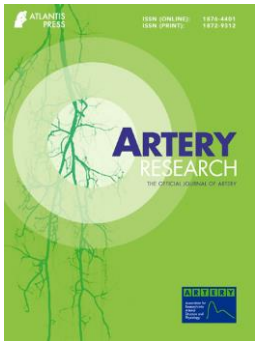

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P9.12: THE RELATIONSHIP BETWEEN RETINAL VESSEL CALIBRE AND NOCTURNAL DIPPING STATUS: THE SABPA STUDY

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Chronic low grade inflammation and decreased glomerular characterized by CysC level may contribute to increased arterial stiffness in renal transplant recipients.

P9.8
ARTERIAL STIFFNESS AND PARAOXONASE ACTIVITY IN RENAL TRANSPLANT RECIPIENTS

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Increased lipid peroxidation and dyslipidemia are well known cardiovascular risk factors in renal transplanted (Tx) patients. Human serum paraoxonase (PON1) is the most potent high-density lipoprotein (HDL)-associated antioxidant enzyme. Previously decreased PON1 activity was shown in Tx recipients. Arterial stiffness parameters such as aortic augmentation index (AIx) and pulse wave velocity (PWV) are established markers of cardiovascular mortality in these patients. However, the association between PON activity and arterial stiffness has not been studied.
131 Tx patients and 63 age- and gender-matched healthy controls (C) were enrolled in the study. Lipid parameters and PON1 paraoxonase and arylesterase activities were measured. Arterial stiffness parameters (Aix, PWV, pulse pressure (PP), systolic and diastolic area indexes (SAI and DAI) and mean arterial pressure (MAP) were determined by arteriograph (Tensiomed).
Significantly lower paraoxonase and arylesterase activities were found in Tx patient compared to C subjects. Significantly higher MAP, PP, AIx and PWV, while significantly lower DAI and SAI were detected in Tx patients compared to C subjects. A significant negative correlation was found between arylesterase activity and PWV in Tx patients. Significantly higher total cholesterol (TC) and low-density cholesterol (LDL-C), while significantly lower HDL-C levels were found in Tx patients compared to C. Significant positive correlations were found between TC and PWV, and between LDL-C and PWV, while there were significant negative correlation between TC and DAI and between LDL-C and DAI in Tx patients.
Dyslipidemia and decreased antioxidant capacity characterized by PON1 activity may contribute to increased arterial stiffness in kidney transplant recipients.

P9.9
ALTERED DEPENDENCE OF AORTIC PULSE WAVE VELOCITY ON TRANSMURAL PRESSURE IN HYPERTENSION REVEALING STRUCTURAL CHANGE IN THE AORTIC WALL

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Aortic pulse wave velocity (aPWV), a major prognostic indicator of cardiovascular events, may be augmented in hypertension as a result of the aorta being stretched by a higher distending blood pressure or by a structural change. We used a novel technique to modulate intra-thoracic pressure and thus aortic transmural pressure (TMP) to examine variation of intra-thoracic aPWV with TMP in hypertensive ($n=20$, mean$\pm$SD age 52.1$\pm$15.3 years, BP 159.6$\pm$21.2/92.0$\pm$15.9 mmHg) and normotensive ($n=20$, age 55.5$\pm$11.1 years, BP 124.5$\pm$11.9/72.6$\pm$9.1 mmHg) subjects. aPWV was measured using dual Doppler probes to insonate the right brachiocephalic artery and aorta at the level of the diaphragm. Resting aPWV was greater in hypertensive compared to normotensive subjects (897$\pm$50 cm/s versus 784$\pm$43 cm/s, $P<0.05$). aPWV was equal in hypertensive and normotensive subjects when measured at a TMP of 96 mmHg. However, dependence of aPWV on TMP in normotensive subjects was greater than in hypertensive subjects (9.6$\pm$1.6 versus 3.8$\pm$0.7 cm/s per mmHg increase in TMP respectively, means$\pm$SEM, $P<0.01$). This experimental behaviour was best explained by a theoretical model incorporating strain induced recruitment of stiffer fibres in normotensive subjects and fully recruited stiffer fibres in hypertensive subjects. These results explain previous contradictory findings with respect to isobaric aPWV in hypertensive compared to normotensive subjects. They suggest that hypertension is associated with a profound change in aortic wall mechanical properties possibly due to destruction of elastin leading to less strain induced stiffening and predisposition to aortic dissection.

