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P.051: ARTERIAL STIFFNESS IS INCREASED IN PATIENTS WITH HEPATITIS C VIRUS SEROPOSITIVITY, BUT NOT IN PATIENTS WITH HEPATITIS B VIRUS SEROPOSITIVITY AND THE ROLE OF LEPTIN

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of the volume waveform matched the shape of the pressure waveform. Volume waveforms were found to lag pressure waveforms. Comparisons of the pressure and volume waveforms in two arms were made for different positions of the arms. Control measurements were taken with both hands at heart level. Zero time differential between the pairs of similar sensors was observed. The shapes of the pressure waveforms matched, as did those of the volume waveforms. As one arm was extended vertically, a time differential between the pressure waveforms and the volume waveforms appeared, with the pulse observed later in the extended arm. The time differential between the pressure and volume sensor on the extended arm appeared to lengthen, as did the width of the volume waveform. When the arm was returned to heart level, the shape of the volume pulse returned to normal over a maximum time of 35 seconds. When an arm was lowered, the pressure waveforms remained unchanged, but the volume waveform in the lowered arm was observed prior to the arrival of the volume waveform in the control arm.

P.048

IDENTIFYING ASSOCIATIONS OF REDUCED ADIPOSITY AND IMPROVED EARLY MARKERS OF ATHEROSCLEROSIS FROM A LIFESTYLE INTERVENTION AIMED AT OVERWEIGHT ADOLESCENTS

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Purpose: Overweight adolescents have increased early markers of atherosclerosis (flow-mediated dilation [FMD], carotid intima-media thickening [CIMT], pulse wave velocity [PWV]). We sought to identify associations of reduced adiposity (body mass index z-score [BMIz]) and improvement in these early markers over a 24-week diet-activity-behavior intervention.

Methods: N = 32 subjects (BMI >85thile, age 12-16 years) underwent vascular, lipid and glycemic assessments at baseline and 24 weeks. Univariate models evaluated associations of changes in markers with patient characteristics at baseline.

Results: After intervention, there was a significant reduction in BMIz (-0.09 ± 0.04 , $p=0.05$) and increase in HDL cholesterol (0.10 ± 0.02 mmol/L, $p=0.001$), but non-significant improvements in CIMT (-0.005 ± 0.004 mm, $p=0.16$), FMD (0.25 ± 0.68 %, $p=0.72$) and PWV (-0.24 ± 0.13 m/sec, $p=0.08$). Greater reduction in adiposity was associated with, at baseline, more episodes/week of vigorous activity (-0.05 ± 0.03 BMIz per 1 episode/week increase, $p=0.04$), and more hours/day screen time (-0.06 ± 0.03 BMIz per 1 hour/day increase, $p=0.03$). Improved CIMT was associated with, at baseline, more high-fat or high-sugar food servings/day (-0.002 ± 0.001 mm per 1 serving/day increase, $p=0.05$). Improved FMD was associated with, at baseline, lower fasting insulin (0.03 ± 0.01 % per 1 unit insulin decrease, $p=0.01$). Improved PWV was associated with at baseline more hours/day screen time (-0.06 ± 0.03 m/sec per 1 hour/day increase, $p=0.05$).

Conclusions: Reduction in adiposity and cardiovascular risk factors associated with our intervention may be insufficient to cause significant improvements in early atherosclerosis markers. A longer, more intensive intervention may be needed and subjects with more risk factors to target may benefit most.

P.049

THE P22PHOX -930A/G POLYMORPHISM OF NADPH OXIDASE: AN INDEPENDENT GENETIC DETERMINANT OF WAVE REFLECTIONS

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Introduction: Oxidative stress impairs wave reflections, which are independent markers and prognosticators of cardiovascular risk. The NADPH oxidase system maintains the redox state in the vessel wall. Recent studies have reported that the presence of allele G in the -930 polymorphic site of the p22^{phox} NADPH subunit is associated with increased enzyme activity, while the presence of allele A accounts for reduced activity. We investigated the relation between the -930^{A/G} polymorphism and wave reflections.

