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P2.09: MATERNAL CENTRAL BLOOD PRESSURE, WAVE REFLECTION AND ARTERIAL STIFFNESS IN COMPLICATED PREGNANCY

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arterial wall function in patients with documented coronary heart disease and dyslipidemia in 24 weeks' randomized controlled trial.

Methods: 60 patients (32 men, 28 women, age 61 ± 8) were randomized into 4 groups with equal number of pts ($n = 15$). In each group pts received drugs as monotherapy: EZ 10mg, simvastatin 10mg, atorvastatin 10mg, rosuvastatin 10mg. After 12 weeks, if LDL-cholesterol (LDL-C) level was more than $2,5 \text{ mmol/l}$ in statins monotherapy treatment, EZ 10 mg was added. LDL-C, stiffness parameter β , compliance (CC) and distensibility (DC) coefficients were determined by high-resolution ultrasound before and after 12 and 24 weeks of treatment. For analysis pts were reform in 3 groups: 1 - pts taken only EZ ($n = 15$), 2 - pts taken only statins ($n = 19$), 3 - pts taken combination statins and EZ ($n = 24$).

Results: After 12 and 24 weeks of treatment the level of LDL-C significantly decreased in all groups. Stiffness, CC and DC also was significantly changed (in table below, % changes from baseline).

Conclusions: Arterial stiffness, compliance and distensibility are significantly changed after 12 and 24 weeks of treatment in all groups. We did not find significantly intergroup differences of these parameters.

weeks	EZ		Statins		Statins and EZ	
	12	24	12	24	12	24
LDL-C, %	- 16,4 [^]	- 11,2 [°]	- 34,7*	- 43*	- 25 [°]	- 45,7 [^]
β , %	- 20*	- 32,5*	- 22,6*	- 29*	- 11,4*	- 20*
CC, %	+10 n/s	+ 26 [°]	+5,5 n/s	+ 18 [°]	+ 5,6 n/s	+ 25 [°]
DC, %	+ 21*	+ 41*	+ 13 [^]	+ 27*	+ 11 [°]	+ 20 [°]

* - $p < 0,001$, [^] - $p < 0,01$, [°] - $p < 0,05$, n/s - no significantly.

P2.06

EFFECT OF PARICALCITOL AND ALFACALCIDOL ON ARTERIAL STIFFNESS IN CHRONIC HEMODIALYSIS PATIENTS

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Background: The incidence of cardiovascular disease in hemodialysis (HD) patients is high. Disorders of the mineral metabolism seem to play a critical role. Epidemiological studies have found an increased survival in HD patients receiving vitamin D receptor analogs (VDRA) and a difference in survival depending on kind of VDRA used. Augmentation index (Aix) and pulse wave velocity (PWV) are strong predictors of cardiovascular mortality in hemodialysis patients. Whether treatment with VDRA influence on Aix and PWV in hemodialysis patients are unknown.

Methods: Eight subjects (6 male) mean(SD) age $74.3(10.4)$ with secondary hyperparathyroidism receiving chronic hemodialysis therapy were randomized to 16 weeks of treatment with paricalcitol or alfacalcidol (6/2). A wash out period of six weeks preceded the treatment. Aortic stiffness was evaluated with aorticPWV and wave reflections with Aix by applanation tonometri (Sphygmocor) at the beginning and at the end of the treatment period.

Results: Overall treatment with VDRA seemed to decrease heart rate adjusted Aix ($-14.2 \pm 7.7\%$, n.s.), PWV were unchanged ($0.8 \pm 5.1\%$).

There was a significant difference in the effect of the two VDRA on PWV. Paricalcitol decreased PWV while alfacalcidol increased PWV (-4.9 ± 4.7 vs. $17.6 \pm 2.0\%$; $p < 0.05$). There were not any difference in changes in Aix between paricalcitol treated patients or alfacalcidol treated patients (-13.1 ± 6.4 vs. $-17.6 \pm 17.4\%$; n.s)

Conclusion: VDRA tends to decrease Aix. Paricalcitol improve whereas alfacalcidol worsens PWV. These findings are coherent with present epidemiologic studies. Larger studies are needed to confirm these results.