P9.10
EXCESS PRESSURE IS INDEPENDENTLY RELATED TO LV MASS AND CONCENTRIC GEOMETRY IN ESSENTIAL HYPERTENSION

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Arterial blood pressure (BP) can be decomposed as the sum of reservoir (Pres) and excess (Pexc) pressure. Pres is constant along the arteries and results in the minimum left ventricular (LV) hydraulic work, while Pexc is linked to the excess work of the heart. We evaluated the relationship of Pres and Pexc with cardiac structural features in hypertension
Methods: 446 never-treated hypertensives (mean age 48$\pm$11 years, 62% men, BP 148/92$\pm$16/10 mmHg) were evaluated through echocardiography, radial applanation tonometry (SphygmoCor) and 24-h ambulatory BP monitoring (SpaceLabs).Amplitudes and areas of Pres and Pexc were calculated using proprietary algorithms based on central pressure curves.LV hypertrophy was defined as LV mass >51 g/m2.7. Relative wall thickness (RWT) was expressed as: 2 x posterior wall thickness/LV diameter, and concentric geometry as: RWT>0.43
Results: Pexc and Pres were correlated with LV mass ($r=0.15$ and 0.17, respectively; both $p<0.01$) and RWT ($r=0.16$, $p<0.01$; $r=0.11$, $p=0.02$). After adjustment for age, sex, body mass index and 24-h systolic BP, subjects with LV hypertrophy had higher Pexc (18.4$\pm$10.3 vs 17.0$\pm$5.4 mmHg, $p=0.02$), but not Pres (39.8$\pm$12.6 vs 37.5$\pm$24.2 mmHg, $p=0.09$). In a multivariate model adjusting for multiple cardiovascular risk factors and other confounders, an increased Pexc independently predicted both LV mass ($\beta=0.08$, $p=0.04$, multiple $R=0.58$) and RWT ($\beta=0.10$, $p=0.02$, multiple $R=0.40$), while these relationship were not observed for Pres
Conclusions: LV mass and RWT are linearly and independently associated to Pexc, but not to Pres in untreated hypertension. Structural cardiac abnormalities may be related to an increase in Pexc

P9.11
ANGIOTENSIN-CONVERTING ENZYME ACTIVITY IN NORMOTENSIVE WHITE AND AFRICAN MEN

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Background: The renin-angiotensin system (RAS) is a proteolytic cascade which consists of multiple enzymes and effector peptides. Angiotensin-Converting Enzyme (ACE) is one of the major enzymes in the RAS and catalyzing the decapeptide Angiotensin I to the octapeptide Angiotensin II. There are other non-RAS effects of ACE like mediating and/or modulating inflammation. We aimed to explore the ACE activity in white and black South African men and establish the associations with a marker of inflammation.
Methods: In a bi-ethnic sample ($n=30$) consisting of white and African men, the RAS-Fingerprinting was determined with LC-MS/MS quantification of Angiotensin peptides. Blood pressure and other variables were determined with known methods. Soluble urokinase Plasminogen Activator Receptor (suPAR) levels were determined using the suPARnostic® ELISA kit.
Results: From the RAS-Fingerprinting and ACE activity (product-substrate ratio) it is evident that ACE activity is significantly lower in the normotensive African men compared to white men. The higher ACE activity found in the white men associated positively with reactive oxygen species (ROS) ($r=0.59$; $p=0.02$) and with suPAR ($r=0.63$; $p=0.01$) but not in the African men.
Conclusions: The ACE activity is higher in the white men and it seems that ACE may drive inflammation only in the white participants.