Methods: The study included 154 healthy individuals (102 males, mean age 40 years). The A-to-G substitution at position -930 in the p22^{phox} promoter was typed by BbvI digestion of specific polymerase chain reaction products amplified from genomic DNA. The AA, AG and GG genotypes were determined. Augmentation index (Alx) was measured as index of wave reflections, using a validated device (SphygmoCor).

Results: In our population, the prevalence of AA, AG and GG genotypes was 24%, 45.5% and 30.5% respectively. Multiple linear regression analysis revealed that after adjustment for age, systolic blood pressure, heart rate, gender, BMI and HDL cholesterol, subjects with GG genotype had significantly lower values of Alx by 5.89% compared to subjects with AA genotype ($p<0.01$), while subjects with AG genotype had significantly lower values of Alx by 4.77% compared to subjects with AA genotype ($p<0.01$).

Conclusion: Our findings suggest that the -930^{A/G} polymorphism of the p22^{phox} promoter of NADPH oxidase is an independent determinant of wave reflections in healthy individuals. Presence of the G allele is associated with lower values of Alx.

P.050

PREDICTIVE FACTORS FOR MACRO- AND MICRO-VASCULAR COMPLICATIONS IN TYPE 2 DIABETES

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Patients with type 2 diabetes (DM2) have the extremely elevated cardiovascular risk. The aim of our cross-sectional study was to estimate the prevalence of macro- and micro-angiopathy in DM2 patients and to search out possible predictors of both angiopathies.

The sample of 415 DM2 outpatients - 217 (52%) men and 198 (48%) women, aged 66 ± 9 y, average DM2 duration 9 ± 8 y, was divided into 4 groups: MMC+, n = 112 (with manifest macroangiopathy), MMC-, n = 303 (without it), mmc+, n = 222 (with manifest microangiopathy) and mmc-, n = 193 (without it). All observed parameters were assessed by standard methods and evaluated by the Wilcoxon's test and the multiple logistic regression model.

Patients MMC+ suffered more often from nephropathy (66 vs 39 %, $p<0.001$), neuropathy (24 vs 14%, $p<0.05$) and retinopathy (18 vs 11%, $p<0.05$) than patients MMC-. Independent risk factors for MMC+ development were the age over 60 y. (RR 1.09, $p<0.001$), plasma glucose level >5.6 mmol/L (RR 1.70; $p<0.05$) and hs-CRP >1 mg/L (RR 2.7; $p<0.05$). Protective factors for MMC+ was the female gender (RR 0.42; $p<0.001$), serum HDL-cholesterol >1 mmol/L (RR 0.15; $p<0.05$) and DBP >80 mmHg (RR 0.40; $p<0.01$). Duration of DM2 ≥ 9 y. (RR 1.16; $p<0.001$), the age ≥ 60 y. (RR 1.09; $p<0.01$) and hs-CRP >1 mg/L (RR 2.99; $p<0.01$) were considered as independent predictive factors for mmc+.

Macro- and microvascular complications are associated closely in diabetic patients. Low casual DBP (below 80 mmHg) respectively high pulse pressure, high age (over 60 y.) and high hs-CRP (over 1 mg/L) were considered as independent risk factors for the both angiopathies in DM2 patients.

P.051

ARTERIAL STIFFNESS IS INCREASED IN PATIENTS WITH HEPATITIS C VIRUS SEROPOSITIVITY, BUT NOT IN PATIENTS WITH HEPATITIS B VIRUS SEROPOSITIVITY AND THE ROLE OF LEPTIN

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Background: Recent data suggest that chronic systemic inflammation and impaired levels of adipose tissue hormones play a critical role in cardiovascular disease. Aortic stiffness and wave reflections are independent markers of cardiovascular risk. The present study was undertaken to assess whether chronic infection with hepatitis B virus (HBV) or hepatitis C virus (HCV) and the secondary steatosis in HCV patients affect aortic stiffness and wave reflections.

Methods: We studied 36 patients (mean age: 49 ± 15 yrs, 16M/20F) positive for HCV chronic infection and 28 patients (mean age: 56 ± 11 yrs, 19M/9F) with HBV chronic infection, who had never been treated with interferon, and 40 control subjects matched for classical risk factors. Aortic stiffness was evaluated with carotid-femoral pulse wave velocity (PWV) and wave reflections with augmentation index (Alx) of the aortic pressure waveform. Leptin levels were measured by ELISA kit.

