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P.043: INFLUENCE OF CATECHOLAMINES ON ARTERIAL STIFFNESS IN PHEOCHROMOCYTOMA

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stable angina pectoris (AP) and influence of abnormal glucose metabolism (AGM) and percutaneous transluminal coronary angioplasty (PTCA) on this parameter.

Methods: Blood samples were taken from 54 persons (mean age 54.3 ± 1.0 years): 36 patients with AP (16 with AGM, 20 without) and 18 controls. CD34+ cells were measured by flow-cytometric analysis. Besides, CPCs numbers were estimated in patients without AGM undergoing coronary angioplasty on the 1st day and the 3rd-5th day after the procedure.

Results: All patients with AP had reduced numbers of CPCs by 29% in comparison to control subjects ($p=0.01$). The group of patients with AGM displayed a tendency to greater decrease in CPCs' count than group without ($p=ns$). On the 1st day after PTCA we observed significant reduction of CPCs number in comparison to this parameter before the procedure ($p=0.03$). On the 3rd-5th day after coronary intervention the number of CPCs increased (insignificantly) as compared to the 1st day after PTCA but did not reach the level observed before the procedure. No significant difference was found between CPCs numbers on the 1st day after PTCA and this parameter in patients with AP and concomitant AGM ($p=ns$).

Conclusions: AP was associated with CPCs reduction, especially in patients with concomitant AGM. Coronary intervention also led to significant decrease in CPCs' count. The influence of AGM and PTCA on CPCs level was similar. These findings suggest a possible use of CPCs as a new diagnostic marker and therapeutic target for AP treatment.

P.040

ASSOCIATION OF ARTERIAL STIFFNESS, CAROTID INTIMA-MEDIA THICKNESS, CAROTID PLAQUES AND FLOW-MEDIATED DILATATION WITH METABOLIC SYNDROME

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Purpose: The purpose was to investigate whether the metabolic syndrome was associated with measures of arterial stiffness, flow mediated dilatation (FMD), carotid intima-media thickness (IMT) and carotid plaques (CP) in middle-aged subjects without and with MetS.

Methods: 186 asymptomatic volunteers (40-65 years old, 86 males) without clinically overt cardiovascular disease were examined. MetS was defined according to the International Diabetes Federation consensus. The prevalence of MetS was 32.8%. Augmentation index (Alx) and carotid-radial pulse wave velocity (PWV) as measures of arterial stiffness were assessed by applanation tonometry. FMD as the measure of endothelial function was determined using high resolution B-mode ultrasonography. IMT and CP were assessed by high resolution B-mode ultrasonography.

Results: PWV was significantly elevated in the MetS group (9.20 ± 1.08 vs. 23.30 ± 1.02 , $P = 0.003$). FMD was significantly lower in the MetS group (5.32 vs. 6.45% , $P = 0.018$). There was no statistically significant difference in Alx between patients with and without MetS (23.97 ± 8.08 vs. 23.30 ± 9.75 , $P = 0.248$). The presence of MetS was significant ($P = 0.005$) when predicting values of PWV but not FMD. IMT was higher in the MetS group (0.08 [$0.07-0.1$] vs 0.07 [$0.06-0.08$] $P < 0.001$). The MetS was a significant predictor of the presence of carotid plaques (OR = 0.341, 95% CI [$0.173-0.673$], $P = 0.002$).

Conclusions: Metabolic syndrome is associated with increased arterial stiffness, decreased flow mediated dilatation, increased carotid intima-media thickening and with the presence of carotid plaques.

P.041

ARTERIAL STIFFNESS MAY BE DETERMINED BY ASYMMETRIC DIMETHYLARGININE (ADMA)

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Background: Arterial stiffness is an independent determinant of cardiovascular outcome. However, the factors regulating arterial stiffness remain unclear. Endothelial nitric oxide may partly regulate arterial stiffness. We hypothesized that asymmetric dimethylarginine (ADMA) an endogenous inhibitor of nitric oxide synthase would correlate with arterial stiffness.

