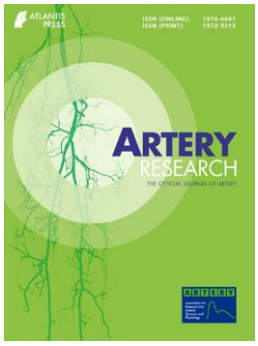

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P3.5: URINARY PROTEOMICS AND VASCULAR PHENOTYPING IN A COHORT OF TYPE 2 DIABETIC PATIENTS AT HIGH CARDIOVASCULAR RISK

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P3.3
CARDIAC 82RB-PET/CT REVEALS MICROVASCULAR DYSFUNCTION IN ASYMPTOMATIC PATIENTS WITH TYPE 2 DIABETES

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Aims: Coronary flow reserve (CFR) and coronary calcium score (CCS) represent different aspects of atherosclerosis. We examined the prevalence and predictors of reduced CFR and high CCS in type 2 diabetes (T2DM) patients free of overt cardiovascular disease compared to non-diabetic controls.
Methods: Cross-sectional study of 60 T2DM patients stratified by normoalbuminuria (<30mg/24h) (n=30; age (mean±SD) 60.9±10.1 years; 40% women) and albuminuria (≥30mg/24h) (n=30; 65.6±4.8 years; 27% women) randomly selected from our outpatient clinic and 30 non-diabetic controls (59.8±9.9 years; 40% women) undergoing cardiac ^{82}Rb PET/CT.
Results: In controls, normoalbuminuric, and albuminuric patients CFR was 3.0±0.8, 2.6±0.8, and 2.0±0.5 (P<0.001); frequency of reduced CFR (<2.5) was 16.7, 40.0, and 83.3% (P<0.001); and CCS (median[IQR]) was 0 [0-81], 36[1-325], and 370[152-1025] (P<0.001), respectively. After comprehensive adjustment, CFR remained significant higher (P=0.023) and CCS significant lower (P=0.020) in normoalbuminuric *vs.* albuminuric patients. The univariate association between CFR and CCS was significant in control subjects (R^2=0.23; P=0.007), but not in normoalbuminuric or albuminuric patients (R^2≤0.10; P≥0.09). However, after adjustment lower CFR was related to higher CCS, UAER, age, heart rate, lower HbA_{1C}, and male gender (P≤0.047) in albuminuric patients; and to female gender (P=0.024) in normoalbuminuric patients. Higher CCS was related to lower CFR and UAER (P≤0.048) in albuminuric patients; and to higher HbA_{1C} in controls (P=0.033).
Conclusion: T2DM patients free of overt cardiovascular disease had a high prevalence of coronary microvascular dysfunction, especially with concomitant albuminuria. This was not explained by elevated CCS. Prospective studies are needed to show the prognostic significance.

P3.4
FUNCTIONAL CHANGES IN THE CAROTID ARTERY ASSOCIATED WITH AN ACUTE BOUT OF RESISTANCE EXERCISE

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Background: Despite the popularity of strength training, few studies have examined the impact of an acute bout of resistance exercise upon functional characteristics of the carotid arterial wall.
Methods: Two-dimensional short-axis images of the common carotid artery (CCA) were collected in fifteen healthy males (age: 21 ± 3 years; height: 176.5 ± 6.2 cm; mass; 80.6 ± 15.3 kg; leg-press 1RM: 317 ± 72 kg) before, during, and immediately after (7-12 seconds) an isometric hold of the double-leg press exercise at 30% and 60% of one repetition maximum (1RM) and analysed for peak circumferential strain (PCS), systolic and diastolic strain rate (S-SR and D-SR, respectively). Additionally, beat-by-beat blood pressure was measured throughout.
Results: No differences were revealed between 30% and 60% 1RM. During exercise, systolic and diastolic blood pressure (SBP and DBP respectively) increased significantly from baseline (p<0.01). Immediately post, SBP returned to baseline levels whereas DBP fell significantly below baseline (p<0.01) In contrast, PCS and S-SR both decreased significantly from baseline during resistance exercise (p<0.01) and were significantly greater than baseline levels during recovery. D-SR did not change throughout (p=0.252).
Conclusions: Resistance exercise causes an acute decrease in the relative expansion and lengthening velocity of the carotid arterial wall during effort, independently of exercise intensity. During recovery, PCS and S-SR of the CCA wall are increased compared with baseline, suggesting that the acute stress of resistance exercise has lasting effects on arterial function. This may be an important mechanism for the adaptation of arterial function to resistance exercise.