Results: Patients with HCV infection had higher PWV than controls (7.6 ± 1.4 vs. 6.7 ± 1.3 m/s, $P<0.05$), while Alx did not differ (27.5 ± 15 vs. 27.1 ± 14 %, $P=NS$). Carotid-femoral PWV and Alx in the subjects with HBV infection were similar to those in the control subjects. After adjustment for confounding factors, leptin levels ($p<0.05$, $t=4.5$, stand. coefficient = 1) were independently associated with an increase in PWV in patients with HCV.

Conclusions: Patients with HCV have impaired aortic elastic properties, whereas HBV does not influence aortic stiffness. These findings are important to further characterize the increase of cardiovascular risk in patients with hepatitis C virus seropositivity and to specify the linking role of the adipose tissue-related hormones.

P.052

AN INTERLEUKIN-6 POLYMORPHISM DETERMINES CHANGES IN ARTERIAL STIFFNESS CAUSED BY ACUTE INFLAMMATION

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Purpose: A promoter polymorphism (-174G>C) of interleukin-6 has been linked with increased cardiovascular risk. Arterial stiffness is an important predictor of cardiovascular risk. Recent data suggest that acute inflammation leads to an increase of aortic stiffness. The effect of this polymorphism on arterial stiffness has not been defined yet.

Methods: Nineteen healthy adults (mean age 34.7 ± 2.2 years old, 11 men) participated in the study (randomised, double-blind design). Salmonella Typhi vaccine was used as an inflammatory stimulus. RLFPs were performed by standard methods for IL-6 and three genotypes were determined, GG, GC and CC. Pulse wave velocity (CF-PWV) was measured as an index of aortic stiffness using a non-invasive device (Complior[®]). Arterial stiffness expressed by wave reflection was studied using a validated system (SphygmoCor[®]). Augmentation index (Alx) was measured as an index of wave reflection. Arterial stiffness was assessed before and 8 hours after vaccination as well as in 11 non-vaccinated matched volunteers.

Results: Eight hours after vaccination, the G allele was associated with a more prominent change of pulse wave velocity (for GG and GC, 5.70 to 5.92 m/sec, $p < 0.05$, for CC group, $p = \text{NS}$) and a significant decrease in Alx (GG and GC, 18.31% to 12.22% , $p < 0.05$ and CC 23% to 14.7% , $p = \text{NS}$), indicating increased aortic stiffness and decreased wave reflection. There were no changes in the control group.

Conclusions: Acute inflammation results in changes of arterial stiffness to a different degree, depending on interleukin-6 genotype. These findings underscore the genetic significance of IL-6 gene on the pathophysiology of cardiovascular system.

P.053

AN INTERLEUKIN-6 POLYMORPHISM DETERMINES CHANGES IN ARTERIAL STIFFNESS CAUSED BY ACUTE INFLAMMATION

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Purpose: Arterial stiffness is an important predictor of cardiovascular events. A polymorphism in the promoter region of il-6 (-174G>C) has been associated with cardiovascular risk. However, the relationship between this polymorphism and arterial stiffness has not been investigated yet.

Methods: Two hundred and forty-five individuals participated in the study (mean age 40.8 ± 0.5 years old, 164 males). RLFP was performed and three genotypes were determined, GG, GC and CC. Arterial stiffness as expressed by wave reflection was studied using a validated system (SphygmoCor[®]) that employs high-fidelity arterial tonometry and appropriate computer software for pulse wave analysis. Augmentation index (Alx) was measured as an index of wave reflection. Higher values of augmentation index indicate increased wave reflection and arterial stiffness.

Results: The distribution of genotype was GG/GC/CC: 125/107/13, respectively. After adjustment for age and sex, multinomial logistic regression analysis revealed that GC genotype is associated with higher values of Alx compared to GG homozygosity (22.56% versus 19.6% , $p < 0.1$). Moreover, further analysis showed that the presence of C allele (GC or CC genotype) was linked to increased Alx compared to GG genotype (22.37% versus 19.6% , $p < 0.1$), which indicates impaired elastic properties. The values of aortic and peripheral blood pressures did not differ among three groups ($p = \text{NS}$).

