P3.1: SUB-MAXIMAL EXERCISE BLOOD PRESSURE RELATES TO LEFT VENTRICULAR MASS INDEX, BUT IS DEPENDENT ON LOW AEROBIC CAPACITY

Martin Schultz*, Dean Picone, Rachel Climie, Costan Magnussen, Leah Wright, Thomas Marwick, Alison Venn, James Sharman

calibrated to mean (MAP) and diastolic pressures (DBP) obtained with a Philips SureSigns monitor on the fistula-free arm.

Mean±SD values and coefficient of variation(CV) of repeated measurements are shown below:

	Pre-dialysis	CV	During dialysis	CV
Peripheral SBP(mmHg)	139±16	4%	120±16	7%
Peripheral DBP(mmHg)	74±12	5%	70±8	6%
Peripheral MAP(mmHg)	99±13	6%	88±12	7%
Central cSBP(mmHg)	127±20	3%	117±6	5%

Peripheral form factor (FF) was 37±13% (range 19-59) before dialysis and 39±21% (13-61) during dialysis while central FF was 45±7% (30-57) and 39±21% (21-46), respectively.

Estimation of cSBP during dialysis was feasible with Complior Analyse. Its variability was similar to peripheral BP variability. The wide range of peripheral form factor values suggested that there is a need to improve peripheral BP estimation during dialysis.

P2.18

IMPACT OF CARDIOVASCULAR RISK FACTORS ON CAROTID STIFFNESS AND CAROTID INTIMA MEDIA THICKNESS − GENDER DIFFERENCES

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Background and purpose: Whether the influence of risk factors on carotid stiffness (CS) and carotid intima media thickness (CIMT) is modulated by gender is still unclear. The aim of our study was to examine the association between cardiovascular (CV) risk factors, CS and CIMT in men and women.
Material and methods: 252 subjects (including 132 women), mean age: 55 years, with CV risk factors and without the history of manifest CV disease underwent the examination of CS parameters and CIMT. The following CS parameters: beta stiffness index (beta), Peterson's elastic modulus (Ep), one-point pulse wave velocity (PWV-beta) and arterial compliance (AC) were measured with the use of the high-resolution echotracking system.
Results: The multivariate analysis revealed that age, diabetes and MAP were independent determinants of CS parameters in both men and women. Pulse pressure (PP) was significantly associated with beta (β coefficient +0,261, p=0,006), Ep (β coefficient +0,426, p<0,001) and PWV-beta (β coefficient +0,283, p=0,007) only in women. Of the risk factors significantly associated with CIMT in the multivariate analysis, age was an independent determinant of CIMT in both sexes, while PP (β coefficient +0,317, p=0,014) and increased waist circumference (β coefficient +0,207, p=0,048) only in women.
Conclusions: The influence of CV risk factors on CS and CIMT is modulated by gender. The impact of the pulsatile component of blood pressure on CS and CIMT and of the increased waist circumference on CIMT seems to be more prominent in women than in men.

P2.19

COMPARISON OF BRACHIAL AND CENTRAL BLOOD PRESSURES FROM 2 SPHYGMOCOR XCEL SYSTEMS EQUIPPED WITH A 2M AND 6M-LONG HOSE

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Background and aim: Magnetic resonance imaging (MRI) provides excellent anatomical coverage for local and regional indices of aortic function and structure. However, blood pressure (BP) assessments is usually necessary for the calculation of these functional MRI parameters. Unfortunately, most pressure devices are not safe in high magnetic field. The aim of our study was to evaluate the use of the new SphygmoCor XCEL device (AtCor Medical, Australia) with a 6m hose to estimate central BP.
Methods and results: A SphygmoCor XCEL device with a 2m hose and a 2nd device with a 6m hose were fitted simultaneously on both arms of 38 subjects (63% men, median age:36.8years (28.5-58.4)). After 5 minutes rest supine, BP was recorded and then cables were changed (cuffs unchanged). Brachial, central BP, augmentation pressure (AP) and augmentation index (Aix) were recorded.
Brachial SBP, DBP, PP, central SBP, DBP PP, AP and Aix from the 2m and 6m device were strongly correlated (R2=0.96, 0.91, 0.78, 0.97, 0.85, 0.95, 0,96

