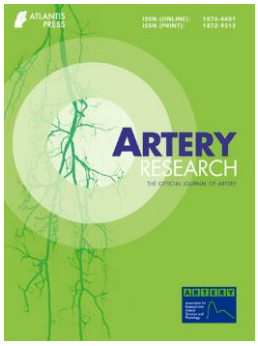

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P4.14: THE EFFECT OF GENDER AND BODY SIZE ON ARTERIAL HAEMODYNAMICS AT REST AND DURING EXERCISE

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In the population-based Maastricht Study, we evaluated the associations between carotid stiffness (cPWV) and ΔPWV, and glucose metabolism status (GMS). Additionally, we investigated the interdependency of cPWV and ΔPWV in their association with GMS as to find out whether remodeling may act differentially upon cPWV and ΔPWV.
Methods: The study consisted of 594 individuals (312 normal glucose metabolism [NGM], 98 impaired glucose metabolism [IGM] and 184 T2D). cPWV and ΔPWV were determined by ultrasonography and tonometry. Regression analyses were used to investigate the associations of cPWV and ΔPWV with GMS (NGM as reference). Models were adjusted for age, sex, mean arterial pressure (MAP), and central pulse pressure, cPWV or ΔPWV as appropriate, and additionally for: anti-hypertensive medication, prior cardiovascular disease, estimated glomerular filtration rate, or body mass index.
Results: After adjustment for age, sex and MAP, T2D was associated with greater cPWV (β (95% CI; 0.284 (0.012-0.556)) and ΔPWV (0.299 (-0.005-0.603)). Further adjustments did not change these associations. After additional adjustment for cPWV or ΔPWV the associations with ΔPWV and cPWV attenuated (0.209 (-0.083-0.502) and 0.208 (-0.053-0.470), respectively). IGM was not associated with either cPWV or ΔPWV.
Conclusions: In T2D both cPWV and ΔPWV are increased. The associations were only partially interdependent, which suggests that remodeling impacts on both stiffness and its pressure-dependency.

P4.12
AGE, WAIST CIRCUMFERENCE AND BLOOD PRESSURE ARE ASSOCIATED WITH SKIN MICROVASCULAR FLOWMOTION: THE MAASTRICHT STUDY

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Introduction: Skin microvascular flowmotion (SMF) plays an important role in optimal delivery of nutrients/oxygen to tissue and in maintaining normal peripheral resistance. It is unclear however, which determinants influence SMF. Therefore, we investigated which cardiovascular risk factors are associated with SMF.
Methods: We measured SMF in 506 participants without a prior cardiovascular event. SMF was investigated using Fourier transform analysis of skin laser Doppler flowmetry. The associations of the cardiovascular determinants age, sex, waist circumference, 24-h systolic blood pressure (SBP), total-to-HDL cholesterol, fasting plasma glucose (FPG), and cigarette smoking with SMF were analyzed by use of multiple linear regression analysis.
Results: The mean age of the study population (n=506) was 58.8 ± 8.5 years, 260 (51.4%) were men, mean waist circumference was 95.7 ± 13.0 cm, mean 24-h SBP was 119 ± 12 mmHg, and 73 (14.4%) were smokers. After adjustment for cardiovascular risk factors and medication, per 1SD higher age SMF was 0.17 SD (95%CI: 0.08; 0.26; $P < 0.001$) higher; per 1SD higher waist circumference SMF was -0.12 SD (-0.23; -0.01; $P = 0.03$) lower; per 1SD higher 24-h SBP SMF was 0.17 SD (0.07; 0.27; $P < 0.001$) higher. No other associations with SMF were found.
Conclusions: Age and blood pressure were directly, while waist circumference was inversely associated with SMF. The exact mechanisms underlying these findings remain elusive. The present data support the hypothesis that microvascular dysfunction, specifically, impaired SMF, plays a role in the development of obesity-related insulin resistance and hypertension.

