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P6.13: AMBULATORY AND OFFICE CENTRAL SYSTOLIC BLOOD PRESSURE IS MORE CLOSELY ASSOCIATED WITH LEFT VENTRICULAR MASS THAN AMBULATORY AND OFFICE PERIPHERAL SYSTOLIC BLOOD PRESSURE IN A YOUNG NORMOTENSIVE POPULATION

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cardiovascular disease in SCT remains to be determined. The present study sought to determine the arterial stiffness, an independent marker of sub-clinical atherosclerosis, between SCT and trained SCD.

Materials and methods: Twelve SCT (43±11yrs, 6 males) were compared to 14 trained younger SCD (29±9yrs, 2 males) and 26 controls with normal hemoglobin (36±11rs, 13 males). Aortic (AoStiff-Physioflow) and peripheral arterial stiffness (pOpmetre-Axelle-France) assessed by foot-to-toe pulse wave velocity (ft-PWV), blood pressure (BP) and Framingham-Laurier cardiovascular risk score (CVR in %) were measured in each group.

Results: SCT exhibited stiffer arteries (AoStiff: 5.8±0.71 m/s, ft-PWV: 10.9±6.2 m/s) than controls (AoStiff = 4.8±0.5 m/s, ft-PWV: 7.7±2.6 m/s) and SCD (AoStiff = 4.9±0.6 m/s, p=0.001, ft-PWV: 6.1±0.9 m/s p=0.003). SCT were older (p=0.001) than controls and SCD. The systolic and mean AP were lower in SCD than controls and SCT. In the whole group, the CVR score was the major contributor to PerStiff ($r^2=0.402$, $p<0.0001$) while AoStiff was mainly associated to the hemoglobin abnormalities ($r^2=0.291$, $p<0.0001$).

Conclusion: Both central and peripheral arterial stiffness are increased in SCT compared to SCD. Our data suggest that hemoglobin abnormalities and CVR play a differential role in the observed changes.

P6.10

ALCOHOL INTAKE IS ASSOCIATED WITH 24-HOUR AORTIC BLOOD PRESSURE IN A YOUNG HEALTHY STUDENT COHORT

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Objective: Increased brachial (bBP) and aortic blood pressure (aBP) have been linked to increased arterial stiffness and cardiovascular risk in older individuals. Literature suggests that increased alcohol intake is associated with increased BP both acutely and long term in older adults and heavy alcohol drinkers. However, the effects of alcohol intake on 24-hour BP and aBP in young healthy adults remains unclear. The purpose of this study was to explore the relationship between weekly alcohol intake and 24-hour BP in a young healthy student cohort.

Methods: Forty-three (11 male, aged 24±5 yrs) healthy students were recruited. Age, height and weight were recorded and weekly alcohol intake reported via self-assessment questionnaire. 24-hour bBP and aBP were measured using the Mobil-O-Graph (IEM, Germany). Aortic BP was calculated using two calibration methods: brachial systolic and diastolic pressures (syst-cal) and mean and diastolic pressures (MAP-cal).

Results: 24-hour aSBP was associated with weekly alcohol consumption, using both calibration methods ($r = 0.411$, syst-cal; $r = 0.54$, MAP-cal; both $P < 0.05$). In addition, 24-hour night-time aSBP (MAP-cal) was associated with weekly alcohol consumption ($r = 0.39$; $P < 0.05$).

Conclusion: Increased alcohol intake in young healthy students is associated with increased 24 hour and night-time aSBP. These data suggest that excessive alcohol intake at an early age could potentially increase cardiovascular risk via detrimental effects on the vascular system. Larger, longitudinal data are needed to investigate these associations further.

P6.11

THE FRAMINGHAM RISK SCORE IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Background: Patients with chronic obstructive pulmonary disease (COPD) have increased risk of cardiovascular (CV) events and mortality beyond that attributable to smoking. Increased arterial stiffness has been identified in COPD, however its prognostic value has not been established. The Framingham risk score provides a validated estimate of an individual's future CV risk. We hypothesised that patients with COPD would have greater Framingham risk score and aPWV than controls and that aPWV would relate to the Framingham risk score.

