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P.004: HABITUAL CHOCOLATE CONSUMPTION IS ASSOCIATED WITH IMPROVED ARTERIAL ELASTIC PROPERTIES AND CENTRAL HEMODYNAMICS

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and collagen have not only passive elastic or rigid properties, but also are implicated in the control of SMC function. In animal models of essential hypertension (SHR and SHR-SP), the structural modifications of the arterial wall include a higher number of elastin/SMC connections, and smaller fenestrations of the internal elastic lamina, which could redistribute the mechanical load towards elastic materials. Thus, the changes in arterial wall material which accompany wall hypertrophy in these animals are not associated with an increased stiffness. Taken together, these data afford strong arguments to consider that arterial stiffness is not only influenced by the amount and density of stiff wall material, but mainly by its spatial organization.

Poster Presentations

P.001

ASSOCIATION OF BETA-THALASSEMIA MAJOR WITH IMPAIRED ENDOTHELIAL FUNCTION AND INCREASED LEVELS INFLAMMATION MARKERS

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Objective: We examined endothelial function and serum levels of inflammatory mediators in transfusion-dependent patients with beta-thalassemia major (BTM).

Methods: The study population consisted of 85 patients with BTM (aged 25 ± 0.6) with normal left ventricular function and 71 healthy age- and sex-matched controls. Forearm blood flow was measured with gauge-strain plethysmography. Forearm vasodilatory response to reactive hyperemia (RH%) or to nitrate (NTG%) were assessed. Serum levels of interleukin 6 (IL-6), soluble vascular cell adhesion molecule (sVCAM-1) and soluble intercellular adhesion molecule (sICAM-1) were determined with ELISA.

Results: Patients had significantly lower levels of total cholesterol (124 ± 4.5 vs. 208 ± 7 mg/ml, $p < 0.01$), ApoA1 (122 ± 3 vs. 129 ± 4 mg/ml, $p < 0.05$), ApoB (62 ± 3 vs. 97 ± 4 mg/ml, $p < 0.01$) and Lp(a) (8.1 ± 1.4 vs. 15.5 ± 4 mg/ml, $p < 0.01$) than controls. IL-6 levels were significantly higher in patients (3.1 ± 0.31 pg/ml) than controls (1.14 ± 0.16 pg/ml, $p < 0.01$). Similarly, sVCAM-1 and sICAM-1 levels were significantly higher in patients (515 ± 30 and 362 ± 24 ng/ml, respectively) than controls (331 ± 12.6 and 268 ± 13.05 ng/ml, respectively, $p < 0.01$ for both). Maximum hyperemic forearm blood flow and RH% were lower in patients (7 ± 0.4 ml/100 ml tissue/min and $48 \pm 2.5\%$, respectively) than controls (8.6 ± 0.2 ml/100 ml tissue/min and $88.5 \pm 5.4\%$, respectively, $p < 0.01$ for both).

Conclusions: BTM is associated with impaired endothelial function and increased levels of IL-6, sVCAM-1 and sICAM-1, suggesting a potential role of inflammation and endothelial dysfunction in the cardiovascular complications of the disease. These observations concerned subjects with normal left ventricular ejection fraction, which implies an early implication of these mechanisms in the pathophysiology of heart insult in BTM.

P.002

VASCULAR BED PROPERTIES IN MULTISYSTEMIC LANGERHANS-CELL HISTIOCYTOSIS

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Introduction: Langerhans-cell histiocytosis (LCH) is a rare disorder that combines features of carcinogenesis and chronic inflammation with specific predilection for the Hypothalamic-Pituitary system. Chronic inflammation, insulin resistance (IR) and hypopituitarism have been associated with increased risk for cardiovascular disease. The purpose of this study was to investigate structural and functional vascular properties in treated patients with multisystemic LCH and their associations with inflammation markers and insulin resistance indices.

