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### **P47: TETRAHYDROBIOPTERIN AND MARKERS OF OXIDATIVE STRESS IN A YOUNG BI-ETHNIC POPULATION: THE AFRICAN-PREDICT STUDY**

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**Conclusions:** In hypertensive patients age appears to be the major determinant of TOD, with central SBP, and marginally peripheral SBP, PWV and Alx, also playing a significant role. Our results suggest that estimation of 24-hour central hemodynamics and arterial stiffness in ambulatory conditions may help improve the individualized assessment of the BP-associated TOD.

#### References

- [1] Omboni S, Posokhov IN, Parati G, Avolio A, Rogoza AN, Kotovskaya YV, Mulè G, Muiesan ML, Orlova IA, Grigorieva EA, Cardona Muñoz E, Zelveian PH, Pereira T, Peixoto Maldonado JM. Vascular Health Assessment of The Hypertensive Patients (VASOTENS) Registry: Study Protocol of an International, Web-Based Telemetering Registry for Ambulatory Blood Pressure and Arterial Stiffness. *JMIR Res Protoc* 2016;5:e137.
- [2] Omboni S, Posokhov IN, Kotovskaya YV, Protogerou AD, Blacher J. Twenty-Four-Hour Ambulatory Pulse Wave Analysis in Hypertension Management: Current Evidence and Perspectives. *Curr Hypertens Rep* 2016;18:72.

#### P45

##### RENIN AT DIFFERENT PHYSICAL ACTIVITY LEVELS IN A BI-ETHNIC POPULATION: THE AFRICAN-PREDICT STUDY

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**Background and objectives:** It is widely accepted that regular physical exercise reduces the BP, particularly in hypertensive individuals. It is recommended in the prevention of hypertension to assist in BP control. The BP lowering mechanisms of exercise remain largely elusive, we therefore evaluated the RAAS as a regulator of arterial BP.

**Methods:** The sub-study was embedded in the African Prospective study on the Early Detection and Identification of Cardiovascular disease and Hypertension (African- PREDICT) and included 111 white and 99 black participants aged 20–30 years.

Office- and central blood pressure as well as other cardiovascular variables were measured. Renin was analysed with an ELISA- and aldosterone with a RIA kit.

**Results:** The BP decreased significantly in the white but not in the black participants when tertiles for physical activity levels were compared. The total renin (renin + prorenin) level decreased significantly from 789.2 to 700.0 pg/ml ( $p = 0.04$ ) in the white but not in the black participants (821.6 to 806.6 pg/ml;  $p = 0.84$ ) with high physical activity level. In multiple regression analysis, in the white participants, MAP and aldosterone contributed significantly and independently to the low renin in the third percentile for physical activity level. This was not evident in the black participants.

**Conclusion:** Only in white participants high physical activity levels were associated with decreased blood pressure and the RAAS may be an important mechanism in this regard.

#### P46

##### ARTERIAL STIFFNESS IN RELATION TO BIRTH CHARACTERISTICS IN THE JAMAICAN 1986 BIRTH COHORT

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**Background:** We tested the association between birthweight and arterial stiffness measured by aortic pulse wave velocity (PWV) and cardio-ankle vascular index (CAVI) in a birth cohort of 30 year old Jamaicans.

**Methods:** Participants were from the 1986 Jamaica Birth Cohort. Arterial stiffness was measured as PWV using Arteriograph 24h™ and CAVI with VaSera™ devices. Current anthropometry (height, weight, waist and hip

circumference), and brachial blood pressure measures were linked to birthweight and other early life markers of CVD risk (birth-length and maternal height). Linear regression models were used for analysis.

**Results:** Analyses included 235 participants 44% male, with mean  $\pm$  SD age  $29.8 \pm 0.7$  years, birthweight  $3.1 \pm 0.0$  kg, PWV  $6.3 \pm 0.1$  m/s and CAVI  $6.3 \pm 0.1$ . Bivariate models showed men had higher arterial stiffness ( $p < 0.001$ ). Maternal height ( $p = 0.031$ ), waist/hip ratio ( $p = 0.019$ ), BMI ( $p = < 0.001$ ) and blood pressure (systolic and diastolic) ( $p < 0.001$ ) were associated with PWV, but only BMI ( $p < 0.001$ ) was associated with CAVI. There was no association between birthweight and PWV or CAVI,  $p = 0.38$  and  $p = 0.41$  respectively. In multivariable models, associations between birthweight and PWV and CAVI did not change after controlling for gender, BMI, and SBP. Positive associations (coef  $\pm$  SE) between PWV and BMI ( $0.03 \pm 0.01$   $p = < 0.01$ ) and SBP ( $0.03 \pm 0.01$   $p = 0.001$ ) remained significant; as did the negative associations for BMI and CAVI ( $-0.04 \pm 0.01$   $p < 0.001$ ).

**Conclusion:** Men had higher arterial stiffness even when controlling for blood pressure and the associations of blood pressure and BMI with PWV were positive whereas and BMI with CAVI was negative. Neither arterial stiffness measure was associated with birthweight.

#### P47

##### TETRAHYDROBIOPTERIN AND MARKERS OF OXIDATIVE STRESS IN A YOUNG BI-ETHNIC POPULATION: THE AFRICAN-PREDICT STUDY

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**Background/Objectives:** Tetrahydrobiopterin (BH4) is a cofactor for nitric oxide synthase (NOS). Oxidative stress, reported in black populations (1), may lead to the oxidation of BH4, the uncoupling of eNOS, decreased NO and increased superoxide levels (2,3). We compared BH4 and markers of oxidative stress and their association, between black and white cohorts.

**Methods:** In the African-PREDICT study, we included black ( $n = 300$ ) and white ( $N = 297$ ) participants (aged 20–30 years). We measured blood pressure, and determined serum levels of BH4 and markers of oxidative stress.

**Results:** Blacks had higher blood pressure ( $p < 0.001$ ). In blacks the following serum levels were lower: BH4 ( $p < 0.0001$ ), total antioxidant status (TAS) ( $p < 0.0001$ ), glutathione peroxidase (GPx), while reactive oxygen species (ROS) ( $p < 0.03$ ) was higher. In blacks BH4 related positively with GPx in single, partial (adjusted for socio-economic status, sex, age, BMI, GGT and cotinine) and multiple regression ( $R^2 = 0.16$ ,  $\beta = 0.17$ ,  $p = 0.02$ ) and glutathione reductase (GR) ( $R^2 = 0.16$ ,  $\beta = 0.15$ ,  $p = 0.05$ ). We found a negative correlation between BH4 and GPx ( $R^2 = 0.07$ ,  $\beta = -0.26$ ,  $p = 0.0006$ ) in whites.

**Conclusions:** Higher oxidative stress levels in young blacks (increased ROS, lower TAS and GPx) could explain the low concentrations of BH4, the possible uncoupling of eNOS, resulting in higher blood pressure. The uncoupling of eNOS may explain the production of ROS and peroxynitrite and may be linked to the positive correlation of BH4 with GPx and GR found in blacks, that may lead to early vascular changes.

#### Reference

- Mels CMC et al. 2014. Free Radical Research. Tiefenbachere CP. 2001. American Journal of Physiology – Heart and Circulatory Physiology. Bedall JK et al. 2014. Antioxidants & Redox signalling.

#### Poster Session I – Hypertension

##### P54

##### SEX DIFFERENCES IN AMBULATORY CENTRAL BLOOD PRESSURE AND PULSE WAVE REFLECTIONS IN UNTREATED PATIENTS

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