P4.13
TYPE 2 DIABETES IS ASSOCIATED WITH ALTERED CAROTID ARTERY MECHANICS INDEPENDENTLY OF AGEING AND MEAN ARTERIAL PRESSURE—THE MAASTRICHT STUDY

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Introduction: Type 2 diabetes (T2D) is characterised by accelerated vascular ageing, which changes arterial wall structure and hence artery mechanics (e.g., pressure-area (P-A)). Pulse wave velocity (PWV) is affected by both blood pressure and changes in wall mechanics. To better capture underlying changes in wall mechanics in T2D, we aimed to disentangle the vascular ageing phenomena (characterised by PWV) from pressure effects.
Methods: We studied young (<55y) and older (>70y) individuals without and with T2D matched at the group level for age, sex and MAP (n=29 each) from the Maastricht Study. Non-linear P-A curves were derived from carotid tonometry and echo-tracking, using Langewouters-model fits. Isobaric PWV (Bramwell-Hill) was determined at MAP.
Results: In individuals without T2D, the average P-A curve in older, as compared to younger individuals, was shifted rightward (diastolic area (A_d), mean±SD: 48.8±10.3 vs. 42.5±8.3mm^2, p=0.003), which led to higher PWV (9.9±2.0 vs. 7.4±1.6m/s, p<0.001). Next, in younger individuals with T2D, as compared to those without, a similar pattern was found (A_d: 45.7±9.6 vs. 42.5±8.3mm^2, p=0.068 and PWV: 8.2±1.6 vs. 7.4±1.6m/s, p=0.072). Finally, in older individuals with T2D, as compared to those without, the P-A curve was again shifted rightward (A_d: 53.1±10.4 vs. 48.8±10.3mm^2, p=0.034), but PWV was not significantly different (10.1±1.7 vs. 9.9±2.0m/s, p=0.29).
Conclusion: Independently of blood pressure, both ageing and T2D have a dilatory effect on carotid arteries, with ageing also clearly demonstrating stiffening. Although T2D is associated with additional stiffening in individuals younger than 55y, this was not observed in individuals older than 70y.

P4.14
THE EFFECT OF GENDER AND BODY SIZE ON ARTERIAL HAEMODYNAMICS AT REST AND DURING EXERCISE

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Aim: The positive association between body size and blood pressure (BP) is well recognised. However, not all overweight individuals are hypertensive. This study aimed to examine the influence of body size and gender on the haemodynamic mechanisms driving systolic BP (SBP) at rest and during exercise, in young adults.
Method: Detailed anthropometric, biochemical and haemodynamic measurements including BP, cardiac index (CI) and peripheral vascular resistance (PVR) were obtained in 2497 untreated individuals (23±6 years) at rest. Subjects were classified as normal-weight (NW; BMI <25) or overweight (OW; BMI>25). A sub-set of 86 individuals (29±6 years) undertook steady-state, sub-maximal cycling exercise, with detailed haemodynamic measurements re-assessed.
Results: At rest, a positive association was found between SBP and cardiac index (CI) in NW but not OW males and females (p<0.001 for both). In contrast, a positive association was found between SBP and PVR in OW but not NW males (P<0.001 for both). Although BMI did not correlate with BP during exercise, body fat (BF) % was inversely associated with exercise-induced changes in PP, even after adjustment for gender. A higher BF% was also associated with a poorer maximum dilatory response to ischaemia.
Conclusion: The primary haemodynamic mechanisms driving SBP differ depending on body size in young adults. BF% may be a more useful tool than BMI to further examine the impact of body size on BP in young adults. Structural differences in resistance vessels may underlie the association between body size and BP responses to exercise.

P5.1
PROTEOMIC ANALYSIS ON HUMAN ARTERIAL TISSUE: RELATIONS TO ARTERIAL STIFFNESS

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We hypothesized that arterial stiffness is associated with changes in the arterial protein profile, particularly in relation to extracellular matrix (ECM) components, and aimed at determining differentially expressed proteins in human arterial tissue by quantitative proteome analysis in patients with different degrees of arterial stiffness. Arterial stiffness, assessed by carotid-femoral pulse wave velocity (PWV), central blood pressure and augmentation index by pulse wave analysis, as well as carotid intima-media thickness were measured the day prior to surgery in a group of patients undergoing coronary artery bypass grafting. Protein extracts of well-defined, homogenous, non-atherosclerotic individual samples of the left mammary artery from 10 of these patients with high PWV and 9 with low PWV, were compared by quantitative proteome analysis, using iTRAQ-labeling and nano-LC-MSMS. Of 504 quantified proteins, 28 were differentially expressed between groups with high and low PWV (p<0.05). Six out of eight members of the extracellular matrix family of small leucine-rich repeat proteoglycans displayed significant or borderline significant differences between the two groups (p<0.001, Fisher's Exact Test). Only one other of 43 identified ECM proteins were differentially regulated (collagen alpha-1(VIII)). Several proteins related to smooth muscle cell function and structure were found in different amounts between the two groups.