Methods: The Caerphilly Prospective Study (CaPS) is a longitudinal cohort study of a representative sample of 2512 men aged 49 to 59 years in Wales. In a subset of 850 men (mean age 73 years) we assessed arterial stiffness (aortic pulse wave velocity, PWV) and wave reflections (augmentation index, Alx). ADMA measurements were made on a subsample of 250 men from the top and bottom of the age-adjusted PWV distribution by ELISA (DL Diagnostika).

Results: The mean and median PWV was 11.8 and 11.6 m/s (SD 3.8 m/s), mean Alx 30.6% (SD 7.5%) and mean and median ADMA was 1.2 $\mu\text{mol/l}$ and 0.89 $\mu\text{mol/l}$ (IQR 0.69, 1.78 $\mu\text{mol/l}$). There was a positive dose-response association between PWV and ADMA values after adjustment for GFR, heart rate, mean arterial pressure and age. The geometric mean PWV values were 10.9 m/s, 11.4 m/s and 11.8 m/s per tertile of ADMA (p -value for trend = 0.04). There was no association between ADMA and Alx (p -value for trend = 0.91).

Conclusion: This study shows that ADMA levels are greater amongst subjects with an elevated PWV. As this study is cross-sectional, we cannot be sure whether inhibition of nitric oxide synthase leads to arterial stiffening or vice versa. Future prospective studies are required.

P.042

NOT ONLY DIABETES MELLITUS, BUT ALSO IMPAIRED GLUCOSE TOLERANCE IS ASSOCIATED WITH ERECTILE DYSFUNCTION IN HYPERTENSIVE PATIENTS

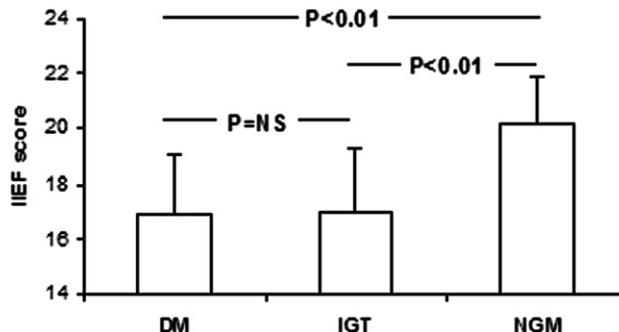
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Introduction: Erectile dysfunction may be an early sign of atherosclerosis. The incidence of erectile dysfunction is increased in patients with cardiovascular risk factors, such as hypertension and diabetes mellitus. However, the effect of glucose metabolism on the incidence of erectile dysfunction in hypertensive subjects has not been defined.

Methods: We studied 255 consecutive male subjects (age 52 ± 11 years) with never-treated uncomplicated hypertension. The study population was divided into three groups according to glucose metabolism: i) type-II diabetes mellitus (DM) 13 patients, age 58 ± 13 years, ii) impaired glucose tolerance (IGT) 51 patients, age 55 ± 10 years, and iii) normal glucose metabolism (NGM) 191 patients, age 50 ± 11 years. Erectile dysfunction diagnosis and score were evaluated according to the International Index of Erectile Function (IIEF) questionnaire.

Results: Patients with DM had decreased IIEF score compared to NGM patients (16.9 ± 6.6 vs. 20.2 ± 5.1 , $p < 0.01$). Patients with IGT had also decreased IIEF score compared to NGM patients (17.0 ± 6.9 vs. 20.2 ± 5.1 , $p < 0.01$). When patients with DM were compared to patients with IGT no difference was observed in IIEF score.

Conclusions: Not only diabetes mellitus, but also impaired glucose tolerance is associated with erectile dysfunction, i.e. an early sign of atherosclerosis, in hypertensives.



P.043

INFLUENCE OF CATECHOLAMINES ON ARTERIAL STIFFNESS IN PHEOCHROMOCYTOMA

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Objective: To evaluate the effect of long-term catecholamine overproduction in subjects with pheochromocytoma on arterial stiffness measured

non-invasively by carotid-femoral pulse wave velocity (PWV) and central augmentation index (AI).