Methods: At baseline 524 patients with COPD and 143 controls (free from lung disease) were assessed for; lung function (forced expiratory volume

(FEV₁), forced vital capacity (FVC) and their ratio), BMI, blood pressure (BP) and aPWV. In addition, medical and smoking history were recorded and used to calculate the Framingham risk score and vascular age.

Results: Patients and controls were similar in age, gender and BMI, but patients had greater aPWV, Framingham risk score and vascular age which remained after adjustment for age, and MAP. In COPD, Framingham risk related to age $r=0.295$, aPWV $r=0.234$, SBP $r=0.194$ and FEV₁% predicted $r=0.112$, (all $p<0.01$). In controls, Framingham risk score related only to age $r=0.383$, aPWV $r=0.189$ and systolic BP $r=0.195$ $p<0.05$.

Conclusions: The association between the Framingham risk score and aPWV suggests that either may be useful to identify individuals with COPD at risk of future CV events. Further follow-up of this cohort will evaluate the prognostic utility of these measures of CV risk.

P6.12

AORTIC AND LOCAL CAROTID STIFFNESS: RELATIONSHIP WITH CARDIAC AND VASCULAR ORGAN DAMAGE IN A GENERAL POPULATION SAMPLE IN NORTHERN ITALY

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Background: Carotid-femoral pulse wave velocity (aoPWV), the gold-standard measurement of arterial stiffness, has been found associated with cardiac and vascular organ damage. Less information is available with regard to the correlation between local carotid stiffness (CS) and cardiac and vascular preclinical damage.

Aim: of the study was to analyse the correlation between aoPWV and CS and cardiac and vascular preclinical organ damage in a middle age general population in Northern Italy (Vobarno Study).

Methods: 245 subjects (57%female, age 56±4 years) underwent laboratory examinations, clinic and 24 hours BP measurement, cardiac and carotid ultrasound, aoPWV measurement (Complior-system). CS was determined from the relative stroke change in diameter (measured with a high-resolution echotracking system) and carotid pulse pressure (measured with applanation tonometry) and was expressed in the same dimensions as pulse wave velocity (m/s).

Results: Both aoPWV and CS were significantly related with age ($r=0.29$, $p<0.001$ and $r=0.23$, $p<0.001$, respectively). A positive correlation was observed with clinic and 24 hours blood pressure parameters and both aoPWV and CS. AoPWV was significantly related to left ventricular mass index (LVMI, $r=0.20$, $p<0.05$), and was significantly higher in subjects with LV hypertrophy (LVMI>115 g/m² in men and >95 g/m² in women) as compared to subjects without LVH (9.1±1.5 vs 8.5±1.4 m/s, $p<0.05$). On the contrary, CS was not related with LVMI and no difference in CS was observed between subjects with or without LVH (6.5±1.5 vs 6.3±1.2, $p=ns$). AoPWV was also significantly related to vascular organ damage (carotid IMT Meanmax: $r=0.16$, $p<0.05$; CBMmax: $r=0.16$, $p<0.05$; Tmax: $r=0.19$, $p<0.005$), while CS was not.

Conclusion: Although carotid-femoral pulse wave velocity (AoPWV) and carotid stiffness provided similar information on the impact of aging and blood pressure on large artery stiffness, only AoPWV, and not CS, is related to cardiac (LVM) and vascular (IMT) damage in a general population sample.

P6.13

AMBULATORY AND OFFICE CENTRAL SYSTOLIC BLOOD PRESSURE IS MORE CLOSELY ASSOCIATED WITH LEFT VENTRICULAR MASS THAN AMBULATORY AND OFFICE PERIPHERAL SYSTOLIC BLOOD PRESSURE IN A YOUNG NORMOTENSIVE POPULATION

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Background: High blood pressure (BP) at a young age and increased left ventricular mass (LVM) are associated with increased risk of future cardiovascular mortality. In addition, ambulatory 24-hour central systolic BP (24cSBP) is more closely associated with LVM than either 24-hour peripheral SBP (24pSBP) or office measurements of pSBP and cSBP. However these associations have only been observed in older hypertensive patients. The purpose of this study was to determine (1) if BP was associated with LVM, and (2) which

method of BP measurement was more strongly associated with LVM in a young healthy normotensive population.

