 2013. Patients who had atrial fibrillation and they werw divided into two groups were inciuided, those with thyroid disorder or have had and those who did not.

**Results:** 1.099 discharge reports were reviewed objectifying 708 patients with atrial fibrillation. The average age is 81,30 years. Of the 708 patients with disorders is 221, of which there are 70 men and 151 women. Among the 221 patients with no thyroid abnormalities with HTA 188 (85,5%), 45% diabetics (20,4%), and 107 with ischemic heart disease (33,3%). Of the 98 without thyroid abnormalities are 53 men and 45 women. Of these, 37 were diabetic (37,8%), 82 wery hipertensive (83,7 %) and 41 with ischemic (48%) disease. No significant differences in any of the gropus with respect to sex (p = 0,084), DM (P = 0,225), age (o = 0,201) and ischemic heart disease (p = 0,471) were found. However, if significant differences werw found regarding patients with hypertension (p = 0,03).

**Conclusions:** in our patients with a very high average age (80 years) was observed. Thyroid abnormalities are present in a hign percentage of patientes, almost 31%. The HTA is a casual factor atrial fibrillation is associated with a high prevalence of episodies of heart faillure. The HTA patients have thyroid disorders more often, compared to normotensive patients.

## P707

**New score for evaluation of intra-hospital outcome of patients with acute myocardial infarction**

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**Topic: Coronary Artery Disease - Other**

**Introduction:** Risk stratification has become an integral component of modern treatment in clinical practice. Procedural processes during primary percutaneous coronary intervention (pPCI) as well as knowledge about the distribution and types of lesions in coronary arteries are of great importance, and a final risk evaluation is recommended directly after the pPCI. Methods of data mining allow finding hidden patterns in data, but also development of modern predictive models.

**Purpose:** To create and test a simple, practical and usable predictive model in daily practice for the assessment of intra-hospital treatment outcome of patients with acute myocardial infarction with ST-segment elevation (STEMI) treated with pPCI.

**Methods:** Presented research is unicentric, retrospective but also prospective study. Retrospective study included 1495 patients with STEMI admitted to our hospital and treated with pPCI during the period from December 2008 to December 2011. Each patient was initially described by 629 attributes (demographic characteristics, data from history and clinical findings, biochemical parameters of blood tests on admission, the echocardiographic parameters, angiographic and procedural details and admission diagnosis codes). For model development, an open source software solution Weka was used. During the evaluation of different algorithms, algorithm that gives the best results in terms of accuracy and ROC parameter was chosen. As part of the retrospective study, in order to assess the models performance, ten-fold cross-validation on the entire data set was used. Additional validation of the developed predictive model was conducted in a prospective study, on a sample of 400

patients with STEMI, treated with pPCI in 2015. In addition, GRACE risk score was calculated for the prospective study patients and comparison with the developed model has been performed.
**Results:** Alternative decision tree (ADTree) was selected as best performing algorithm. Cost sensitive classification was used as an additional methodology to enhance accuracy. ADTree selected eight key parameters that most influence the outcome of intra-hospital treatment: systolic blood pressure on admission, left ventricular ejection fraction, stroke volume of the left ventricle, troponin, creatine phosphokinase, total bilirubin, T wave shape and the result of the intervention. The performance of the developed model are: the accuracy of the prediction is 93.17%, ROC 0.94. The developed model kept its performance in prospective validation: accuracy of prediction 90.75%, ROC 0.93. Widely used GRACE score achieved ROC = 0.86 in the prospective study patients, indicating that developed predictive model is superior.
**Conclusion:** Developed predictive model is simple and reliable. Its implementation in everyday clinical practice, would allow clinicians to distinguish high-risk patients after reperfusion treatment, and then to intensify treatment and clinical follow-up.

**P708**
**Mortality following first-time hospitalization with acute myocardial infarction in Norway, 2001-2014: time trends, underlying causes and death setting**
G Sulo[1], J Igland[2], S Overland[1], E Sulo[3], GM Egeland[4], SE Vollset[5], GS Tell[2]
[1]Norwegian Institute of Public Health, Bergen, Norway, [2]University of Bergen, Department of Public Health and Primary Health Care, Bergen, Norway, [3]Haraldsplass Diakonale Hospital, Bergen, Norway, [4]Norwegian Institute of Public Health, Department of Health Registries, Bergen, Norway, [5]National Institute of Health (Home), Washington, United States of America
On Behalf of: CVDNOR Project
Topic: Coronary Artery Disease - Other
**Background:** Acute myocardial infarction (AMI) is a well-defined, life-threatening condition that requires immediate treatment and is associated with considerable mortality and disability rates.
**Purpose:** To explore trends in 28-day and one-year mortality (by underlying case and death setting) following first-time hospitalization with an incident acute myocardial infarction (AMI) in Norway 2001-2014.
**Methods:** Information on hospitalizations was obtained from the Cardiovascular Disease in Norway Project. Information on deaths (underlying cause and death setting - in hospital versus outside a hospital) was obtained from The Cause of Death Registry. Trends in mortality were analyzed using Cox proportional hazards models and results expressed as average annual changes in rates over the study period.
**Results:** Of 176 320 subjects [mean (SD) age, 72.3 (13.9) years; 61.0% men] included in the study, 14.5% died within 28 days of AMI admission. The 28-day mortality declined by 4.6% per year (Ptrend<0.001). Of the 141 139 patients surviving first 28 days, 12.8% died within one year of AMI admission. Cardiovascular disease (CVD) mortality declined by 5.8% per year while non-CVD mortality increased by 1.2% (both Ptrend<0.001), mainly influenced by increasing risk of dying due to neoplasms (1.3% per year), respiratory conditions (1.9% per year) and infectious diseases (3.7%) (all Ptrend<0.001).
Analyses stratified by death setting revealed a decline by 4.7% and 0.8% per year in the risk of dying in a hospital or outside of a hospital, respectively  (both Ptrend<0.001).
Over the study period, we observed a shift toward more non-CVD deaths, and deaths occurring outside hospitals, especially in nursing homes.
**Conclusions:** We observed a continuous decline in 28-day mortality following an incident AMI in Norway during 2001-2014. Longer-term mortality declined for CVD while increasing for non-CVD conditions. In-hospital declined more than out-of-hospital mortality.

**P709**
**Detection of muscle dysfunction in coronary heart disease patients: a randomized clinical trial comparing high versus moderate-intensity aerobic exercise**
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Topic: Coronary Artery Disease - Other
**Background:** Mechanical efficiency (ME) refers to the ability of an individual to transfer energy consumed by external work. Individuals with lower ME values should be less efficient respect to performance and may therefore be limited in terms of physical activity Most studies that assess the efficiency of the different cardiac rehabilitation exercise programs evaluate the modification of the cardiovascular risk factors, quality of life and clinical variables associated with the prognosis of morbidity and mortality, but there are very few research that evaluates ME, even though it provides important information concerning biomechanical adaptations and the use of the energy sources associated with clinical training and therefore the functional capacity of patients.
**Purpose:** The evaluating ME may be valuable in order to the detection of muscle dysfunction and the assessment of any subsequent adaptations in response to training. This study aimed to compare the influence of 2 different exercise protocols: moderate continuous training (MCT) versus high intensity interval training (HIIT), as part of a cardiac rehabilitation program on ME values among coronary patients.
**Methods:** All patients underwent exercise testing with a cycle ergometer including analysis of exhaled gases. Patients were randomized on a one-to-one basis to either the MCT or the HIIT group. The mode of exercise training was a cycle ergometer with 40 minutes per sessions, 3

days per week (total of 24 sessions over 2 months). Selected CPET variables and ME measurement were recorded before and after the exercise program. ME (expressed as a percentage) was calculated during an incremental maximal cycling test at stages corresponding to VT1, VT2 and VO2peak.
**Results:** A total of 110 patients were included and studied (53 patients in MCT-group and 57 patients in HIIT-group). Both exercise programms significantly increase VO2peak with a higher increase in the HIIT group (2,96±2,33 ml/kg/min vs 3,88±2,40 ml/kg/min, for patients of the MCT and HIIT groups respectively, p<0,001). The ME at VO2peak and VT2 only significantly increased in the HIIT group (p<0,001). At VT1, ME significantly increased in both groups, with a greater increase in the HIIT group (2,20±6,25 % vs 5,52±5,53 %, for patients of the MCT and HIIT groups respectively, p<0,001).
**Conclusions:** The application of HIIT to patients with chronic ischemic heart disease of low risk resulted in a greater improvement in VO2peak and in ME at VT1, than when MCT was applied. Moreover, only the application of HIIT brought about a significant increase in ME at VT2 and at VO2peak.

**P710**
**Diagnostic and prognostic value of IGFBP-7 and galectin-3**
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[1]Medical University of Bialystok, Bialystok, Poland
Topic: Coronary Artery Disease - Other
**Objective:** Galectin-3 (Gal-3) is a new risk factor of coronary disease (CAD) occurrence. The role of insulin-like growth factor-binding protein-7 ( IGFBP-7) in atherosclerosis has not been definitely acknowledged. The aim of the study was to evaluate the diagnostic and prognostic value ofGal-3 and IGFBP-7 in CAD patients.
Patients and
**Methods:** The study group was composed of 233 patients with myocardial infarction (MI) and 100 patients with a stable CAD. Selected classical and new (carotid intima-media thickness (cIMT) cardiovascular risk factors were assessed, Gal-3 and IGFBP-7 concentrations were measured. The control group was composed of 100 healthy individuals. The follow-up for MI patients lasted from 2 to 4 years (average period − 2.8 years).
**Results:** In the study group (MI and CAD patients) both Gal-3 and IGFBP-7 concentrations were significantly higher than in the controls (Gal-3: median 7.9 and 10.7 ng/ml vs.5.5 ng/ml (p = 0.0001), respectively, IGFBP-7: median 35.1and 32.7 ng/ml vs.25.2 ng/ml (p = 0.0001), respectively,). The value of ≥ 8.6 ng/ml (AUC = 0.93, 95% CI = 0.889-0.964) for Gal-3 and the value of ≥ 38.7 ng/ml for IGFBP-7 (AUC = 0.703, 95%CI = 0.648-0.753) have been assigned as a cut-off point with comparable diagnostic quality (difference between areas = 0.024 − Fig.1). Gal-3 concentrations correlate with a degree of coronary vessels changes advancement (9.2ng/ml in 3-vessel disease vs.7.4ng/ml, p = 0.003), while IGFBP-7 does not. Significant correlations between IGFBP-7 and Gal-3 concentrations and cIMT values were found. In the group of MI patients who died during the follow-up, we found a significantly higher concentration of Gal-3 (20.0ng/ml vs 8.0ng/ml, p = 0.0005) and cIMT values (common carotid artery(CCA): 1.4 ± 0.4 mm vs. 1.0 ± 0.3 mm, p = 0.03; carotid bulb(CB): 2.3 ± 0.5 mm vs. 1.9 ± 0.4 mm, p = 0.009), but not IGFBP-7 concentration. In the model of multivariate logistic regression analysis the variables influencing the appearance of CAD were: age > 65years, male, IGFBP 7 concentration  > 38.7ng/mL, Gal-3 concentration  > 6.1 ng/ml (p = 0.0008, OR = 1,30, 95%CI 1,12 − 1,52) and cIMT values in CB  > 0.9mm. In the second model - the variables influencing the mortality after MI during follow-up were: age > 65years,  Gal-3 concentration > 8.7 ng/ml, IMT values and plaque occurrence in CB, previous MI and EF<40%.
**Conclusions:** Both Gal-3 and IGFBP-7 are independent risk factors of CAD occurrence, but only Gal-3 concentration and cIMT values are markers of CAD advancement. Gal-3 concentration (but not IGFBP-7) and IMT values in CB were an independent predictive indicators of increased risk of all-cause mortality in patients after MI during mid-term follow-up.

**P711**
**In patients with coronary artery disease systolic blood pressure peaks at age 80 years and diastolic blood pressure starts to decrease at less than 60 years.**
H Hartmut Seyfert[1]
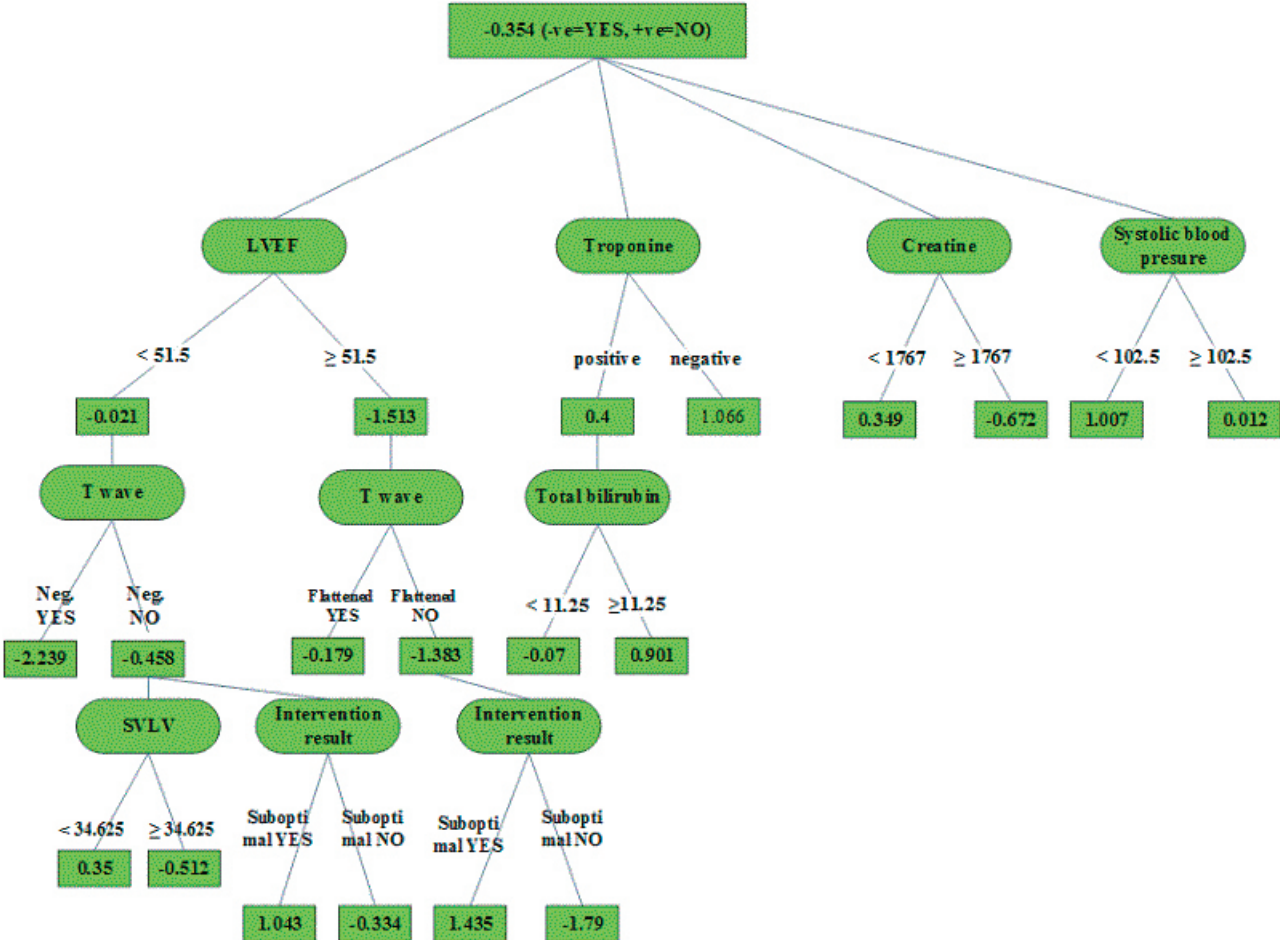[1]Kreiskrankenhaus Demmin - Department of Cardiology, Demmin, Germany
Funding Acknowledgements: none
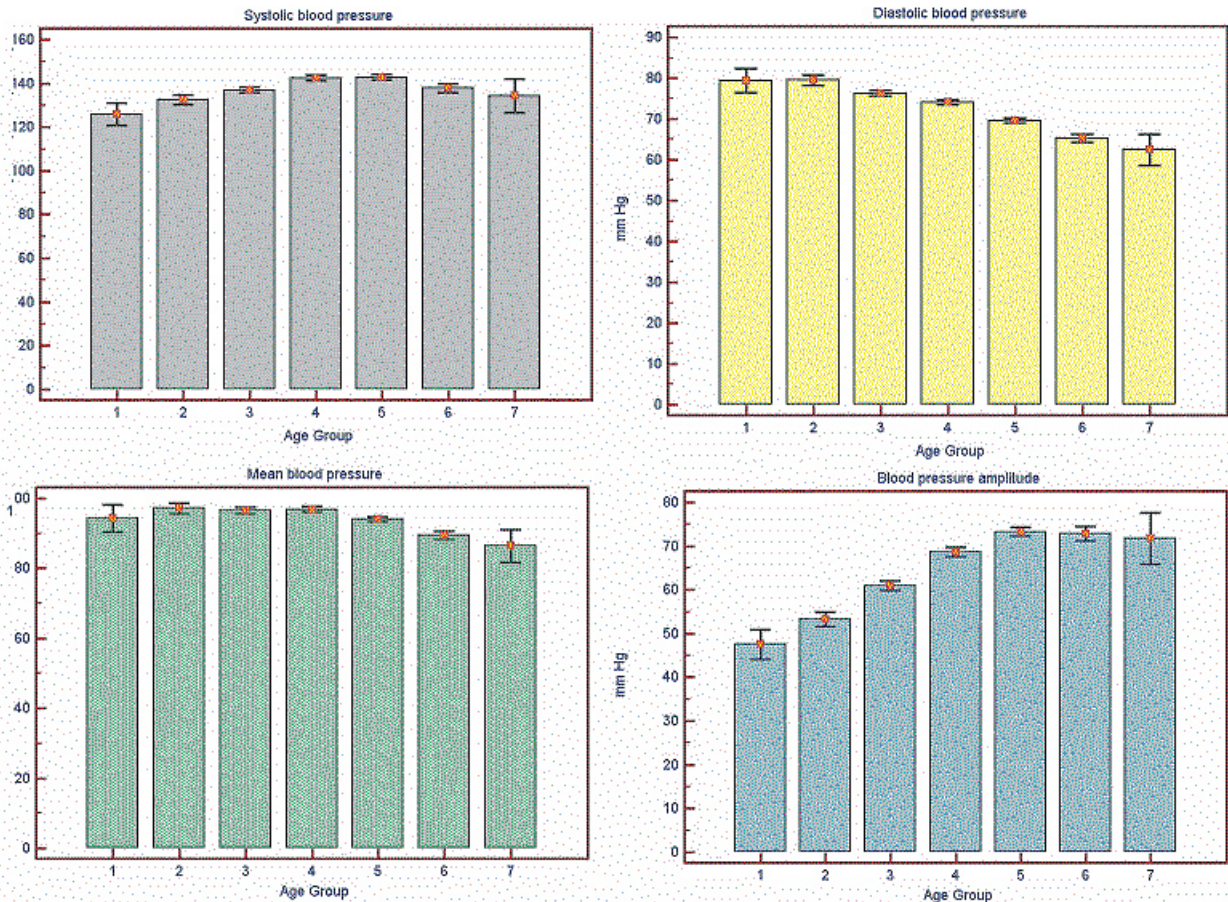Topic: Coronary Artery Disease - Other
**Introduction:** Few data exist on blood pressure in the old and very old. As a substantial part of patients (Pts) with symptomatic coronary artery disease (CAD) is older than 80 years, knowledge of age-dependance of blood pressure (BP) in these patients is mandatory to prevent inadvertent consequences.
**Method:** Between 2002 and 2016, in 6344 patients Pts presenting the first time in our institution with indication for percutaneous coronary intervention (PCI - 3691 Pts with acute myocardial infarction (MI)). BP was measured at the beginning of PCI with the pigtail catheter in the coronary sinus. 10 BP cycles were averaged for determining systolic (RRs), diastolic (RRd), mean (RRm) BP, and BP amplitude (RR-Amp). 69.2% Pts were male, median age was 68 yrs (95% CI 64,7 − 65,4; IQR 58 − 76 yrs). Coronary artery disease was classified as 1-, 2- or 3-vessel disease (VD), if a diameter stenosis > 50% of a major epicardial coronary artery was present in 1, 2 or 3 coronary arteries, respectively. Left main disease was was not additionally categorized. 1-VD was found in 32,5%, 2-VD in 31,3%, and 3-VD in 36,2% of Pts. Arterial hypertension was found in 79,2%, diabetes in 34,5%, dyslipidaemia in 79%, smoking in 27,6%, obesity in 33,4%, family history of cardiovascular disease in 14%, cerebrovascular disease in 7,4%, peripheral arterial occlusive disease in 3,3% Pts. 10,4% had a history of MI,

**Abstract Number: P707**
**ADTree based model**

-0.354 (-ve=YES, +ve=NO)

**LVEF**
< 51.5 → -0.021
≥ 51.5 → -1.513

**T wave** (from -0.021)
Neg. YES → -2.239
Neg. NO → -0.458

**SVLV** (from -0.458)
< 34.625 → 0.35
≥ 34.625 → -0.512

**T wave** (from -1.513)
Flattened YES → -0.179
Flattened NO → -1.383

**Intervention result** (from -0.179)
Suboptimal YES → 1.043
Suboptimal NO → -0.334

**Intervention result** (from -1.383)
Suboptimal YES → 1.435
Suboptimal NO → -1.79

**Troponine**
positive → 0.4
negative → 1.066

**Total bilirubin** (from 0.4)
< 11.25 → -0.07
≥11.25 → 0.901

**Creatine**
< 1767 → 0.349
≥ 1767 → -0.672

**Systolic blood presure**
< 102.5 → 1.007
≥ 102.5 → 0.012

**Abstract Number: P712**
**Blood pressure vs Age**



Group 1 < 40; Group 2 >= 40 - < 50; Group 3 >= 50 - < 60; Group 4 >= 60 - < 70; Group 5 >= 70 - < 80; Group 6 >= 80 - < 90; Group 7 <= 90

6,2% CABG, 10,8% prior PCI, and on dialysis were 1,3%.
**Results:** BP increased from<40 years to it's peak at 80 years (p<0,001, ANOVA – Log-Transformation) with a slight decrease thereafter, whereas diastolic BP decreased from age 60 continuously (p<0,001, ANOVA – Log-Transf.). Consequently RR-Amp as sign of arterial stiffness increased to it's peak at 90 years (p<0,001, ANOVA – Log-Transf.), whereas RRm showed only a moderate decrease (p<0,001, ANOVA – Log-Transf.).
**Conclusion:** In Pts with symptomatic CAD and indication for coronary intervention systolic BP reaches it's peak at 80 years with a decline thereafter, accompanied by a decrease of diastolic BP which starts earlier in life. As a consequence coronary perfusion pressure decreases, as it is mainly driven by diastolic blood pressure. Additionally, decreasing systolic as well as diastolic BP might cause renal or cerebral malperfusion. Careful BP therapy is mandatory in old and very old Pts with symptomatic CAD to maintain or improve quality of life and to prevent symptoms caused by therapeutic interventions.