respectively, p<0.001 for all.). Bland Altman plots showed no statistical difference between 2 and 6m for brachial and central SBP, DBP, PP values. However there was a difference between AP and Aix recorded with 2m and 6m hose (-2.65±1.5mmHg, p=0.043 and -5.25±2.93%, p=0.038 respectively).
Conclusion: SphygmoCor Xcel device with a 6m hose, brachial and central BP shows no statistical difference with the standard 2m hose, allowing data to be collected during MRI exams. However other parameters using waveform morphology such as AP and Aix are not so reliable.

P2.20

PERIPHERAL ARTERY DISEASE DETECTED BY ANKLE-BRACHIAL INDEX IS ASSOCIATED TO CARDIAC AND CAROTID ABNORMALITIES IN PATIENTS WITH ARTERIAL HYPERTENSION AND DIABETES

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Few studies evaluated cardiac or carotid abnormalities in patients with arterial hypertension and diabetes according to the presence of peripheral artery disease detected by abnormal ankle brachial index (ABI). For this purpose, we studied 99 diabetic hypertensive patients with abnormal (n=50, ABI≤0.9 or ABI>1.4) and normal (n=49, ABI>0.9 or ≤1.4) ABI values. All patients underwent successively to echocardiography and carotid ultrasound. From echocardiographic study, we analyzed the occurrence of a composite endpoint that included significant cardiac morphological and functional changes. The mean age was 65.4±7 years and 61.6% were women. It was observed a higher prevalence of left atrial enlargement (46%vs.26,5%, p<0.05), left ventricular hypertrophy (LVH) (56%vs.26.5%, p<0.01), left ventricular systolic dysfunction (12% vs.2%, p<0.05) and left ventricular regional kinetics abnormalities (16vs. 0%, p <0.01) in patients with abnormal ABI. The left ventricle mass (178.6±58vs.149.8±46 g/m², p<0.01) was greater in abnormal ABI group. The echocardiographic composite endpoint was more prevalent in abnormal ABI group (84.0%vs.59.2%, p <0.01). Binary logistic regression analysis showed abnormal ABI as an independent predictor for the occurrence of echocardiographic composite endpoint (OR=3.43; 95%CI=1.07-11.0;p<0.05) and the presence of LVH (OR=4.35, 95%CI=0.42-13.52, p=0.01). Carotid ultrasound revealed a higher frequency of plaque occurrence in common carotid arteries in patients with abnormal ABI (69,6%vs.30,4%, p< 0.05). Also, it was noted a higher number of patients from abnormal ABI group with carotid stenosis>50% (26,5% vs.6.3%; p<0.01). In conclusion, in patients with arterial hypertension and diabetes, the presence of peripheral artery disease detected by abnormal ABI was associated to important structural and functional cardiac and carotid modifications.

P3.1

SUB-MAXIMAL EXERCISE BLOOD PRESSURE RELATES TO LEFT VENTRICULAR MASS INDEX, BUT IS DEPENDENT ON LOW AEROBIC CAPACITY

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Background: Exaggerated blood pressure (BP) responses to sub-maximal exercise independently predict cardiovascular (CV) events, mortality and incident hypertension. The aim of this study was to explore relationships between exercise BP, left-ventricular (LV) structure and function and aerobic fitness as potential mechanisms underlying the CV risk associated with sub-maximal exercise BP.
Methods: 149 participants aged 40±2 years, 45% male completed a staged cycle test to estimate physical work capacity (aerobic fitness; PWC170) with concomitant BP measured each two minutes. 2D echocardiography was used to quantify LV mass (obtained from 2D-guided M-mode echo), and LV function (longitudinal strain, haemodynamics).
Results: Early-stage exercise systolic BP was associated with aerobic fitness and LV mass index (r=0.22, and 0.24, p<0.05) and was greater in those performing high stage-relative work (high-fitness) compared with low stage-

relative work (low-fitness) (154±22 vs. 133±15 mmHg, p<0.001). The high-fitness group had greater stroke volume, lower heart rate and LV longitudinal strain compared to the low-fitness group (72±18 vs. 59±15 ml, 61±9 vs. 68±9 bpm, -18±4 vs. -20±3%, p<0.05 for all). Exercise systolic BP was associated with LV mass index independent of resting BP, age and sex in the low-fitness group during stage one of the PWC170 (β=0.13, 95% CI=0.01-0.3) but not in the high-fitness group at any stage.