Design: Twenty two subjects with pheochromocytoma (PHEO), 34 subjects with essential hypertension (EH) and 40 healthy normotensive controls (C) were investigated using an applanation tonometer (Sphygmocor). Twelve patients with pheochromocytoma were studied after tumor removal.

Results: The gender, age, body mass index and lipid profiles were comparable among all the groups. Fasting plasma glucose levels in PHEO were higher in comparison to the other groups (6.1 ± 1.7 vs. $EH\ 4.9 \pm 1.1$ vs. $C\ 4.8 \pm 0.8$ mmol/l; $p < 0.001$ for all comparisons). Brachial blood pressure values in PHEO were lower in comparison to EH ($135 \pm 24/77 \pm 12$ vs. $153 \pm 6/90 \pm 11$ mmHg; $p < 0.001/0.001$) and higher in comparison to C ($135 \pm 24/77 \pm 12$ vs. $121 \pm 11/72 \pm 9$ mmHg; $p < 0.001/n.s.$). The pulse wave velocity in pheochromocytoma did not differ from EH (7.1 ± 1.3 vs. 7.3 ± 1.5 m.s⁻², ns.) and was significantly higher than in controls (7.1 ± 1.3 vs. 5.9 ± 0.7 m.s⁻²; $p < 0.001$). No differences were found in AI among all groups. In multiple regression the only significant variables independently associated with PWV in pheochromocytoma were 24h urine norepinephrine excretion ($\beta = 0.566$, $p < 0.001$) and fasting plasma glucose levels ($\beta = 0.346$, $p = 0.015$). Successful tumor removal led to a significant decrease in PWV (6.9 ± 0.8 vs. 5.5 ± 0.7 m.s⁻²; $p < 0.001$).

Conclusion: Catecholamine excess in pheochromocytoma is accompanied by an increase in pulse wave velocity, which is reversed by the successful tumor removal. Pulse wave velocity in subjects with pheochromocytoma is positively associated with 24h urine norepinephrine levels and fasting plasma glucose levels.

Acknowledgements

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P.044

EFFECT OF MILD INCREASE OF PHYSICAL ACTIVITY ON MICROVASCULAR REACTIVITY IN OBESE SUBJECTS WITH DIABETES MELLITUS TYPE 2

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Microangiopathy, well known in diabetic patients as a cause of late complications, develops mainly due to chronic exposition to elevated glucose and triglyceride level. Physical training acts as a protective factor even if no changes in metabolic parameters are observed. It's supposed, that lifestyle modifications leads to the improvement of endothelial dysfunction and microvascular reactivity, in healthy subjects it has already been proven experimentally.

In 8 patients with type 2 diabetes mellitus was measured microvascular reactivity and perfusion of skin in lower limbs by laser-doppler flowmetry and transcutaneous oximetry. First before the study, second after 3-week's period of habitual physical activity, third after 3-week's period of mild increased physical activity and finally after next 3-week's period of habitual activity. Training intensity was objectified (non sport-practiced subjects) by pedometers. Results were evaluated by Friedman and pair Wilcoxon test.

After mild aerobic activity (walk about 800 [560 - 1400] meters/day) microvascular reactivity was increased in both tests (increase after heating from $4,9x [4,4-5,4]$ to $6,1x [5,7-6,8]$, $p < 0.01$, shorten half time to reach maximum perfusion from $4,1 [2,7-5,4]$ s to $3,1 [2,4-4,0]$ s, $p < 0.05$. The increased perfusion lasted after following four weeks of habitual activity in smaller extent (microvascular reactivity increase after heating $5.2 [4.8-6.1]$ s, half time to reach maximum perfusion $3.8 [2.7-5.0]$, this increase was not significant in comparison with habitual activity in the first period). Metabolic and anthropometric parameters and transcutaneous oxygen tension didn't change significantly.