**P713**
**Circadian effects of chest pain onset on coronary flow and recovery of left ventricular systolic function following primary coronary angioplasty**
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**Topic: Coronary Artery Disease - Other**
Recently it was reported that cardiac surgery is associated with better outcome when performed in the afternoon. Adverse cardiovascular events demonstrate circadian variability.
**Aim:** To test the hypothesis that circadian variation affect outcome in patients presenting with acute ST-elevation myocardial infarction (STEMI) after primary percutaneous coronary intervention (PCI).
**Methods:** A retrospective study of 604 patients with acute STEMI referred for primary PCI, 150 with anterior STEMI and acquisition of Doppler velocities in the left anterior descending coronary artery (LAD) were analyzed for circadian variation effects of chest pain onset. The time of symptom onset was categorized into four 6-hour intervals: midnight–6:00 A.M., 6:00 A.M.–noon, noon–6:00 P.M. and 6:00 PM.–midnight.
**Results:** The 6:00-12:00 chest pain onset group was the largest (31.3%) while the 00-6:00 am group was the smallest (19.4%), p<0.05. Chest pain onset-PCI time intervals were similar between the groups. Patients with onset of chest pain between 12:00 and 18:00 had better coronary microcirculation function according to LAD velocity and diastolic deceleration times, less myocardial damage according to peak myocardial biomarker blood levels and 4-10 folds improvement in left ventricular systolic function by wall motion score index compared to the 18:00-mid night chest pain onset group, p<0.05.
**Conclusions:** Despite similar time duration from pain to primary PCI, patients with onset of chest pain between 12:00-18:00 had better infarct related coronary artery microcirculation function, less myocardial damage and better recovery of left ventricular systolic function.

**P714**

**Age and first STEMI - Inverse relation with BMI in smokers and non-smokers and manifestation at younger age in smokers than in nonsmokers, especially in women.**

H Hartmut Seyfert[1]

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**Topic: Coronary Artery Disease - Other**

**Introduction:** Smoking and increased BMI are established cardiovascular risk factors. The presence of both should influence the age at first STEMI.

**Aims:** To analyze the association between BMI and sex on age at first ST-elevation myocardial infarction (STEMI) in smokers.

**Method:** Of 6344 patients (pts) who underwent percutaneous coronary intervention (PCI) between 2002 and 2016 there were 1920 with first STEMI. Coronary artery disease (CAD) was classified as 1-, 2, or 3-vessel disease (VD) if a major coronary artery had a diameter stenosis of > 50%. BMI was determined as height [m] divided by weight [kg]^2. BMI groups were < 25, > = 25 − < 30, > = 30 − < 35, and > = 35. Cardiovascular risk factors apart from BMI were recorded but not used for analysis.

**Results:** Hypertension was diagnosed in 65.1%, diabetes in 28.8%, dyslipidaemia in 67.3%, obesity in 27.8%. 34.7% were smoker.

Smokers were on average 55 (median; 95% CI 62 − 64; IQR 54 − 72) years (yrs.) old at first MI, non-smokers 71 (95% CI 70 − 72, IQR 62 − 78; p < 0,0001), men 63 (95% CI 62 − 64, IQR 54 − 72), women 72 (95% CI 71 − 74; IQR 60 − 79; p < 0,0001). Smoking men had STEMI at age 55 (95% CI 54 − 55; IQR 48 − 63) vs. non-smoking men at 68 yrs. (95% CI 67 - 69; IQR 60 − 75; p < 0,0001). And smoking women experienced first STEMI at 56 yrs. (95% CI 54,4 - 58; IQR 50 − 65) vs. non-smoking women at 76 yrs. (95% CI 74,1 − 76; 69 − 81 IQR). BMI in the patient population was 27,8 (95% CI 27,7 − 28,1; IQR 25,3 − 30,8). BMI impacted significantly on age at first STEMI, those with the lowest BM −Group (BMI < 25) were the oldest. Non-smokers had 2,02 VD (mean; 1,97 − 2,06 95% CI, 0,81 SD; 1,0 − 3,0 IQR) and smokers 1,81 (mean; 1,74 − 1,87 95% CI; 1,0 − 3,0 IQR; p < 0,0001). Ejection fraction was significantly better in smokers vs nonsmokers (p = 0,0064).

**Conclusion:** Smokers with first STEMI are significantly younger than non-smokers with first STEMI. Lower BMI is associated with later occurrence of first STEMI. This holds true for women as for men. Smoking reduces age at first STEMI in women to nearly equal age of men with first STEMI.

**P715**

**Primary prevention with aspirin and in-hospital mortality in patients with an acute coronary syndrome**

PM Pedro Azevedo[1], T Mota[1], J Bispo[1], D Carvalho[1], J Guedes[1], R Fernandes[1], S Pereira[1], W Santos[1], J Mimoso[1], I Jesus[1]

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**Topic: Coronary Artery Disease - Other**

**Introduction:** The routine use of aspirin for primary prevention of cardiovascular disease (CVD) is controversial and recent randomized controlled trials failed to demonstrate a clear benefit in favour of aspirin. Nevertheless, they are still frequently prescribed in high-risk patients. Studies have reported controversial results regarding the impact of previous aspirin use on the short-term prognosis of patients with an acute coronary syndrome (ACS).

**Purpose:** Assess the impact of aspirin use for primary prevention of CVD on the short-term prognosis of patients with an acute coronary syndrome.

**Methods:** We analyzed retrospectively all patients admitted consecutively in a coronary care unit with an acute coronary syndrome from October 2010 to September 2017. Patients with previous cardiovascular disease (ACS, previous revascularization, stroke or peripheral artery disease) or medicated with an anticoagulant were excluded from analysis. Patients treated with aspirin for primary prevention were compared against those without. We assessed and compared baseline characteristics, clinical data and in-hospital mortality between the groups. Statistical analysis was performed in SPSS.

**Results:** 2041 patients were included (1474 (72%) men, mean age 63.98 ± 13.4 years), of which 165 (8.1%) were previously treated with aspirin. Those on aspirin were older (mean age 73.5 vs 63.1, p<0,001) and less frequently smokers, but were more likely to have hypertension, diabetes, hyperlipidemia, valvular heart disease, heart failure, chronic kidney disease and dementia, as well as guideline-based medication (beta-blocker, ACE inhibitors and statins). Patients on aspirin were more frequently admitted with non-ST segment elevation myocardial infarction (67.9% vs 46.6%, p<0,001). They were more likely to have heart failure (Killip class ≥ 2), higher creatinine, lower haemoglobin and a tendency for lower left ventricular ejection fraction (56.4% vs 58.6%, p = 0,08). They were less frequently submitted to invasive coronary angiography (64.2% vs 85%, p<0,001) and percutaneous coronary intervention (41.8% vs 66%, p<0,001). There was no difference regarding haemorrhage and need for transfusion. In-hospital mortality was 3% overall (aspirin 6.1% versus no aspirin 2.8%, p = 0,02). On multivariate logistic regression analysis, after adjusting for covariates, aspirin use was not associated with higher in-hospital mortality (OR 1.4, 95% CI 0.5-3.9).

**Conclusion:** Aspirin use for primary prevention is more frequent in older patients with higher cardiovascular risk profile and more comorbidities. After adjusting for covariates, previous aspirin use had no impact on in-hospital mortality in patients with an acute coronary syndrome.

**P716**

**Type 2 myocardial infarction in a multidisciplinary clinic. Analysis of 5-years cases**

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**Topic: Coronary Artery Disease - Other**

The absence of unified views on the etiology and treatment strategy of the 2 type of myocardial infarction (MI) determines the relevance of research on this issue.

The aim of the study was to estimate the frequency of occurrence, the main causes of the development of type 2 MI in patients hospitalized in all departments of a multidisciplinary hospital.
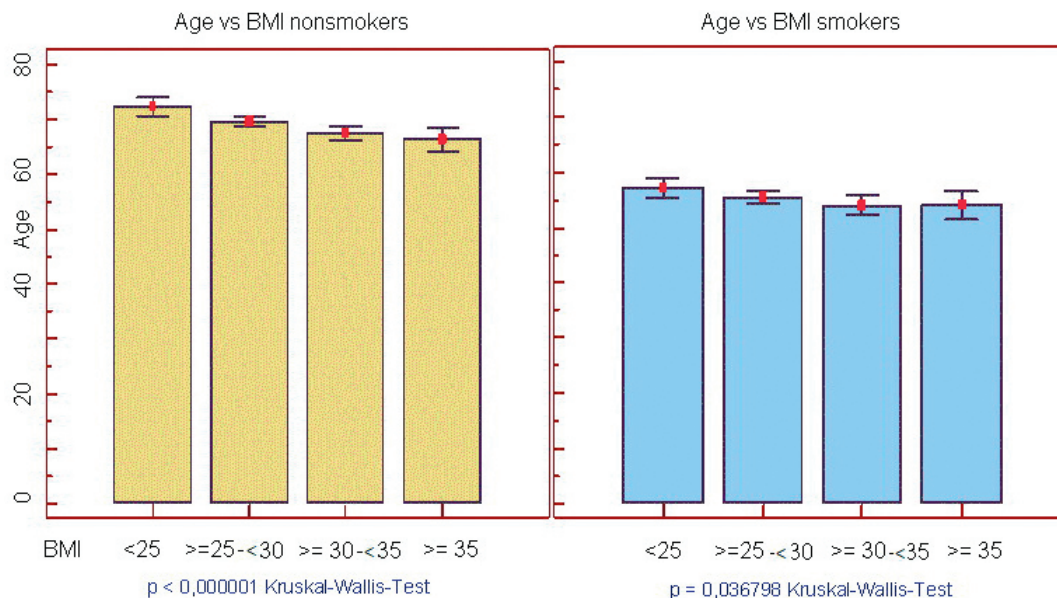
MATERIALS AND METHODS: retrospective analysis of 3326 medical records of patients with a verified diagnosis of MI hospitalized from 2009 to 2016 in various departments of a multidisciplinary hospital; protocols of autopsies of 264 patients who died in 1 year in various departments of the hospital.

**Results:** The absence of signs of atherothrombosis in the coronary arteries (CA) according to coronary angiography was revealed in 153 (4.6%) of 3326 patients with a verified diagnosis of MI. 107 patients had no significant atherosclerotic lesion of the CA (stenosis less than 50%), which meets the criteria of MINOCA (70% of type 2 and 3.2% of total MI). The main causes of 2 type MI were: 30.1% - coronary artery spasm; 19.6% of cases cause MI were tachycystolic rhythm disturbances; 21.6% of cases - acute arterial pressure deviation (hypo/hypertension); in 17.6% of cases, the probable cause of MI was coronary artery thrombosis / thromboembolism due to antiphospholipid syndrome often associated with active oncological diseases, as well as verified thrombophilia, polycythemia; in 6.5% - anemia of different genesis in combination with other factors (tachyarrhythmia, pronounced fluctuations in blood pressure); in 4.6% of cases - Taco-Tsubo syndrome. Examination of protocols of autopsies of all patients who died in all departments of the hospital during 1 calendar year showed that among 264 cases of hospital mortality in 173 cases (65.6%), the immediate cause of death was acute cardiovascular events. Of these 173 cases, the causes of death were distributed as follows: 41 cases (23.7%) − acute pulmonary embolism; 50 cases (28.9%) - acute cardiovascular failure that did not lead to MI; 61 cases (35.2%) - type 2 MI; 21 cases (12.2%) - 1st type MI.

**Conclusion:** type 2 MI occurs in less than 5% of all hospitalized patients in which MI was diagnosed. In 70% of cases there is no significant atherosclerotic lesion of the coronary arteries (MINOCA). The most common causes are CA spasm and changes in systemic hemodynamics (tachysystole, arterial hypo- and hypertension). Among the causes of hospital mortality in all categories of patients are cardiovascular diseases (65.5%), more than a third of which are represented by type 2 MI.

**Abstract Number: P714**

**Age vs BMI in smokers and non-smokers**



Age vs BMI nonsmokers    Age vs BMI smokers

p < 0,000001 Kruskal-Wallis-Test    p = 0,036798 Kruskal-Wallis-Test

**P717**

**Endothelial dysfunction and nociceptive disturbances among patients with microvascular angina**

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[1]North-Western Sate Medical University named I.I. Mechnikov, St-Petersburg, Russian Federation

**Topic: Coronary Artery Disease - Other**

**Introduction:** The pathogenesis of microvascular angina pectoris (MVA) is not completely clear to the end, some authors consider the violation of pain (nociceptive) sensitivity to be an important cause of this disease. The purpose of this study was to study the perception of pain and serum endothelin-1 in patients with MVA.

Materials and methods. The criteria for inclusion in the group with MVA (49 patients): chest pain, positive stress test, unchanged coronary artery according to coronary angiography, the presence of a violation of myocardial perfusion and a decrease in the coronary reserve according to the positron emission tomography (PET) of the myocardium in rest, with a sample with adenosine and a cold test. Pain in the chest was noted in all 49 patients. Assessment of the nature of the pain syndrome was carried out using a 10-point visual-analogue scale (VAS), verbal rank scale (VRS). All subjects underwent a study of the functional activity of nociceptive and antinociceptive systems using the nociceptive flexor reflex method on the Nicolet VikingSelect expert class equipment, the pain threshold (Pb), the threshold of the reflex (Pr), and ratio coefficient (Pb / Pr), which in healthy people is approximately 0.9-1.0. The content of endothelin-1 in the serum of peripheral blood was determined by the method of enzyme immunoassay using test systems "Endotelin 1-21" (the normal values are up to 0.26 fmol / l) Fresh samples immediately after collection of blood were placed on ice and centrifuged during the day.

**Results:** The intensity of pain in the usual attacks in patients with MVA according to the VAS data (5.51 ± 0.2) in most cases was moderate and none of the subjects reached the maximum possible values. According to VRS, moderate pain was described by 60% of patients with MVA, strong - 34.3%.In the study of NFR in patients with MVA, the group as a whole showed a decrease in the pain threshold, the threshold of the reflex, and the ratio coefficient (Pb / Pr) as compared with normal values. In the MVA group, Pb was equal to 9.5 ± 0.58 mA; Pr = 12.1 ± 0.58 mA; Pb / Pr = 0.78 ± 0.02. When studying the level of endothelin-1 in patients with MVA the level of this peptide was raised to 2.9 ± 0.82 fmol / l. According to the correlation analysis between endothelin-1 and the parameters of NFR, an inverse correlation was observed: between endothelin-1 and pain threshold (r = -0.4; p <0.01); between the level of endothelin-1 and the ratio coefficient of PB / PR (r = -0.9; p <0.01).

Based on the results of the correlation analysis of the pain intensity index on the VAS scale and endothelin-1 level in patients with MVA, a significant relationship was found (r = 0.6, p <0.01)

**Conclusions:** In patients with MVA, a decrease in the pain threshold and an elevated level of endothelin-1 were found. Thus, the severity of endothelial dysfunction in patients with MCC was interrelated with the process of perception of pain.

**P721**

**Acute left circumflex occlusion: infarct size, electrocardiographic abnormalities, reperfusion delay, average hospital stay and cardiovascular mortality.**

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**Topic: Coronary Artery Disease - Other**

**Background:** Left circumflex (LCx) occlusion is underdiagnosed in most of reperfusion studies about myocardial infarction, due to its poor electrocardiographic expressiveness and late diagnosis, which leads to longer higher infarct size and reperfusion time.

**Purpose:** To compare peak of cardiac biomarkers, electrocardiographic abnormalities, reperfusion delay, hospital stay and survival in acute and subacute myocardial infarction, due to left anterior descending (LAD), left circumflex (LCx) or right coronary artery (RCA) occlusion.

**Methods:** Observational retrospective study including 1634 coronary angiographies in a single university hospital between 2016 and 2018. We analyzed clinical presentation, delay from emergency unit to invasive cardiology department, peak of markers, electrocardiographic parameters, average hospital stay and long-term mortality.

**Results:** 873 patients with myocardial infarction were analyzed, of which LCx was occluded in 10%. 38, 52, and 10% of cases with LCx occlusion presented as Non-ST Segment Elevation Myocardial Infarction (NSTEMI), ST Segment Elevation Myocardial Infarction (STEMI) and subacute myocardial infarction respectively. Levels of troponin were higher in LDA than in LCx and RCA occlusion (p=0.002).

The most frequent ECG findings in patients with LCx occlusion were "ST depression in V1-V4 leads and ST elevation in inferior and lateral leads" (5%). Isolated ST depression in I, AVL, V4-V6 was the most frequent finding detected in NSTEMI due to LCx occlusion (sensitivity 13%; specificity 91%; positive predictive value 67%, negative predictive value 45%). Specificity and positive predictive value increases up to almost 100% when a transthoracic echocardiography shows left ventricular inferior, septal and/or posterior wall hypokinesia.

No differences on time from symptoms onset to emergency department were detected (p=0.201), but mean time from emergency unit to invasive cardiology department arrival was 292, 1608 and 350 minutes in LDA, LCx and RCA occlusion (p<0,001). Furthermore average hospital stay was 8, 9 and 7 days respectively (p=0,281). Patients with LDA occlusion presented lower systolic function after AMI (p<0.001) and higher rate of all-cause mortality

before discharge (p= 0.028). A higher rate of third degree atrioventricular block was found in RCA occlusions (p<0,001), but no differences in all-cause mortality 6 months and 1 year after AMI were found (p=0.082; p=0.080 and p=0.155).

**Conclusions:** Isolated ST depression in lateral leads seems to be a low sensitive but highly specific electrocardiographic parameter in NSTEMI due to LCx occlusion. Our study showed higher reperfusion delay in patients with acute LCx occlusion, which didń lead to higher infarct size, longer average hospital stay, nor long time all-cause mortality.

**Reperfusion delay and hospital stay**



Figure 1. Reperfusion delay and average hospital stay
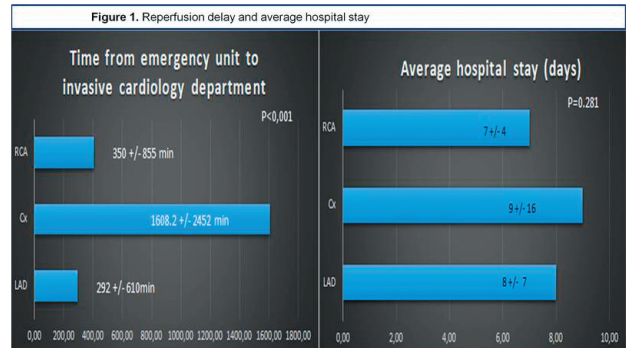
**P723**

**Leukocyte telomere length and risk of coronary heart disease and stroke: prospective evidence from a Russian cohort**

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**Topic: Coronary Artery Disease - Other**

**Background:** Previous studies suggest that reduced leukocyte telomere length (LTL) is related to higher risk of mortality and several chronic conditions, including cardiovascular disease (CVD). However, the consistency of this association across different populations is not clear; for example, several studies reported null findings, and two recent studies from the US found that the association of LTL with mortality differed by ethnicity.

**Objectives:** To investigate the relationship of LTL with all-cause and CVD mortality and non-fatal CVD events in a Russian cohort.

**Methods:** Data from 1,144 individuals, a random subset of the Health Alcohol and Psychosocial Factors in Eastern Europe (HAPIEE) cohort study in Novosibirsk, Russia, were used. Baseline LTL from leukocyte DNA was measured by quantitative real-time polymerase chain reaction, and participants were followed-up over an average 12 years for mortality (149 and 60 deaths from all causes and CVD, respectively) and non-fatal coronary heart disease (CHD, 88 events) and stroke (44 events). The association between LTL tertile and fatal/non-fatal outcomes was assessed using multivariable Cox regression models.

**Results:** Compared to individuals with the lowest tertile of LTL, those with highest tertile had a 42% lower risk of death from all-causes; the hazard ratio (HR) was 0.58, 95% CI 0.39-0.88). The corresponding HR for CHD mortality was 0.42 (95%CI 0.19-0.97). Similar patterns of association were identified for non-fatal and combined fatal/non-fatal CHD and stroke events but the associations were weaker, with HR of 0.77 (0.51-1.18) and 0.74 (0.39-1.43), respectively.

**Conclusion:** Consistently with results of previous studies in Western populations, this cohort of elderly Russian adults found an inverse association between LTL and CVD and all-cause mortality. Associations with combined fatal / non-fatal CVD events were weaker and were largely driven by associations with fatal events. These findings support the hypothesis that that LTL plays a role in human health outcomes across diverse populations, potentially including cardiovascular diseases.

**P724**

**Is there a room for polypill use in secondary cardiovascular prevention?**

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**Topic: Coronary Artery Disease - Other**

**Abstract Number: P724**

**Basal characteristics and drug therapy**

| | Patients (n = 141) |
|---|---|
| Sex (male) | 113 (80.1%) |
| Age (mean±SD) | 60.5 (±11.2) |
| Event (STEMI, NSTEMI, angina) | 82 (58.2%), 54 (38.3%), 5 (3.5%) |
| ACEi/ARBs | 103 (73%) |
| ASA | 130 (92.2%) |
| Statins (Atorvastatin 80mg, atorvastatin 40mg, rosuvastatin, other statin) | 103 (73%), 16 (11.3%), 15 (10.6%), 6 (4.2%) |
| Ezetimibe | 46 (32.6%) |
| Anti-arterial hypertensive combination pill | 36 (25.6%) |
| Number of drugs (mean±SD) | 6.95 (±2.5) |
| Optimal blodd pressure control (<140/90 mmHg) | 95 (72.5%) |
| Optimal LDL control (<70 mg/dl) | 94 (66.7%) |

**Background:** Poor adherence is a barrier to optimal secondary cardiovascular prevention. The need for a polymedication, the cost of some drug therapies and the silent evolution of some cardiovascular conditions are often related to poor adherence. A fixed-dose polypill strategy (AAS, ACEi and statin) has emerged as a possibility to improve adherence in cardiovascular prevention and therefore improve outcomes. Nevertheless, the complexity of cardiovascular disease patientś drug therapy regimes and the need for titration of doses in order to reach the goals, makes it difficult to introduce a fix-dose polypill.

**Methods:** we performed a prospective study of consecutive patients attending a secondary prevention consultancy. In order to find out whether they were amenable to a polypill regime, we analyzed their drug therapy scheme and the level of control of blood pressure and LDL cholesterol.

**Results:** We included 141 patients, and their treatment is shown in table 1. Of the total of patients, we found that only 9 patients (6.4%) were optimal candidates for receiving a fixed-dose polypill. The reasons for not being eligible are summarized in figure 1, highlighting the need for higher statin dose or statin intolerance as the most frequent cause (80.9%), or the need for titration or combination of drugs according to the blood pressure levels.

**Conclusion:** despite the fact that polypill could bring the opportunity to improve cardiovascular drug therapy adherence, the complexity of secondary prevention patients and the common need for a high dose statin makes it difficult to implement a polypill scheme in the real practice.

**P726**

**Epigenetic profile of adipocytes depending on localization of fatty deposits in patients with ischemic heart disease**

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**Topic: Coronary Artery Disease - Other**

**Purpose:** to study features of ectopic localization and epigenetic profile of adipocytes in patients with coronary heart disease.

