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P119: LDL CHOLESTEROL IS ASSOCIATED WITH SYSTEMIC VASCULAR RESISTANCE AND WAVE REFLECTION IN SUBJECTS NOT USING MEDICATIONS WITH HAEMODYNAMIC INFLUENCES

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Results: Black men and women had higher blood pressure ($p < 0.001$), higher IL-6 ($p \leq 0.016$), shorter telomeres ($p < 0.001$) but similar NOx levels when compared to their white counterparts. GPx activity was higher and L-citrulline lower in black compared to white groups ($p \leq 0.002$). Independent positive associations of telomere length with NOx (adj $R^2 = 0.21$; $\beta = 0.249$; $p = 0.03$) and GPx activity (adj $R^2 = 0.21$; $\beta = 0.229$; $p = 0.03$) were indicated in white men and TNF- α (adj $R^2 = 0.33$; $-\beta = 0.274$; $p = 0.01$) in white women. These associations were absent in the black groups.

Conclusion: Telomere length of black men and women was shorter but not associated with NOx and age or markers of oxidative stress and inflammation, as observed in the white groups. Therefore it seems that the less favourable cardiovascular and inflammatory profiles of blacks were unrelated to shorter telomere lengths. The lower L-citrulline levels indicate decreased NO synthesis that may affect the association between telomere length and NOx.

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P116

CARDIAC OUTPUT IS INCREASED IN YOUNG PEOPLE WITH ELEVATED BP

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Background: The relationship between Blood Pressure (BP) and cardiovascular risk is continuous. Here, we examined haemodynamic characteristics across a range of BP categories, to determine haemodynamic mechanisms associated with early elevations of BP and whether these differ by gender.
Methods: 2618 apparently healthy subjects aged 18–40 years were grouped according to gender and BP category, following the recent reclassification of BP as part of AHA/ACC 2017 guidelines. All individuals undertook a lifestyle and medical history questionnaire, together with detailed metabolic and haemodynamic assessments.

Results: Hypertension (HT), stage 1 was the most common BP phenotype in males (29%), whereas normal BP was the most common BP phenotype in females (68%). In both males and females, cardiac output (CO) was significantly increased in subjects with elevated BP and HT versus normotensives ($P < 0.001$ for all). Stroke volume (SV) was increased in hypertensive males compared with those with elevated or normal BP. In contrast, peripheral vascular resistance (PVR) and pulse wave velocity (PWV) were significantly increased in hypertensive females ($P < 0.001$ for all) compared with the other BP categories.

Conclusion: In young adults, increased CO is evident at the elevated BP stage and this could represent an initiating mechanism involved in the onset of HT. SV, PVR and PWV might play different roles in females and males in the development of later sustained HT. Elevated CO may be an important risk stratifier for future HT in young people.

Poster Session II – Hypertension VI

P117

ARTERIAL STIFFNESS, CAROTID REMODELING AND OTHER RISK FACTORS DETERMINING CORONARY ARTERY DISEASE IN HYPERTENSIVE PATIENTS

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Increased arterial stiffness and carotid artery Intima-Media Thickness (IMT) are associated with atherosclerosis and Coronary Artery Disease

(CAD), but their correlation with the anatomic extent of atherosclerosis in hypertensive patients is not completely known. We aim to evaluate whether Pulse Wave Velocity (PWV), carotid IMT and Vascular Aging Index (VAI) predict CAD in hypertensives. We enrolled 76 consecutive patients (36 males; mean age 58.2 years) with arterial hypertension who were undergoing elective coronary angiography for the diagnosis or exclusion of CAD. Carotid-femoral pulse wave velocity (PWV), vascular aging index (VAI) calculated from the second derivative of photoplethysmography, and carotid IMT and diameter (CD) measured by high definition echotracking device were done in all subjects. Correlations between hemodynamic data, traditional cardiovascular risk factors and the presence or absence of CAD were analyzed. CAD (stenosis $\geq 50\%$ in at least one coronary) was observed in 52 patients.

Results: Concerning clinical, demographic and laboratory parameters there were no significant differences between patients with and without CAD. PWV in patients with CAD were significantly higher (10.7 vs. 11.87 m/s) ($p = 0.01$), but the correlation disappeared after adjustment for age. Carotid IMT and CD were similar in patients with and without CAD. Logistic regression analysis showed that patients older than 60 years, with PWV > 12 m/s, CD > 7.67 mm, VAI > -0.05 , and cholesterol levels > 200 mg/dl had a significantly higher percentage of CAD than its counterparts. In conclusion, the presence of CAD enhances age-induced changes of arterial stiffness in hypertensive patients. Besides classical cardiovascular risk factors, significant changes in PWV and CD could identify CAD in high risk hypertensive patients.