Methods: Forty-one adults (23 ± 4 years, 27% male) took part in the study. LVM was measured using 2-D echocardiography (Vividq, GE) and indexed to body surface area (LVMI). Both office and 24-hour pSBP and cSBP were measured using the Mobil-O-Graph system (IEM, Germany). cSBP's were calculated using brachial mean and diastolic pressures (MAP-cal).

Results: Participants had normal office pSBP (117 ± 10 mmHg) and LVMI (79 ± 17 g/m²) values. On average, office cSBP (128 ± 19 mmHg) was significantly higher than 24cSBP (123 ± 14 mmHg, $P < 0.05$). LVMI was not associated with pSBP ($r = 0.275$, $P = 0.82$) and weakly associated with 24pSBP ($r = 0.320$, $P = 0.041$). However the strongest associations with LVMI were with cSBP MAP-cal ($r = 0.506$, $P = 0.001$) and 24cSBP MAP-cal ($r = 0.556$, $P < 0.0001$).

Conclusion: In the current young normotensive population, both office cSBP and 24cSBP were more closely associated with LVMI than peripheral measures of SBP. These findings may have implications for the progression and potential treatment of hypertension-induced target organ damage.

P6.14

THE EFFECT OF PHYSICAL ACTIVITY ON 24-HOUR AUGMENTATION INDEX

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Introduction: Augmentation Index (AIx) is a surrogate measure of systemic arterial stiffness and wave reflections. Clinic measures of AIx are considered to be a sensitive measure of risk in young adults and are lower in individuals who take part in high levels of physical activity (PA). The development of an ambulatory blood pressure monitoring (ABPM) system, which also calculates AIx, now allows usual AIx to be assessed. The aim of this study was to assess the association between 24-hour AIx and levels of physical activity in a young healthy cohort.

Methods: Forty-six adults (23 ± 5 years, 28% male) took part in the study. 24-hour AIx@75 (AIx at heart rate 75bpm) was measured using the ABPM device (Mobil-O-Graph, IEM). Weekly PA levels were recorded using a detailed PA questionnaire (total minutes per week).

Results: An inverse association between 24-hour AIx@75, Night-time AIx@75 and levels of PA ($r = -0.420$, $P < 0.01$ and $r = -0.403$, $P < 0.01$, respectively) were observed. Interestingly, no associations were observed between 24-hour blood pressure and levels of PA.

Conclusion: These novel data, in a young normotensive cohort illustrate the beneficial effect of increased PA on 24-hour AIx. 24-hour measurements of vascular function may provide a more robust tool to understand the chronic effects of PA on vascular health. Further studies are needed to understand the use of ABPM for 24-hour monitoring of vascular stiffness.

P6.15

ATTENUATION OF ARTERIAL STIFFNESS GRADIENT WITH AGE AND ITS IMPACT ON CENTRAL PULSE WAVE PROFILE IN DIALYSIS PATIENTS

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Background: Arterial stiffness has been considered as an index of vascular ageing. However, the relationship between age and stiffness of various segments of the arterial tree is heterogeneous. Moreover, the hemodynamic impact of vascular stiffness is thought to be related to the attenuation or even reversal of the physiological arterial stiffness gradient. The objectives of the present study were to evaluate the impact of age on aortic (central elastic artery) and brachial (muscular conduit artery) stiffness and to assess hemodynamic correlates of the arterial stiffness gradient.

