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P5.06: PRESSURE AND FLOW RELATIONS IN THE SYSTEMIC ARTERIAL TREE THROUGHOUT DEVELOPMENT FROM NEONATE TO ADULT

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P5.04

EFFECT OF ROSUVASTATIN ON THE ECHOLUCENCY OF THE COMMON CAROTID INTIMA-MEDIA THICKNESS: THE METEOR TRIAL

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Objective: Echolucency of the carotid intima-media thickness (CIMT) is thought to reflect a high probability of lipid infiltration and is associated with increased cardiovascular risk factor levels, morbidity, and mortality. The present study assessed the effect of statins on echolucency of the common CIMT.

Methods: Ultrasound images from the far wall of the common carotid artery were used from 984 individuals of the METEOR trial. Echolucency was measured as the grey scale median (GSM). Lower GSM values indicate a higher lipid content in the arterial wall. The primary endpoint was the difference in annual rate of change in GSM between rosuvastatin and placebo treatment during 2 years of follow-up.

Results: Two-year change GSM did not significantly differ between rosuvastatin and placebo in the total population: mean difference 1.13 (95% confidence interval [CI]: -1.00;3.25). The effect of rosuvastatin differed across quintiles of baseline GSM values (p for interaction 0.01). In the lowest quintile, i.e. in those with the largest amount of lipid infiltration, the difference in rate of change in GSM was 4.18 (95%CI: -0.23; 8.58). Increases in GSM (i.e. lipid removal from the CIMT) were significantly related to decreasing low-density lipoprotein cholesterol (LDL-C) levels in the lowest quintile, but not in the other quintiles (beta: 0.76 [95%CI: 0.26; 1.25]).

Conclusion: Rosuvastatin did not affect the echolucency of the arterial wall in all individuals. However, a potential effect of rosuvastatin on echolucency of the CIMT is most likely to be found in individuals with an echolucent, lipid-rich, arterial wall at baseline.

P5.05

RELATIONSHIP BETWEEN THE CATALASE RS 769214 SNP AND CAROTID PLAQUES IN A CAUCASIAN COHORT

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Many conventional risk factors associated with the development of arterioatherosclerosis have been reported. Despite large scale epidemiological studies, about half the burden of atherosclerotic cardiovascular disease remains unexplained by such conventional factors, although risk factor modification (when possible) is associated with improved outcome. Oxidative stress, has an important role in endothelial cell pathophysiology, in different aspects of the vascular response to stretch or shear stress, and in vascular aging. By this way, age-accelerated atherosclerosis has been induced in catalase activity-deficient mice. On the opposite, overexpression of catalase leads to both a delayed installation of arteriosclerosis and an increased life span in a murine model. We previously reported that the rs769214 SNP in the catalase (CAT) gene promoter was associated with a defect of renutrition of an elderly malnourished population; the same SNP was also showed to be involved in the development of an essential high blood pressure in an Asian population. The aim of this study was to evaluate the relationship between this SNP and the existence of carotid plaques in a large cohort of Caucasian subjects issued from the ERA study. Subject were classified according to the presence of two rs769214 G allele (CAT1 haplotype). In our study, the carotid plaques are higher in number and existence in CAT2 haplotype carriers. This result remains after sex and age adjustment. In conclusion, our results indicate that CAT rs769214 SNP A allele may be a risk factor that contribute to carotid plaques in Caucasians.

	All patients	CAT 1	CAT 2	P
N	439	52	387	
Age (y)	58±10	58±11	58±10	NS
Women (%)	33	38	32	NS
Tobacco (%)	20	19	20	NS
High blood pressure (%)	69	67	69	NS
Diabetes (%)	4	4	4	NS
Cholesterol (mg/dL)	229 ± 38	225 ± 31	229 ± 39	NS
Carotid plaques:	32	16	34	0.015
-existence (%)	0.51±0.87	0.20±0.51	0.55±0.90	0.011
-number				

