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### **P13.06: ASSOCIATIONS BETWEEN “VASCULAR AGE” AND MARKERS OF SUBCLINICAL ATHEROSCLEROSIS IN MEN WITH LOW LEVEL OF CARDIOVASCULAR RISK**

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**P13.03**  
**THE PATIENTS WITH LACUNAR ISCHEMIC STROKE (LIS) HAVE**  
**ENDOTHELIAL DYSFUNCTION (ED) AND INCREASED ARTERIAL STIFFNESS**

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ED is thought to be implicated in the pathogenesis of cerebral small vessel disease in patients with LIS while the role of arterial stiffness is less known. **Objective:** The aim of this study was to assess the endothelial function (EF) and arterial stiffness in patients with LIS.

**Methods:** In this study, 35 patients with LIS, as defined by clinical characteristics and MRI findings were compared with 18 healthy age and gender-matched patients with similar risk factors.

EF was assessed using the brachial flow-mediated vasodilatation (FMD); in LIS group on the first day after stroke onset. Carotid stiffness index  $\beta$  was calculated as follows:  $\ln(\text{systolic}/\text{diastolic blood pressure})/[(D_{\text{max}}-D_{\text{min}})/D_{\text{min}}]$ , where  $D_{\text{max}}$  and  $D_{\text{min}}$  are maximum and minimum common carotid lumen diameters measured by carotid ultrasound. Carotid intima-media thickness (IMT) was also measured. FMD was categorized according to ROC analysis and ED was defined as  $FMD \leq 6.0\%$ .

**Results:** Twenty-two (63%) LIS patients had ED on the 1st day and only three patients (17%) in the control group ( $p < 0.05$ ). FMD was lower in LIS group ( $6.1 \pm 2.5\%$  versus  $9.8 \pm 2.2\%$  in the control group,  $p = 0.02$ ), while carotid stiffness was higher ( $10.5 \pm 2.2$  versus  $7.5 \pm 2.6$ ,  $p = 0.04$ ). There was not significant difference in IMT between two groups ( $0.91 \pm 0.17$  versus  $0.87 \pm 0.21$ ,  $p = 0.4$ ). Moderate correlation was observed between stiffness and IMT ( $r = 0.33$ ,  $p = 0.01$ ). No correlations were found between FMD and IMT, FMD and arterial stiffness.

**Conclusion:** The majority of patients with LIS have the impairment of the structural-and-functional properties of the arterial wall that manifest in the ED and increased stiffness.

**P13.04**  
**EARLY POSTPRANDIAL INCREASE IN BLOOD GLUCOSE DOUBLES FLOW**  
**MEDIATED DILATION IN YOUNG HEALTHY SUBJECTS**

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A. P. G. Hoeks, K. D. Reesink

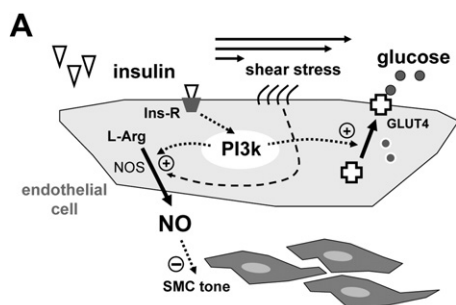
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**Background:** In healthy subjects insulin induces microcirculatory vasodilation by stimulating endothelial nitric oxide release (Fig. A). Whether insulin would modulate large artery flow mediated dilation (FMD) in the early postprandial phase has not been investigated, yet.

**Methods:** In six healthy volunteers (age  $28 \pm 3$  yrs, BMI  $26 \pm 5$  kg/m<sup>2</sup>), we measured blood glucose and brachial artery FMD during fasting conditions and 30 minutes after consumption of a 75g glucose solution. FMD with reactive hyperemia was obtained by simultaneous Doppler/B-mode echo and beat-to-beat video analysis, providing smoothed velocity and diameter curves (Fig. B).