P118

CXCL13 AS A NOVEL POTENTIAL BIOMARKER OF ESSENTIAL HYPERTENSION

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Background: Arterial hypertension is the main modifiable risk factor of cardiovascular disease. Inflammation and endothelial dysfunction contribute to arterial wall remodeling and blood pressure elevation, leading to the development of age-associated changes of cardiovascular system that limit the lifespan.

Objectives: Our aim was to explore the role of inflammatory mediators in blood pressure regulation, and to identify potential biomarkers of essential hypertension (EH) in the study group including individuals with enhanced survival (beyond 80 years).

Methods: We performed gene expression analysis in peripheral blood leukocytes of EH patients and healthy individuals using RT² Profiler PCR Array (Qiagen) in the group of 30 EH patients and 32 control subjects aged between 30 and 60 years, and 12 individuals aged between 82 and 113 years (6 EH patients, 6 normotensive controls). Next, we performed genotyping of polymorphic markers located in differentially expressed genes, and analysed associations with EH in the study group consisting of 1724 individuals aged between 30 and 108 years.

Results: In the group of middle-aged hypertensive patients, we found altered transcriptional activity of 21 gene. Relative expression level changes in EH patients were more pronounced for CXCL13 (13.8-fold), IL1F6 (12.9-fold), CD40LG (8-fold), CXCL1 (7.2-fold). In the elderly hypertensive individuals compared to healthy controls, transcriptional activity of NFKB1 and IL18R1 genes was increased (FC, fold change, 3.21 and 2.41, respectively, $P < 0.05$). The association analysis demonstrated the association between EH and CXCL13 rs355689C allele (OR = 0.61, $P_{Bonf} = 5 \times 10^{-4}$).

Conclusions: Our results suggest that CXCL13 might contribute to the development of hypertension.

P119

LDL CHOLESTEROL IS ASSOCIATED WITH SYSTEMIC VASCULAR RESISTANCE AND WAVE REFLECTION IN SUBJECTS NOT USING MEDICATIONS WITH HAEMODYNAMIC INFLUENCES

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Increased arterial stiffness and carotid artery Intima-Media Thickness (IMT) are associated with atherosclerosis and Coronary Artery Disease

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Background and Aim: Low density lipoprotein cholesterol (LDL-C) is a primary risk factor for atherosclerosis, but it is also associated with elevated blood pressure (BP) and future development of hypertension. We examined the relationship between LDL-C and haemodynamic variables in normotensive and never-treated hypertensive subjects.

Methods: Altogether 615 volunteers (19–72 years) without lipid- and BP-lowering medication were recruited. Supine haemodynamics were recorded using continuous radial pulse wave analysis, whole-body impedance cardiography, and single channel electrocardiogram. The haemodynamic relations of LDL-C were examined using linear regression analyses with age, sex, body mass index (BMI) (or height and weight as appropriate), smoking status, alcohol use, and plasma C-reactive protein, sodium, uric acid, high density lipoprotein cholesterol (HDL-C), triglycerides, estimated glomerular filtration rate, and quantitative insulin sensitivity check index as the other included variables.

Results: The mean (SD) characteristics of the subjects were: age 45 (12) years, BMI 27 (4) kg/m², office BP 141/89 (21/13) mmHg, creatinine 74 (14) μmol/l, total cholesterol 5.2 (1.0), LDL-C 3.1 (0.6), triglycerides 1.2 (0.8), and HDL-C 1.6 (0.4) mmol/l. LDL-C was an independent explanatory factor for aortic systolic and diastolic BP, aortic pulse pressure, augmentation index, pulse wave velocity (PWV), and systemic vascular resistance index ($p \leq 0.013$ for all). When central BP was included in the model for PWV, LDL-C was no more an explanatory factor for PWV.

Conclusions: LDL-C is independently associated with BP via systemic vascular resistance and wave reflection. These results suggest that LDL-C may play a role in the pathogenesis of primary hypertension.

P120

DETERMINANTS OF BRACHIAL-ANKLE PULSE WAVE VELOCITY

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It has been proven that aortic pulse wave velocity (aoPWV) the measure of arterial stiffness is a strong and independent predictor of both cardiovascular events and all-cause mortality. Beyond the "gold standard" cfPWV brachial-ankle PWV (baPWV) measurement has been accepted for assessing arterial stiffness and endorsed into the position paper of Artery Society as a recommended method. The aim of this study was to define the determinants of baPWV.

Patients and Methods: baPWV and ABI was measured with BOSO-ABI system in 188 consecutive adults (98 male, 91 female) at risk of or with manifest CV disease (mean age: 58 years). This oscillometric device is capable to measure blood pressure on both upper and lower extremities simultaneously with four cuff to assess ABI and baPWV, as well.