P.045

REVERSIBLE LEFT VENTRICULAR DYSFUNCTION AND BRAIN NATRIURETIC PEPTIDE (BNP) PLASMA LEVELS IN PATIENTS WITH TRAUMATIC BRAIN INJURY

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Aim: We investigated the possibility of myocardial dysfunction and pertinent alterations of BNP plasma levels in patients with traumatic brain injury (TBI).

Patients and Methods: This study included 30 critically care patients (20 males, mean age 30 ± 8 years old) who were admitted to the intensive care unit with TBI (Glasgow Coma Scale upon admission < 8). Patients with a previous history of cardiovascular disease, chest trauma, sepsis and/or other critical illness known to be associated with myocardial dysfunction were excluded. Left ventricular (LV) function was assessed by transoesophageal echocardiography. BNP plasma concentrations were measured in all patients. Echocardiographic and BNP measurements were performed on a weekly basis.

Results: Eight patients progressed towards brain death. Five patients presented global reversible LV dysfunction during the first week after the TBI, which normalized over time (within 2 weeks upon presentation). Ten patients exhibited segmental contractility disturbances during the first 2 weeks after the TBI, which normalized over time (within 4 weeks upon presentation). All the above patients presented electrocardiogram changes that normalized in line with the echocardiographic changes. The initial BNP plasma concentrations in the 15 patients with the reversible cardiovascular dysfunction were significantly increased as compared with those without cardiovascular dysfunction (105 ± 53 pg/ml vs. 53 ± 26 pg/ml, $p < 0.001$). BNP concentrations were positively correlated with diffuse subarachnoid hemorrhage ($r = 0.85$, $p < 0.001$) and poor outcome ($r = 0.88$, $p < 0.001$).

Conclusion: Reversible cardiac disturbances developed in almost 50% of patients with TBI. Increased BNP concentrations are associated with a poor outcome in the above patients.

P.046

IMPAIRED ARTERIAL ELASTIC PROPERTIES IN HUMAN IMMUNODEFICIENCY VIRUS INFECTED NAÏVE PATIENTS. THE ROLE OF SUBCLINICAL INFLAMMATION

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Introduction: Subclinical inflammation has been associated with impaired arterial elastic properties. Human immunodeficiency virus (HIV) infection per se represents a model of chronic inflammation, possibly related to progression of atherosclerosis.

Purpose: To investigate the impact of HIV infection on arterial elastic properties in HIV naïve patients.

Methods: We studied 32 HIV infected naïve patients (aged 32 years, 28 males, 18 smokers) and 26 healthy individuals matched for age, sex and smoking status. Aortic augmentation index (AIx) and augmented pressure (AP) were assessed using assessment applanation tonometry of the radial artery. Carotid femoral pulse wave velocity (PWV) was estimated as an index of aortic stiffness by means of a computerized method (Complior SP).

Results: HIV patients compared to controls had increased levels of pulse pressure (52 vs. 44 mmHg, $p = 0.004$), while there was no difference regarding body mass index and metabolic profile. AP and AIx were significantly decreased in HIV patients (0.3 vs. 4 mmHg, $p = 0.01$ and 1% vs. 12% , $p = 0.005$, respectively) even after correction for heart rate (0.6% vs. 8.3% , $p = 0.043$). HIV patients and controls exhibited similar values of PWV (6 vs. 6.1 m/s, respectively, $p = 0.83$).

Conclusions: HIV infected naïve patients compared with controls are characterized by decreased wave reflections and similar values of large artery stiffness. Peripheral vasodilatation is suggested to be the predominant mechanism, induced probably by the chronic subclinical inflammation in this setting.

P.047

EXAMINATION OF PRESSURE AND VOLUME PULSE WAVES

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Measurements of the arterial pulse were made at the brachial, carotid, and radial artery. The pressure and volume waveforms were obtained using piezoelectric and optical sensors, respectively. The data were digitized using a digital storage oscilloscope interfaced with a personal computer. The time between velocity maxima of the two waveforms was computed after Savitzky-Golay filtering. In the absence of arterial expansion, the derivative