Conclusions: Sub-maximal exercise systolic BP independently relates to LV mass index in those with low, early stage-relative aerobic capacity. BP measured during submaximal exercise testing (light-intensity) may reveal early changes in hypertension-related organ damage that are more evident in people with low-fitness.

P3.2
ROGOZA INDEX IN HEALHY VOLUNTEERS AS A FUNCTION OF AGE

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Background: Recently, prof Anatoly N Rogoza proposed a new vascular index calculated from one-channel volume sphygmography of brachial artery, Rogoza's Index or Rogoza Index. It may be useful as a new indicator of asymptomatic vascular damage associated with cardiovascular risk in patients with hypertension.

Objective: This study provides just an idea about the Rogoza Index in healthy volunteers as a function of age and sex.

Methods: The object of the study was the set of 120 bpw-files (BPLab format) with oscillometric ambulatory (24-h) blood pressure readings in age-matched group of 60 male and 60 female healthy volunteers. Rogoza Index (ms/cm) was calculated as RWTT/L where RWTT is reflected wave transit time (ms) and L is height (cm).

Results: Averaged 24-h Rogoza Index was $1.1885 - 0.0063 \cdot$ Age ($r=-0.30$) for men and $0.93276 - 0.0025 \cdot$ Age ($r=-0.27$) for women; averaged daytime Rogoza Index was $1.2054 - 0.0067 \cdot$ Age ($r=-0.32$) and $0.90598 - 0.0022 \cdot$ Age ($r=-0.22$) and nightime $1.1412 - 0.0049 \cdot$ Age ($r=-0.24$) and $1.0076 - 0.0033 \cdot$ Age ($r=-0.31$) accordingly. All correlations are significant, $p<0.05$.

There was also a significant difference between Rogoza Indices in male and female subgroups: for 24-h period Rogoza Index was of 0.88 vs 0.80 ms/cm (mean, p=0.002); for daytime of 0.79 vs 0.87 ms/cm (p=0.001); and for nighttime of 0.84 vs 0.90 ms/cm (p=0.002).

Conclusions: Rogoza Index is sex- and age- dependent like other surrogate indices of arterial stiffness.

P3.3
THE CKD273 URINARY PROTEOMIC BIOMARKER FOR EARLY DIAGNOSIS OF DIABETIC NEPHROPATHY DOES NOT INDICATE GENERALISED SUBCLINICAL VASCULAR DISEASE IN NORMOALBUMINURIC TYPE 2 DIABETIC PATIENTS

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Background: Diabetic nephropathy (DN) is associated with cardiovascular disease. Microalbuminuria (MA), its traditional hallmark, reflects both renal and generalised vascular damage. We previously established a urinary proteomic classifier (CKD273) for early DN prediction that correlates with other biomarkers of renal function. Whether CKD273 only indicates renal damage or also generalised vascular disease remains unclear.

Methods: We recruited 80 patients with type 2 diabetes (age, 62±7 years; blood pressure 138±11/79±8mmHg) free from cardiovascular complications with normal renal function (eGFR (88±15 ml/min/1.73m^2) and normoalbuminuria (albumin: creatinine ratio (UACR), 5 (2-16) mg/g). Participants underwent measurement of carotid-femoral pulse wave velocity (PWV; SphygmoCor) and carotid intima media thickness (cIMT; ultrasound). Urinary proteomic analysis was performed by capillary electrophoresis coupled to mass spectrometry.