**Methods:** The study included 84 patients with ischemic heart disease (CHD). For quantitative evaluation of adipose tissue, magnetic resonance imaging (MRI) of the abdominal region and also of the heart with contrast on the Exelart Atlas 1.5 MR imager was performed. Was used to measure volume of visceral adipose tissue (VAT), subcutaneous adipose tissue (SAT) and thickness of perivascular adipose tissue (PVAT). In the culture of adipocytes was evaluated the expression genes of TNF-α, IL-6, IL-10, and adiponectin. All patients were measured the level of TNF-α, IL-6, IL-10 and adiponectin in serum. Statistical analysis was performed using Statistica 9.0. All patients gave written informed consent to participate in the study.

**Results:** According to the MRIs, the average volume of VAT was 150 ± 10.1 cm3, SAT 110 ± 7.1 cm3, the area of the left coronary artery of the left coronary artery 3.7 ± 0.2 mm, the front descending spacecraft 3.5 ± 0.3 mm and the right spacecraft 4.8 ± 0.1 mm. In the course of the study it was established that the volume of fat deposits around the spacecraft did not depend on the value of the VAT and SAT. A positive correlation was found between the concentration of TNF-α and the thickness of the PVAT left coronary artery (r = 0.88, p = 0.01), IL-10 and PVAT of the envelope coronary artery (r = 0.88; p = 0.01). The level of adiponectin was directly depended to the volume of the SAT (r = 0.48, p = 0.03). Expression of cytokine genes IL-6, TNF-α and IL-10 was higher in samples of VAT, as compared to adipocytes of SAT. Moreover, it should be noted that the expression of TNF-α and IL-10 in the culture of adipocytes of PVAT was 3.7 and 4-fold, respectively, more than in other samples. The expression of the TNF-α and IL-10 gene was directly related to the area of the PVAT left coronary artery (r = 0.44, p = 0.03 and r = 0.74, p = 0.03). Expression of the adiponectin gene in the adipocyte culture of PVAT was less than 25% compared to expression in the SAT and was directly related to the volume of the SAT (r = 0.51, p = 0.03). The obtained data indicate that adipokines released by fat cells possess not only local but also systemic effects. Thus, a direct correlation was found between the content of TNF-α, IL-10 and adiponectin in the blood serum and the expression of their genes in cell cultures of PVAT (r = 0.43, p = 0.04, r = 0.53, p = 0, 02; r = 0.77, p = 0.04). Between the concentration of adiponectin, TNF-α in the serum and the expression of their genes in the culture of the SAT (r = 0.33, p = 0.00 and r = 0.28, p = 0.03).

**Conclusion:** PVAT is an isolated endocrine organ with an individual epigenetic profile and pro-inflammatory activity other than VAT and SAT.

**P729**

**Ticagrelor versus clopidogrel in primary percutaneous coronary intervention- Single center prospective study**

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**Topic: Coronary Artery Disease - Other**

**Background:** Clopidogrel yields moderate and variable inhibition of platelet aggregation with a fairly slow onset and variable transformation of the prodrug to the active metabolite even with the currently recommended double loading dose. Ticagrelor, a reversible and direct-acting oral antagonist of the adenosine diphosphate receptor P2Y12, provides faster, greater and more consistent P2Y12 inhibition than clopidogrel.

**Objective:** Evaluation of efficacy and safety outcomes of ticagrelor Vs clopidogrel in patients with ST-Elevation acute coronary syndrome intended for reperfusion with primary percutaneous coronary intervention.

**Methods:** This was a prospective, single-centre controlled cohort study designed to compare ticagrelor with clopidogrel within the subset of 200 patients according to strict inclusion and exclusion criteria (100 patients in the ticagrelor group and 100 patients in the clopidogrel group) with a definite diagnosis of ST-segment elevation acute myocardial infarction and planned for primary percutaneous coronary intervention. Our patients were naive to anti-platelets (aspirin and ADP receptor antagonist). After a successful primary percutaneous coronary intervention, the patients were monitored for In-hospital complications (e.g. stent thrombosis, bleeding) and major adverse cardiac events "MACE" (cardiac death, nonfatal myocardial infarction, target lesion revascularization and Stroke). Clinical follow up of the patients done by visits at 3 and 6 months for the occurrence of ischemic symptoms, the occurrence of bleeding requiring blood transfusion or occurrence of MACE.

**Results:** There were no significant differences regarding clinical and laboratory baseline characteristics between the two groups (Ticagrelor and Clopidogrel). There was a reduction of the primary endpoint (myocardial infarction, stroke, or cardiovascular death) with ticagrelor versus clopidogrel with a statistically significant difference (P = 0.003). Ticagrelor also reduced several secondary endpoints, including myocardial infarction alone with a statistically significant difference (P = 0.002) and definite stent thrombosis with a statistically significant difference (P = 0.002). The risk of stroke was higher with ticagrelor than with clopidogrel but with no statistically significant difference (P = 0.155). Ticagrelor did not increase the risk of bleeding compared with clopidogrel with a statistically non-significant difference (P = 0.56) (possibly because of the reversibility of the agent). Dyspnea requiring drug discontinuation was more frequent with ticagrelor than with clopidogrel with a statistically significant difference (P = 0.002).

**Conclusion:** Ticagrelor is a potent alternative to clopidogrel for patients with ST-segment elevation myocardial infarction and planned for primary percutaneous coronary intervention with significant mortality reduction without increasing the risk of major bleeding.

**P730**

**Intensive and structured optimization of lipid-lowering therapy improves the lipid control after an acute coronary syndrome.**

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**Topic: Coronary Artery Disease - Other**

**Introduction:** Long-term optimal control of cardiovascular risk factors is key to improve prognosis of patients with coronary artery disease. Unfortunately, as shown in Euroaspire V and other studies, a small number of patients after an acute coronary syndrome (ACS) achieve optimal LDL-cholesterol (LDLc) levels (?70mg/dl) during follow-up.

**Purpose:** The purpose of this study was to evaluate the security and efficacy of an intensive and structured lipid-lowering therapy (LLT) protocol. Efficacy was defined as the percentage of patients with an LDLc<70 mg/dL level after an ACS at 3-month and 1-year follow-up.

**Methods:** Prospective observational study of all patients admitted to our hospital with the diagnosis of ACS from November 2016 to July 2017. LLT was modified at discharge, based on

**Abstract Number: P724**
**Causes of non-eligibility for polypill**



AHT: arterial hypertensive
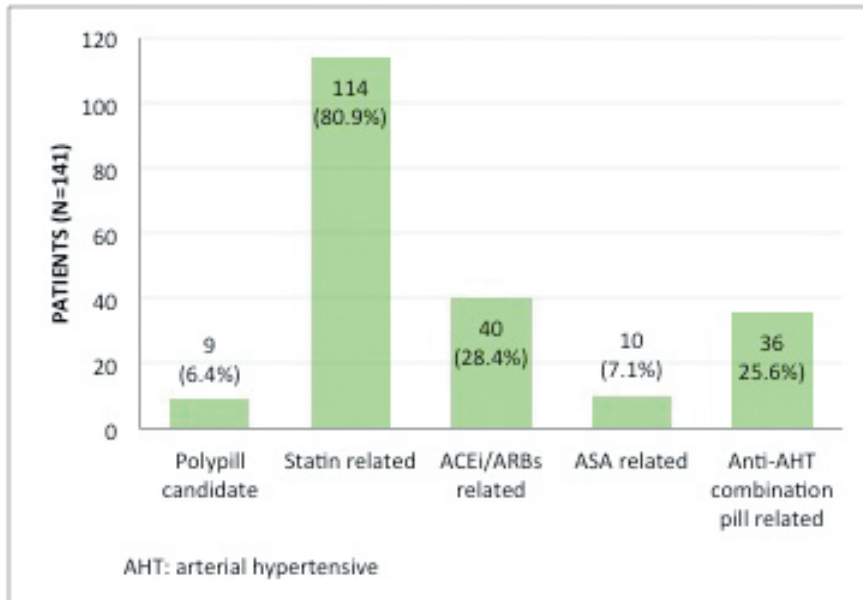
patient's LDLc levels and Masana table. First LDLc control was performed at 6 weeks post discharge and changes in medication were made according to the algorithm designed for the study. This step was repeated after every pharmacological change with LDLc level controls every 6 weeks, until optimal LDLc levels were achieved. From this moment, the follow-up was performed by the family doctor and the local cardiologist.

We collected clinical and analytical data at discharge and during follow-up.

**Results:** We enrolled 125p. Mean age 62±14 years, 81% male and 86% underwent percutaneous coronary revascularization. Mean LDLc at discharge was 105±39 mg/dl, 70% were discharged on high-intensity and 25% on very high-intensity LLT. After 3 months, 97p (78%) had optimal LDLc level. See Figure 1 for more details. Adverse effects were present in 11p (9.5%) (2.6% myalgia, 2.6% high-CK levels, 4.3% hypertransaminasemia). Discontinuation of the LLT due to adverse events was unnecessary.

After 1-year in only 83p (66%) laboratory test results including LDLc levels were performed. Among these patients, only 49p (61%) had optimal LDLc levels. More details of the results available on Figure 2.

**Conclusions:** This intensive and structured optimization of the LLT is safe and improves significantly the rate of patients with LDLc<70 mg/dl at 3-month follow-up. Unfortunately, once this LLT protocol is stopped because of optimal LDLc is achieved, the lipid control decreases appreciably (both in number of patients whose LDL levels are measured, and in the percentage of patients with optimal LDLc levels at 1-year follow-up). Despite this decrease, the percentage of patients with an LDLc<70 mg/dl is higher than described in other observational studies.

**Figures 1 and 2**
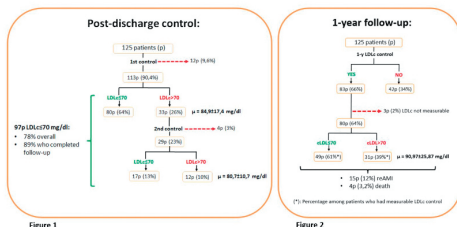


Clinical baseline charact. and results
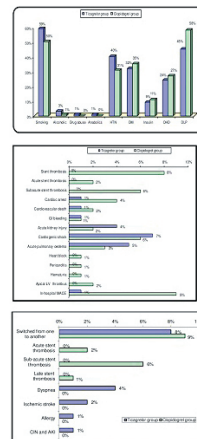


**P733**
**Elevated levels of circulating soluble st2 at discharge predicts late ventricular adverse remodeling in patients with st-segment elevation myocardial infarction**

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**Topic: Coronary Artery Disease - Other**

**Background:** Late (at 4-24 month) adverse left ventricular (LV) remodeling after ST-segment elevation myocardial infarction (STEMI) is the most common cause of heart failure (HF) developing and poor prognosis. Soluble ST2 (sST2) is established biomarker of fibrosis and inflammation with known predictive value for HF death and HF admission, but its role in prognostication of adverse LV remodeling after STEMI is not fully clear. The aim of the study was to investigate whether circulating levels of sST2 predict adverse LV remodeling in STEMI patients with TIMI III flow through myocardial infarct-related coronary artery.

Abstract Number: P734
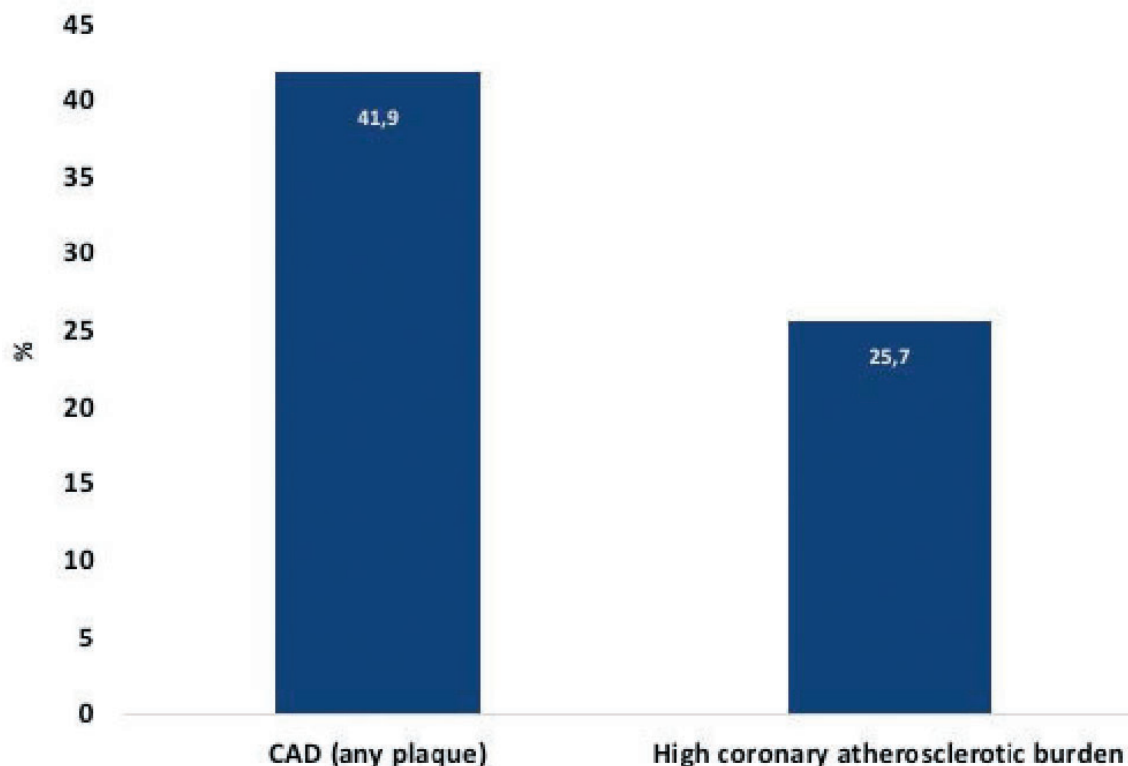


**Methods:** The study was retrospectively included 65 patients with STEMI and TIMI-III flow after primary or facilitate percutaneous coronary intervention (PCI) that were admitted to intensive care unit of our Institute between January 2016 and July 2018. Exclusion criteria were known malignancy, severe anemia, chronic obstructive lung disease, liver cirrhosis, chronic kidney disease, valvular heart disease. Primary PCI with bare-metal stent implantation was performed in 33 patients and 32 patients were previously treated with primary thrombolysis (tenecteplase, alteplase) with followed PCI during 24 hours after initial STEMI confirmation. B-mode and Tissue Doppler and Strain Echocardiography, blood sampling for biomarkers' assay were performed at admission, at discharge from the hospital and as well as at 4 month and 6 month after STEMI.

**Results:** Late adverse LV remodeling was referred as increase of LV end-diastolic volume (EDV) at 6 month (first cohort, n = 29), while other patients (second cohort, n = 36) did not have demonstrated a trend to decrease of LV EDV or they have ever revealed reducing this parameter. There was a significant difference between both cohorts in levels of sST2 at discharge, while levels of natriuretic peptides, troponin I were similar (P = 0.24). Indeed, circulating levels of sST2 in first cohort were higher when compared to second cohort (59.72 ng/mL; 95% confidence interval [CI] = 36.99 ng/mL -139.53 ng/mL versus 44.75 ng/mL; 95%CI = 28.25 ng/mL -77.32 ng/mL, P = 0.039, respectively). ROC-analyses has showed that the best balanced cut-off point for sST2 for adverse remodeling at 6-month was 35 ng/mL (AUC = 0.672; 95% CI 0.523-0.799; P = 0.0344; sensitivity = 46.7% and specificity = 85.7%).

**Conclusions:** We have shown that the levels of sST2 measured at discharge in STEMI patients with TIMI III flow after PCI could predict late adverse LV remodeling. These findings may open new approach to stratify patients with successful opening of MI-related coronary artery at risk of HF.

P734

**Coronary atherosclerotic burden in recreational male veteran athletes with low to intermediate cardiovascular risk**

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Topic: Coronary Artery Disease - Other

**Background:** Although the evidence describing a significant proportion of veteran athletes with coronary atherosclerotic disease (CAD), its prevalence in recreational athletes with low-intermediate cardiovascular (CV) risk is not established. This study sought to characterized the coronary atherosclerotic burden in recreational veteran male athletes with low-intermediate CV risk.

**Methods:** Asymptomatic male athletes aged ≥40 years old with low-intermediate risk, who exercised > 4 hours/week for > 5 years, underwent cardiac computed tomography (CT) - coronary artery calcium (CAC) score and angiography. High coronary atherosclerotic burden was defined as at least one of: CAC score > 100; CAC score ≥75thpercentile; obstructive CAD; disease involving left main, 3-vessels or 2-vessels including proximal anterior descending artery; segment involvement score > 5; CT-adapted Leaman score ≥5. Athletes were categorized by tertiles of volume of exercise, calculated by Metabolic Equivalent Task (MET) scores.

**Results:** A total of 105 athletes were included, all with SCORE <4%, mainly engaged in high-dynamic sports. The median volume of exercise was 66 [44; 103]METs/h/week, with 8±5 hours-training/week and 17±10 years of exercise. A high coronary atherosclerotic burden was present in 27 (25.7%) athletes. Ten (9.5%) athletes had CAC score > 100, 13 (12.4%) ≥75thpercentileand 6 (5.7%) obstructive lesions. The extension and severity of coronary plaques did not differ according to the volume of exercise.

**Conclusions:** The prevalence of subclinical CAD detected by cardiac CT in recreational male veteran athletes with low-intermediate CV risk was high. Up to a quarter of our cohort had a high coronary atherosclerotic burden.

P736

**Exercise training with selected loads in the rehabilitation of patients after coronary artery bypass grafting**

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Topic: Coronary Artery Disease - Other

**Purpose:** To assess the effectiveness of the fast-track exercise trainings using cycle spiroergometry parameters in patients after coronary artery bypass grafting (CABG).

**Methods:** 50 patients after CABG were included in the study and randomly assigned to two groups. The mean age was 61.1 ± 9.1 years (44 men (88%), 6 women (12%). Group 1 patients

(n = 25) underwent treadmill exercises of different intensity estimated by the cardiopulmonary test in addition to the 6-day standard rehabilitation program. Group 2 patients (n = 25) underwent the standard cardiac rehabilitation program, including dosed walking and dosed exercise trainings. The inclusion criteria were as follows: isolated CABG and the presence of written informed consent. The exclusion criteria included severe concomitant somatic pathology, limiting the patient's physical activity. All patients underwent routine examination, including clinical and laboratory tests, cycle spiroergometry on days 6 and 16 after CABG with the estimation of VO2peak and the anaerobic threshold. There were no cases of complications. Exercise trainings were performed 5 times a week (an average of 9 trainings) lasting for 20 minutes: 5 minutes - warm-up, 10 minutes - workout, 5 minutes − cool down. Statistic analysis was performed using the software package STATISTICA 8.0 (StatSoft). Quantitative variables were assessed using the Mann-Whitney test. The mean values are presented as medians and the interquartile ranges. The null hypothesis was rejected at p <0.05.
**Results:** There were no significant differences found in cycle spiroergometry parameters on day 6 between the study groups. It confirmed the comparability of the study groups. On day 16, exercise tolerance increased in both groups from 50 to 75 W (p = 0.1). On day 16 after CABG, VO2peak was significantly higher > 59 [51; 69]% in the group with the fast track exercise trainings compared with the control group, 49 [40; 56]% (p = 0.04) and higher than that on day 6 after CABG (49 [45, 55]%). The anaerobic threshold was similar in both groups, but with a tendency towards to its increase in the group with the fast track exercise trainings, as compared to the control group - 46 [38, 55]% vs 39 [32; 47]% (p = 0,12), and that on day 6 - 38 [30; 43]% (p = 0.09). **Conclusion:** Alternative rehabilitation programs allowed improving exercise tolerance in both groups. However, the fast track exercise trainings with selected loads were more beneficial for improving the functional capacity of the bronchopulmonary system.

## P737

**Clopidogrel versus ticagrelor: real life data**
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**On Behalf of:** Portuguese Registry of Acute Coronary Syndromes (ProACS)
**Topic: Coronary Artery Disease - Other**
**Introduction:** PLATO trial demonstrated a reduction on cardiovascular mortality with the use of ticagrelor in patients with acute coronary syndromes (ACS), with no increase on major bleeding events.
**Objective:** Evaluation of the prognostic impact of dual antiplatelet strategy implemented in the patients with ACS.
Materials and methods: Retrospective analysis of patient data admitted with ACS included in multicentric register between 2012-17 (n 10157). Compared patients medicated with ticagrelor (n 1359, 79.1% of male gender) versus clopidogrel (n 8798, 73.7% male) and evaluation of the endpoint adverse events during hospitalization.
**Results:** Patients medicated with clopidogrel were older (66±13 vs 62±12 years, p<0.001) and with higher prevalence of arterial hypertension (69.9 vs 62.9%, p<0.001), previous coronary artery disease (angina pectoris 22 vs 14.1%, myocardial infarction 19.8 vs 14.8%, coronary artery bypass grafting 5.4 vs 3.2%, p<0.001), stroke (8.1 vs 4.1%, p<0.001), peripheral artery disease (6 vs 1.4%, p<0.001), heart failure (5.4 vs 1.9%, p<0.001) and chronic kidney disease (5.9 vs 2.9%, p<0.001). Patients medicated with ticagrelor presented more frequently as ACS with ST elevation (48 vs 40.1%, p<0.001) and in Killip Kimball class I (90.09 vs 84.6%, p<0.001). Patients medicated with ticagrelor received more beta blocker therapy during hospitalization (88.8 vs 81.1%, p<0.001) and were submitted through an invasive strategy more frequently (91.4% vs 85.8%, p<0.001). There was no significant statistical difference between the groups concerning to major bleeding events (1.6 vs 1.4%, p 0.485) or necessity of blood transfusion (1 vs 1.5%, p 0.165). There were not observed differences on re-infarction rate (0.8 vs 1%, p 0.573), cardiogenic shock (2.3 vs 3.7%, p 0.009), cardiorespiratory arrest (3.7 vs 3%, p 0.200) or stroke (0.3 vs 0.7%, p 0.085). Mortality rate was superior between patients medicated with clopidogrel (3.2 vs 1.5%, p<0.001).
**Conclusion:** Dual antiplatelet strategy with ticagrelor was not associated with increased bleeding events and was associated with an inferior mortality rate.