**Results:** Blood glucose increased from  $4.5 \pm 0.2$  to  $7.5 \pm 0.9$  mmol/l ( $p < 0.001$ ). With glucose loading, FMD, when defined as the peak increase in diastolic diameter relative to baseline ( $\Delta D_{\text{peak}}/D_{\text{baseline}}$ ), increased from  $3.2 \pm 2.6$  to  $7.4 \pm 4.9\%$  ( $p = 0.011$ ). FMD, when normalized for the relative mean flow velocity increase ( $\Delta v_{\text{mean}}/v_{\text{baseline}}$ ), showed a more pronounced increase from  $0.047 \pm 0.042$  to  $0.113 \pm 0.047$  ( $p < 0.001$ ).

**Conclusions:** Glucose loading leads to an increased brachial artery FMD response in the early postprandial phase, which is most likely related to the endothelial insulin-NO pathway.



**P13.05**  
**IS AIX INCREASED IN COPD?**

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**Background:** Chronic obstructive pulmonary disease (COPD) and cardiovascular disease (CVD) often coexist. Arterial stiffness predicts CVD and aortic augmentation index (Aix) is a non-invasive surrogate measure of arterial stiffness. We hypothesize that airflow limitation is associated with increasing arterial stiffness and the effect of having COPD increases Aix independently of other CVD risk factors.

**Methods:** This population-study is based on 3,432 subjects from the Copenhagen City Heart Study where Aix was measured; 494 had COPD. We analysed differences in Aix between subjects with and without COPD and used multiple linear regression analyses to examine the association between COPD and Aix stratified by age and gender and adjusted for CVD risk factors. Furthermore we analysed the association between Aix and FEV<sub>1</sub>, FVC and FEV<sub>1</sub>/FVC in the entire population.

**Results:** Aix was higher in subjects with COPD than in subjects without: 25.7 vs. 21.0 ( $p < 0.001$ ) in men and 33.6 vs. 29.4 ( $p < 0.001$ ) in women. We found no association between Aix and COPD adjusted for CVD risk factors ( $p = 0.17$ ) except in men younger than 60 years ( $p = 0.003$ ); and only when mild COPD was excluded from the analyses. Aix had a significant curvilinear association with FEV<sub>1</sub> and FVC but no association with the FEV<sub>1</sub>/FVC ratio, the association with FEV<sub>1</sub> and FVC was seen only for higher volumes; i.e., FEV<sub>1</sub> > 3 L.

**Conclusion:** Aix and COPD are only weakly associated. In the general population, this finding potentially questions a direct association between COPD and arterial stiffness.

**P13.06**  
**ASSOCIATIONS BETWEEN "VASCULAR AGE" AND MARKERS OF**  
**SUBCLINICAL ATHEROSCLEROSIS IN MEN WITH LOW LEVEL OF**  
**CARDIOVASCULAR RISK**

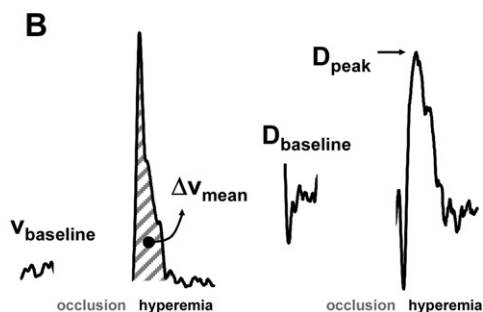
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**Background:** Previous studies showed how different risk factor burdens could be translated into vascular age.

**Aim:** To define correlations between "vascular age" and such subclinical markers of atherosclerosis as pulse wave (PWV), carotid intima-media thickness (IMT).

**Material and Methods:** We investigated 150 men (age 35 – 65) with a low level of cardiovascular risk according to "SCORE" scale without diabetes. Patients have been divided to the following groups: according to age- "< 45 yrs." (n=58) and "> 45 yrs" (n=92); with arterial hypertension (AG) (n=56), without AG (n=94); delta "-."(n=108), when chronological



age is less than vascular age and delta "+" (n=40), when chronological age is higher than vascular age.