P5.06

PRESSURE AND FLOW RELATIONS IN THE SYSTEMIC ARTERIAL TREE THROUGHOUT DEVELOPMENT FROM NEONATE TO ADULT

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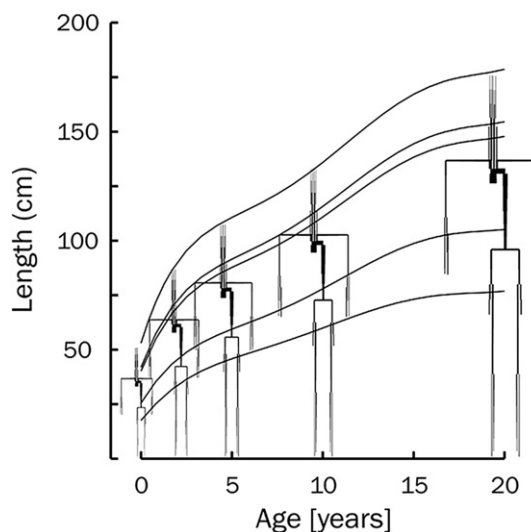
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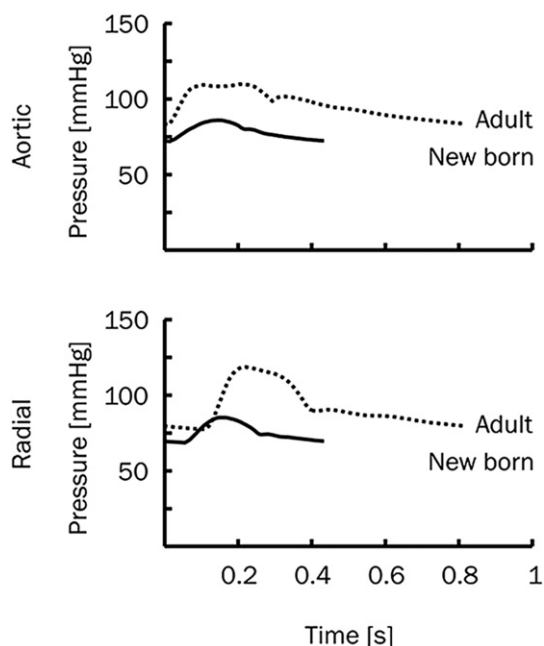
Introduction: For the adult circulation, several models exist, describing pressures and flows throughout the arterial system. Such models allow studying the effect on hemodynamics of physiological and pathophysiological changes in the vasculature. Here we present a model encompassing the full range from neonatal to adult dimensions during normal growth (Figure, left).

Methods: The arterial system was modeled by 121 segments characterized by length, radius, wall thickness, viscoelastic wall properties and blood viscosity. The most distal segments ended in three element Windkessels. All parameters were adapted as a function of age as prescribed by body length and weight.

Results: Pressures and flows were calculated as a function of age at several sites along the arterial tree. Central to peripheral transfer functions are given. Our results indicate that peripheral pressure in younger subjects resembles central pressure (Figure, right). Furthermore, total arterial compliance, inertance and impedance are calculated. Findings indicate that for all ages the arterial tree can be simulated by using a three element Windkessel.

Conclusions: The arterial system was modeled from newborn to full-grown. The results bear clinical significance for the interpretation of peripherally measured pressure in younger and older subjects, the transfer to central pressure, and for the use of a Windkessel model for determining flow from pressure.





P5.07

ASSOCIATION OF WAVE REFLECTIONS AND AORTIC STIFFNESS WITH UTERINE ARTERY DOPPLER PULSATILITY INDEX AND RISK OF PREECLAMPSIA

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Objectives: Arterial stiffness is increased in women with preeclampsia. Assessment of spiral artery transformation and successful placentation by uterine artery Doppler pulsatility index (UtAD PI) is a widely used screening tool for early-onset preeclampsia. We sought to determine whether there was a relationship between uterine artery Doppler impedance and aortic stiffness and arterial wave reflection.

Methods: 92 women were recruited from the high risk obstetric clinic in the second trimester. Median age: 32.8years (Range 19-45years), median gestation: 23⁺⁶weeks (Range: 19⁺⁶-26⁺¹weeks). Smokers were excluded. Transabdominal uterine artery Doppler measurements were performed bilaterally using Siemens Acuson S2000 ultrasound machine and mean pulsatility index calculated. cfPWV and pulse wave analysis were performed using Vicorder and SphygmoCor respectively. Prior to cardiovascular measurements, women were rested supine for 10 minutes in 30° left lateral position. Three consistent readings were performed and a mean value calculated. cfPWV was adjusted for mean arterial pressure and augmentation index (Alx) adjusted for heart rate and height using SPSS v18.0.