Conclusions: In healthy individuals, a polymorphism of the promoter region of interleukin-6 gene is associated with wave reflection and impaired arterial elastic properties. This finding provides evidence of a possible genetic link between the inflammatory cascade, arterial stiffness and the cardiovascular system.

P.054

RELATIONSHIP BETWEEN, BLOOD VISCOSITY, SHEAR STRESS AND ARTERIAL STIFFNESS IN PATIENTS WITH ARTERIAL HYPERTENSION

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The aim of the study was to investigate relationships between whole blood viscosity (WBV), ascending aorta shear stress (AASS) and carotid-femoral pulse wave velocity (PWV) in patients with arterial hypertension (HT).

Material and methods: Study group (G1): 43 pts. with primary HT - (age 53 ± 6.4 yrs.) was compared with control group (G2): 15 normotensives (age 55 ± 5.9 yrs.) Blood pressure using "Omron M5 I", PWV using Complior[®]-device, WBV using "Brookfield DV III+pro", aortic diameter and flow velocity (required for AASS calculation) using VIVID 7 GE ultrasonograph were measured.

Results: SBP (152 ± 11.3 vs 124 ± 9.7 mmHg, $p < 0.001$), DBP (92 ± 6.1 vs 83 ± 5.2 mmHg, $p < 0.001$), WBV at shear rate $100-400/\text{s}^{-1}$ (5.1 ± 1.2 vs 4.3 ± 0.9 cP, $p < 0.05$) and, PWV (11.8 ± 1.7 vs 8.8 ± 1.6 m/s, $p < 0.05$) were higher in G1 than in G2 group. Mean AASS was higher (27.7 ± 5.3 vs 21 ± 4.3 dyne/cm², $p < 0.05$) in G1 than in G2 group. In G1 group PWV correlated positively with age: ($r = 0.37$, $p < 0.39$), SBP: ($r = 0.45$, $p < 0.05$) and WBV: ($r = 0.41$, $p < 0.05$), and negatively with AASS: ($r = -0.29$, $p < 0.05$).

Conclusions: Hypertensive patients are characterized by stiffer aorta and higher WBV, as well as lower AASS. Low shear stress seems to be one of the factors responsible for aortic stiffness in hypertensive patients.

P.055

COMMON CAROTID ARTERY STIFFNESS: MORE SENSITIVE TO AGE AND GENDER RELATED LARGE ARTERY STIFFENING THAN AORTIC PULSE WAVE VELOCITY?

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Background: The relationship between global arterial stiffness measures and measures based on local diameter and pressure readings is not yet fully understood.

Methods: We compared the changes with age and gender of aortic stiffness parameters – pulse wave velocity (PWV) and total arterial compliance (TAC) – to stiffness indices at the common carotid and femoral arteries – compliance (CC) and distensibility coefficient (DC); β -stiffness index – in a subset of 1026 women and 938 men, all apparently healthy subjects aged 35-55 participating in the Asklepios study.

Results: At the carotid artery, DC and β gradually increased with age with more pronounced stiffening in women, yielding a significant age-gender interaction. A similar trend was observed for CC. Femoral arterial stiffness did not change with age and no age-gender interaction was found. PWV indicated gradual stiffening with age occurring at an equal pace in men and women with no age-gender effect. TAC on the other hand did show a significant age-gender effect next to a change with age: it decreased in women, while remaining constant in men.

Discussion: In healthy middle-aged subjects, the age-related evolution of carotid stiffness and TAC indicates a more rapid increase in large artery stiffness in women than in men. This evolution, however, is not reflected in PWV. We speculate that PWV, integrating the properties of a large arterial segment that gradually varies from a large elastic to a more muscular vessel, might lack the sensitivity to pick up subtle age and gender effects primarily affecting the large, elastic arteries.

P.056

HERITABILITY OF ARTERIAL WALL INTIMA MEDIA THICKNESS IN DIFFERENT VASCULAR BEDS

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Background and purpose: Genetic and environment factors have been linked to the cause of atherosclerosis. Carotid and femoral intima media