We used ultrasound images of carotid arteries for assessing IMT and carotid plaques; computer sphygmography for assessing PWV. "Vascular age" was calculated by using multivariable sex-specific risk factor algorithm, formulated by D'Agostino et al in 2008, which incorporates age, total and HDL cholesterol, systolic BP, use of antihypertensive medication, smoking and diabetes status.

**Results:** Results showed that vascular age was higher than chronological age in all groups, especially in group "with AG" (p=0,00001)(figure1). The statistical data of "delta" - median" 7,0; low quartile (-13); upper (-2), which means that the largest difference of vascular age from chronological age was 13 year. The PWV, IMT, common plaque levels were not significantly different in two groups. The correlations between both ages (chronological and vascular) and PWV(p=0,001), IMT (p=0,0003), common plaque level (p=0,0001) were almost the same (table 1).

**Conclusions:** Vascular age is associated with markers of subclinical atherosclerosis at the same weak level as chronological age.

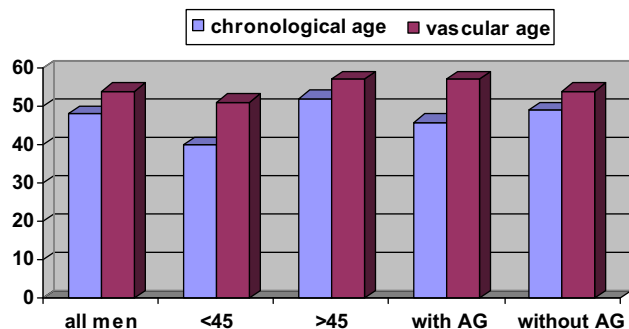


Figure 1 Comparison between chronological and vascular ages in different groups.

Table 1 Spearman Correlations Coefficient between measured study variables and vascular, chronological ages.

№	Parameters	Chronological age (y)		Vascular age (y)	
		R	p	R	p
1	PWV(sm/c)	0,29	0,001	0,25	0,006
2	IMT(mm)	0,34	0,00004	0,30	0,0003
3	Total plaque (%)	0,53	0,0001	0,56	0,0001

p<0,05- significant correlation; R- level of rank correlation.

### P13.07

#### SEVERITY OF VASCULAR DISEASE IN UNCONTROLLED HYPERTENSIVES: ARE TWO SIDES OF A COIN?

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**Introduction:** Uncontrolled blood pressure (UBP) is associated with higher risk of target organ damage and CV events. A severe subclinical impairment of vascular function and structure should be expected in this situation but, currently this has not been analyzed.

**Objective:** To determine the pattern of vascular damage in UBP p.

**Methods:** We screened 3277 p. derived for non-invasive vascular evaluation (NIVE) (Dec 2006/Dec 2009). After applying exclusion criteria (age >65; diabetes mellitus, secondary HTN, previous CV events/secondary prevention) 1503 hypertensives were included and classified according BP values as UB (≥140/90 mm Hg) or controlled (CBP)(<140/90 mm Hg). (ESH 2007) NIVE comprised: IMT; PWV and FMD; atherosclerotic plaque (AP) characterization; Aortic and Peripheral pulse pressure(CPP and PPP) and Augmentation indexes (CAix and PAix).

**Results:** UB were 729 p. (47 y.o.; 63% males; 153/96 ± 14/8mm Hg, 69 ± 11 bpm) and CBP 774p. (48.9 years old; 70% males; 124/78 ± 8/6 mm Hg, 66 ± 10 bpm).

