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P115: LEUKOCYTE TELOMERE LENGTH AND ITS RELATION TO NITRIC OXIDE METABOLITES IN A BI-ETHNIC SAMPLE: THE SABPA STUDY

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EFFECT OF DIFFERENT TYPES OF PHYSICAL TRAINING ON THE FUNCTION ENDOTHELIAL IN HYPERTENSIVE INDIVIDUALS

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Introduction: Endothelial dysfunction is a characteristic of systemic arterial hypertension and an early marker of atherosclerosis. Aerobic training (AT) is known to improve endothelial function, but little is known about the effects of resistance training (RT) and combined training (CT) on endothelial function. Objective: To evaluate the effect of AT, RT and CT on endothelial function in individuals with hypertension.

Methods: Thirty-seven individuals with hypertension (53.8 ± 10.6 years old, systolic blood pressure 134.3 ± 13.1 mmHg, and diastolic 84.3 ± 12.1 mmHg) were randomly allocated in 3 groups: AT ($n = 13$, 40 min of cycle ergometer at 65% maximum heart rate – HRmax), RT ($n = 12$, 6 exercises, 4 sets/12 repetitions at 60% maximum strength – 1RM) and CT ($n = 12$, RT + AT, as follows: 6 exercises, 2 sets/12 repetitions at 60% 1RM, and AT: 20 min in cycle ergometer at 65% HRmax). All of them performed two sessions/week, 40 min/session, during 8 weeks. Endothelial function was evaluated by the brachial artery flow-mediated dilatation (FMD). We conducted Generalized Estimating Equation, post-hoc Bonferroni, to assess differences among groups ($p < 0.05$).

Results: All parameters (age, blood pressure, and FMD) were similar among groups at study entry. The different modalities of exercise determined similar benefits in %FMD, when compared pre- and post-training moments (within each modality): AT 9.96 ± 4.34 versus $13.13 \pm 5.74\%$ ($\Delta 3.17\%$, $p < 0.001$); RT 9.84 ± 4.53 versus $14.35 \pm 6.41\%$ ($\Delta 4.51\%$, $p = 0.001$) and CT 9.68 ± 4.95 versus $16.23 \pm 8.44\%$ ($\Delta 6.55\%$, $p = 0.001$). When %FMD was compared among groups, no difference was observed ($p = 0.248$).

Conclusions: The different modalities were efficient and similar in improving endothelial function, through flow-mediated dilatation, in individuals with hypertension.

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DIURNAL RHYTHM OF CENTRAL BLOOD PRESSURE DURING TWENTY-FOUR-HOUR AMBULATORY MONITORING

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It's known that ABPM is better in diagnosing hypertension than office-based measurements. Growing evidence supports that cBP is stronger predictor of cardiovascular risk than brachial BP. Dipping status of subjects can be assessed based on night-to-day BP ratio derived from ABPM. However, there is no data regarding diurnal rhythm of central hemodynamics. Arteriograph 24 is suitable for 24-hour monitoring of both central and brachial BP. The aim of our study was to compare the 24-hour pattern of peripheral and central BP in same patients.

Patients and methods: 24-hour aortic BP-monitoring was performed with Arteriograph 24 in 46 subjects (30 male, 16 female). Measurements were carried out with Arteriograph 24 – a combination of a "single" Arteriograph and an ABPM. Mean age of patients were 55.36 years. Their dipper status was assessed according to the ESH-guidelines and the circadian variation of central hemodynamics was determined as the difference of peripheral and central BP during day and night.

Results: Only 7 of 46 subjects were non-dipper according to their brachial BP. All of them had elevated central BP at night. In contrast we observed elevated Alx and higher cBP during nighttime in further 30 cases who had dipping of nighttime brachial BP.

Conclusions: cBP have diurnal rhythm but the circadian variation of cBP is not necessarily parallel with the corresponding peripheral values. Theoretically elevated peripheral vascular resistance during night helps to maintain the appropriate cBP to provide the cerebral, coronary and renal perfusion. If this observation is confirmed by further large-scale trials the clinical implications of dipping status could be reconsidered.