P9.12
THE RELATIONSHIP BETWEEN RETINAL VESSEL CALIBRE AND NOCTURNAL DIPPING STATUS: THE SABPA STUDY

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Introduction: The relationship between a non-dipping blood pressure profile and retinal vessel calibre is not well established. A sustained increase in

nocturnal arterial pressure may induce changes throughout the vascular tree, including the retinal microvasculature. We therefore explored the relationship between retinal vessel calibre and dipping status in a cohort of African and Caucasian teachers.
Methods: 68 African and 81 Caucasian men were selected from those taking part in the follow-up phase of the SAPBA study. 24hr Ambulatory blood pressure measurements and dipping status were determined. The percentage mean arterial pressure (% MAP) dipping was calculated as: (diurnal MAP - nocturnal MAP)/diurnal MAP x 100. Retinal images were captured and the central retinal artery equivalent, central retinal vein equivalent (CRVE) and subsequent arteriolar-venular ratio (AVR) determined.
Results: African men demonstrated higher 24hr MAP and poorer % MAP dipping compared to Caucasian men. When sub-divided into non-dippers and dippers, African non-dippers demonstrated a reduced AVR and an increased CRVE ($p<0.001$) compared to their dipper counterparts. The AVR was positively ($R^2=0.34$, $\beta=0.38$; $p=0.001$) while the CRVE was negatively ($R^2=0.24$, $\beta=-0.50$; $p<0.001$) associated with % MAP during dipping. CRVE maintained a negative association with dipping status (non-dipper, yes/no) ($R^2=0.21$, $\beta=-0.38$; $p=0.001$). These associations were independent of 24hr MAP. No associations were observed in the Caucasian men.
Conclusion: In this group of African men, a non-dipping blood pressure profile was associated with a reduced AVR and larger CRVE, reflecting microvascular deterioration as a result of prolonged periods of increased arterial pressure.

P9.13
A STUDY ON AMBULATORY MEASUREMENT OF CENTRAL HEMODYNAMICS ON HEALTHY INDIVIDUALS WITH NO CARDIOVASCULAR RISK FACTORS

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Introduction /Aim: Central blood pressure (BP) parameters arise as a novel tool in clinical practice. Mounting evidence demonstrates that central systolic BP has a closer correlation with target organ damage and a stronger value for predicting cardiovascular events. However, data regarding ambulatory measurement of central BP parameters and pulse wave velocity (PWV) are scarce including both healthy individuals and patients at risk for cardiovascular disease. In the latter group, a recent study has shown that central BP falls during night but less compared to peripheral BP. We sought to investigate whether this phenomenon is also observed in healthy individuals.
Methods: We recruited 50 healthy volunteers and performed 24h ambulatory measurement of PWV and central systolic BP using the validated Mobil-O-graph device.
Results: As expected, PWV correlated with 24 hour mean peripheral and central BP. However the strongest correlation presented between day PWV and day systolic BP ($r=0.441$, $p=0.001$). In addition, PWV decreased significantly during night following both peripheral and central BP ($p<0.001$). We also observed that central systolic BP exhibits a similar dipping profile compared to peripheral systolic BP but to a significant lesser degree ($p=0.001$).
Conclusion: The 24h ambulatory measurement of central hemodynamics provides important information regarding central BP and PWV.Central systolic BP decreases similarly, though at a smaller scale, compared with peripheral BP throughout the night, a phenomenon observed in both healthy individuals and patients at cardiovascular risk. Whether this phenomenon is a physiological response or an index of vascular pathology remains to be further investigated.