Results: There was a significant positive association between uterine artery Doppler pulsatility index and increasing cfPWV ($r=0.23$, $P=0.03$) (Fig.1) and Alx ($r=0.36$, $P=0.0005$) (Fig.2).

Conclusions: Increasing UtAD PI reflects impaired placentation and increasing risk of preeclampsia. We show that women at increasing risk of preeclampsia have higher aortic stiffness and arterial wave reflection, even in the absence of preeclampsia. Further studies are required to determine whether this is a reflection of abnormal pregnancy on arterial stiffness, or whether the increased arterial stiffness precedes pregnancy.

Association of carotid-femoral PWV and uterine artery Doppler PI in the late second trimester

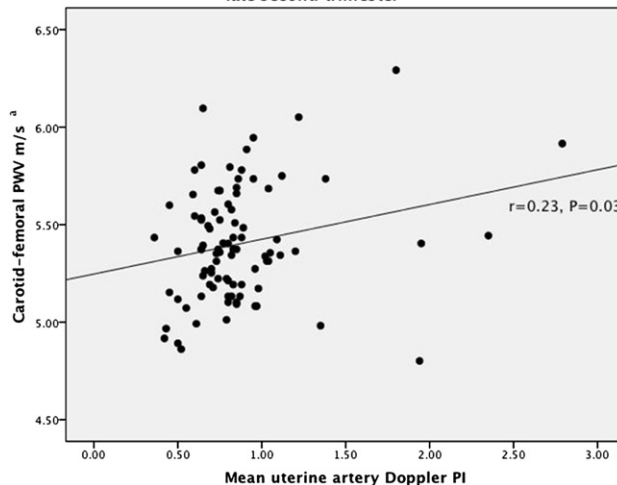


Figure 1

adjusted for mean arterial pressure

Association of augmentation index and uterine artery Doppler PI in the late second trimester

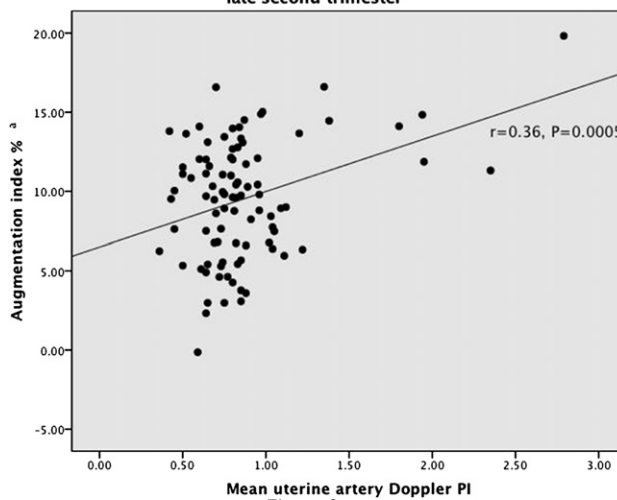


Figure 2

adjusted for height and heart rate

P5.08

NORMALISATION FOR WALL SHEAR STRESS STIMULUS IMPROVES ACCURACY IN THE ASSESSMENT OF GLUCOSE-INDUCED CHANGES IN FLOW-MEDIATED DILATION

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Background: In healthy arteries, acute changes in wall shear stress (WSS) elicit a vessel dilation response, through endothelial NO-release and smooth muscle relaxation (flow-mediated dilation, FMD). Metabolic or pharmacologic agents might modulate FMD, but may also interfere with the transient WSS stimulus utilised to assess FMD. We hypothesized that glucose-induced changes in FMD can be detected with greater sensitivity by normalising FMD for the WSS stimulus.

Methods & Results: Twenty-two healthy volunteers (24 ± 6 yrs, BMI 24 ± 7 kg/m²) underwent a standard oral glucose tolerance test during which brachial FMD was assessed by simultaneous B-mode/PW-Doppler ultrasound at baseline