## P738

**Returning to work after an acute coronary syndrome**
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**Topic: Coronary Artery Disease - Other**
**Introduction:** Acute coronary syndrome (ACS) is one of the major causes of mortality and disability in developed countries. Return to work (RTW) after an ACS has a strong socioeconomic impact, as well as on patient's quality of life and is a major goal of Cardiac Rehabilitation (CR). This retrospective study aimed to determine rate and timing of RTW in patients who underwent CR after ACS.
**Methods:** We retrospectively evaluated patients (pts) admitted for ACS in our department of Cardiology during a 30-month period, who were referred to CR. Only pts who were previously employed were included in the final analysis. Timing and rate of RTW was measured through consultation of the patient's clinical electronic records.
**Results:** A total of 112 pts, 83% (n = 93) male, were evaluated during a follow-up period of 12 months after hospital discharge. The mean age was 49.6 ± 7.8 years (30-65). The rate of RTW was 90.2% (101 pts) in a 12-month period. Three pts (2.7%) retired and 8 pts (7.1%) did not RTW. The causes of not RTW were: non-cardiovascular (mostly depression/anxiety) in 5

pts, cardiovascular (CV) in 2 pts (re-hospitalizion for CV events) and another patient did not RTW due to functional llimitation. Five (4.5%) of the 101 pts who RTW had to stop working again: 3 pts due to re-hospitalization for CV events, 1 due to depression and another one due to functional limitation. The mean time for RTW was 112.5 ± 74 days (29-314) after hospital discharge, with a median of 99.5 days. Based on median, RTW pts were divided in 2 groups: early (defined as ≤100 days) and late RTW (defined as > 100 days). No significant differences were found in early RTW rates, considering gender, age, type of ACS, left ventricular function or number of affected coronary vessels. Early RTW was more frequent in those higher-educated (63% vs 43%, p=0.02; >9 years vs ≤9 years of education); more physically active (60% vs 36.8%; p=0.02; ≥ 600MET-min/week vs<600MET-min/week) and less depressed (57.7% vs 26.7%; p=0.03; Patient Health Questionnaire 9 [PHQ9] score<10 vs PHQ9 score ≥ 10).
**Conclusions:** Pts involved in a CR program after ACS have high rates of RTW at a 12-month period. Early RTW might be influenced by elements other than only clinical variables, including psychosocial factors and adherence to lifestyle counseling. Special attention to these factors can help identifying pts at higher risk for late RTW, in order to allow an earlier return to the professional activity.

## P739

**Myocardial infarction among patients with atrial fibrillation (5 years data)**
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**Topic: Coronary Artery Disease - Other**
Management of patients with atrial fibrillation (AF) and myocardial infarction (MI) is associated with certain difficulties, in particular, combination of antiaggregents and anticoagulants (AK).
The purpose: to estimate the prevalence of various types of MI in patients with AF, as well as the occurrence of AF in patients with MI, features of antithrombotic therapy in this group of patients.
Materials and methods: analysis of the case histories of 1255 patients with MI for 4 years (2013-2017).
**Results:** Among all patients with MI AF was registered in 215 patients (17,1%), men - 46.5%, women - 53.5%, average age 74 ± 2.4 years. History of AF had 121 patients: chronic - 43.8%, paroxysmal - 43.0%, persistent - 13.2% forms; in 67 patients (31.2%) − AF was firstly registered in the acute period of MI, in 27 patients (12.6%) certain anamnesis of AF was unknown. The most of patients with both pre-existing and new onset AF (79% and 91%, respectively) had type 1 MI. 21(17,3%) patients with chronic AF had MI. 2 of whom (0.24% of all patients with MI) had embolic MI. In 6 patient (8,9%) among patients with the new onset AF the MI developed due to of tachysystole and was regarded as a type 2 MI. Coronarography was performed in 97.7%, 95% of patients underwent angioplasty and stenting of the infarct-related artery.
Among patients with MI and pre-existing AF, triple antithrombotic therapy (oral AK + acetylsalicylic acid + clopidogrel) in 64% of cases was prescribed for 1-3 months, then - double therapy (AK + clopidogrel) for 12 months, then − only AK; in 13% of cases, the duration of dual therapy was reduced to 3-6 months due to the developed of minor bleeding. In 16.3% of cases, AK was not prescribed in patients with an extremely high risk of bleeding, including inability to control INR in the outpatient stage, poor compliance; in 6% of cases (in patients without coronary stenting/developed minor bleeding/high risk of bleeding) only AK were prescribed. Novel oral AK (NOAK) as part of antithrombotic therapy (in 91.7% of cases) began to be used only in 2016. Among patients with a history of AF and type 2 MI AK were assigned in 100% of cases, either in the form of monotherapy (PLA) − 28,6% of patients (due to high risk of bleeding) or in combination with 1 disaggregant − 54,5%. In the group of patients with new-onset AF only 14,3% of patients AK were prescribed at discharge (repeated AF paroxysms during hospitalization).
**Conclusion:** Thus, according to the analysis, pre-existing AF occurs in 8% of patients with MI. Developing MI, mainly, was 1 type. In patients with combination of MI and AF, oral AK in antithrombotic therapy was prescribed in most cases, except for patients with first developed paroxysm of AF during MI, without recurrence of paroxysms of AF in the future, patients with an extremely high risk of bleeding, low adherence to therapy.

## P740

**Usefulness of secondary prevention programs in patients after myocardial infarction with chronic total occlusions**
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**Topic: Coronary Artery Disease - Other**
Current data suggest that successful percutaneous coronary intervention for CTO is associated with improvement in patient symptoms, quality of life, left ventricular function, and survival. In patients with unsuccessful CTO PCI cardiac surgery may be needed. We aimed to investigate effects of secondary prevention programs based on exercise cardiac rehabilitation in functional capacity improvement in patients with CTO after myocardial infarction (MI) and by pass surgery.
Patients and methods: Medical records from Cardiac rehabilitation Department, Institute for Rehabilitation were screened for patients with previous MI and CTO. Medical data of the identified cases was retrieved and reviewed.
**Results:** Out of 3102 patient screened patients, previous MI with CTO was diagnosed in 120

patients (92% were males, 33 to 84 years of age). PCI recanalization was successful in 14%. Risk factors were noted. Blood was sampled for lipid analysis. Target TC and LDL levels were reached in 100%. Previous medical treatment and ejection fraction were noted (20% with EF <20%). Exercise test was performed on admission and exercise based cardiac rehabilitation program was tailored individually. One to two treatment sessions per day were given by a physiotherapist seven days a week. No rhythm disorders or ST segment changes were detected by telemetry while crossing over Nyllin steps, cycling or free walking. Patients fulfilled cardiac rehabilitation program without any complications. Exercised tests on discharged (21st day) have shown functional capacity improvement in all patients greater than 30%.

**Conclusions:** Patients with previous MI and CTO are not often referred to secondary prevention exercise based cardiac rehabilitation program. Our results showed that the programs are safe and useful. Further efforts are required to set up guidelines for long term management and cardiac rehabilitation might have important role.

**P741**
**Gender psycho-emotional difference of patients with coronary artery disease in depending of treatment of Ukrainian cohort**
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**Topic: Coronary Artery Disease - Other**
**Aim:** To determine the gender prevalence of anxiety and depression in patients (pts) with coronary artery disease (CAD) in depending of treatment.
**Methods:** 266 men and women (mean age -59.8 ± 9.8) with CAD in EUROASPIRE IV of the Ukrainian cohort were studied. Pts were divided into two groups. The first group (45.1%) included pts after myocardial infarction (MI) and unstable angina (UA). The second group (54.9%) had pts after PCI or CABG. The assessment of depression and anxiety was performed using the special Hospital Anxiety and Depression Scale (HADS). When evaluating the scores, the HADS <7 scores were normal, the scores 8–10 were mild anxiety or depressive symptoms, and the scores > 10 were moderate or severe symptoms of anxiety or depression. HADS-A (anxiety) was consistent with the pts anxiety result, and HADS-D (depression) was a depression score.
**Results:** Men and women were divided in proportion 3:1 (73% of men and 27% of women). In the first group 31.7% of pts had symptoms of anxiety and depression. The mild symptoms of anxiety had 16.2% and sever anxiety had 13.5%. Mild depressive disorders were observed in every fifth (20%) and severe depression had 11.7% of pts.
In the second group, every one of five pts had signs of anxiety (21.9%) and every fourth pts had signs of depression (28.1%). Mild anxiety symptoms were detected in 18% of pts. Moderate or severe anxiety was reported in 7.5% of pts. Mild depressive disorders were observed in every fifth (19.9%) pts and severe depression had 8.3% of pts. Mild anxiety symptoms were more common in women (28%) than men (20%) in two groups. Signs of depression were also more common in women (40%) than in men (28%) in two groups.
**Conclusion:** 1. Patients who had MI or UA are more prone to depression and anxiety than those who have undergone CABG or PCI.
2. Women are more prone to psycho-emotional status disorders than men.
3. Women have depressive symptoms more often than symptoms of anxiety.
4. It is necessary to conduct an early diagnosis of anxiety and depression in pts with CAD.

**P742**
**Physical training in patients who underwent myocardial infarction: follow-up for 1 year**
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**Topic: Coronary Artery Disease - Other**
The recovering of patients after myocardial infarction (MI) and their returning to the professional activity is the main goal of treatment. The objective of this study was to evaluate the restoration of physical load tolerance in 43 patients (pts) after acute MI and in 4 months follow up. During acute coronary syndrome all pts underwent coronary angiography with the stenting of infarct-related coronary artery. Examination of the tolerance to physical load on a bicycle ergometer and echocardiography were performed on the 12-15th day after MI and in dynamics. All pts were assigned to two groups (gr): the 1st gr (27 pts who took part in cardiac rehabilitation with in-hospital physical training on a bicycle ergometer in individually polished regimen 3 times a week during 3 months) and the 2nd gr (16 pts who had physical training as distance walking as out-hospital rehabilitation during the same time). All of them were comparable according to the initial information. The level of the threshold capacity (W) in the 1st gr increased from 82.4 to 127.0 Wt (p = .0001) from the 1st to the 2nd test. Similar changes were in the 2nd gr (79.2 and 96.3 Wt, respectively, p = .05). According to these data the level of workload (A) from the 1st to the 2nd test raised from 53.9 to 120.6 kJ in the 1st gr (p = .0001) and from 47,4 to 74.5 kJ in the 2nd gr (p = .0012). At the same time the results of the 2nd test differed significantly (p = .00003). In the 1st gr the increasing of ejection fraction was observed from 50.6 to 54.3% (p = .0023) in comparison with the 2nd gr (51.4 and 50.8%, p = .64). These results were due to improvement of kinesis: in the 1st gr dyskinesis was transformed into hypokinesis in 25.9 % of pts in comparison with the 2nd gr (12.5%). A significant improvement of tolerance to physical load and higher working capacity were established after the course of regular training regimens in pts with different lesions of coronary arteries. The returning to professional activity in the 1st gr was 100% and in the 2nd gr 75%. In conclusion, the regular individual regimens of physical rehabilitation have improved the tolerance to

physical load and allowed to return to work even in patients with incomplete myocardial revascularization.

**P743**
**Relationship of parameters of epicardial fatal deposit and adipokinic status in patients with ischemic heart disease**
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**Topic: Coronary Artery Disease - Other**
**Purpose:** to study of the relationship between the thickness of epicardial fat and parameters of adipokine status in patients with coronary heart disease on the background of visceral obesity.
**Methods:** Eighty-eight myocardial infarction (MI) patients were grouped based on their visceral obesity (VO). Magnetic resonance imaging (MRI) was used to determine the area of visceral (VAT), epicardial (EAT) and subcutaneous adipose tissue (SAT). VO was verified when the area of VAT >130 cm2. Patients were divided into two groups, the first included patients with VO (n = 59), the second without VO (n = 29). Serum level of leptin, adiponectin, soluble leptin receptor (SOB-R), growth factor stimulant (ST-2) and interleukin-33 (IL-33) were determined. The calculation of the free leptin index (FLI) was determined by the formula: leptin / SOB-R * 100. Leptin resistance was defined as an FLI >0.25. All study was carried out in compliance with the Helsinki Declaration, and its protocol was approved by the Ethical Committee of Research Institute. Statistical analysis was performed using Statistica 10.0. All patients gave written informed consent to participate in the study.
**Results:** In patients with VO, the thickness of the left ventricular epicardial adipose tissue (EATLV) was 1.75 times more, and right ventricular (EATrv) 1.43 times greater than in patients without VO. In the group of patients with VO, the presence of a direct correlation was established between the magnitude of the area of VAT and EATLV (r = 0.46, p = 0.02), EATrv (r = 0.49, p = 0.01). In both groups, the leptin level was higher than the reference values, while the concentration of leptin in patients with VO was 1.5 times higher than in patients without VO. The concentration of SOB-R was not dependent on the presence of VO and was not statistically significantly different between groups. FLI corresponded to the presence of leptin resistance in both studied groups (was more than 0.25). The development of adipokine imbalance was also indicated by a decrease in the content of protective adiponectin in patients with a VO of 18.7% compared with patients without VO (p <0.05). The relationship of the thickness of EAT with the concentration of adiponectin was not detected. Unlike patients without VO, in patients with VO, the concentration of leptin was negatively dependent on the thickness of EAT of the left ventricle and right ventricle (r = -0.28; p = 0.02 and r = -0.33; p = 0.02). A negative relationship with the thickness of the EAT has been established for FLI (r = -0.28; p = 0.03).
**Conclusions:** The thickness of EAT is greater in patients with VO, in which adipokine imbalance is most pronounced: a decrease in the concentration of protective adiponectin, an increase in the level of leptin and the development of leptin resistance.

**P745**
**The impact of primary percutaneous coronary intervention volume on prognosis of patients with ST elevation myocardial infarction**
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**Topic: Coronary Artery Disease - Other**
**Introduction:** Primary percutaneous coronary intervention (PCI) in acute myocardial infarction (AMI) results in greater patency of the infarct-related artery (IRA) and lower rates of death and re-infarction. Approximately 30 % of the patients with ST-elevation myocardial infarction (STEMI) have multivessel coronary artery disease. Current data for the complete revascularization (CR) in hemodynamically stable patients with STEMI at the time of primary PCI is still contradictory. We sought to compare prognosis and clinical events between multivessel and single vessel disease patients with STEMI after non-IRA lesions PCI during the index procedure.
**Methods:** The study included 67 non-shock STEMI patients undergoing PCI, of which 35 have multivessel (Group 1) and 32 - single vessel (Group 2) disease. Other parameters in the groups were comparable. Study groups were followed 30 days after the PCI for comparing bleeding, stent thrombosis, and cardiovascular death rates. The STEMI was diagnosed according to the Universal Definition of Myocardial Infarction ESC Guidelines. The patients underwent primary PCI according to ESC Guidelines for the Management of acute myocardial infarction in patients presenting with ST-segment elevation. Significant atherosclerotic CAD was defined as a visually estimated stenosis ≥ 50% for the left main (LM) and ≥ 70% for other major arteries and/or their epicardial branches.
**Results:** We found no significant between-group differences for both bleeding rate (2.85% (1 of 35 patients) in Group 1 vs 3.1% (1 of 32 patients) in Group 2, p = 0.949), cardiovascular death rates (2.85% (1 of 35 patients) in Group 1 vs 3.1% (1 of 32 patients) in Group 2, p = 0.949). Also we found no significant between – group for both stent thrombosis rate (5.7% (2 of 35 patients) in Group 1 vs 3.1% (1 of 32 patients) in Group 2, p = 0.609).
**Conclusion:** Non IRA-lesions PCI during the index procedure may not influence on 30-day bleeding and cardiovascular mortality rates in STEMI patients. Also non IRA-lesions PCI during the index procedure may not influence on 30-day stent trombosis rate in STEMI patients.

**P746**

**The periprocedural myocardial damage prevention during elective percutaneous coronary intervention as a result of pharmacological preconditioning with an oral form of nicorandil in patients with stabl**

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**Topic: Coronary Artery Disease - Other**

**Background:** Inevitably the myocardium will be damaged during any PCI in a varying degree. The objective of the study was to evaluate the possibility of reducing the incidence of periprocedural myocardial damage by the formation of pharmacological preconditioning prior to elective PCI by using the oral form of nicorandil in patients with stable coronary heart disease (CHD).

Materials and methods

This study enrolled 88 patients with a stable CHD undergoing to elective PCI. Patients were randomized in two groups: control group (n = 43) - patients using antianginal therapy according to routine standards of treatment, and nicorandil group (n = 45) — oral form of nicorandil which was added to standard antianginal therapy of the patients with the following treatment regimen: 2 days before elective PCI in dosage 10 mg 3 times per day and 2 hours before the procedure, the patient was given a single dose of 20 mg nicorandil. Hs-troponin I and CK-MB were analyzed three times in all patients - before PCI, 24 and 48 hours after PCI to determine the effect of pharmacological preconditioning.

**Results:** There was no significant difference in clinical characteristics between the two groups. However, patients from the nicorandil group showed a significant decrease in hs-troponin after 24 hours (117 ng/ml vs 73,6 ng/ml, p = 0.04), and a decrease in the delta of hs-troponin after 24 hours (113 ng/ml vs 67,3 ng/ml, p = 0.03). Also a significant decrease of CK-MB in 24 hours was also observed in the nicorandil group (2,7 ng/ml vs 1,9 ng/ml, p = 0.008).

**Conclusion:** It is obvious that limitation the risk of developing such injuries can be beneficial to the patient, despite consideration that the threshold levels of asymptomatic elevation of hs-troponin and CK-MB levels without signs of complications that are accompanied by a worsening of the prognosis have not yet been determined.

| | Control group n = 43 | Nicorandil group n = 45 | p |
| --- | --- | --- | --- |
| Hs-Troponin baseline ng/ml | 5,2 (2,1, 29,6) | 4,3 (1,5, 15,5) | 0,44 |
| Hs- Troponin after 24 h ng/ml | 117,0 (29,0, 1369,6) | 73,6 (13,5, 412,1) | 0.04 |
| Delta of hs-troponin in 24 h | 112,8 (23,2, 1337,8) | 67,3 (8,1, 399,6) | 0.03 |
| Exceed above the upper normal limit | 85% | 62% | 0,03 |
| CK-MB baseline ng/ml | 1,1 (0,3, 3,9) | 1,0 (0,6, 2,4) | 0,35 |
| CK-MB after 24 h ng/ml | 2,7 (0,7, 7,0) | 1,9 (0,9, 3,6) | 0,008 |
| Delta of CK-MB in 24 h | 0,7 (-0,6, 5,0) | 0,3 (-0,7, 2,4) | 0,18 |

The results of using nicorandil 2 days before elective PCI in dosage 10 mg 3 times per day and a single dose of 20 mg nicorandil 2 hours before the procedure

**P748**

**Determination of aerobic exercise intensities in patients with hereditary thoracic aortic disease**

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**Topic: Aortic Disease — Diagnostic Methods**

**Background:** Hereditary thoracic aortic disease (HTAD) presents a heterogeneous group of patients with elevated risk of aortic pathology. Although there is evidence for positive effects of moderate aerobic dynamic exercise, its influence in the course of disease is still not understood. Recommendations regarding preventive and rehabilitative exercise remain unclear.

**Purpose:** We aimed to assess the use of bicycle stress tests for the determination of exercise intensities in patients treated for HTAD. The main focus was patient safety, choice of exercise protocol and test termination criteria. In addition, we investigated different analytical models for determining aerobic training intensities.

**Methods:** According to their medical history patients were assigned to 2 exercise protocols (10/10/3, 30/30/3) and 3 groups of upper RR-limit under exercise (140/85, 160/90 and 180/90mmHg). A bicycle exercise test was performed assessing heart rate (HR), blood pressure (RR), blood lactate concentration, borg scale (RPE) and cardiopulmonary exercise testing (CPET). Test termination criteria were defined as exhaustion, cardiovascular event and reaching of the RR-limits. Moderate exercise intensities were calculated using the percentage of HR- and VO2-reserve, percentage of peak heart rate and VO2 according to the ACSM recommendations. Lactate threshold (LT) and aerobic ventilatory threshold (VT1) were derived from the lactate and CPET data.

**Results:** 46 patients (25 ♂, mean age 40 year ±14) underwent the exercise test. Medication included AT-1 antagonist in 27 patients and/or betablocker in 21 patients. 28 patients reported a regular physical activity > 2h/week. 37 patients were assigned to the 30/30/3 protocol, 4 to an upper RR-limit of 140/85, 17 to 160/90 and 25 to 180/90mmHg. Mean RR and HR at rest were 123/81mmHg ± 12/7 and 73/min ± 14, respectively. Exercise test was aborted for RR-increase in 22 patients, no adverse events occurred. At test termination mean RPE was 16 ±3, mean HR 142/min ±33 and mean RR 173/88mmHg ±17/10. VT1 could be determined in 42 patients, LT in 28 patients. LT was only assessed when maximum lactate at test termination was > 3mmol/l and exercise intensities were calculated in patients reaching RPE >16 and/or respiratory quotient >1,05. Aerobic/moderate exercise intensities using all 5 models could be assessed in 27 patients and showed significant differences (p<0,05) for all the models (figure 1).

**Conclusion:** Bicycle exercise testing is feasible and safe in this group of patients. Resting RR under medication was normal, abnormal exercise RR-regulation could be observed in almost half of the patients and led to early test termination. Assessment of moderate exercise intensities highly depends on the model applied. In patient counselling, both factors need to be strongly considered and counselling should therefore be carried out by an experienced sports physician with a background in the treatment of patients with cardiac diseases.

**P749**

**Can individuals with aortic disease participating in a cardiac rehabilitation program safely achieve health benefit?**

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**Topic: Aortic Disease — Clinical**

**Background:** Currently, there are no established standard exercise guidelines available for patients with aortic disease (AD) (aneurysms and dissections). Exploring the safety and health benefit outcomes in the AD population attending cardiac rehabilitation programs (CRP) will be an important contribution to the literature. The purpose of this study is to retrospectively examine the safety and efficacy of CRP for patients with AD.

**Methods:** A retrospective review of 56 consecutively enrolled AD subjects post surgical repair, in comparison to an age- and sex-matched cohort of coronary artery disease (CAD; N = 56) in a CRP was conducted. Cardiovascular fitness (VO2peak) and anthropometric measures were conducted at baseline and 6 months of aerobic and resistance training. Additional outcome measures included program adherence and major adverse cardiovascular outcomes (death, myocardial infarction, stroke, acute aortic complication).