UBP patients showed: >IMT (LCC 0,71 ± 0,2 vs 0,68 ± 0,2mm), >PPP (57 ± 12 vs 46 ± 7 mmHg), >CPP (58 ± 16 vs 43 ± 12 mmHg), >PAix (0.9 ± 32 vs -11 ± 32 %) and PWV (11 ± 3 vs 10 ± 2 m/s)(p< 0.5 for all). CPP/ PPP relation was inverted in UB group.

**Conclusions:** UB was associated with moderate to severe subclinical vascular disease in this large population but it is not clear if UB is rather a consequence than a cause of subclinical vascular disease.

### P13.08

#### CAROTID INTIMA-MEDIA THICKNESS CORRELATION WITH THE NEW ARTERIAL WALL PARAMETERS IN HIGH CARDIOVASCULAR RISK PATIENTS

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**Introduction:** Increased carotid intima-media thickness (IMT), as early sign of atherosclerosis, closely correlates with traditional risk factors: increased cholesterol level, high blood pressure (BP), age, metabolic syndrome. The aim of our study was to evaluate the relationship between IMT and other arterial wall parameters.

**Methods:** Consecutive high cardiovascular risk patients aged from 50 to 55 were investigated at the Vilnius University Hospital, including detailed assessment of cardiovascular risk factors, serum lipid profile, C-reactive protein (CRP). Carotid IMT and carotid stiffness were measured by echo-tracking with ART.LAB system. Aortic and brachial pulse wave velocity (aPWV and bPWV), heart rate adjusted aortic augmentation index (AIx/HR) were evaluated by applanation tonometry with SphygmoCor. Endothelial function in brachial artery was assessed by calculating the flow mediated dilatation (FMD). Correlations between IMT and other arterial wall parameters were estimated.

**Results:** 860 patients (mean age±SD 52.63±1.58; 536 (62.3%) females) were analyzed. There was only a very weak correlation between IMT and femoral PWV (r=0.094; p=0.049) in the whole group. IMT did not correlate with arterial wall parameters in female group, however, IMT correlated with AIx/HR in male group (r=0.190; p=0.004). Significant but relatively weak IMT correlations with age (r=0.079; p=0.024), BMI (r=0.134 ; p<0.001), systolic BP (r=0.122; p=0.001), diastolic BP (r=0,106; p=0,003), HDL-Ch (r=-0.143 ; p<0.001), CRP (r=0.089 ; p=0.013) were observed without impact of gender. Regression models showed that IMT may not be predicted by PWV, AIx/HR, FMD.

**Conclusions:** Carotid IMT has a weak correlation with the new arterial measures in high cardiovascular risk patients.

### P13.09

#### REGIONAL AORTIC PULSE WAVE VELOCITY VERSUS LEFT VENTRICULAR MASS IN CLASSIFYING CARDIOVASCULAR RISK DIFFERENCES; A MAGNETIC RESONANCE STUDY

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**Background:** Compared with Europeans, South Asians (SA) suffer from excess coronary disease (CHD) while African-Caribbeans (AfC) have less CHD despite greater hypertension/stroke. Underlying arterial function differences are unclear.

**Aim:** To compare aortic pulse wave velocity (aPWV), and left ventricular mass index (LVMI), both strong, independent predictors of outcomes, in describing cross-ethnic CHD risk difference.

**Methods:** Magnetic resonance (MR) imaging was used to measure LVMI, and aPWV in the arch (aPWVarch) and descending aorta to bifurcation (aPWVdes) in 50 asymptomatic medication-free community-sampled AfC (n=17, age: 52.2±6yr), SA (15, 52.1±6) and European (18, 53.5±6) men recruited to the European Male Ageing Study. Central systolic blood pressure (BP) was measured using the Arteriograph device on the left arm, supine.

**Results:** Mean±SE of LVMI (g/m<sup>2</sup>) was lower in SA (65±2) than in AfC (74±2, p=0.005) and European (71±2, p=0.047) group adjusted for age, systolic blood pressure (SBP) and heart rate (HR); R<sup>2</sup>=0.45.