P3.5
URINARY PROTEOMICS AND VASCULAR PHENOTYPING IN A COHORT OF TYPE 2 DIABETIC PATIENTS AT HIGH CARDIOVASCULAR RISK

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Background: We have previously described a urinary proteomic classifier (CKD273) for diagnosis of diabetic nephropathy (DN). Whether CKD273 only highlights renal damage or reflects generalised vascular damage in diabetic patients remains unclear.
Methods: We recruited 45 Type 2 diabetic patients: 15 normoalbuminuric; 15 with MA and 15 with DN: albumin:creatinine ratio 1.1 (0-3.3), 7.7 (2.6-22.5), 124.5 (0.8-412.6) mg/mmol; estimated glomerular filtration rate (eGFR); 74 (46-125), 69 (49-100), 37 (6-60) ml/min/1.73m^2. Participants underwent pulse wave analysis assessment of heart-rate corrected augmentation index (AIx@75) and ultrasound measurement of carotid intima-media thickness (c-IMT). Urine samples were analysed using capillary electrophoresis coupled to mass spectrometry (CE-MS).
Result: There was no difference in age (61±8, 64±6 and 59±7 years; p=0.130), body mass index (34.4±6.2, 35.1±8.1, 34.4±6.7 kg/m^2; p=0.955) or blood pressure (144±15/83±7, 149±20/83±10, 148±16/82±12 mmHg; p=0.765/0.910) between groups. Participants were at high CV risk (Framingham score: 30±11, 38±12, 32±12; p=0.141; ASSIGN score: 36±15, 43±15, 39±17; p=0.415) and had subclinical vascular damage (AIx@75: 22 (7-38), 23 (13-21), 25 (4-35)%; p=0.993; c-IMT: 0.723 (0.563-1.276), 0.760 (0.614-1.082), 0.704 (0.581-0.986)mm; p=0.305) independent of eGFR (r=0.259, p=0.086 for c-IMT; r=0.082 p=0.598 for AIx@75). Despite similar CV risk and vascular phenotypes the CKD273 classifier was significantly different between the groups (-0.169±0.373, 0.421±0.467, 0.765±0.434; p=0.002) but not related to c-IMT(r=0.075, p=0.747) or AIx@75 (r=-0.299, p=0.200).
Conclusion: CKD273 distinguished normoalbuminuria from MA and DN independent of vascular phenotype. Neither traditional renal markers nor a novel proteomic classifier appear to fully explain the vascular damage in our cohort.

P3.6
AGE-DEPENDENT DIFFERENCES IN CAROTID ARTERY CIRCUMFERENTIAL STRAIN MEASUREMENTS, INDEPENDENT OF BLOOD PRESSURE, AEROBIC FITNESS CAPACITY, GENDER AND CONVENTIONAL NON-INVASIVE PARAMETERS OF VASCULAR STIFFNESS

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Background: Aging is associated with increased carotid stiffness. Functional impairment of the arterial wall may occur before structural wall changes during the atherosclerotic process and be detectable before symptoms of cardiovascular disease (CVD). Two-dimensional ultrasound imaging of vascular tissue motion and deformation (Strain) during the cardiac cycle using speckle tracking may be superior to classical markers of arterial stiffness.
Purpose: To describe the effectiveness of non-invasive methods for the evaluation of elastic properties of the arterial wall between age groups.
Method: 28 healthy volunteers aged 18-35 yrs (n=12, ≈25 yr) or 55-75 yrs (n=16, ≈63 yr) were recruited for this study. Ultrasonographic imaging of the common carotid artery was performed in the circumferential axis and strain was calculated by speckle tracking software. Conventional elasticity parameters (elastic modulus (Ep), and Beta-stiffness (β)) were calculated using B-mode guided M-mode sonography and non-invasive blood pressure measurements.
Results: Resting carotid pulse pressure (Young=46 +/- 8 mmHg vs. Old=51 +/- 12 mmHg) and the systolic to diastolic pressure ratio (Young=1.586 +/- 0.169 vs. Old=1.583 +/- 0.149) where not significantly different between groups. Strain and strain-rate were significant different between age groups, even after controlling for gender, aerobic capacity (VO2peak), β, and Ep.
Conclusion: Strain appears to be a superior measure of arterial stiffness markers when comparing age-dependent changes in vascular stiffness. VO2peak, gender, β, and Ep do not explain age-dependent differences in circumferential carotid arterial strain by two dimensional speckle tracking imaging.