**Results:** At baseline, both the AD and CAD groups were subjected to similar prescription intensity as seen by the appropriate increase in exercise heart rate (ExHR) and systolic blood pressure (ExSBP) compared to resting measurements (AD resting vs exercise: 75.7±14.7 vs 115.4±24.1 bpm p<0.05, 128.0±15.1 vs 165.0±23.5 mmHg p<0.05; CAD group resting vs exercise: 65.6±11.5 vs 114.4±23.6 bpm p<0.05, 123.4±11.7 vs 167.5±28.2 mmHg p<0.05). At 6 months, both groups exercised a longer distance and higher intensity compared to baseline (AD distance, intensity: 2.2±0.8 vs 1.1±0.4 miles p<0.001, 5.1±1.1 vs 4.7±1.0 miles/hr p<0.001; CAD distance, intensity: 2.2±1.0 vs 1.2±0.6 miles p<0.001, 5.2±1.1 vs 5.0±1.0 miles/hr p<0.001). With a higher intensity exercise at 6 mths, both groups had corresponding increase in ExHR that was significantly higher than baseline (AD: 128.3±24.4 vs 115.4±24.1 bpm p<0.001; CAD: 125.5±23.4 vs 114.4±23.6 bpm p<0.001). Similarly, the AD had a significant increase in ExSBP at 6 mths compared to baseline (175.1±31.2 vs 165.0±23.5

Abstract Number: P749
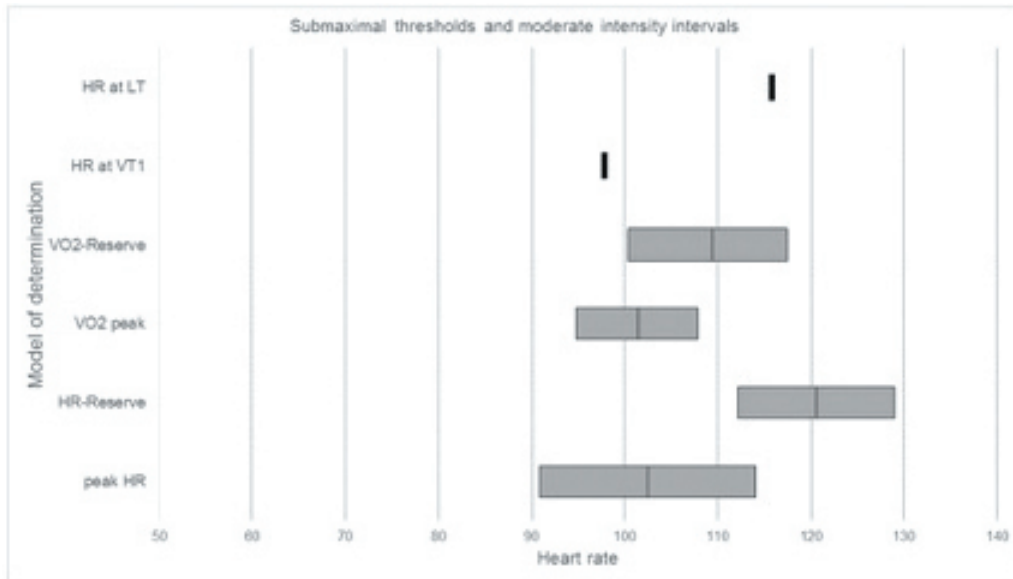
mmHg p = 0.01). Both groups had a significant increase in VO2peak at 6 mths compared to baseline (AD: 23.2±8.2 vs 18.6±6.3 ml/kg/min; CAD: 24.4±8.2 vs 20.2±6.9 ml/kg/min). There was a slightly higher proportion of AD patients who completed the CRP (75 % vs. 69.6.4%, p = 0.5 ). There was no difference in proportion of weekly classes attended (47.3±34.4 vs. 47.8±36.1%,p = 0.9). No major adverse cardiovascular events occurred.
**Conclusion:** Patients with AD participating in a comprehensive CRP consisting of aerobic and resistance training achieved significant and similar health benefits compared to those with a primary diagnosis of CAD. Supervised exercise programs are safe and efficacious and should be a standard of care therapy for appropriately screened AD patients.

## P750
### Depressed heart rate variability associated with poor functional outcome after early post-stroke rehabilitation
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**Topic: Peripheral Vascular and Cerebrovascular Disease – Clinical**
Background Impaired autonomic nervous system regulation is frequently observed in patients with stroke. Previously, an association of increased sympathetic activity with unfavourable functional outcome has been shown in post-stroke patients. The aim of the present study was to evaluate the impact of heart rate variability (HRV) assessed by the time-domain method on functional outcome in patients with subacute stroke.
Methods 146 consecutive patients (70±11 y, BMI 27.0±5.3 kg/m$^2$, 60% males) with ischaemic (82% of patients) or hemorrhagic stroke were studied during the early post-stroke rehabilitation. All patients underwent 24-h Holter-monitoring at admission. Study examinations were performed at begin of rehabilitation (23±16 days post-stroke, p.s.) and at 4-weeks follow-up (26±6 days p.s.). The functional status was assessed by Barthel Index [BI], modified Rankin scale [mRS], and Rivermead Motor Assessment [RMA]. Depressed HRV was defined by HRV-TI ≤20 and SDNN <100 ms. Functional disability was defined by the cumulative presence of mRS≥4 points, BI≤70 and RMA≤5 at discharge.
Results In total, 20 patients (19%) were found with depressed HRV at admission to the early post-stroke rehabilitation. The functional status (mRS, RMA, BI) after stroke at the beginning of the rehabilitation did not differ between patients with normal HRV and with depressed HRV (mRS and BI, both P>0.08; RMA, P=0.2) At discharge, patients with depressed HRV showed the lowest functional status according to the BI (60 ± 23 vs. 76 ± 20, P <0.0001), mRS (3.7 ± 0.6 vs. 3.0 ± 1.0, P <0.001) and RMA (6.4 ± 2.3 vs. 7.4 ± 2.2, P <0.05, all analysed by ANCOVA adjusted for baseline) as compared to the patients with normal HRV. After adjustment for body mass index, age, sex, β-blocker, Ca$^2$+-antagonists and the presence of diabetes mellitus, cumulative functional disability was independently associated with depressed HRV (OR 3.87 [95% CI 1.29-11.59], P =0.016).
Conclusion Increased sympathetic nervous system activity (depressed HRV) in patients with stroke was associated with the worst functional outcome after the early post-stroke rehabilitation.

## P752
### Peripheral arterial disease of the lower limbs in asymptomatic diabetic patients: prevalence and determining factors
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**Topic: Peripheral Vascular and Cerebrovascular Disease – Clinical**
**Summary: Background:** peripheral arterial disease (PAD) of the lower limbs is an important predictor of cardiovascular disease; however it's still underdiagnosed over asymptomatic diabetic patients, free of cardiovascular disease.
**Purpose:** determining the prevalence and risk factors for PAD in an asymptomatic population of diabetic patients at low or intermediate risk factors of cardiovascular disease, with a free history of cardiovascular disease.
**Methodology:** this was a prospective study conducted over 14 months period from November 2017 to January 2018. A total of 309 diabetic patients were included from two diabetes centers. PAD was defined as an ankle-brachial index (ABI) less than 0,9.
**Results:** among the 309 patients, the ankle-brachial index (ABI) was<0.9 in 98 (31,71%) patients considered to have PAD. The ABI was > 1.3 in 36 (11,35%) patients who had suspected mediacalcosis.
The average age of the PAD population was 56.2 years. Female gender predominated (57%). The mean duration of diabetes was 11yeras: 80% type II Diabetes.
PAD of the lower limbs was mild in 26 patients (26,53%) moderate in 49 (50%) and severe in 23 ( 23,46%)
Duplex Doppler commonly showed lesions of the femoral and tibial arteries.
Factors associated with PAD were advanced age (p <0.0001), age of diabetes > 6 years (p <0.0001), uncontrolled diabetes as assessed by HbA1c levels > 7% (p <0), 0001) and elevated fasting glucose levels (p = 0.039), Hypertension (p <0.0001) and dyslipidemia (p <0.0001). For mediacalcosis, male gender was the only factor identified.
**Conclusion:** Primary prevention outpatient screening of asymptomatic diabetic patients with

lower or intermediate cardiovascular risk can identify numerous patients with PAD. Advanced age, a mean duration of diabetes over 6years, uncontrolled diabetes, hypertension, and dyslipidemia were predictive factors for diabetic PAD of the lower limbs in our population.

## P753
### Validation of a new device for precise assessment of pulse wave velocity in arteries of various structures.
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**Topic: Peripheral Vascular and Cerebrovascular Disease – Clinical**
**Background:** Arterial stiffness (AS) is a process that develops with age and obesity, but it is also an independent predictive factor for the development of hypertension, and cardiovascular complications. Measuring the pulse wave velocity (PWV) is the most common method of assessing arterial stiffness. Two methods of PWV evaluation dominate in the world (carotid-femoral and brachial-ankle). However, recent studies indicated that the age-related increase in PWV was not even uniform in different arteries and the AS gradient is a better predictor of mortality than the classic PWV one. So we need new devices for a more accurate assessment of AS in different body areas. Our group constructed a precise, multi-site system for the simultaneous, real-time, synchronously measurement of pulse wave velocity (M3S). M3S consists of a maximum of 8 photopletysmographic (PPG) detectors - Fig.1A.
**Aim:** The purpose of the study is to validate the PWV measurement by M3S device against a gold standard (SphygmoCor XCEL).
**Methods:** Measurements collected from 36 subjects using the M3S were compared with simultaneously recorded SphygmoCor XCEL measurements. With the 34 paired PWV values, we investigated the agreement between the M3S prototype and the SphygmoCor XCEL device using Pearson correlation analysis and Bland-Altman plot. We also performed analysis on the determinants and reproducibility of PWV measured with both devices.
**Results:** The correlation coefficient for pulse wave velocity measured with the two devices was 0.73 (p < 0.001) - Fig 1B. Compared with the SphygmoCor XCEL device, the M3S prototype slightly underestimated PWV by -0.13 (±1.96 standard deviations SD: + 0.73 m/s, -0.98 m/s). The coefficient of variation (CV) between the difference and the average of the M3S and SphygmoCor XCEL measurements was 7.9% (p = 0.10) - Fig. 1C.
**Conclusion:** This technique used by the M3S could provided a multi-site measurement of PWV. It can be potentially extended for measurement and non-invasive characterization of global arterial stiffness with the possibility of calculating the different AS gradients. Fig 1. A. Block diagram of M3S measurement system with configuration for PWV validation B. Relationship between SphygmoCor XCEL (carotid-femoral) PWV and M3S (left ear-right toe) PWV C. Bland-Altman plot for the analysis of the difference between the SphygmoCor XCEL and M3S devices.

## P754
### Abnormal ankle-brachial index and risk of major adverse cardiac events in a mediterranean cohort: long-term follow-up results
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**Topic: Peripheral Vascular and Cerebrovascular Disease – Clinical**
**Background:** The ankle–brachial index (ABI) is the ratio of the ankle versus brachial systolic blood pressure. It is a simple, non-invasive, and inexpensive method to diagnose lower extremity peripheral artery disease (PAD). Several longitudinal studies in the general population have demonstrate the relationship between abnormal ABI values (less than 0.9 or greater than 1.4) and overall and cardiovascular (CV) mortality and morbidity. However, most of them were Asian cohort-based studies, so the evidence in other population (e.g. Mediterranean population) is limited.
**Purpose:** The aim of the study is to analyze the relationship of the ABI with major adverse cardiovascular events (MACE) in a very long-term follow-up cohort of a Mediterranean population.
**Methods:** We prospectively included 185 volunteers (60.6 ± 16.9 years, 53.5% male) from a Spanish population. They underwent a medical evaluation, including ABI measurement at baseline (ABI values were categorized as abnormal if less than 0.9 or greater than 1.4). We performed clinical follow-up (median of 8.5 years). The incidence of MACE (MACE was defined as a composite of all-cause death, CV death, acute coronary syndrome [ACS], new-onset heart failure [HF], new-onset atrial fibrillation [AF] or stroke) was compared between patients with abnormal and normal ABI values.
**Results:** The 57.4% of patients had high blood pressure, 36.2 % dyslipidemia and 14.0% diabetes mellitus. It is remarkable that 44.0% had a history of smoking, and 77.3% had increased body mass index (BMI). Abnormal ABI was detected in 27.4% of patients.
At follow-up, the MACE rate was 15.5%. The incidence of all-cause death was 6%, while CV mortality rate was 1.8%. 2 (1.1%) and 8 (4.3%) patients experienced ACS and stroke, respectively. Finally, 3.6% of patients developed new-onset HF; incidence of new-onset AF was also 3.6%.
Although not statistically significant, incidence of the composite MACE was higher in patients with normal ABI values (38.5% vs 61.5%, p = 0.08). Nevertheless, patients with pathological ABI had a significantly higher CV mortality than those with normal ABI values (7.1% vs

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**Fig.1**
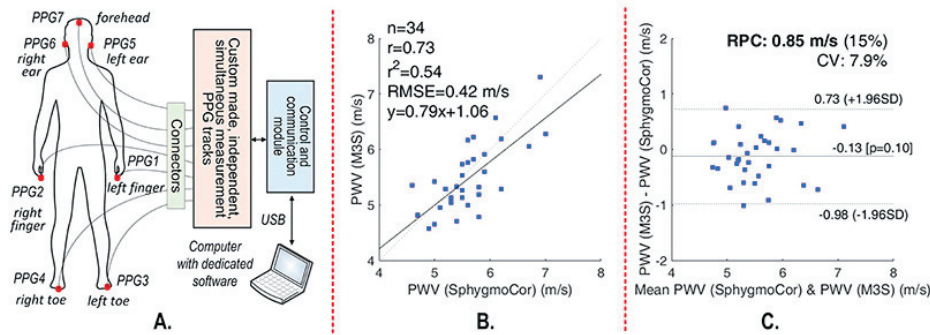


0.0%, p = 0.002). However, there were no significant differences in the risk of all-cause mortality, ACS, new-onset HF, new-onset AF or stroke, regardless of ABI values.
**Conclusions:** In this study, incidence of cardiovascular death was higher in patients with abnormal ABI values. However, we did not observe a relationship among abnormal ABI and other MACE. Larger population studies may be needed to demonstrate the predictive ability of ABI to asses risk of MACE in Mediterranean population.

## P755
### The role of novel inflammatory markers in the risk stratification of females with peripheral arterial disease

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**Topic: Peripheral Vascular and Cerebrovascular Disease – Clinical**

**Introduction:** The increasing prevalence of peripheral arterial disease (PAD) among an ageing general population is slowly becoming a health care issue. This is even more so is case of female patients, as they are constantly underrepresented in PAD clinical trials. Taking into account the well-established role of inflammation in the atherosclerotic process, this research aimed to determine the role of some of the novel inflammatory markers in the diagnosis and severity of PAD in women admitted to a Romanian Rehabilitation Hospital. Material and methods. A number of 71 symptomatic PAD subjects with a mean age of 65,77±9,63 years (55.55 % women) were enrolled. They were divided into two groups accordind to gender and compared to 17 healthy individuals. Data regarding traditional and some novel cardiovascular risk factors (hs-CRP, TNF- α and IL-6 values on admission), clinical and paraclinical parameters were collected. All PAD subjects had available imagistic data. Clinically manifest PAD was defined according to the 2017 ESC Guidelines. Results.Traditional risk factors most prevalent in women cohort were hypertension (72.5%), smoking (65%) and dyslipidemia (67.5%), with only the latter being significantly more prevalent than in men– p<0.001. The majority of female PAD subjects presented as critical limb ischemia (55%), compared to just 38.62% in males (p<0.005). 60% of PAD women had at least one major arterial trunk occlusion on imagistic study compared to just 41.9% for men (p<0.001).Concerning inflammatory markers, these were significantly higher in symptomatic PAD subjects compared to controls: hs-CRP (p<0.0001), IL-6 (p=0.0053) and TNF-α (p=0.005). There there were no statisticaly significant inter-gender differences between PAD subjects: hs-CRP (10715.85 ±201.12 vs 10723.96±232,42 ng/ml)- p=0.38, TNF-α (14,97±25,60 vs 8.09±6,62 pg/ml)- p=0,08, with the exception of IL-6 (25.042±61,47 vs 10.95± 11.36 pg/ml), which was higher in women- p=0.005. The level of hs-CRP, TNF-α and IL-6 correlated well with disease severity. Conclusion. Novel inflammatory markers play an important role in disease severity stratification, being independent predictors of a more advanced disease upon first diagnosis. Inter-gender differences are observed for IL-6 values, which tend to be higher in PAD women.

## P757
### The effects of renal artery denervation on blood pressure values and diastolic dysfunction in resistant hypertension

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**Topic: Hypertension – Treatment**

**Summary:** Controlling of blood pressure (BP) values in patients with resistant hypertension (HTN) continues to be a challenge for contemporary cardiology. Denervation of renal arteries (RDN) could be a new therapeutic pathway with high promises in the treatment of resistant HTN.
**Objective:** To evaluate the impact of RDN versus pharmacological treatment on BP values and diastolic function parameters in resistant HTN.
**Methods:** 45 patients with essential HTN without comorbidities with mean age 53.2±0.61 years who received ambulatory daily treatment with Losartan 100 mg, Amlodipine 10 mg and Indapamide 1.5 mg, then, after confirmation of the persistence of BP values > 140/90 mmHg, were randomized into three branches depending on the medication supplemented with the following: I M group - Moxonidine (0.6 mg/day) ; II B group - Bisoprolol (10 mg/day); III RDN group - RDN. RDN was performed using the EnligHTN® catheters.
**Results:** At the baseline, the mean office systolic (SBP) and diastolic (DBP) BP were 173 ± 21 mmHg and 92 ± 11 mmHg (p?0.001) respectively. 24 hours ABPM showed the following average values: SBP 148 ± 23 mmHg and DBP 85 ± 7 mmHg (p?0.001).
At 3-month follow-up it was documented the reduction of BP values in all three observational groups, with a higher prevalence in the RDN group (Fig.1).
Diastolic dysfunction of varying degrees was initially diagnosed in 100% of the patients. At 3-month follow-up, the improvement in diastolic function parameters was noted in all groups, but statistically insignificant in group I M and with a superior effect in the RDN group compared to the Bisoprolol group (Tab.1).
**Conclusion:** RDN was associated with a statistically significant decrease in both office and ABPM blood pressure. Concomitantly, an improvement in diastolic function parameters has been documented in patients with resistant HTN.

**Tab.1 Diastolic function parameters**

| variables | baseline | 3 months follow-up | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | I M group | p | II B group | p | III RDN group | p |
| LAVI (ml/m²) | 39.1±2.4 | 38.5±1.2 | 0.39 | 37.3±2.1 | <0.05 | 36.5±1.2 | <0.05 |
| E (cm/s) | 74.7±14.1 | 72.3±17.8 | 0.75 | 72.3±21.9 | <0.05 | 70.1±25.3 | <0.05 |
| A (cm/s) | 67.4±19.1 | 66.1±18.3 | 0.46 | 64.7±11.4 | <0.05 | 62.1±13.2 | <0.05 |
| E/A | 0.84±0.21 | 1.02±0.3 | 0.37 | 1.1±0.3 | <0.05 | 1.1±0.2 | <0.05 |
| TDE (ms) | 251.2±29.3 | 238.7±15.8 | 0.15 | 215.8±23.1 | <0.05 | 220.3±24.8 | <0.05 |
| É (cm/s) | 7.3±1.7 | 7.3±2.1 | 0.041 | 7.7±2.1 | <0.05 | 7.8±2.1 | <0.05 |
| E/É | 11.0±3.3 | 10.5±3.5 | 0.22 | 9.4±1.7 | <0.05 | 9.3±1.3 | <0.05 |

**Abstract no: P757**
**Blood pressure change at 3 months (mmHg)**

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## P758
### The psychological traits of the patients with hypertension correlated with the white coat effect level

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**Topic: Hypertension – Treatment**

**Objectives:** The aim of study was to define if the psychological status (PS) of patients with arterial hypertension (AH) may correlate with white coat effect (WCE) level.
Design and
**Methods:** We analyzed ambulatory blood pressure monitoring (ABPM) data of 300 AH patients without serious concomitant diseases after the washout period (1-2 weeks). ABPM was performed by Spacelabs 90207. After ABPM session patients completed the psychological questionnaire "Minnesota Multiphase Personality Inventory". The WCE level was assessed as the difference between clinical BP measurement and mean daytime BP. We used Spearman Partial Coefficient for correlation analysis adjusted for age, sex and duration of AH.
**Results:** The mean daytime BP was (M±SD): systolic (SBP) - 140.1±12.8; diastolic (DBP) - 90.0±10.0 mm Hg. We found correlations (r) between PS and WCE scores: 1) positive - between psychological, emotional behavioral impulsivity (3, 4 scales) combined with self - control and social conform (K, 7 scales); 2) negative – with psychological disadaptation, leadership traits, aggression level, (F, 6) (table).
**Conclusion:** The WCE scores is associated with high social conformality and self – control combined with psychological, emotional and behavioral impulsivity. At the same time, WCE is less prominent in patients with high aggression level, psychological disadaptation, leadership traits, due to a small difference between the clinical and ambulatory BP levels because. This type of patient behavior is associated with increased possibility of conflict situations and

with ambulatory BP increase.
p: * < 0,05,** < 0,005, *** - < 0,001; Ns – no significant correlations

**Relationship between MMPI and WCE**

| MMPI cale score | Relationship (r) between MMPI scale score and WCE indices for SBP | Relationship (r) between MMPI scale score and WCE indices for DBP |
|---|---|---|
| F | Ns | -0.2* |
| K | Ns | 0.2* |
| 3 | 0.2 * | Ns |
| 4 | 0.3*** | Ns |
| 6 | Ns | -0.2* |
| 7 | 0.3*** | Ns |

p: *<0,05, *** -<0,001; Ns – no significant correlations

**P760**

**Cardiovascular risk scores and vascular age after aerobic exercise and nutritional intervention in overweight/obese pre- and post-menopausal women with primary hypertension: data from the EXERDIET-HTA**

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**On Behalf of:** LAKET research group

**Topic: Hypertension − Treatment**

INTRODUCTION. Cardiovascular disease is the leading cause of death in women. Menopause is associated with increased cardiovascular risk (CVR). The assessment of CVR and the adoption of a healthy lifestyle (diet and physical activity) are relevant for cardiovascular disease prevention.

PURPOSE. To estimate CVR and vascular age (VA) profiles when analyzing potential menopausal state differences (pre-menopausal, PRE-M; post-menopausal, POST-M), before and after diet and aerobic exercise intervention in overweight/obese women with primary hypertension (HTN).

METHODS. Overweight/obese non-Hispanic white women (n = 75; 38 PRE-M and 37-POST-M) with HTN had their CVR and VA determined using the New Pooled Cohort Risk Equations (NPE) and the Framingham method (FHS). The assessment was performed before and after the 16-week intervention period with hypocaloric diet and aerobic exercise (2 days/week). The variables for the CVR determination were: age, systolic blood pressure (SBP), total cholesterol (TC), high-density lipoprotein cholesterol, diabetes mellitus, antihypertensive medication, and smoking status.

RESULTS. At baseline, PRE-M presented lower values (P<0.05) compared to POST-M in age (49.2 vs. 55.7 yr), TC (207.1 vs. 222.4 mg/dL), CVR estimation (NPE = 3.1 vs. 5.5%; FHS = 9.8 vs. 12.9%) and VA (67.5 vs. 79 yr), respectively. At follow-up, only POST-M significantly reduced (P<0.01) SBP (D = ↓4.7%), and TC (D = ↓5.7%). FHS-CVR estimation (PRE-M D = ↓23.5%, POST-M D = ↓14.7%) and VA (PRE-M D = ↓8.3%, POST-M D = ↓7.4%) was reduced (P<0.05) in both groups. However, for NPE-CVR estimation there was no overall change for either group. There were no significant between groups differences in the magnitude of change in any of the studied variables.

CONCLUSIONS. POST-M women presented higher CVR and VA estimation compared to PRE-M women. A healthy lifestyle change including diet and exercise was effective in lowering CVR estimation in PRE- and POST-M women according to the FHS model. The NPE-CVR tool could have insufficient sensitivity to show the benefits of a lifestyle intervention in overweight/obese non-Hispanic white women with HTN.