P2.07

DOES ROSUVASTATIN MEDIATES A BETTER CONTROL OF CENTRAL BLOOD PRESSURE IN TREATED HYPERTENSIVES PATIENTS?

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Introduction: The pleiotropic antiatherosclerotic effects of statins have been widely described and were proposed to mediate a potential antihypertensive action. However, statin indication in hypertensives with subclinical atherosclerosis is still controversial.

Based on these observations, we decided to evaluate the effect of rosuvastatin on central arterial pressure and arterial stiffness by using noninvasive tests.

Aim: To evaluate rosuvastatin effects on: a) central and peripheral blood pressure, aortic and peripheral augmentation index and b) arterial stiffness.

Material and methods: We included 79 consecutive essential hypertensives under stable antihypertensive drug treatment. All patients were subjected to a 3-month intensive diet and physical activity period; and were allocated to: a) rosuvastatin (20 mg/day, OD) or b) no rosuvastatin treatment. The following determinations were conducted at the beginning and after a 1 year follow-up period: Total/HDL/LDL cholesterol; triglycerides; pulse wave velocity (Complior[®]), central blood pressure and Augmentation Index (Tensioclinic[®]).

Results: No differences in basal population characteristics were found between the two groups. At follow-up the rosuvastatin group showed a significant reduction in all the parameters studied (table 1 and figure 1).

Conclusion: These findings suggest that in stabilized hypertensives subjects, rosuvastatin is associated with an antihypertensive effect on top of the specific antihypertensive treatment. This effect is predominant for central blood pressure variables and is accompanied with a significant improvement in arterial stiffness.

Statin effects on peripheral artery distensibility may mediate a secondary relief of aortic load conditions. Further studies are needed to evaluate the potential implication of these findings for hypertensive patients.

P2.08

ARE CENTRAL PULSE WAVE INDICES SUPERIOR OVER BRACHIAL BLOOD PRESSURE IN PREDICTION OF LEFT VENTRICULAR MASS IN YOUNG MEN?

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Objective: Central BP (cBP) stronger correlates with target organ damage than casual brachial BP. pportive data for superiority of cBP over ambulatory BP. The aim of the study was to evaluate correlation between left ventricular mass index (LVMI) and central, clinic and ambulatory BP in young men.

Methods: 196 male subjects 18-25 ($21 \pm 1,4$) years with a history of casual BP elevation underwent routine physical, laboratory and instrumental tests, ABPM and pulse wave analysis (Sphygmocor, AtCor, Australia). Arterial hypertension (AH) was considered sustained if both clinic BP and ABPM values exceeded recommended diagnostic thresholds. Observed/predicted LVM ratio (OPLVMR) was assessed using de Simone et al. approach. Spearman analysis was performed to assess correlation between LVMI and OPLVMR.

Results: 24-h and daytime SBP ($r = 0,30$ and $r = 0,31$, $p < 0,001$) slightly stronger than clinic SBP ($r = 0,27$, $p < 0,001$) correlated with LVMI. Correlation between cPP and LVMI was $r = 0,26$, $p = < 0,001$. No significant correlation was found between clinic BP and OPLVMR. Stronger correlation with OPLVMR was observed for 24-h and daytime SBP ($r = 0,32$, $p = 0,001$) than for cPP ($r = 0,25$, $p = 0,01$). In patients with sustained AH ($n = 114$) no significant correlation between clinic BP, ABPM or cPP and LVMI or OPLVMR was found but negative significant correlation was observed between PP amplification and LVMI ($r = - 0,20$, $p = 0,03$) and positive with PP Aix $r = 0,21$, $p = 0,02$).

Conclusion: cBP seems not to be superior ABPM for LVMI and OPLVMR prediction. Correlations between PP amplification and Aix and LVMI in subjects with sustained AH may confirm impact of early changes of arterial stiffness for target organ damage in young hypertensive population.

P2.09

MATERNAL CENTRAL BLOOD PRESSURE, WAVE REFLECTION AND ARTERIAL STIFFNESS IN COMPLICATED PREGNANCY

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Objective: Pregnancy is associated with profound alterations in the maternal cardiovascular system. The aim of the study was to assess using applanation tonometry (AT) the maternal central aortic blood pressures (BP), wave reflection and arterial stiffness in pregnancy complicated with threatened abortion.