P9.14
INCREASED CAROTID ARTERY STIFFNESS DECREASES MEASURED CAROTID-FEMORAL PULSE WAVE VELOCITY AND EFFECTS THE ESTIMATION OF AGE DEPENDENCY OF AORTIC STIFFNESS

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Carotid-femoral pulse wave velocity (PWV_{cf}) is promoted as a clinical marker of aortic stiffness and is a measure utilising two sites where the pulse can be obtained non-invasively. PWV_{cf} calculation requires subtraction of the heart-to-carotid pulse transit time from the heart-to-femoral pulse transit time. This implies that an independent increase in carotid stiffness (PWV_c) will decrease PWV_{cf}. This study aims to quantify the effect of age dependent increase in PWV_c on PWV_{cf} compared to the age dependent increase in aortic stiffness, determined as aortic PWV (PWV_a). Comparison was made by using data from previous studies reporting increase in stiffness with age of the carotid artery[1] ($PWV_c=0.0009\times age^2-0.0465\times age+6.2$ m/s), femoral artery[2] ($PWV_f=0.0443\times age+7.18$ m/s), and PWV^3_{cf} ($PWV_{cf}=0.001\times age^2-0.017\times age+5.49$ m/s). Using these values and average distances for aortic, carotid, and femoral arterial lengths, PWV_a was calculated as a function of age ($PWV_a=0.0016\times age^2-0.0711\times age+5.43$ m/s). Comparison of PWV_a and PWV_{cf} demonstrates that the age dependency of PWV (m/s/year) is not the same when determined from PWV_{cf} and PWV_a. From 20 to 55 years, PWV_{cf} overestimates the age dependency of PWV_a by an average of 29%. From 55 to 90 years, PWV_{cf} underestimates age dependency of PWV_a by an average of 17%. These findings suggest that increased carotid stiffness can compromise the potential prognostic power of PWV_{cf} measurements.
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P9.15
THE ROLE OF LUNG FUNCTION ON ADOLESCENTS' BLOOD PRESSURE TRAJECTORIES IN A MULTI-ETHNIC COHORT: THE DETERMINANTS OF ADOLESCENTS SOCIAL WELLBEING AND HEALTH (DASH) STUDY

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Objectives: To investigate the relationship between baseline lung function (LF) and changes in blood pressure (BP) in multi-ethnic adolescent schoolchildren.
Methods: A multi-ethnic cohort (the DASH study) of 2525 children (80% ethnic minorities), aged 11-13y at baseline, were followed-up two years later (14-16y). Demographic details of ethnicity, socio-economic position and smoking were collected via self-completed questionnaires. Trained nurses measured BP (mean of last 2 of 3 readings) and anthropometry at both waves and spirometry (interpreted using Global Lungs Initiative reference equations) at baseline only. Associations between change in systolic and diastolic BP(ΔsBP, ΔdBP in mmHg) and lung function (LF) z-scores were assessed in multivariable linear regression models. The influence of correlates (age, room temperature, ethnicity, change in Z-scores of: body mass index, height, trunk length) on the LF-BP relationship was investigated.
Results: In males, adjusted for age and room temperature, one Z-score increase in FEV1 was associated with lower BP change between 11-13y and 14-16y (ΔsBP -1.09 ($p<0.001$) and ΔdBP -0.46 ($p=0.03$)); FVC was associated with ΔsBP only (-0.475, $p=0.004$). In females, similar patterns were seen for FEV1, with FVC associated with ΔdBP only. Adjustment for FEV1 (and to a lesser extent FVC) attenuated ethnic differences in BP changes for some groups (e.g. abolishing differences for Black Africans compared to Whites), but not others (e.g. South Asians), while other covariates did not.
Conclusions: FEV1, and to a lesser extent FVC, are correlates of BP changes in adolescence. Differences in adolescent LF may contribute to ethnic differences in BP trajectories during youth.

P10.1
ARTERIAL STIFFNESS AND THE "PHENOTYPE" METABOLIC SYNDROME: A CROSS-COUNTRY STUDY. THE MARE CONSORTIUM

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Specific clusters of metabolic syndrome (MetS) components impact differentially on arterial stiffness, indexed as pulse wave velocity (PWV). Of note,