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APPLICATION AND REPLICABILITY OF BILATERAL AND SIMULTANEOUS MULTIPLE ARTERIAL BLOODPRESSURE MEASUREMENTS IN SEDENTARY AND PHYSICALLY ACTIVE PROFESSIONS

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Background: Lack of physical activity is endemic in office life. Sedentary associated disorders include general adaptation syndrome ('stress'), musculoskeletal, cardiovascular, metabolic and overweight. These conditions provoke absenteeism. Purpose: We evaluated applicability and replicability of a novel multi-arterial blood pressure device in healthy sedentary and physically active, non-sedentary individuals in their professional environment.

Methods: Arterial properties of 20 asymptomatic ($46.0(\text{SD}12.9)$ years, 6 sedentary and 14 non-sedentary volunteers) were assessed twice. A Vascassist device and Vasometrix software (iSYMED/Adiphea, Butzbach, Germany) was used. Ankle-brachial index (ABI) and pulse wave velocity (PWV) were calculated. Central Aortic Pressure (CAP) and Vascular Age (VA) were calculated using general transfer functions (GTF's).

Results: Initial RR's were raised ($134(\text{SD}15.6)/81(12.6)$ versus $124(10.6)/73(10.8)$ mmHg in repeat assessments, $p < 0.001$). Initial and repeat ABI's ($1.20(\text{SD}0.08)$, $1.20(0.08\%)$, $r = 0.78$), and PWV's ($10.3(\text{SD}1.6)$, $10.2(1.4)\text{m/s}$, $r = 0.85$) were highly correlated. So were CAP's ($116.3(9.4)$ and $115.5(9.4)\text{mmHg}$), and VA's ($39,7(12.8)$ and $41.0(11.9)\text{years}$). Sedentary subjects showed increased initial SBP's ($\Delta 9.0\text{mmHg}$, $p = 0.03$), DBP's ($\Delta 14.2\text{mmHg}$, $p < 0.001$), and VA's ($\Delta 11.1\text{yrs}$, $p = 0.04$), but not in repeat assessments (all p 's > 0.1). ABI's in the active were lower ($1.17(0.05)$ vs. $1.28(0.07\%)$: p 's < 0.001), as were diastolic CAP's (Δ 's 14.3 and 12.5mmHg ; p 's < 0.01). Δ PWV's were indifferent.

Conclusions: As in clinic, in corporate environments 'white coat' hypertension is observed and can be considered an autonomic response being more outspoken in the sedentary. RR, ABI, PWV, CAP and VA proved highly replicable endpoints. Simultaneous multiple arterial blood pressure assessments and validated GTF modelling create robust functional and structural arterial endpoints for efficacy evaluation of pharmaceutical, nutraceutical and lifestyle cardiovascular health interventions.

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LEUKOCYTE TELOMERE LENGTH AND ITS RELATION TO NITRIC OXIDE METABOLITES IN A BI-ETHNIC SAMPLE: THE SABPA STUDY

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Objectives: Shorter leukocyte telomere length is associated with cardiovascular risk and decreased nitric oxide bioavailability. Aforementioned are also linked with increased oxidative stress and inflammation. 1,2 Telomere length, NO metabolites (NOx), blood pressure, oxidative stress and inflammation markers in a bi-ethnic population were compared. The associations of telomere length with NOx and markers of oxidative stress and inflammation were investigated.

Methods: Included were 152 black and 186 white teachers, aged 23 to 68 years. Ambulatory blood pressure was measured. Leukocyte telomere length, NOx and glutathione peroxidase (GPx), marker of oxidative stress, interleukin-6 (IL-6), tumor necrosis factor- α (TNF- α), inflammatory markers and L-citrulline, marker of NO synthesis, were analysed.

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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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

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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.

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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.

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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