Methods: We studied 8 patients with multisystem LCH (age: 38.38 ± 4.49 yrs; BMI: 25.99 ± 1.26 kg/m²) and 24 controls (age: 37.92 ± 2.50 yrs; BMI: 25.03 ± 0.68 kg/m²) matched for sex, age and BMI. Structural properties were assessed by intima media thickness estimation in common carotid artery

(mean value right and left, MCCA, mm) and functional by endothelial function, using flow-mediated dilatation (FMD, %) on the brachial artery. Nitrate-induced dilatation (NID) was applied to exclude smooth muscle cells injury. C-reactive protein (CRP), fasting glucose, insulin, total cholesterol, HDL, triglycerides were measured; Waist-to-hip ratio (WHR), LDL and IR indices (glucose-to-insulin ratio, HOMA, QUICKI) were calculated.

Results: No difference in IMT ($p = 0.11$) and FMD ($p = 0.74$) values was detected among LCH patients and controls. Higher CRP ($p = 0.003$) and insulin levels ($p = 0.035$), and higher WHR ($p = 0.017$) and lower glucose-to-insulin ratio ($p = 0.003$) values were observed in LCH patients.

Conclusions: Treated patients with multisystemic LCH do not present alteration in vascular bed properties. However, such patients should be followed with caution as higher values of chronic inflammatory markers and insulin resistance indices were detected. Further larger scale studies are required to clarify whether these findings are inherent to the disease process or secondary to treatment.

P.003

FUNCTIONAL AND STRUCTURAL VASCULAR BED PROPERTIES IN YOUNG WOMEN WITH POLYCYSTIC OVARY SYNDROME AND NORMAL LIPIDEMIC, GLYCEMIC AND BLOOD PRESSURE PROFILE

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Introduction: Cardiovascular risk factors and endothelial dysfunction have been shown to be present early in life in women with Polycystic Ovary Syndrome (PCOS). The aim of the present study was a global assessment of abnormalities in the arterial bed of young women with PCOS and normal profile of glycemia, lipidemia and blood pressure by non-invasive, reproducible methods.

Methods: 27 women with PCOS (age: 25.41 ± 0.80 years; BMI: 27.42 ± 1.12 kg/m²) and 27 control women (age: 27.33 ± 0.83 years; BMI: 25.05 ± 1.19 kg/m²) of comparable age, body mass index and waist-to-hip ratio were studied. Macrovascular function was assessed by flow-mediated dilatation (FMD) on the brachial artery. Nitrate-induced dilatation (NID) was applied to exclude smooth muscle cells injury. Microvascular function was assessed by venous occlusion plethysmography studying forearm blood flow. Arterial structure was evaluated by ultrasonographic assessment of intima-media thickness (IMT) of the carotid artery.

Results: FMD values were lower in women with PCOS compared to controls (PCOS: $3.84 \pm 0.74\%$ vs. controls: $9.83 \pm 0.97\%$, $p < 0.001$), but no difference was observed in NID (PCOS: $16.59 \pm 1.84\%$ vs. controls: $16.64 \pm 2.05\%$, $p = 0.98$) values. The time required for reactive hyperemia to reach peak value, a plethysmography parameter, was longer in PCOS women (PCOS: 20.63 ± 4.67 s vs. controls: 10.38 ± 5.11 s, $p = 0.02$). No difference was observed in the combined IMT among the studied groups (PCOS: 0.49 ± 0.01 mm controls: 0.51 ± 0.02 mm, $p = 0.19$).

Conclusions: Using non invasive methodologies endothelial dysfunction in the macrocirculation and evidence of early impairment in the microcirculation were demonstrated in young women with PCOS who had normal profile of glycemia, lipidemia and blood pressure, without evidence of structural arterial impairment.

P.004

HABITUAL CHOCOLATE CONSUMPTION IS ASSOCIATED WITH IMPROVED ARTERIAL ELASTIC PROPERTIES AND CENTRAL HEMODYNAMICS

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Introduction: Flavonoid-rich chocolate has been shown to improve endothelial performance, but its impact on blood pressure (BP) is inconsistent. The effect of habitual chocolate consumption on arterial elastic properties and central (aortic) hemodynamics, which are important predictors of cardiovascular risk, has not been investigated.