Results: Mean CKD273 score (-0.234±0.376) was well below the pre-established cut-off (0.343) for diagnosis of DN. There was a trend towards higher CKD273 score in patients with UACR above the median (-0.160±0.372 *vs* -0.318±0.368; *P*=0.061). Median time from diabetes diagnosis was 11 (1-30) years; diabetes control was suboptimal (HbA1c, 62 (45-102) mmol/mol); and participants had subclinical vascular damage (PWV, 9.2 (6.4-12.5) m/s; cIMT, 0.850 (0.543-1.292) mm). As expected we saw a significant

correlation between PWV and systolic blood pressure ($r=0.259$; $P=0.024$). The CKD273 classifier did not correlate with PWV ($r=0.174$; $P=0.132$) or cIMT ($r=-0.096$; $P=0.415$).

Conclusion: CKD273 is not a marker of subclinical macrovascular disease in normoalbuminuric type 2 diabetic patients without overt cardiovascular complications. Our data provide further evidence that CKD273 is a specific marker of renal damage.

P3.4
PULSE WAVE REFLECTIONS AND THEIR DIURNAL CHANGES IN PATIENTS WITH MARFAN SYNDROME COMPARED TO HEALTHY CONTROLS

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Introduction: Patients with Marfan syndrome may suffer from a variety of symptoms, including changes of the cardiovascular system. The aim of this study was to perform ambulatory 24 hour blood pressure and pulse wave measurements in a group of Marfan patients and a group of healthy controls and to analyse wave reflections.

Methods: All measurements were obtained with the Mobil-O-Graph device. Reflection magnitude (RM) was calculated with the inbuilt ARCSolver algorithms and averaged during daytime and nighttime. The study included 27 patients with Marfan syndrome and 27 healthy controls. Matching criteria were age (39 years mean in both groups), sex (14 female) and daytime brachial systolic blood pressure (119 mmHg mean in both groups). Patients with Marfan syndrome were significantly taller than controls (190 cm vs. 174 cm).

Results: Reflection magnitude increased significantly during night in both groups (Marfan: 57.8 day, 66.6 night; controls: 58.6 day, 68.7 night). Differences between groups were not significant both day and night. Correlations between RM and body height were positive in Marfan patients (R=0.36 day, R=0.33 night) but negative in controls (R=-0.47 day, R=-0.66 night), showing a significantly different trend (p<0.01).

Conclusions: There are similar levels and diurnal changes of reflection magnitude in patients with Marfan syndrome and healthy controls, but correlations of RM to body height are significantly different in Marfans and controls. This finding may relate to structural changes of the cardiovascular system associated with Marfan syndrome.

P3.5
TYPE 2 DIABETES EXACERBATES CAROTID ARTERY ECHOGENICITY AND CENTRAL ARTERY STIFFNESS IN MIDDLE-AGED AND OLDER INDIVIDUALS

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Grey scale median of the common carotid artery intima-media complex (IM-GSM) characterizes the composition of the arterial wall and low IM-GSM reflects more generalized atherosclerotic vulnerability. However, it is unclear whether the presence of DM itself affects IM-GSM, similar to that observed with aortic stiffness. We measured IM-GSM and aortic stiffness in middle-aged and older individuals with and without DM. We included 264 individuals with DM (DM+; 67.0±8.9yrs; 83F) and 226 individuals without DM (DM-; 66.3±9.3yrs, 81F). Ultrasound images of the common carotid artery intima-media thickness (IMT) were obtained and IM-GSM was analysed using semi-automated edge-detection software. Aortic stiffness was assessed by carotid-femoral pulse wave velocity (cfPWV) using a SphygmoCor® device. IM-GSM was significantly lower in DM+ than DM- (103.6±1.5au vs 113.4±1.6au, *p*<0.05) after adjustment for age and sex. Adjustments for cardiovascular disease (CVD), hypertension (HT), statin treatment and IMT did not change the finding. cfPWV was significantly higher in DM+ than DM- (10.2±1.0m/s vs 9.1±1.0m/s, *p*<0.05) after adjustment for age, sex and mean arterial pressure. Adjustments for CVD, HT, statin treatment and heart rate did not change the finding. With further adjustment for HbA1c, cfPWV became similar between the groups, but IM-GSM remained lower in DM+ than DM- (*p*<0.05). These results demonstrate that the presence of DM