Methods: Radial AT (Sphygmocor; AtCor Medical) was performed in 55 women (mean age $26,8 \pm 5,6$ years) with singleton pregnancies at 5 to 22 weeks of gestation. All women had pregnancies complicated by threatened abortion. Central BP and augmentation index (Aix) - a measure of arterial wave reflection - were assessed using pulse wave analysis of the radial artery waveform and a validated transfer function. Pulse wave velocity (PWV) measurement on carotid-femoral segment was performed to evaluate arterial stiffness. Brachial BP measured with mercury sphygmomanometer by

Korotkoff sounds. The data are shown as Mean±SD, $p < 0,05$ was considered significant.

Results: Brachial and central BPs were similar in women at 5-13 weeks of gestation ($n=35$) and those at 14-21 weeks of gestation ($n=20$): brachial BP $106,8 \pm 9,6/68,3 \pm 7,4$ and $106 \pm 10,9/67,7 \pm 7,3$ mmHg, respectively, central systolic BP $92,7 \pm 8,9$ and $91,5 \pm 8,7$, respectively. Alx adjusted to heart rate (Alx-75) was lower in women at 14-21 weeks of gestation than in those at 5-13 weeks: $4 \pm 12\%$ vs $2,5 \pm 13\%$ ($p < 0,05$). Carotid-femoral PWV was significantly higher in the first trimester of pregnancy than in the second: $8,3 \pm 0,1$ vs $8,1 \pm 0,2$ m/s ($p < 0,05$).

Conclusion: The results of the study suggest that there is decline in wave reflection and aortic stiffness from 5-13 weeks to 14-21 weeks of gestation in pregnancies complicated with a threatened abortion.

P2.10

THE INFLUENCE OF SMOKING ON ARTERY STIFFNESS IN YOUNG MAN WITH ESSENTIAL ARTERIAL HYPERTENSION

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Objectives: Non-invasive screening tests for identifying the abnormal structure and function of arteries in hypertension are strongly recommended. Useful information may be obtained by measuring arterial stiffness (AS) by pulse wave velocity. The aim of the study was to measure the arterial stiffness among hypertensives and to establish the influence of smoking habit on this parameter.

Methods: The study group consisted of 60 young and middle age man (18-40 years old, mean 27.8) with essential hypertension. The group was divided into smoking and non-smoking subgroups. Arterial stiffness was measured by DVP photoplethysmography using a direct, standardized approach. Stiffness index (SI) derived from digital volume pulse (DVP) was analysis. The anthropometric and blood pressure measurements and concentration of serum lipid profile, fasting glucose and creatinine level and C-reactive protein were performed.

Results: In the whole examined population the mean SI was 7.48 ± 1.68 m/s. There were no statistically significant differences between subgroups - in smoking subjects mean SI was 6.93 ± 1.66 m/s, whereas in non-smoking patients mean SI was 7.65 ± 1.57 m/s. There were correlations between SI and age and systolic blood pressure.

Conclusions: 1. There was no statistically significant difference in stiffness index in smoking and non-smoking young patients with essential hypertension. 2. Noninvasive measurements of arterial stiffness should be considered in young patients without symptoms of subclinical organ damage.

Pathophysiology 1

P3.01

WHY THE RETURN TIME OF THE REFLECTED WAVE CHANGES LITTLE WITH AGE

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Introduction: The return time of the reflected wave as a function of age has been reported to decrease by some but unaltered by others (1). The increased pulse wave velocity (c) suggests earlier return with age, but the effect of reflection (2) and foot-foot velocity (c_{f-f}) of the backward wave are not accounted for.

Method: We consider the aorta to be a uniform tube (phase velocity, c), with at its distal end the impedance of lower body and legs. With age the aortic wall stiffens and c increases. We assume, for simplicity, the distal bed not to change.

Results: With stiffer aorta, c_{f-f} of the forward wave ($\sim c$) is increased. However, the phase angle of the reflection coefficient becomes more negative, i.e., the apparent aortic length increases. The reflected wave contains few high harmonics, and its foot pertains to low frequencies traveling with a high $c_{f-f} = c_{app}$ (we found $c_{app} \approx 2.5c$), this high speed contributes little to the return time. Thus, the stiffer aorta increases forward wave speed which shortens the return time, while the phase angle of reflection lengthens the return time (2). The two opposite effects are comparable in magnitude, and therefore the return time is quite independent of age.