Methods: We examined 178 healthy subjects (mean age 40.8 years) with no cardiovascular risk factors or disease, except for smoking. Chocolate intake was quantified with a dietary questionnaire, and subjects were assigned in groups of non-consumers, low consumers (<12 g/day - median value) or high consumers (\geq 12 g/day). Carotid-femoral pulse wave velocity (PWV) was measured as an index of aortic stiffness. Aortic augmentation index (Alx) and aortic BP were assessed using applanation tonometry of the radial artery.

Results: Increasing chocolate consumption was associated with decreased central systolic BP ($P < 0.05$) and central PP, but not central diastolic or peripheral (brachial) BPs. There was an inverse relation of chocolate consumption with Alx and PWV. Alx was significantly lower in subjects with high chocolate consumption (Bonferroni $P < 0.01$), whereas both low and high consumers had decreased PWV values ($P < 0.05$ and $P < 0.01$) compared with non-consumers. In multivariate analysis, increasing chocolate intake was an independent determinant of low PWV values (ANCOVA $P < 0.01$) and low Alx ($P < 0.01$), after controlling for potential confounders.

Conclusions: Habitual chocolate consumption of more than 12 gr per day is associated with improved arterial elastic properties and aortic hemodynamics in healthy individuals.

P.005

THE ASSOCIATION OF COFFEE CONSUMPTION WITH WAVE REFLECTIONS IN HYPERTENSIVE PATIENTS

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Introduction: Wave reflections are important markers and prognosticators of cardiovascular risk, and have been implicated in the pathogenesis of systolic hypertension. Caffeine increases acutely wave reflections. Furthermore, chronic coffee consumption is associated with increased wave reflections in normotensive subjects. In the present study we aimed to assess the association between chronic coffee consumption and wave reflections in hypertensive patients.

Methods: We examined 228 never treated hypertensives (age 50.7 ± 11.9 years, 143 males) under any medication. Frequency of coffee consumption was assessed using a validated food frequency questionnaire. According to the distribution of coffee consumption, we categorized daily coffee consumption as: (1) none, (2) low (<200 ml/day), (3) moderate (200-450 ml/day) and (4) high (>450 ml/day). Augmentation Index (Alx) was measured non-invasively as an index of wave reflections, using SphygmoCor®. Analysis of covariance (ANCOVA) was applied to evaluate the association between Alx and coffee intake after adjusting for several potential confounders.

Results: Alx was found to be increased with increasing degree of daily coffee consumption when adjusted for gender, age, height, smoking status, heart rate, mean pressure, HDL cholesterol and hsCRP ($p < 0.02$). Systolic, diastolic, pulse and mean pressures were not different among the 4 groups of daily coffee consumption.

Conclusions: Increased daily coffee consumption is associated with enhanced wave reflections in hypertensive patients. This finding may have important implications for the management of these patients.

P.006

THE ACUTE EFFECT OF GREEN TEA ON ENDOTHELIAL FUNCTION IN HEALTHY INDIVIDUALS

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Introduction: The effect of tea consumption on cardiovascular risk has not been defined yet, although there is evidence of a beneficial effect attributed to its flavonoid content. Endothelial dysfunction is a key event in the pathogenesis of atherosclerosis. The aim of the study was to evaluate the effect of green tea on endothelial function.

Methods: Thirteen apparently healthy subjects (age 32 ± 3 years) with no risk factors for cardiovascular disease (except from 6 smokers) were studied at 3 sessions: (i) one with 6 gram of green tea, (ii) one with 125 mg of caffeine (the content of caffeine in green tea preparation) and (iii) one after placebo (hot water). Flow-mediated dilatation of the brachial artery was examined, using ultrasonography at baseline, at 30 min (peak plasma concentration of caffeine) and at 90 and 120 min (peak plasma concentration of flavonoids) after each intervention.

Results: The effect of green tea (or caffeine) on each variable is better described as changes in the response of each variable, where response is defined as net green tea (or caffeine) minus placebo values at each time point. Resting and hyperemic diameter of the brachial artery did not change

significantly either with green tea or caffeine. Flow-mediated dilatation was significantly increased with green tea (by 2.46%, $p < 0.02$) but not with caffeine.