**P761**

**Assessment of biological age and aging speed as an indicator of the state of microcirculation in patients with arterial hypertension**

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**Topic: Hypertension − Treatment**

**Purpose:** Assessment of biological age and aging speed as an indicator of the state of microcirculation in patients with arterial hypertension (AH). Methods. The study included 67 men aged 27 to 60 years (mean age - 47,83 ± 9,95 years) with AH. Average of blood pressure was 159,13 ± 16,60 mmHg. Determination of biological age (BA) was conducted by the method of Webster's II (1985). The subjects were divided into 3 groups according to categories: group 1, normal rate of aging - the difference up to five years, 2nd group, moderately prematurely aged - from 5 to 10 years, 3rd group, prematurely aged - 10 years and more. In group 1, we included 18 subjects (mean age 42,17 ± 11,79 years), in the 2 nd - 26 patients (mean age 43,49 ± 11,04 years), in the third - 43 people (mean age 48,94 ± 8,58 years). The study was carried out on the distal vascular bed via doppler ultrasound with a high-frequency transducer 20 MHz. Blood flow was studied in standard points in the nail fold of fingers. Processing of the data was performed using the program «Statistica 6.0». Results. The linear velocity of blood flow rates were significantly lower in patients with a normal rate of aging (p <0,05) and did not differ in the 2nd and 3rd groups (r≥0,05). Thus, the level of end diastolic velocity at the average speed of the envelope curve (Vakd) was 0,06 ± 0,23 cm / s for the group 1, 0,10 ± 0,25 cm / s for the 2nd group and 0,09 ± 0,28 cm / s for the third group. The average level of the index ripple Gosling (PI), reflecting elastic properties vessels had significantly more important in patients with a normal rate of aging - 7,96 ± 0,31, compared with a moderately prematurely aged - 4,45 ± 0,56 and the accelerated pace of aging - 4,47 ± 0,43 (p <0,05). It was found a significant positive correlation relationship between BA and the risk of cardiovascular complications, the level of SBP and DBP, waist circumference, body mass index, a negative correlation with the glomerular filtration rate (p <0,05). In the study of the response of the microvasculature on the functional tests, the subjects with a normal rate of aging had an adequate response of the microvasculature during the occlusion test, and the subjects with moderately prematurely aged and prematurely aged - paradoxical reaction. Conclusions. Microvasculature parameters have physiological features, depending on the rate of aging. Thus, the pace of ageing and biological age can be used as additional criteria for the assessment of microcirculation during treatment AH and identification of people who need treatment correction.

**P762**

**ADMA concentration in patients with controlled and uncontrolled course of hypertension.**

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**Topic: Hypertension − Treatment**

**Background:** Asymmetric dimethylarginine (ADMA) is an endogenous competitive inhibitor of endothelial NO-synthase (eNOS), which is synthesized as a result of the hydrolysis of proteins rich in methylated arginine residues. The physiological concentration of ADMA in plasma is about 0.46-/+ 0.19 $\mu$mol/l.

**Purpose:** We conducted a comparative analysis of ADMA concentration in two groups of patients diagnosed with hypertension. Group I - patients with uncontrolled course of disease and group II- patients with controlled hypertension. We studied the correlation analysis of ADMA level with clinical, demographic indicators and laboratory data in both groups.

**Methods:** We included 109 patients in our study: group I − 73 patients, group II − 36 patients. The following procedures were performed: questioning of patients, measurement of blood biochemical parameters, including, concentration of ADMA in the blood serum and 24-hour BP monitoring. The criteria for including in group II : the constant use of correctly selected therapy for hypertension, the 24-hour BP monitoring with hypertensive index of systolic and diastolic blood pressure within the reference values and also absence of the hypertensive crises during the last year.

**Results:** The concentration of ADMA in patients with uncontrolled hypertension was 0.69 [0.62-0.81] $\mu$mol/L and was significantly higher than in patients in the group II, where the mean ADMA concentration was 0.63[0.59 -0.70] $\mu$mol/L (p <0.05). It was revealed that in group I the level of ADMA is not associated with clinical and demographic characteristics and data of anamnesis (p> 0.05). We found a positive correlation between the level of ADMA and the age of patients in the group II, and also between the level of ADMA and the duration of hypertension; 0.460 and 0.374 respectively (p <0.05). In this group, the degree of increasing blood pressure, presence of smoking and BMI were not reliably associated with the level of ADMA (p> 0.05). In patients of group I, there was a positive correlation between the ADMA level and the creatinine level (r = 0.615, p <0.05), and a negative association between the ADMA level and the renal filtration function which was assessed by GFR (r = -0.444, p <0.05). Lipid profile and blood glucose levels were not associated with ADMA in patients of second group,(p> 0.05). In the group II ADMA level was not correlated to renal function (p > 0.05), but a positive association of moderate strength were revealed with serum glucose and triglyceride concentrations(r = 0.416 and r = 0.409, respectively (p <0.05). Other parameters of the lipid profile in both groups were not associated with the level of ADMA (p > 0.05).

**Conclusions:** Significant increase in the level of ADMA in patients of both groups was found in comparison with the physiological norm (p <0.05), and it was significantly higher in patients with uncontrolled course of hypertension in comparison with the ones in group II.

**P764**

**Assessment of the factors of angiogenesis in patients with arterial hypertension and coronary artery disease**

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**Topic: Hypertension − Treatment**

**Purpose:** Assessment of the factors of angiogenesis in patients with arterial hypertension (AH), coronary artery disease (CAD) and acute coronary syndrome (ACS).

Materials and methods: 82 patients and 19 healthy volunteers were examined. The patients were divided into three groups: I - 28 people with AH, mean age 55,00±1,80 years, II - 22 patients - patients with AH and CAD, mean age - 64,68±2,60 years, III - 32 people with AH and ACS - 32 patients, mean age, 48±1,84 years. To conduct the enzyme immunoassay, reagents Bender Medsystems (USA) VEGF were used. The concentration of the test substance was obtained by calculation from the optical density values using the MathCad program in accordance with the instructions of the reagent manufacturer. Statistical processing of data was carried out using statistical analysis program Statistica 6.0 (Statsoft, USA).

Results of the study: mean VEGF levels were not different in patients with AH and relatively healthy volunteers: 196,04±17,17 pg / ml in patients with AH (fluctuations from 22,04 to 834,05 pg / ml) and 176, 78±14,34 pg / ml in healthy volunteers, their scatter is much lower - from 56,23 to 303, 12 pg / ml. The level of endostatin was significantly higher among patients with elevated blood pressure than in the relatively healthy 313,73±13,34 and 97,42±7,25, with p <0,05, respectively. In patients with AH and ACS, the maximum values of VEGF are significantly lower in patients of group 1 (only AH), with no difference in the level of VEGF among patients with AH and CAD when comparing them with patients of the 1st and 3rd groups, i.e. they occupy an intermediate position. The maximum values of endostatin were among patients who underwent ACS, minimal - with CAD and intermediate - in patients of the 1st group, all the differences are reliable.

**Conclusions:** when comparing the levels of angiogenesis factors in blood, the survey showed that in patients with AH and ACS, the maximum values of VEGF are significantly lower in patients of Group I, the difference in VEGF level among patients with AH and CAD when comparing them with patients I and III groups were not identified, i.e. they occupy an intermediate position. The maximum values of endostatin were among patients who underwent ACS, minimal - with CAD and intermediate - in patients of Group I, all differences are reliable.

**P768**

**Prevalences and control asymmetries in hypertension, beteween urban and rural populations in the North of Portugal**

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**Topic: Hypertension – Treatment**

High blood pressure is the leading risk factor for cardiovascular morbidity and mortality in Portugal. To deliver an effective and high-quality care to patients is very important to know their diseases, likewise, for health systems to be effective, it is necessary to understand the key challenges in efforts to improve populations health and how these challenges can be changed. The objectives of this study are estimate de prevalence and control of hypertension in urban and rural regions of the North of Portugal.
Material and

**Methods:** a retrospective analyses of all patients-based electronic medical records, during 2017/2018 years, was conducted. The data belongs to adult (age>18years old) populations registered in all primary care centers of the North of Portugal approximately 3 million people.
**Results:** the overall prevalence of hypertension was 31,5%. It was higher in femelle  than in male (32,3% versus 29,9%), and control was 48,9% in male and 54,8% in femelle.
According with the different NUTs III the prevalence of hypertension varies between 30,5% and 38,6%, with the higher values in rural areas. The control of hypertension have the same tendency with higher values in urban areas (54%) and the lower values in the rural areas (30,1%)

**Conclusions:** This study identified an increased prevalence and poor control of hypertension in most rural regions of the North of Portugal. This provides an important opportunity to study the underlying factors and design tailored interventions to address this disparity in health outcome.

**P769**

**Seasonal changes of blood pressure phenotypes in two russian regions**

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**Topic: Hypertension – Treatment**

**Background:** The seasonal changes of ambulatory blood pressure (ABP) in hypertensive patients, as well as the problem of BP phenotypes, became the focus of numerous studies during the past decade. The exploration of this problem in Russia deserves particular attention due to multiplicity of climate conditions across different regions.
**Purpose:** The aim of the study was to assess the seasonal BP phenotype changes in two sites of the Russian Federation − Ivanovo (relative "North") and Saratov (relative "South").
**Methods:** We included patients from the general population who visited ambulatory clinics for various reasons. The main inclusion criterion was office BP 130/85-139/89 mm Hg and/or long-term antihypertensive therapy. All participants provided written informed consent. The ABP monitoring was performed with the BPLab device twice in each patient: in winter and in summer 2012-2014. The interval between ABPMs was 6 months±7 days. We analyzed the factors associated with abnormal levels of the main ABP variables by stepwise multivariate logistic regression model. The analysis was adjusted for age and sex.
**Results:** 1,766 patients were enrolled, and 770 of them completed both visits - 499 from Ivanovo (mean age 52±10 years, 181 men), and 271 from Saratov (mean age 58±11 years, 151 men). The mean office systolic BP (M±SD) was 132.0±1.9 mm Hg in Ivanovo and 133.2±2.0 mm Hg in Saratov. The mean office diastolic BP (M±SD) was 79.5±2.0 mm Hg and 78.4±2.3 mm Hg respectively.
**Conclusions:** The higher 24-hour and daytime BP levels in winter and in Ivanovo, despite normal office BP levels, reflect insufficient BP control in the cohort, with a tendency to masked hypertension. The nocturnal hypertension, despite normal office BP levels, and reduced dipper tendency, which could be explained by relatively hot summers and poor sleep quality, were more typical for Saratov residents.

**Logistic regression main results**

| Variable | Factor associated with abnormal level | β | Wald chi-square | p |
|---|---|---|---|---|
| SBP24 | Ivanovo residency | 0.260 | 4.476 | 0.034 |
| SBPd | Ivanovo residency | 0.402 | 14.524 | <0.001 |
| SBPn | Summer | 0.287 | 7.031 | 0.008 |
| DBP24 | Winter | 0.400 | 10.407 | 0.001 |
| DBPd | Winter | 0.403 | 13.734 | <0.001 |
| DBPn | Saratov residency | 0.435 | 12.803 | <0.001 |
| nSBP fall | Saratov residency | 0.587 | 24.955 | <0.001 |
| nDBP fall | Saratov residency | 1.013 | 74.456 | <0.001 |

SBP - systolic BP; DBP - diastolic BP, 24 - 24 hours, d - daytime, n - nighttime

**P770**

**Transcranian direct current stimulation: a prospective safety study on blood pressure regulation**

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**On Behalf of:** FEAD
**Topic: Hypertension – Treatment**

Central mechanisms are related to the modulation of the cardiovascular system. Thus, transcranial direct current stimulation (tDCS) is a low intensity current stimulus capable of altering cortical excitability, increasing or decreasing the activity of underlying areas. It is a therapeutic method used for the treatment of various diseases such as depression and Parkinson's.
In this context, the objective of the present study was to analyze the impact of a tDCS session on the pre-frontal and motor cortical area on blood pressure in healthy individuals. Were selected normotensive subjects with a mean age of 31.1 ± 10.0.  24-hour Ambulatory Monitoring Blood Pressure  (AMBP) was used for analysis of systolic, diastolic, mean, pulse pressure and heart rate in the 24-hour period of the tDCS session and sham session. The tonometer was used to evaluate the central pressure and augmentation index and the method of photoplestomography for recording of beat-to-beat for the spectral analysis of the autonomic modulation.
The results of central pressure and augmentation index do not present difference after the TDCS session, as well as, the AMBP results where, in Day time SBP (post Sham 117 ± 13 and post TDCS:118 ± 11 mmHg), DBP (post**Sham:** 72 ± 12 and post TDCS: 72 ± 10 mmHg), PAM (post**Sham:** 87 ± 12 and post TDCS: 88 ± 10 mmHg) and HR (post**Sham:** 107.29 ± 9.3 and post TDCS: 107 ± 9.2 bpm), in the Night Time DBP (pos**Sham:** 61 ± 7.8 and post TDCS: 60.1 ± 7.7 mmHg), PAM (post**Sham:** 77 ± 7.55 and post TDCS: 75.9 ± 8.0 mmHg) and HR (post**Sham:** 67.24 ± 5.5 and post TDCS: 64.7 ± 6.1 bpm). In the autonomic modulation, the HF band, representative of parasympathetic modulation, presented a significant increase after the TDCS session (HF post Sham 48±1.2 and HF post TDCS 57±2.0 %), reflecting the reduction of the sympathovagal balance (LF/HF pos**Sham:** 1.8± 3.2 and LF/HF post TDCS:0.9±2.0) of healthy individuals.
The results also reinforce the good tolerability and cardiovascular safety in the use of tDCS being possible to use it as future tool for regulating blood pressure, and for this to be explored in the other areas of cortical stimulation.

**P771**

**Factors associated with blood pressure variability in treated hypertensive patients with comorbidity**

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**Topic: Hypertension – Treatment**

**Background:** The comorbidity and blood pressure (BP) variability (BPV) have prognostic value in hypertensive patients.
**Purpose:** The aim of our study was to estimate factors associated with BPV in treated hypertensive patients (THP) with various comorbidity.
**Methods:** We included THP from routine cardiologist ambulatory practice with various comorbidity receiving standard therapy of different diseases, if need. The standard questionnaire, anthropometry, office (including measurements in orthostasis) and ambulatory BP measurements, ECG, echocardiography, biochemistry analysis, spirometry were performed. The stepwise multivariate logistic regression model adjusted for age and sex was used.
**Results:** The 156 THP were included, mean age 63.4±8.8 years, 43 men. The patients had single or multiple comorbidities: asthma (n=57), diseases of gastrointestinal tract (n=42), diabetes mellitus or compensated hypothyroidism (n=31), coronary artery disease (n=21), COPD (n=20), musculoskeletal system diseases (n=12).
**Conclusion:** COPD, bronchial obstruction and renal function make the most important contribution to the increased BP variability in hypertensive patients with various comorbidities from routine cardiologist ambulatory practice.

**Factors associated with BP variability**

| | Factors | β | Wald $\chi^2$ | p |
|---|---|---|---|---|
| SD SBP of day ≥13 mm Hg | FEV$_1$ | -0.953 | 17.556 | <0.0001 |
| | GFR≥82 ml/min | -1.991 | 30.629 | <0.0001 |
| | SBP in orthostasis >140 mm Hg | 0.806 | 5.297 | 0.021 |
| | Constant | 2.115 | 9.479 | 0.002 |
| SD SBP of night ≥10.5 mm Hg | COPD | 2.064 | 6.322 | 0.012 |
| | FEV$_1$post | -0.850 | 7.213 | 0.007 |
| | GFR≥82 ml/min | -0.931 | 4.148 | 0.042 |
| | serum creatinine ≥83 mmol/l | 0.988 | 4.358 | 0.037 |
| | Constant | 1.010 | 1.064 | 0.302 |

SBP - systolic blood pressure, SD - standard deviation, FEV1 - forced expiratory volume in the first second of the initial (prior to inhalation bronchodilator), GFR - glomerular filtration rate (Cocroft-Gault), COPD - chronic obstructive pulmonary disease, FEV1post. - forced expiratory volume in the first second after inhalation of bronchodilator (in 15-20 min)

**P772**

**The psychological status scale scores were related to the antihypertensive drug effectiveness in patients with arterial hypertension**

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**Topic: Hypertension – Treatment**

**Objectives:** The aim of the study was to define relationships between psychological traits of patients with arterial hypertension (AH) and the antihypertensive drug effectiveness.
Design and

**Methods:** We analyzed ambulatory blood pressure monitoring (ABPM) data of 277 patients with AH without serious concomitant diseases We used data base of several studies with the same design: 1) the washout period duration - 1-2 weeks; 2) initial ABPM session (SpaceLabs 90207) before treatment; 3) treatment with standard therapeutic doses (amlodipin, diltiazem, metoprolol, betaxolol, enalapril, moxonidin, lisinopril) with the addition of diuretic if needed; 4) psychological status assessment was performed by the psychological questionnaire "Minnesota Multiphase Personality Inventory"(MMPI) before and at the end of the treatment. The antihypertensive therapy effectiveness was assessed as the difference between mean ABPM levels before and after treatment. We used Spearman Partial Coefficient for correlation analysis adjusted for age, sex and duration of AH.

**Results:** The initial mean daytime BP level was (M±SD): systolic (SBP) - 140.6±11.9, diastolic (DBP) - 90.8±8.9 mm Hg. We found following correlations (r) (p<0.05): a) negative – between the antihypertensive drug effectiveness and leadership traits, aggression level (6 MMPI scale score) (r=-0,21); b) positive - between the result of antihypertensive therapy and optimism, cheerfulness (9 MMPI scale score, optimism, cheerfulness level) (0,21) (see table).

**Conclusion:** Thus leadership traits, aggression had a negative correlation with the antihypertensive therapy effectiveness. At the same time, optimism, cheerfulness level had positive relationship with the result of antihypertensive therapy.

**Relationship between MMPI and ABPM**

| MMPI scale score | Relationship (r) between MMPI scale score and the antihypertensive drug effectiveness for nighttime SBP | Relationship (r) between MMPI scale score and the antihypertensive drug effectiveness for 24 hour SBP | Relationship (r) between MMPI scale score and the antihypertensive drug effectiveness for nighttime DBP |
|---|---|---|---|
| 6 MMPI scale score | -0.21 | -0.21 | Ns |
| 9 MMPI scale score | Ns | Ns | 0.21 |

Ns -no statistically significant relationships

**P773**

**Hypertensive patients : evaluation of a therapeutic education program.**

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**Topic: Hypertension – Treatment**

**Objective:** Evaluation of a therapeutic education program for hypertensive patients over a 6-month period with personalized objectives.

methods: A prospective single-center study conducted in 106 patients, the study was conducted as follows:

1- Initial collection of epidemiological, clinical and paraclinical data from patients in normal consultation,

2- Each patient received a therapeutic education session -personalized- with education in the use of the "hypertension follow-up notebooks " developed by the work team.

3- The monitoring of the effectiveness of the education program was carried out over three evaluation consultations over the 6 months of survey.

**Results:** 106 patients participated in the study: mean age 47 ± 10 years; 62.26% of them male (66 patients). Essential hypertension in 95.28% of patients, grade II to III, uncontrolled in approximately 70% of them. With an average evolution period of: 9.5 ± 7.5 years

At 6 months, a significant decrease of SAP (from 154 +/- 3 to 143 +/- 3 mmHg, p less than 0.01) and DAP (from 95 +/- 2 to 87 +/- 2 mmHg, p less than 0.01) was notified. 50.7% versus 33.8% of patients have SAP and DAP in the therapeutic objectives. The monitoring of dietary and physical activity objectives is correlated with the decrease in BP (p < 0.05). Significant increase in self-monitoring with therapeutic decision-making (p < 0.01). Significant decrease in hypertension- related distress and feelings of failure (p < 0.01). Success rate among patients who chose the objective "reduce salt": 53%, "reduce fat": 50%, "walk several times/week (30 min)": 88%, "exercise at least once/week": 22%. 67% have at least one physical activity objective in place. No significant decrease in weight (-0.6 ± 4.1 kg) but 39% lost at least 2 kg.

**Conclusion:** A therapeutic education program with personalized objectives can give significant results at 6 months in terms of BP figures, dietetics and physical activity, self-monitoring of hypertension while reducing feelings of distress.

**P774**

**Should beta-blockers still be indicated for hypertensive patients?**

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**Topic: Hypertension – Treatment**

**Objective:** To evaluate and compare the physiological antihypertensive effect of beta-blockers vs. vasodilators by cardiopulmonary exercise test (CPET) and by bioimpedance hemodynamic cardiography (ICG).
Design and

**Methods:** 42 pts, 24 males and 18 females, were divided into two groups:
A)16 lone hypertensive pts treated only with vasodilator agents.
B)26 lone hypertensive pts treated only with beta-blocking agents.
A CPET and a bioimpedance cardiograpy were performed in all the pts while taking their medications.
The following CPET indices were measured during exercise: HR, BP, O2-consumption(VO2), O2-pulse(O2P), Ventilatory anaerobic threshold(VAT), and Respiratory exchange ratio(RER). The bioimpedance parameters were: HR, BP, Cardiac output (CO) and index, Stroke volume (SV) and index, Systemic vascular resistance (SVR) and index, and Left cardiac work (LCW) and index. The two tests were performed within two weeks apart.
Peak values of the cardiopulmonary indices were compared among the two groups, as well as the bioimpedance parameters, for each index separately, and P values less than 0.05 were considered statistically significant.

**Results:** The following table summarized the CPET results:
Group N age peak-HR* peak-VO2* peak-O2P* VAT(%VO2-max) peak-Rer: A 16 58 + /-13 90 + /-8# 96 + /-9# 108 + /-13# 55 + /-8# 1.17 + /-0.12
B 26 59 + /-10 69 + /-12&69 + /-11&102 + /-33# 43 + /-9&1.17 + /-0.1
*Expressed by % related to normal predicted values.
Statistically significant: # vs &or $; &vs $.
Significant hemodynamic differences between group A vs. B were observed as well:
CO – 4.5 L/min + -0.8 vs. 5.6 + -0.9 (p<0.05); SV – 64 ml + -8 vs. 76 + -9 (p<0.05);
SVR – 1572 + -381u vs. 1150 + -355u (p<0.05) and LCW – 4.7 + -0.9u vs. 6 + -1u (p<0.05).

**Conclusions:** A significant physiological disadvantage was shown in the treatment of beta-blockers compared to vasodilators in pts with lone hypertension by both, the CPET and the bioimpedance hemodynamic cardiography. It is suggested that the negative inotropic and chronotropic effects of beta-blockers cause reduction of CO which increase SVR and after-load, which further reduce CO. These findings suggest re-consideration whether to treat hypertensive patient with beta-blockers.

**P776**

**Accumulation of psychosocial risk factors and prevalence of classic cardiovascular disease (CVD) risk factors and CVD incidence. Prospective cohort study within the Polish part of the HAPIEE study.**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** Psychosocial risk factors (PSRF) are inter-related and tend to cluster in individuals. They are associated with cardiovascular disease (CVD), however, in most studies their effect on CVD is assessed separately.