Conclusion: With age, the forward wave travels faster (increased c_{f-f}), but the increased phase of the reflection coefficient counteracts this and therefore the return time changes little with age.

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P3.02

CAROTID ARTERIAL STIFFNESS ASSESSED WITH E-TRACKING AND ENDOTHELIAL DYSFUNCTION ASSESSED WITH ENDOPAT 2000 ARE RELATED TO ADIPOCYTOKINE LEVELS IN DIABETIC PATIENTS

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Introduction: Plasma levels of adiponectin (APN), are significantly reduced and IL-6 levels are elevated in diabetic patients, but their relations with endothelial dysfunction remains unclear.

Methods: We have observed 40 consecutive patients with type 2 diabetes mellitus (mean age 61 ± 5), with or without nephropathy. We have measured endothelial dysfunction with the Endo-PAT, that is the only FDA approved non-invasive device that reliably endothelial function. We assessed the arterial stiffness by a non-invasive new tool known as "e-tracking, Aloka, Japan" We have compared the data of endothelial function with the measurement of 50 healthy volunteers. Patients were divided in two groups: group A with normal endothelial index following international references (EFI > 1.7) and group B with reduced endothelial function (EFI < 1.7). For each patient a blood sample was collected in tubes containing EDTA as anticoagulant. Samples were centrifuged at $+4^{\circ}\text{C}$ for 15' at 3000g and than stored at -80°C until assayed. Adipocytokines (IL-6 and APN) plasma levels were measured with commercially available ELISA kits following producer's protocol.

Results: IL-6 and APN were negatively ($r: -0.51$; $p < 0.05$) and positively ($r: 0.54$; $p < 0.05$) correlated respectively with endothelial index in group B. Arterial stiffness (β parameter) was negatively correlated ($r: -0.30$; $p < 0.05$) with APN levels in group B. The presence of microvascular complications such as nephropathy was also associated with older age and longer duration of the disease.

Conclusions: patients affect by type 2 diabetes mellitus, endothelial dysfunction and carotid arterial stiffness are correlated with plasma levels of IL-6 and APN, independently of presence of nephropathy.

P3.03

ARTERIAL STIFFNESS IS ASSOCIATED WITH A HIGHER RISK OF EXTEND PERIVENTRICULAR AND DEEP WHITE MATTER LESIONS ACCORDING TO GENDER IN ELDERLY

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White matter lesions (WMLs) are detected on brain MRI of elderly and are predictive of cognitive decline. Arterial stiffness is a cause of systolic hypertension and of increase in central pressure and might predict cardiovascular events. This study aimed to examine relationships between arterial stiffness parameters and WMLs in a large noninstitutionalized French cohort.

Methods: In a sample of 931 subjects belonging to 3C-Dijon study, WMLs were detected using automated software from which total, periventricular and deep WMLs volumes were estimated. Central systolic blood pressure (SBP) and aortic stiffness (carotid-to-femoral Pulse Wave Velocity, PWV) were assessed by tonometry. Due to differences in vascular profile, analyses were stratified by gender.

Results: 349 males and 582 females (respectively 75.0 ± 3.7 and 75.4 ± 3.8 years) were included. Males had higher cardiovascular risk factors: hypertension (69.3 vs. 61.5% for females, $P < 0.0005$) and diabetes (11.8 vs. 5.5%, $P < 0.001$). Mean Total WMLs were similar between males and females but PWV was higher in males (15.2 ± 3.3 vs. 14.3 ± 3.1 m/s). In multivariable analyses adjusted for age, brain volume, heart rate, hypertension and diabetes, PWV was related to higher periventricular WMLs volume only in males (odds ratio of being in 3rd tertile of WML volume [per 1 SD increase in PWV]: 1.48; 95%CI: 1.10-2.02; $P < 0.05$) but not in females. In contrast, in females, a higher central SBP was significantly associated with a greater volume of deep WMLs (OR: 1.27; $P < 0.05$) but not in males.

Conclusion: These data suggest that relationships between aortic stiffness, central SBP and WMLs might differ by gender.