Conclusions: Green tea has an acute beneficial effect on endothelial function in healthy individuals. This may, at least partly, contribute to the beneficial effect of tea on cardiovascular risk.

P.007

EVALUATION OF AORTIC STIFFNESS AND WAVE REFLECTIONS IN PATIENTS AFTER SUCCESSFUL COARCTATION REPAIR

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Introduction: We have previously shown that normotensive patients with successful coarctation repair (SCR) have decreased distensibility of the upper body and increased distensibility of the lower body arteries. Aortic stiffness and wave reflections are implicated in the pathogenesis of hypertension. In this study we aimed at assessing whether aortic stiffness and wave reflections are influenced in this category of patients.

Methods: 19 normotensive, asymptomatic patients 26 ± 7 years old, and age at surgery 15 ± 9 years with SCR and gradient <25 mmHg, and 19 age, gender, height, weight, smoking status, lipid profile adjusted controls were studied. Carotid-femoral pulse wave velocity (PWV) was measured as an index of the stiffness of the whole aorta using a validated non-invasive device (Complior®). Wave reflections resulting from the whole body were studied using a validated system (SphygmoCor®) that employs high-fidelity arterial tonometry for the non-invasive registration of radial pulse waveform and appropriate computer software for pulse wave analysis. Aortic pressure waveform was synthesized from the radial waveform using a generalized transfer function. Augmentation index (Alx) was measured as an index of wave reflections.

Results: SCR patients had higher systolic, pulse and mean pressure than controls, while diastolic pressures did not differ. PWV and Alx were not different among the two groups (table).

| | Postcoarctectomy pts | Controls | P value |
|-----------------|----------------------|------------------|---------|
| Age, years | 26.5 ± 7.3 | 27.5 ± 5.8 | NS |
| SP, mmHg | 130.6 ± 14.9 | 116.9 ± 14.6 | <0.01 |
| DP, mmHg | 71.7 ± 8.7 | 68.6 ± 8.3 | NS |
| PP, mmHg | 58.9 ± 13.2 | 48.3 ± 10.4 | <0.01 |
| Mean P, mmHg | 90.7 ± 10.0 | 83.4 ± 10.2 | <0.05 |
| Heart rate, bpm | 70.5 ± 11.1 | 70.7 ± 11.2 | NS |
| PWV, m/s | 5.2 ± 0.9 | 5.5 ± 0.9 | NS |
| Alx, % | 11.1 ± 13.7 | 9.3 ± 9.2 | NS |

Conclusions: Despite the fact that SCR patients had higher systolic and pulse pressures, PWV and Alx were not different than controls, possibly because these indices are influenced by the elastic properties of both the pre- and post-coarctation part of the arterial tree.

P.008

THE EFFECT OF RAMIPRIL AND VALSARTAN ON AORTIC STIFFNESS AND WAVE REFLECTIONS IN PATIENTS WITH SUCCESSFUL COARCTATION REPAIR

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Introduction: Patients after successful coarctation repair (SCR) have increased incidence of cardiovascular complications due to relapse of hypertension, which is mainly attributed to impaired elastic properties of the upper body arteries. Angiotensin converting enzyme inhibitors and angiotensin receptor antagonists reduce aortic stiffness and wave reflections; however their effect on arterial stiffness in postcoarctectomy patients has not been studied yet.

Methods: 12 patients, 25 ± 6 years with SCR at 14 ± 7 years, normotensive at rest, were studied at 4 different occasions with a randomised, cross-over design: (i) at baseline and 4 weeks after ramipril 5 mg/day; (ii) at baseline and 4 weeks after valsartan 160 mg/day. Carotid-femoral pulse wave velocity (PWV) was measured as an index of aortic stiffness with Complior®. Augmentation index (Alx) was measured as an index of wave reflections using SphygmoCor®.

Results: Both ramipril and valsartan decreased peripheral blood pressure (systolic by 7.6 ± 9 and 5.9 ± 7 mmHg respectively, $P < 0.05$ for both, diastolic by 6.5 ± 5 and 9.1 ± 6 mmHg respectively, $P < 0.01$ for both). PWV and Alx