Method/results: In 310 dialysis patients (67 years [25^{th} - 75^{th} percentiles: 56-76], 185(60%) men, 134(43%) diabetes and 162(52%) cardiovascular disease), we measured aortic and brachial stiffness by pulse wave velocity of carotid-femoral (cf-PWV) and carotid-radial (cr-PWV) using direct distances (Complior). Arterial stiffness gradient was determined by cf-PWV/cr-PWV (PWV ratio). Central pulse wave parameters were obtained through generalized transfer function applied to the radial artery pulse profile (Sphygmocor). Mean cf-PWV, cr-PWV and PWV ratio were respectively of 13.52 ± 4.07 m/s,

8.76 ± 1.68 m/s and 1.59 ± 0.52 m/s. Cr-PWV decreased with age ($\beta = -0.031$, $R = -0.274$, $P = 0.001$), while cf-PWV ($\beta = 0.144$, $R = 0.529$, $P = 0.001$) and PWV ratio ($\beta = 0.021$, $R = 0.613$, $P = 0.001$) increased. In contrast to cf-PWV and cr-PWV, PWV ratio was not associated with MBP ($P = 0.997$).

Conclusion: The use of PWV ratio may be a more logical choice for risk determination than aortic stiffness as it provides a better estimation of the loss of arterial stiffness gradient and is not influenced by MBP in this population.

P6.16

LEFT VENTRICULAR GEOMETRY AND CAROTID VASCULAR DAMAGE IN PATIENTS UNDERGOING CORONARY ANGIOGRAPHY

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Background: Vascular structural(intima-media thickness, IMT) and functional(carotid stiffness, cPWV)alterations are related to different pattern of left ventricular (LV) geometry in general populations and in hypertensives. The relationship between vascular damage and LV geometry has not been analyzed prospectively in patients undergoing coronary angiography.

Methods: 399 consecutive patients with clinical indication to coronary angiography, prospectively underwent standard ultrasound examination for the evaluation of LV mass index(LVMI g/m²), relative wall thickness(RWT), distal anterior descending coronary artery flow velocity(LADd_vel), carotid ultrasound with real time echotracking system for measurement of central blood pressure(cSBP, cDBP), common carotid intima media thickness(cIMT) and carotid pulse wave velocity(cPWV) (Esaoe MyLab 70). The noninvasive evaluations were performed blindly to clinical information, before coronary angiography.

Results: cIMT and cPWV were higher in patients with concentric LVH(LVMI ≥ 49 g/h² in men and ≥ 47 g/h² in women and $RWT \geq 0.42$) as compared to N (normal LV mass and geometry) and CR (concentric remodeling, normal LVMI and $RWT > 0.42$). LADd_vel was greater in patients with concentric LVH than in other groups. The prevalence of coronary stenosis($>50\%$) was greater in patients with concentric LVH and CR as compared to N. Patients with concentric geometry ($RWT \geq 0.42$) showed higher values of cIMT(773 ± 169 vs 729 ± 162 , $p < 0.005$), cPWV(8.9 ± 2.7 vs 9.6 ± 2.6 , $p < 0.05$) and LADd_vel(40 ± 22 vs 48 ± 31 , $p < 0.05$) and a greater prevalence of coronary stenosis($>50\%$) than patients with $RWT < 0.42$ (53 vs 69%, $p < 0.005$).

Conclusions: Our results confirm that in patients undergoing coronary angiography concentric geometry is associated with structural and functional carotid alterations, with increased central blood pressure and anterior descending coronary artery flow velocity. In this large group of patients, concentric geometry is associated with a greater prevalence of coronary stenosis, as assessed by coronary angiography.

P6.17

CARDIOVASCULAR RISK FACTORS CONTRIBUTE TO THE VARIANCE OF WALL-TO-LUMEN RATIO

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Background: Common carotid artery intima-media thickness (cIMT) is an accepted ultrasound marker of subclinical atherosclerosis. It is argued that increase in cIMT may also reflect nonatherosclerotic thickening, thus, lumen diameter could be taken into account. A common approach to account for lumen diameter is wall-to-lumen ratio (WLR), however, its precise relations