**Aim:** To assess the relationship between accumulation of PSRF: low education, material deprivation, depressive symptoms and low perceived control and the prevalence of main CVD risk factors and with the risk of incident CVD.

**Methods:** Cohort study with 11-year-follow-up was conducted. Random sample of 10,728 permanent residents of Krakow at age 45-69 was examined. Interview based on structured questionnaire was followed by physical examination and fasting blood sample collection. Education, material deprivation, perceived control and depressive symptoms were measured using standard tools. Index of accumulation of PSRF was calculated by summing up the number of 4 above-mentioned PSRF to which an individual was exposed. Classic CVD risk factors were defined according to European Society of Cardiology guidelines. Information on new CVD cases was obtained from the second screening and three postal questionnaires, confirmed by clinical diagnosis. Information on deaths with causes was obtained from local registry, Central Statistical Office and by interviewing participants' families. Association between accumulation of PSRF and classic risk factors was assessed using logistic regression. Independent effect of accumulation of PSRF on CVD risk was assessed using Cox proportional hazard models.

**Results:** Over 30% of the sample was not exposed to any PSRF, about 30% experienced one, further 20% were exposed to two PSRF, remaining 20% of participants were exposed to 3 of 4 PSRF. In 43,572 personyears of observation in men and in 51,773 personyears in women, 479 and 291 new CVD cases were registered, respectively. In women strong positive associations between accumulation of PSRF with clear dose effect were found with smoking, diabetes, physical activity, hypertension and obesity. In men only smoking, diabetes and physical activity were more frequent in participants exposed to 3 or 4 PSRF. After adjustment for age, compared to men unexposed to any PSRF, men with 3 or 4 PSRF had increased risk of incident CVD (HR = 1.57 95%CI = 1.15-2.14 and HR = 2.24 95%CI = 1.43-3.52, respectively). Further adjustment for marital status, SCORE risk, body mass index and diabetes reduced the estimates which became insignificant, nevertheless the linear trend was still observed (p = 0.018). In women in fully adjusted model second PSRF increased risk of CVD by 70% (HR = 1.70 95%CI = 1.14-2.54) and exposure to 3 or 4 PSRF yielded over 2-fold higher risk of incident CVD (HR = 2,3995%CI = 1.57-3.63 and HR = 2.08 95%CI = 1.14-3.81, respectively).

**Conclusion:** Accumulation of PSRF is associated with greater number of classic risk factors in women and substantially increases the risk of incident CVD. In men the association between PSFR and CVD incidence was largely attenuated by covariates.

**Abstract Number: P777**
**SRT composite score for men**

| Years/Score | 0 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 | 5.5 | 6 | 6.5 | 7 | 7.5 | 8 | 8.5 | 9 | 9.5 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <16 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 to 4 | 3 to 4 | 5 to 6 | 7 to 9 | 10 to 18 | 19 to 35 | 36 to 50 | 51 to 61 | 62 to 99 |
| 16 to 20 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 to 3 | 4 | 5 to 16 | 17 to 28 | 29 to 36 | 37 to 49 | 50 to 99 |
| 21 to 25 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 to 4 | 5 | 6 to 14 | 15 to 22 | 23 to 38 | 39 to 44 | 45 to 99 |
| 26 to 30 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 3 to 9 | 10 to 25 | 26 to 39 | 40 to 53 | 54 to 99 |
| 31 to 35 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 to 5 | 6 to 23 | 24 to 38 | 39 to 55 | 56 to 67 | 68 to 99 |
| 36 to 40 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 4 to 5 | 6 | 7 to 8 | 9 to 25 | 26 to 38 | 39 to 53 | 54 to 67 | 68 to 99 |
| 41 to 45 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 to 5 | 6 to 9 | 10 to 32 | 33 to 52 | 53 to 65 | 66 to 74 | 75 to 99 |
| 46 to 50 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 to 5 | 6 | 7 to 11 | 12 to 16 | 17 to 48 | 49 to 62 | 63 to 72 | 73 to 82 | 83 to 99 |
| 51 to 55 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 6 to 7 | 8 | 9 to 11 | 12 to 14 | 15 to 22 | 23 to 60 | 61 to 72 | 73 to 82 | 83 to 90 | 91 to 99 |
| 56 to 60 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 5 to 6 | 7 to 8 | 9 to 11 | 12 to 13 | 14 to 22 | 23 to 31 | 32 to 70 | 71 to 82 | 83 to 90 | 91 to 94 | 95 to 99 |
| 61 to 65 | 1 to 3 | 3 | 4 | 4 | 4 | 4 | 5 to 6 | 7 | 8 | 9 to 10 | 11 to 14 | 15 to 16 | 17 to 23 | 24 to 26 | 27 to 33 | 34 to 43 | 44 to 81 | 82 to 90 | 91 to 96 | 97 | 98 to 99 |
| 66 to 70 | 1 to 5 | 5 | 6 to 7 | 7 | 8 | 9 to 11 | 12 to 14 | 15 | 16 to 18 | 19 to 23 | 24 to 26 | 27 to 29 | 30 to 36 | 37 to 42 | 43 to 48 | 49 to 60 | 61 to 89 | 89 to 93 | 94 to 97 | 98 | 99 |
| 71 to 75 | 1 to 8 | 9 to 10 | 11 to 14 | 15 to 16 | 17 to 20 | 21 to 22 | 23 to 26 | 27 to 29 | 30 to 35 | 36 to 39 | 40 to 45 | 46 to 50 | 51 to 60 | 61 to 66 | 67 to 74 | 75 to 81 | 82 to 97 | 98 to 99 | 99 | 99 | 99 |
| 76 to 80 | 1 to 23 | 24 to 25 | 26 to 28 | 29 to 31 | 32 to 37 | 38 to 40 | 41 to 44 | 45 | 46 to 51 | 52 to 55 | 56 to 64 | 65 to 67 | 68 to 77 | 78 to 80 | 81 to 87 | 88 to 91 | 92 to 97 | 98 | 99 | 99 | 99 |
| 81 to 85 | 1 to 27 | 28 to 30 | 31 to 40 | 41 | 42 to 47 | 48 to 49 | 50 to 60 | 61 | 62 to 66 | 67 to 71 | 72 to 78 | 79 to 84 | 85 to 90 | 91 to 94 | 94 | 95 to 96 | 97 to 99 | 99 | 99 | 99 | 99 |
| >85 | 1 to 50 | 51 to 53 | 54 to 59 | 59 | 60 to 68 | 69 to 71 | 72 to 74 | 75 to 80 | 81 to 89 | 89 | 90 to 92 | 93 to 95 | 96 to 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 |

## P777
**Age-reference values for the sitting-rising test derived from 6141 non-athlete adults**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** The sitting-rising test (SRT) was developed in the 1990s as a simple and safe tool to simultaneously evaluate all the non-aerobic components of physical fitness - muscle strength/power, flexibility, balance, and body composition. Recently, the SRT has been shown to be a good predictor of all-cause mortality in subjects aged 51 to 80 years old. Notwithstanding, as the SRT scores tend to diminish with aging, reference values according to age are required for the correct interpretation of SRT scoring.

**Purpose:** to propose age-reference SRT scores for non-athlete adult men and women.

**Methods:** a retrospective analysis of SRT results from 6141 non-athlete adults (4101 men; 16-98 years old) evaluated between July/1998 and February/2018. Reference values were obtained separately for sitting on the floor and for rising from the floor. The score for each of the measures could range from 0 to 5, with half-point intervals. Meanwhile, the composite SRT - a sum of the sitting score with the rising score -, could range from 0 to 10. A score of 10 meant the ability to sit and to rise from the floor without using any support - hand or knee - and without instability. The results were presented for each of the 15 consecutive age ranges with a five-year interval in colored bands of percentiles (P), being: P1-25 - red, P26-50 - yellow, P51-75 - green and P76-99 - blue.

**Results:** No clinically relevant intercurrence was recorded in more than 20 years of the routine use of SRT. A score of 10 was the most frequently seen in men aged 16 to 25 years old and in women aged 16 to 40 years old. However, less than 8% of men and women aged > 55 years old achieved a score of 10. The SRT was highly discriminative - the presence of all four colored bands of quartile - between 46 to 80 years old in men and between 46 to 75 years of age in women. However, it is possible to discriminate at least two bands - favorable and unfavorable colors - across all age ranges analyzed.

**Conclusion:** The availability of reference values obtained, under well-controlled conditions, in a large sample of adults from both sexes in a broad age range (16 to 98 years) enables the clinical application of the SRT in the evaluation of non-aerobic physical fitness. Ideally, one should have a SRT value in the green or blue band, that is, equal to or above the median (P50) for a given age range and sex.

## P778
**Leisure time and occupational physical activity, resting heart rate, and mortality in the Arctic region of Norway. The Finnmark study**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** This study examined the association of leisure time physical activity (LTPA), occupational physical activity (OPA), and resting heart rate (RHR) with all-cause and cardiovascular (CVD) mortality in Sami and non-Sami populations.

**Design:** Longitudinal, population-based study.

**Methods:** Data were collected from the Finnmark 3 study in northern Norway in 1987-1988. The cohort was followed for all-cause and CVD mortality over 26 years and included 17697 men and women with a mean age of 47.2 years at baseline. LTPA and OPA were assessed with a validated questionnaire at baseline, whereas cause of death was obtained from the Norwegian Cause of Death Registry. Associations were adjusted for age, sex, smoking status and body mass index. Furthermore, we adjusted for OPA when studying the association of LTPA and mortality and vice versa.

**Results:** A total of 1983 women and 3147 men died during follow-up. LTPA was linearly and inversely associated with all-cause mortality. Compared to inactive subjects, all-cause mortality was reduced by 5% in the moderate LTPA group (HR 0.95; 95% CI 0.89-1.01) and 16% in the active LTPA group (HR 0.84; 95% CI 0.76-0.92). Both for all-cause and CVD mortality, there were indications of a U-formed relationship with OPA. All-cause mortality was reduced by 27% in the RHR range of <60 beats per minute (HR 0.73; 95% CI 0.67-0.80), compared to RHR ≥ 80. The strength of the relationships was similar in Sami and non-Sami subjects.

**Conclusions:** In this population-based study, LTPA was inversely and linearly associated with all-cause mortality. In contrast, we found a U-shaped association between OPA and CVD and all-cause mortality. All-cause and CVD mortality were reduced in participants with RHR ≤80 beats per minute.

## P779
**Age at menopause and risk of ischaemic and haemorrhagic stroke, the EPIC-NL study**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** Few epidemiological studies have addressed the association between age at menopause and ischaemic and haemorrhagic stroke risk in women, with conflicting findings.

**Purpose:** We aimed to investigate whether the age at menopause is a risk factor for stroke in women and to assess if this association is similar for ischaemic- and haemorrhagic stroke.

**Methods:** We analysed data from 16582 postmenopausal women, aged 26-70 years at recruitment who were enrolled in the European Prospective Investigation into Cancer and Nutrition-Netherlands cohort between 1993-1997. Participants were followed for the occurrence of ischaemic and haemorrhagic stroke until 1 January 2011. At baseline, participants filled in questionnaires about their health, reproductive history including age at menopause, diet and lifestyle. Cox regression was used to investigate the association between age at menopause and stroke. All analyses were adjusted for age, smoking, systolic blood pressure and BMI.

**Results:** Median age of menopause was 48 years. A total of 1064 strokes (602 ischaemic, 165 haemorrhagic, 297 unclassified) were identified. Earlier menopause was associated with increased risk of stroke. Compared to women who experienced menopause between 50 and 54 years old, women who underwent menopause before age 40 years had a 1.51 times higher risk (95% Confidence Interval (CI): 1.25-1.84), women with menopause between age 40 and 44 had a 1.24 times higher risk (95% CI 1.02-1.50), women with menopause between age 45 and 49 had a 1.10 times higher risk (95%CI 0.94-1.30), whereas women with an age at menopause of 55 years and older had a lower risk (HR = 0.81; 95% CI: 0.61-1.08). In linear analyses we observed a 2% lower stroke risk for each year menopause was delayed (HR 0.98; 95%CI 0.97-0.99). Risks were similar for ischaemic stroke. An earlier age at menopause was not associated with haemorrhagic stroke. The association with age at menopause was somewhat stronger for natural menopause (HR <40 vs 50-54 years 1.65 (95%CI 1.12-2.43)) than for surgical menopause (HR<40 vs 50-54 years 1.32 (95%CI 0.92-1.90)).

**Conclusions:** The risk of total and ischaemic stroke decreased with an increase in age at natural as well as surgical menopause.

**P781**

**Estimated cardiorespiratory fitness and risk of atrial fibrillation: the hunt study**

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**On Behalf of:** Cardiac Exercise Research Group
**Topic: Risk Factors and Prevention – Epidemiology**

**Introduction:** Atrial fibrillation (AF) is the most common heart arrhythmia and is associated with increased morbidity and mortality. Obtaining high levels of cardiorespiratory fitness (CRF) may protect against AF development, but is not feasible to measure directly in a large population. However, nonexercise prediction models offers a viable option for estimating CRF (eCRF).

**Purpose:** To investigate the association between (1) eCRF and AF, and (2) long-term change in eCRF and AF.

**Methods:** We prospectively followed 39 844 men (44.7%) and women (55.3%) from HUNT3 (2006-08) until first onset of AF diagnosis or end of follow up in 2015. AF diagnosis were collected through hospital registers. We performed cox proportional hazard regression to assess the association between eCRF in HUNT3, as well as change in eCRF from HUNT2 (1995-97) to HUNT3, and AF incidence. Two previously published nonexercise prediction models were used to calculate eCRF in HUNT2 and HUNT3, respectively. eCRF were divided into quintiles, with the 1st quintile set as reference. Change in eCRF were categorized according to being below or above the median in HUNT2 and HUNT3, yielding four groups: (1) persistently below (ref.), (2) above to below, (3) below to above, and (4) persistently above.

**Results:** Higher levels of eCRF were associated with lower risk of AF. The highest risk reduction was 31% for men (4th quintile, HR 0.69, 95% CI 0.53-0.89) and 47% for women (5th quintile, HR 0.53, 95% CI 0.38 - 0.74), respectively. Participants with eCRF below median at HUNT2 and above at HUNT3 had 30% reduced risk of AF compared to those who were persistently below, (HR 0.70, 95% CI 0.55 - 0.91 both sex combined). Being persistently above median at both HUNT2 and HUNT3 were associated with 18% lower risk (HR 0.82, 95% CI 0.69 - 0.98).

**Conclusions:** Higher levels of eCRF is associated with lower risk of AF. Participants with the lowest decline in eCRF during a 10-year period were least likely to experience future AF events.

**P782**

**Relation between ideal cardiovascular health and T Wave abnormalities in middle-aged women and men free of diagnosed cardiovascular disease. The Polish Norwegian Study**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** Cardiac repolarization indices on standard electrocardiogram (ECG) have been associated with cardiovascular mortality and arrhythmia risk. Little is known about T wave inversion in apparently healthy individuals.

**Purpose:** to compare the ideal cardiovascular health (ICVH) status between individuals with and without T wave inversion in ECG leads other than V1-V3.

**Methods:** Cross-sectional data of 10531 participants, age 45 to 64 years, free of CVD in an ongoing cohort study, with structured questionnaires and fasting blood samples. Ideal CV health was defined according to the American Heart Association criteria (7 metrics assessed at 3 levels: ideal, intermediate, and poor). We assessed number of ideal metrics achieved and we calculated the ICVH score (range 7-21). The T wave inversions were obtained from resting 12-lead standard ECG.

**Results:** There were 3534 men (33.56%) and 6997 women (66.44%), with a mean age of 55.2 years (SD 5.3). The prevalence of T wave inversions other than in leads V1-V3 was 2.19% among women and 2.86% among men. None of the PONS participants had all 7 cardiovascular health metrics at ideal level. In contrast, 6615 (62.81%) participants had unfavorable ICVH, i.e. no more than 2 metrics at ideal level. The presence of T wave inversion was associated with increased odds for unfavorable ICVH, OR 2.05 (95%CI 1.53-2.75), adjusted for age and sex. After further adjustment for education, alcohol ingestion, past diagnosis of hypertension, diabetes, atrio- and intra-ventricular blocks, hypertension medication and left ventricular hypertrophy (Cornell criteria), this association persisted, OR 1.89 (95%CI 1.40-2.56).

**Conclusion:** T wave inversions in leads other than V1-V3 may represent an early indicator of subclinical disease, as suggested by an unfavorable ideal cardiovascular health status. Potential implications: health promotion efforts in conjunction with a simple routine ECG may aid identification of individuals requiring targeted aggressive prevention interventions.

**P783**

**Relationship between the socioeconomic status and the mode of fatality on the first cardiovascular event**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** It is well-known that low socioeconomic status (SES) is associated with higher cardiovascular (CV) mortality. Previous studies showed that there are propensity for fatality on the first CV event and pre-hospital death in the low SES group. However, it is not clear whether this finding persisted after adjustment for preventive treatments and CV risk factors. Also data in the Asian countries are scarce.

**Purpose:** To investigate whether SES is related to likelihood of fatality on the first CV event and pre-hospital death after adjustment for covariates

**Methods:** Among the Korean National Health Insurance Service-National Sample Cohort (NHIS-NSC 2002-2013) which is a sample of about one million representative of Korean population, 178,812 subjects were selected who were over 20 years of age as of year 2002, with available data of routine health check and free of diagnosis of ischemic heart disease, stroke, heart failure or cancer during 2002 and 2003. Cause of death was identified by the International Classification of Diseases (ICD) code in death certificate. Socioeconomic status was stratified by household income as low (lower 30 percentile), high (higher 30 percentile) and middle. Cardiovascular death plus admission due to ischemic heart disease, stroke or heart failure was classified as CV events. Pre-hospital death was defined as CV death without admission and early mortality as pre-hospital death plus death in 4 weeks after the CV event.

**Results:** During the follow-up of median 10 years, 9,387 CV events and 1,543 CV deaths, among which 1,007 cases were fatal earlier than 4 weeks after the event and 760 deaths were pre-hospital. Among those with CV events, lower SES was associated with both early mortality and pre-hospital death after adjustment for age, gender, smoking, extreme body mass index (BMI<18 or > = 30) and statin or antiplatelet treatment before CV events. (Table 1) These covariates were all significant predictors of the outcomes and no interaction with the SES was observed.

**Conclusion:** Lower socioeconomic status were associated with early mortality or pre-hospital death on the first CV event, independently of CV risk factors and preventive pharmacological treatments. More aggressive strategy for primary prevention may be relevant for those with lower SES.

**Table 1**

| **Reference:** high SES | Early mortality | Pre-hospital death |
|---|---|---|
| Middle SES | 1.46 (1.23 - 1.73) | 1.42 (1.17 - 1.72) |
| Low SES | 1.51 (1.26 - 1.81) | 1.64 (1.34 - 2.00) |

Odds ratios (95% confidence interval), adjusted for above mentioned covariates, p for trend<0.0001

**P784**

**Prevalence of insulin resistance and its association with cardiometabolic and lifestyle risk factors in Slovak adolescents**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Background:** Insulin resistance (IR) is the key indicator of metabolic syndrome and a pathophysiologic component of other metabolic disorders including obesity, dyslipidemia, hypertension or prediabetes/type 2 diabetes. The aim of this study was to evaluate the prevalence of IR and associated cardiometabolic and lifestyle risk factors.

**Material and methods:** The cross-sectional study was comprised of 2,629 secondary schools students, 1,205 boys and 1,424 girls in the age of 14-18 years (mean age = 17.1±1.04 y) within the project Support of Cardiometabolic Health in Secondary Schools in the Bratislava Region. The biological risk factors of cardiovascular diseases were examined (TC, HDL-C, TG, glycaemia, blood insulin level, hsCRP, body fat percentage, weight, height, waist circumference, BP and resting HR); LDL-C, BMI, WHtR, plasma atherogenic index (PAI) and HOMA-IR were calculated. The physical fitness was estimated by Ruffier test. Comprehensive questionnaire was used for lifestyle characteristics examination.

**Results:** Boys had higher prevalence of overweight/obesity according to BMI (30.7% vs. 22.9%; p<0.001), girls had higher prevalence of overweight/obesity according to body fat percentage (28.4% vs. 20.1%; p<0.001). The mean value of HOMA-IR was 2.45±1.91 without significant intersexual difference. IR (cut-off point for HOMA-IR = 3.16) was detected in 18.6% students (19.8% of boys, 17.6% of girls). We found significant association of IR and almost all cardiometabolic factors, except of TC and systolic BP in girls. IR was strongly associated with overweight/obesity (IR prevalence in obese group was 56.3%), TG (OR = 5.3; 95% CI = 3.8-7.3), PAI (OR = 5.5; 95% CI = 3.6-8.3) and WC (OR = 13.5; 95% CI = 8.8-20.8). Interactions of IR with lifestyle factors were found in boys, specifically with low levels of physical fitness (OR = 2.21; CI = 1.65-2.95), insufficient physical activity (OR = 0.56; 95CI = 0.42-0.76), breakfast skipping (OR = 0.64; CI = 0.48-0.87), frequent stress situations in privacy (OR = 1.31; CI = 0.97-1.78), lack of sleep (OR = 0.70; CI = 0.45-1.08) and sedentary

activities (OR = 1.34; CI = 1.01-1.79). In girls, there was strong association of IR with low level of physical fitness (OR = 1.46; CI = 1.10-1.94), insufficient physical activity (OR = 0.59; 95CI = 0.40-0.87), breakfast skipping (OR = 0.73; CI = 0.55-0.99), number of daily meals (OR = 0.42; 95%CI = 0.29-0.61), frequent consumption of sweetened beverages (OR = 1.33; CI = 0.99-1.78) and the time spent watching TV (OR = 1.29; CI = 0.98-1.71).

**Conclusion:** We found relatively high prevalence of IR in adolescents and confirmed its strong associations with cardiometabolic and lifestyle risk factors. Recognizing the main lifestyle risk factors and early IR identification is important in terms of preventive strategies. Weight reduction, regular physical activity and healthy eating habits can improve insulin sensitivity and decrease the incidence of metabolic syndrome, type 2 diabetes and CVD in adulthood.

## P785

**The impact of a structured enhanced education and follow- up program in an underserved population**

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**On Behalf of:** SANKO Study Group I
**Topic:** Risk Factors and Prevention − Epidemiology

**Background:** Prior studies suggest that primary prevention programs for coronary artery disease (CAD) may be effective in improving health-related behavioral outcomes. However, the implementation of these programs can be costly mainly due to staffing. Maintaining these programs with limited resources can be very challenging. Thus, the present study was designed to assess the feasibility and effectiveness of a structured,enhanced education and follow-up program for CAD prevention in an area where the diverse population and economy are major problems.

**Methods:** SANKO Coronary Artery Disesae Prevention Project (SCAD-PPI) is a unique trial which utilized medical school students to conduct the entire project. SCAD-PPI took place between 2014 and 2018 and had 2 different education and training phases; in the first phase: 2nd year Medical students underwent a one-year, specially designed training program on primary prevention for CAD. In the second phase: a series of conferences on primary prevention for CAD were organized by the SANKO University and local municipalities for underserved populations. Participants were prospectively assigned to an intervention where pre and post conference knowledge were collected and assessed. Every intervention was conducted by specially trained 3rd year Medical students and an education booklet which was specifically designed for this study was given to the participants. Every month thereafter, for 6 months, each participant was followed by phone. At the 6 month follow -up, data was collected to assess the impact of enhanced education and follow−up program on behavioral outcomes.