Results: baPWV was significantly correlated with age but this correlation was not as strong as it can be observed with aortic PWV ($R = 0.172$). Linear backward regression analysis confirmed that age and brachial systolic blood pressure proved to be the main determinants of baPWV.

Conclusions: baPWV is a suitable complimentary method for assessing arterial stiffness which can provide useful information regarding not only aortic stiffness but the peripheral arteries.

P121

ASSOCIATION OF CARDIORESPIRATORY FITNESS WITH ARTERIAL STIFFNESS AND PERIPHERAL AND CENTRAL BLOOD PRESSURE IN RESISTANT HYPERTENSION PATIENTS

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Background: The relationship between arterial stiffness, blood pressure (BP) and cardiorespiratory fitness (CRF) has been studied in healthy populations and cardiovascular patients, since all of which proved to be independent predictors of all-cause mortality. We aimed to investigate the association of CRF with arterial stiffness and peripheral and central hemodynamics, in patients with resistant hypertension (RT).

Methods: In this cross-sectional study, 30 patients (13 men, 17 women; age, 57.7 ± 8.1 years; weight, 79.2 ± 11.6 kg; body mass index, 29.7 ± 4.0 kg/m²) with resistant hypertension were recruited in the Hospital Infante D. Pedro (Aveiro) and Hospital Pedro Hispano (Matosinhos). Outcome measures included CRF (VO2peak), peripheral and central BP, and carotid-femoral pulse wave velocity (cf-PWV). Correlation analysis was conducted to assess the association between variables.

Results: A significant negative correlation was found between VO2peak (33.7 ± 6.2 mL O₂/kg/min) and central (141.0 ± 21.3 mmHg; $r = -0.395$, $p = 0.031$) and peripheral systolic BP (148.4 ± 21.3 mmHg; $r = -0.363$, $p = 0.049$). VO2peak was also correlated with pulse pressure (PP) amplification ratio (1.2 ± 0.1 mmHg; $r = 0.361$, $p = 0.050$). The association with central systolic BP ($r = -0.403$, $p = 0.035$) and PP amplification ratio ($r = 0.408$, $p = 0.033$) remained significant after adjusted for age. VO2peak showed no correlation with PWV (9.4 ± 2.9 m/s; $r = -0.075$, $p = 0.694$) and peripheral (88.1 ± 12.2 mmHg; $r = -0.138$, $p = 0.467$) and central diastolic BP (88.5 ± 12.7 mmHg; $r = -0.133$, $p = 0.483$).

Conclusion: This study confirms the inverse relationship between CRF and central systolic BP and PP amplification ratio in RH patients, regardless of age.

P122

THE ARTERIAL STIFFNESS DYNAMICS UNDER THE EFFECT OF ROSUVASTATIN ADDED TO DIFFERENT COMBINATIONS OF ANTIHYPERTENSIVE DRUGS

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We studied the influence of rosuvastatin adding to lisinopril/amlodipine or lisinopril/ hydrochlorothiazide fixed combinations on blood pressure (BP) and arterial stiffness dynamics in hypertensive patients of high or very high cardiovascular risk.

Methods: 60 patients (36 men and 24 women aged 52.1 ± 7.3) with uncontrolled high or very high cardiovascular risk hypertension (HTN) were randomized into two groups. Group 1 (n = 30) received a fixed combination of lisinopril/amlodipine 10/5 mg/day. Group 2 consisted of 30 patients who received a fixed combination of lisinopril/hydrochlorothiazide 10-20/12.5 mg/day. The rosuvastatin 20mg/day was added in the both groups. The office BP, central (aortic) BP, augmentation index (AIx), carotid-femoral and carotid-radial pulse wave velocity (PWV) dynamics was evaluated during 24-week follow-up period.

Results: Baseline clinical characteristics did not differ in the groups. The office BP decreased in both groups from 173.3 ± 20.2/104.4 ± 14.0 to 131.2 ± 10.4/83.5 ± 7.8 mmHg ($p < 0.001$) in the 1-st group and from 168.6 ± 23.6/103.6 ± 15.6 to 135.6 ± 15.1/87.3 ± 11.5 mmHg ($p < 0.001$) in the 2nd one. The extent of office BP did not differ. However the degree of central systolic BP reduction was more prominent in the 2nd group (10.5 ± 6,8 and 6.5 ± 7.8 mmHg, respectively). The extent of AIx decline did not differ. Carotid-femoral PWV equally decreased in both groups (from 9.5 ± 1.7 to 8.8 ± 1.8; $p = 0.043$ and from 8.9 ± 1.2 to 8.1 ± 1.4 m/s; $p = 0.001$,