**Results:** A total of 112 participant were enrolled; 83% were women, mean age was 41±13 years, only 27% had a graduate school degree; 59% were not working. Mean BMI was 28.7 + 5.8 kg/m2. Overall knowledge on CAD risk factors, primary prevention measures, diet and daily exercise habits were very poor. After the enhanced education and follow-up program there was a significant improvement on the knowledge of CAD risk factors and primary prevention measures (p<0.001). More importantly, the follow-up program led participants to implement those positive changes into their lives and maintain a healthy life style. A separate cost analysis showed significant savings.

**Conclusion:** This is the first study which showed that a structured training program of medical students could be utilized to implement an enhanced education and follow−up program for primary prevention of CAD in an economically challenged, underserved population with successful outcomes. This model program is not only cost-effective and beneficial for public interest but also enhances active interaction of medical students with patients at a very early stage of their career.

## P790

**Age at menarche and stroke risk: the EPIC-NL study**

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**Topic:** Risk Factors and Prevention − Epidemiology

**Objective:** Stroke is a major health problem that remains the second leading cause of death for women worldwide. Menarche marks the onset of puberty and has been reported to influence cardiovascular health in adolescence and young adulthood. However, its long-term impact on cardiovascular health, including stroke incidence, remains ambiguous.

**Purpose:** This study aimed to study the relationship between age at menarche and stroke risk later in life.

**Methods:** This study includes 28,175 women from the European Prospective Investigation into Cancer and Nutrition − the Netherlands (EPIC-NL) cohort. Cox regression analysis was used to determine the association between age at menarche and stroke risk, stratified for cohort and adjusted for multiple covariates. Moreover, the intermediate effects of hypertension, hyperlipidaemia, diabetes mellitus type 2, history of cardiac heart disease, and BMI were analysed.

**Results:** The mean age at menarche was 13.3 (SD 1.6), varying from 8-20. Compared to age at menarche of 13, age at menarche ≥16 was associated with an increased risk of total stroke

(HR 1.30, 95% CI: 1.06-1.59) and haemorrhagic stroke (HR 1.48, 95% CI: 0.98-2.24), whereas an age at menarche of 14 compared to 13 resulted in a lower risk of total stroke (HR 0.82, 95% CI: 0.68-0.99), and haemorrhagic stroke (HR 0.63, 95% CI: 0.41-0.97). Tests for trend were not statistically significant. No statistically significant association was found for ischemic stroke. None of the potential intermediates influenced the results.

**Conclusion:** A statistically significant increased risk of total stroke and haemorrhagic stroke exists for late age at menarche (≥16).

## P791

**Higher consumption of sugars as an independent risk factor of cardiovascular events - findings from PURE Poland study**

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**Topic:** Risk Factors and Prevention − Epidemiology

**Background:** Cardiovascular diseases (CVD) are a leading cause of death worldwide. Cardiometabolic Syndrome (CardMetS) doubles the risk of CVD. Recently published studies indicate, that the increased intake of carbohydrates may be associated with the risk of CVD events.

**Purpose:** The aim of the study was to investigate the association between the consumption of macronutrients and development of CardMetS and CVD events in 6-years observation.

**Methods:** Poland is one of the 21 countries enrolled in global Prospective Urban and Rural Epidemiology Study (PURE). Analyzed study population consisted of 943 participants aged between 30 and 80 years. Some participants have been removed from analysis due to withdrawal and lack of data in follow-up. Participants with history of CVD and CardMetS in the baseline were excluded from the analysis. Participants completed validated Food Frequency Questionnaire at the baseline. Recorded CVD events included myocardial infarction, stroke, heart failure and angina (symptomatic coronary disease). The CardMetS was defined as having at least three of the criteria: abdominal obesity (waist circumference ≥94 cm for men and ≥80 cm for women), high BP (SBP/DBP ≥130/85 mmHg or antihypertensive medication), hypertriglyceridemia (≥150 mg/dL), low HDL (<40 mg/dL for men or <50mg/dL for women) and hyperglycaemia (fasting blood glucose ≥100 mg/dL or antidiabetic medication). The CVD events and CardMetS were observed within 6 years following the baseline visit. In the analysis the multivariate logistic regression approach was chosen to exclude the risk of bias of other risk factors.

**Results:** There was no statistically significant association between consumption of total protein, carbohydrates and fat and CVD events (p=0,47; p=0,17; p=0,22 respectively). There was statistically significant association between consumption of sugars and CVD events (OR=1,008; 95%CI=1,0-1,015; p=0,03). The results of multivariate logistic regression including other risk factors are presented in Table 1.

**Conclusions:** The consumption of sugars, but not overall carbohydrates, fats and protein was associated with CVD events independently from smoking status, BMI or sex.

**Table 1**

|  | Odds ratio | Lower CI | Highest CI | p-value |
|---|---|---|---|---|
| Sugars | 1.008 | 1.001 | 1.015 | 0.031 |
| Current smoker | 1.548 | 0.616 | 3.889 | 0.353 |
| Former smoker | 1.129 | 0.488 | 2.615 | 0.776 |
| BMI | 1.018 | 0.936 | 1.107 | 0.679 |
| Sex (Male) | 1.992 | 0.961 | 4.129 | 0.064 |

## P793

**Dog ownership and cardiovascular health: results from the Kardiovize 2030 project**

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**Topic:** Risk Factors and Prevention − Epidemiology

**Background:**
Pet ownership has been associated with lower mortality and cardiovascular disease (CVD) events. The potential mechanisms mediating this relationship have not been studied extensively. Furthermore, the relationship between dog ownership and cardiovascular health (CVH) has not been reported previously.

**Purpose:**
This cross sectional study using data from the Kardiovize Brno cohort, a prospective randomly selected urban sample population in Central Europe, aimed to investigate the

relationship between dog ownership, CVH score and its individual components.

**Methods:**
We included 1769 subjects, aged 25 to 64 years, with no history of CVD. Dog ownership was the exposure variable. We assessed the relationship between pet ownership in general, dog ownership and traditional CVD risk factors, CVH metrics (BMI, healthy diet, physical activity level, smoking status, blood pressure, glucose control and total cholesterol) and the comprehensive CVH score. Each CVH metric was given a point score from 0 to 2 (poor, intermediate, or ideal level, respectively) and the CVH score was calculated as the sum of each component. Poor CVH was defined if at least one of seven health metrics was at poor level.
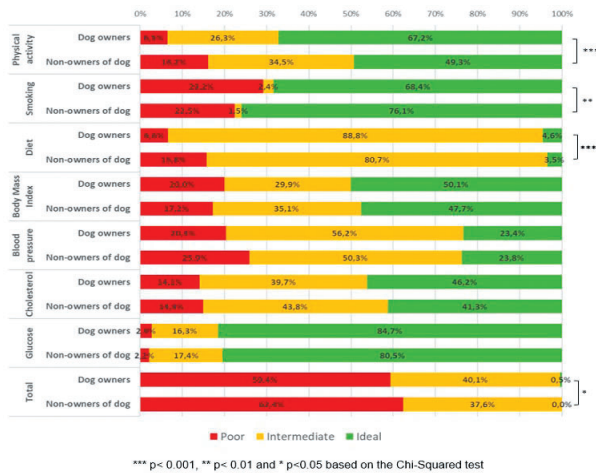
**Results:**
Pet ownership was reported in 746 participants (42.2%), 429 (24.3%) owned a dog while 317 (17.9%) owned another animal. Compared with people not owning a dog, dog owners were more likely to be women (p=0.021), more educated (p<0.001) and to perform more physical activity (p<0.001) but also more likely to smoke tobacco (p=0.006). The Figure shows differences in the seven CVH metrics between dog owners and non-owners. The CVH score was significantly higher among dog owners vs. non-owners of pets in general (median=10, IQR=3 vs. median=9, IQR=3; p=0.006) and between dog owners vs. owners of other pets (median=10, IQR=3 vs. median=9, IQR=3; p=0.005). After adjustment for age, sex and educational level, dog owners exhibited higher CVH score compared to non-owners of dogs (β=0.341; SE=0.117; p=0.004), other pet-owners (β=0.309; SE=0.151; p=0.041) or non-owners of pets (β=0.342; SE=0.122; p=0.005).

**Conclusions:**
Except for smoking, dog owners were more likely to achieve the recommended intermediate/ideal level of behavioural CVH metrics (physical activity and diet) than non-owners of dogs, which translated into better CVH. The association between dog ownership and smoking prevents the association between dog ownership and CVH to be more significant.

**Cardiovascular health by dog ownership**



*** p< 0.001, ** p< 0.01 and * p<0.05 based on the Chi-Squared test

**P794**

**Association of polycystic ovary syndrome and risk or cardiovascular disease, coronary heart disease and stroke**

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**Topic: Risk Factors and Prevention − Epidemiology**

**Background:** Heart failure (HF) is sex-specific with differences in epidemiology, clinical presentation, prognosis and risk factors. The underlying factors that drive these sex-specific differences are still not fully elucidated. It has been suggested that there is a link between reproductive factors and HF, although research is still limited.

**Purpose:** The aim of this study was to investigate the separate and combined associations of parity and breastfeeding with HF in a large cohort study.

**Methods:** Data from the EPIC-NL cohort was used to calculate Cox-hazard ratios (HRs) with 95% confidence intervals (CIs), for the separate and combined associations of parity and breastfeeding with HF, adjusted for age at recruitment, marital status, educational level, smoking status, alcohol intake, ever use of OC of HRT and menopausal status. Information on reproductive factors was available for 28.504 women. After stratifying by study center, complete case analyses were performed, adjusting for multiple covariates.

**Results:** During 14.8 years of follow-up, 631 cases of HF occurred. Compared with nulliparous women, parous women had a non-significant lower risk of HF (HR 0.79 (95% CI: 0.60-1.03). Compared to having no children, women with 1, 2, 3, 4 or ≥5 children all had a lower risk of HF, although there was no clear dose-response relation (HF1=0.85 (95% CI: 0.59-1.21), HF2=0.74 (95% CI: 0.55-0.99), HF3=0.73 (95% CI: 0.53-0.99), HF4=0.91 (95% CI: 0.65-1.28), and HF$^3$5=0.88 (95% CI: 0.62-1.26)). Compared with nulliparous women, both parous women who never breastfed and parous women who ever breastfed had a small but non-significant lower risk of HF (HRs 0.82 (95% CI: 0.59-1.13) and 0.78 (95% CI: 0.59-1.02), respectively. Among parous women, those who ever breastfed did not have a lower risk compared to those who never breastfed (HR 0.93 (95% CI: 0.74-1.16).

**Conclusion:** Parity and breastfeeding were not statistically significantly associated with HF, among women in the EPIC-NL cohort. Although the results were not statistically significant, a trend can be seen for parity, in which parous women tend to have a lower HF risk compared to nulliparous women.

**P795**

**The association of parity and breastfeeding with heart failure: the EPIC-NL study**

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**Topic: Risk Factors and Prevention − Epidemiology**

**Background:** Heart failure (HF) is sex-specific with differences in epidemiology, clinical presentation, prognosis and risk factors. The underlying factors that drive these sex-specific differences are still not fully elucidated. It has been suggested that there is a link between reproductive factors and HF, although research is still limited.

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**Methods:** Data from the EPIC-NL cohort was used to calculate Cox-hazard ratios (HRs) with 95% confidence intervals (CIs), for the separate and combined associations of parity and breastfeeding with HF, adjusted for age at recruitment, marital status, educational level, smoking status, alcohol intake, ever use of OC of HRT and menopausal status. Information on reproductive factors was available for 28.504 women. After stratifying by study center, complete case analyses were performed, adjusting for multiple covariates.

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**Conclusion:** Parity and breastfeeding were not statistically significantly associated with HF, among women in the EPIC-NL cohort. Although the results were not statistically significant, a trend can be seen for parity, in which parous women tend to have a lower HF risk compared to nulliparous women.

**P797**

**Arterial hypertension and trait anxiety in males of open urban population**

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**Topic: Risk Factors and Prevention − Epidemiology**

**Background:** Previous studies have shown that increased trait anxiety (TA) and emotional liability, as well as elevated cardiovascular reactivity may play a relevant role in arterial hypertension (AH) progress due to mental stress.

**Purpose:** To define correlations of AH prevalence and levels of TA in males aged 25-64 years of open urban population.

**Methods:** Cross-sectional epidemiology study was conducted based on representative sample from the voting lists of one of the administrative regions of Tyumen. It included 1000 males, 250 people from each decades of life (25-34, 35-44, 45-54 and 55-64 years). The respond was 85.0% - 850 participants. AH was defined as a condition with systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg in patients having received no antihypertensive therapy under examination. AH group also consisted of patients with BP <140/90 mmHg, if they underwent antihypertensive therapy under examination or stopped taking antihypertensive drugs less than 2 week prior examination. The Spielberger State-Trait Anxiety Inventory (STAI) was used for TA estimation. Mathematical data processing was carried out using an application package for medical information IBM SPSS Statistics 21.0.

**Results:** AH prevalence in males aged 25-64 years was 48.7%. Statistically significant differences of AH prevalence with general population value was revealed in the age groups of 25-34, 45-54 and 55-64 years. In the open population of males aged 25-64 years, age-adjusted prevalence index of high TA was 36.6%, mean TA − 55.8%. With the increase of age high TA

was growing and had reached its maximum in the age category of 55-64 years (50.0%). Males aged 25-34 years had the highest mean TA and it had reached its statistically significant maximum in comparison with this index in the age group of 55-64 years (62.1 vs 42.5%, p<0.001). Statistically significant trends were stated in the groups of the examined males with the revealed AH regarding TA levels. Thus, AH prevalence was higher in case of mean and high TA compared to the index prevalence in case of low TA. At the same time, AH prevalence was significantly higher in case of mean TA relatively to the prevalence in case of high TA.

**Conclusion:** The presented data of open urban population from middle-urbanized Siberian city demonstrate high necessity of cardiovascular prevention in workable males with TA.

## P798
**Central and peripheral blood pressure and the association with body mass index in young adults**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Introduction:** Obesity has nearly tripled worldwide during the last four decades, especially in young adults, and is of growing concern since it is a risk factor for cardiovascular disease and several other non-communicable diseases.

**Purpose:** We explored how body mass index (BMI) are associated with central and peripheral systolic blood pressure (SBP) in a population of healthy, young women and men, from the Swedish Lifestyle, Biomarkers, and Atherosclerosis (LBA) Study.

**Methods:** The 834 individuals were self-reported healthy, non-smoking, age 18-25 years. Brachial blood pressure (peripheral blood pressure) was measured with an oscillometric, non-invasive blood pressure method using a digital automated device. Carotid blood pressure (central blood pressure) was measured with applanation tonometry over the right common carotid artery. BMI (kg/m2) was calculated and categorized into underweight (<18.50), normal (18.50-24.99), overweight (≥25.00), or obese (≥30) according to classification by World Health Organization.

**Results:** The women with overweight and obesity had significantly higher central and peripheral SBP than the under- and normal weight women, P<0.001. The overweight men had significantly higher central and peripheral SBP than the normal weight men, P<0.01. The men with overweight and obesity had also significantly higher peripheral SBP than the underweight men, P<0.01.

**Conclusions:** The positive association between central and peripheral SBP and BMI is observed already in young adults. The study result highlights the importance of increased counseling about healthy lifestyle directed toward young adults.

## P799
**Associations between risk factors and cardiovascular disease mortality among Russian adults**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Introduction:** Although cardiovascular disease (CVD) mortality decreased during last decades, Russia remains one of the countries with the highest CVD mortality rate in Europe. CHD and stroke are the main contributors into CVD mortality.

**Aim:** To evaluate risk factors associated with CVD mortality among Russian men and women

**Methods:** The data came from representative samples observed in different periods of time from 1975 to 2001. Men (12497) and women (5039) aged 35-74 years were examined. Socio-demographic characteristics, smoking and drinking status, blood pressure (BP), lipids profile, CHD by ECG criteria and Rose angina, atrial fibrillation (AF) were considered. Mortality follow-up for men was 10 years, 1945 deaths were observed (604 from CHD, 224 from stroke); for women - 20 years, 1328 deaths (340 from CHD and 236 from stroke) were identified. Cox model of proportional hazard adjusted for age, city and period of screening stratified by education used to determine the link between risk factors (RF) and mortality.

**Results:** From 17 variables which were considered as potential risk factors for CHD were selected 9 significant (p<0.05) among both genders. Stroke mortality associated with 8 and 5 factors respectively for men and women. The most significant association with CHD mortality among men were current smoking, high BP(≥160/95 mm Hg), high total cholesterol (≥6.6 mmol/L) and high BMI (≥30 kg/m2) (table). Among women - high BP, and AF (table). Less risk factors were associated with stroke mortality (table).

**Conclusions:** Among men association between RF and both causes of mortality were stronger than among women. There are pattern of common RF for both cause of deaths, but there are many differences.

**Association between RF and CVD mortality**

| Variables | CHD mortality [HR (95%CI)] | | Stroke mortality [HR (95%CI)] | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| Current smoking | 2.25(1.75-2.89)*** | 2.05(1.43-2.92)*** | 2.23(1.67-2.96)*** | 1.81(1.16-2.81)** |
| Non drinking | | 1.29(1.02-1.63)* | | 1.33(1.01-1.76)* |
| Strong drinking | | 2.83(1.03-7.73)* | | |
| BP≥160/95 | 1.78(1.43-2.22)*** | 2.04(1.62-2.56)*** | 2.31(1.62-3.31)*** | 1.84(1.32-2.56)** |
| HR>80bt/min | 1.28(1.04-1.57)** | | 1.45(1.07-1.98)* | |
| AF | | 3.62(1.89-6.93)*** | 6.18(3.26-11.7)*** | 4.50(2.30-8.77)*** |
| HDL<1.0/1.2mmol/L | 1.26(1.03-1.54)* | 1.35(1.07-1.70)* | 1.70(1.25-2.31)** | |
| TC≥6.6mmol/L | 1.43(1.19-1.72)*** | 1.42(1.14-1.77)** | | |
| BMI >30.0 kg/m$^2$ | | | 1.53(1.12-2.09)*** | |

***p<0.0001; **p<0.001; *p<0.05

## P801
**Discrepancy between subjective and objective awareness of cardiovascular risk factors**

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**Topic: Risk Factors and Prevention – Epidemiology**

Introduction In the last decade the "European Heart Failure Awareness days" initiative has been promoted by the European Society of Cardiology, aiming to increase the knowledge and prevention of heart failure (HF) in Europe. Despite the high and increasing prevalence of HF, in the general population the awareness on this clinical condition and its risk factors is critically low.

Aim During the 2017 initiative, we aimed to investigate subjective and subsequent objective awareness related to self-control of cardiovascular risk factors as physical inactivity, obesity and healthy diet, hypertension, diabetes mellitus, smoking habits.

Methods A 60-item multiple choice questionnaire has been developed to collect demographic data, presence of cardiac disease, adherence to pharmacological treatment, physical activity, psychological well-being, diet and smoking habits. The questionnaires were answered by to 709 people in 8 different cities.

Results The age of our population was 14-40 years old (yo) in 10%, 51-50 yo in 15%, 51-50 yo in 18%, 61-70 yo in 20%, 71-80 yo in 20% and over 80 yo in 13%. 55% were female and >50% declared high scholarity level. 91 out 709 were active smokers, and 167 out 709 former smoker. In 46% of cases the amount of cigarettes smoked was <10 per day, in 39% between 10 -20 and in 10% >21 cigarettes daily. In the 30% of cases the presence of a known cardiovascular disease was reported. The 68% of people was on pharmacological treatment (40% for hypertension, 11% for diabetes mellitus, 26% for hypercholesterolemia and 32% for cardiac ischemic disease or heart failure). Of these, 81% affirmed to be adherent to a prescribed treatment but in the subsequent items, we found that 27% often forgot to assume the prescribed drugs. In 21% of cases, deteriorating of clinical status was the cause of voluntary interruption while in 16% because of symptom improvement. The self-reported status of physical activity was: satisfactory in 50% of cases (very good only in 5,4%), poor in 25,5%, very poor or absent in 21%. Investigating the amount of time and the intensity of the physical activity, 41% of the population was completely sedentary. Dietary habits were consistent with Mediterranean diet, with a correct assumption of vegetables and fruit in respectively 80% and 71% and a lower amount of fish and legumes (65% and 64%).

Discussion Our study revealed a consistent discrepancy in self-assessed and measured adherence to a prescribed pharmacological treatment. Dietary habits were satisfactory while the amount of physical activity was not achieved in half of the cases. These data highlights the importance of increase awareness and to investigate real population adherence to risk factor's management

**P803**
**Correlation between high lipoprotein (a) and hypertension in primary and secondary prevention**

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**Topic: Risk Factors and Prevention – Epidemiology**

**Purpose:** Hypertension and high lipoprotein (a) levels are well known cardiovascular risk factors. Lipoprotein (a) levels predict risk for early manifestation of coronary artery disease. We evaluated the prevalence of elevated levels of lipoprotein (a) ( > 60 mg/dl) and hypertension in healthy employees of different companies undergoing a cardiovascular screening program (primary prevention) and in patients with known cardiovascular disease (secondary prevention).

Patients and methods

145 persons with lipoprotein (a) > 60 mg/dl out of 1546 employees (1003 male and 543 female, mean age 43.9 years) from different companies undergoing a cardiovascular screening program („Unternehmen mit Herz") and 953 patients with coronary heart disease (603 male and 350 female) with elevated lipoprotein (a) > 60 mg/dl (hospitalised between 2004 and 2009 in our department) were enrolled in this study.

Gender, age, low density lipoprotein (LDL), high density lipoprotein (HDL), HbA1c, nicotine abuse, familiar disposition to coronary heart disease, systolic and diastolic blood pressure were evaluated with respect to high level lipoprotein (a) > 60 mg/dl.

**Results:** In the primary prevention cohort elevated levels of Lp (a) > 60 mg/dl were not associated with hypertensive blood pressure levels (mean systolic blood pressure 137 mmHg and diastolic blood pressure 84 mmHg (all patients); mean systolic blood pressure and lipoprotein (a) > 60 mg/dl 136 mmHg and diastolic blood pressure 85 mmHg).

In contrast, in CAD patients the prevalence of hypertension was significantly higher among those with elevated Lp (a) as compared to those with low Lp (a) (83.5% of patients with high lipoprotein (a) levels and hypertension and 67.8% of patients with high blood pressure and low lipoprotein (a) levels; p<0.001).

**Conclusion:** High levels of lipoprotein (a) > 60 mg/dl are a well known independent risk factor for cardiovascular disease in young age. In patients with CAD, we found an association of elevated Lp (a) with arterial hypertension. Further studies should elucidate a potential causal relation between both factors and their effect on cardiovascular risk.