P142: EARLY VASCULAR PARAMETERS IN THE MICRO-AND MACROCIRCULATION IN TYPE 2 DIABETES

Christian Ott, Dennis Kannenkeril, Marina Karg, Agnes Bosch, Joanna Harazny, Roland Schmieder

To cite this article: Christian Ott, Dennis Kannenkeril, Marina Karg, Agnes Bosch, Joanna Harazny, Roland Schmieder (2018) P142: EARLY VASCULAR PARAMETERS IN THE MICRO-AND MACROCIRCULATION IN TYPE 2 DIABETES, Artery Research 24:C, 120–120, DOI: https://doi.org/10.1016/j.artres.2018.10.195

To link to this article: https://doi.org/10.1016/j.artres.2018.10.195

Published online: 7 December 2019
P140
ARterial wave Dynamics in the horse: Insights Obtained from a 1D Arterial Network model simulation
Dainé Campos Arias 1,2, Lisse Vera 3, Sofie Myullie 4, Nikos Stergiopolous 5, Gunther van Loon 3, Patrick Segers 1
1Ghent University, IBiTech-BioMMeda, Ghent, Belgium
2Cujae, Cemat, BioMec, Havana, Cuba, Belgium
3Ghent University, Dept. of Large Animal Internal Medicine, Ghent, Belgium
4Ghent University, Dept. of Morphology, Ghent, Belgium
5LHTC, EPFL, Lausanne, Switzerland

Background: Relatively little is known about equine arterial hemodynamics because it is technically and ethically challenging to investigate a large number of arteries. Pulsed-wave Doppler images of arterial flow velocities typically display patterns of a higher oscillatory nature than in humans, but the background of these oscillations is not well understood. The aim of this study is to gain insight into equine arterial hemodynamics and physiology through 1D arterial network simulations.

Methods: Anatomical data of lengths, diameters and branching angles collected post-mortem from five horses, were used as the input for a previously validated (in humans) 1D arterial network model [1]. Cardiac and arterial parameters were tuned to equine physiology at rest (heart rate 40 bpm, cardiac output 36 l/min, mean arterial pressure 92 mmHg). Pressure and flow waveforms were simulated for the ascending aorta, right common carotid and median (in the front limbs) arteries. Simulated flow velocities were compared with ultrasound data from one horse and wave intensity analysis (WIA) was used to study wave dynamics.

Results: Figure 1 shows that simulated flow velocities are quantitatively close to ultrasound data. Ultrasound images show a high level of oscillations, also present in the simulations. The most prominent feature revealed by WIA is the existence of a mid-systolic forward expansion wave and prominent wave activity throughout diastole.

Conclusions: Initial model simulations indicate a great activity of wave reflection and a quantitative match of intra-arterial waveforms with ultrasound data. Simulations are also able to capture the oscillatory patterns observed in ultrasound data.

Reference:

Poster Session II — Diabetes, Obesity and Kidney

P141
telomere Dynamics RELAtion with obesity
Simon Toupance 1, Mirna Chahine 2, Irini Tsanetakou 3, Carlos Labat 4, Sylvie Gautier 5, Cécile Lakomy 6, Pascale Rossi 3, Toufic Moussallem 5, Pierre Yared 3, Didier Quilliot 3, Evangelos Menenakos 8, Roland Assmar 2, Athanase Benetos 1,2,11
1Department of Geriatrics, University Hospital of Nancy, Nancy, France
2Foundation-Medical Research Institutes, Beirut, Lebanon
3European University of Cyprus, School of Sciences, Engomi, Cyprus
4Inserm UMR 1116, University of Lorraine, Nancy, France
5North hospital, APHM, Marseille, France
6Faculty of Medical Sciences, Lebanese University, Hadath, Lebanon
7Department of Endocrinology, University Hospital of Nancy, Nancy, France
8Medical School of Athens, National and Kapodistrian University of Athens, Greece

Background: The relation between telomere dynamics and obesity remains unclear. Cross-sectional studies found associations between short leucocyte telomere length (LTL) and high body mass index (BMI) but longitudinal studies did not find any association between LTL attrition and BMI. In two parallel studies, we aimed to assess the relationship between obesity and telomere dynamics in different tissues.

Methods: Study 1: Measurements of LTL and TL in skeletal muscle (MTL) were performed in 53 subjects with severe obesity (BMI > 35) and in 53 age- and sex-matched without obesity (21 < BMI < 30). MTL is a proxy of TL at birth and the LTL/MTL ratio represents life-long telomere attrition. Study 2: Measurements of TL in subcutaneous fat (SCF), a high proliferative adipose tissue, and visceral fat (VF), a low proliferative one in 50 severely obese bariatric patients. TL measurements were performed by Southern blot.

Results: Study 1: In younger (<55 years), but not in older, LTL and MTL were shorter in obese patients vs controls (7.16 kb vs 7.54 kb, p < 0.05 for LTL and 81% vs 84%, p < 0.05 for LTL). Study 2: Within obese bariatric patients, SCF/VF TL ratio was lower in those with early onset obesity (96% for obesity since childhood vs 97% since adolescence vs 100% for adult development of obesity; p < 0.05).

Conclusions: Early life obesity is associated with higher TL attrition leading to shorter TL in high proliferative tissues.

P142
EarLyvascular parameters in the micro- and macrocirculation in type 2 diabetes
Christian Ott, Dennis Kannekerilli, Marina Karg, Agnes Bosch, Joanna Harazyn, Roland Schmied
Department of Nephrology and Hypertension, University of Erlangen-Nurnberg, Erlangen, Germany

Background: Diabetes converts from a metabolic disorder into a predominantly vascular disease, once its duration extends over several years or/and when additional cardiovascular risk factors such as hypertension coexist. We analyzed various vascular parameters in the renal, retinal and systemic circulation, with the goal to identify which vascular parameter of early or/and vascular damage is the earliest that can be clinically detected.

Methods: In 111 patients with type-2 diabetes (T2DM) (off any anti-diabetic medication for at least 4 weeks) and 54 subjects without T2DM we assessed urinary albumin-to-creatinine ratio (UACR) and estimated glomerular filtration rate (eGFR), retinal capillary flow (RCF), intercapillary distance (ICD), wall-to-lumen ratio (WLR) of the retinal arterioles [all assessed by Scanning Laser Doppler Flowmetry], and central systolic blood pressure (cSBP) and central pulse pressure (cPP) [assessed by Syphgmocor] both reflecting vascular remodeling of large arteries.

Results: Compared to subjects without T2DM, patients with T2DM were older, more females but 24-hour systolic and diastolic BP did not differ between the two groups (129.3 ± 11.4/78.9 ± 8.3 vs. 130.4 ± 10.8/77.4 ± 5.6 mmHg). The analysis adjusted for age, gender and cardiovascular risk factors showed that ICD, cPP were significantly higher and eGFR was significantly lower in patients with T2DM than in subjects without T2DM (Figure).

Conclusion: These data suggest that at similar BP capillary rarefaction in the retinal circulation (ICD), eGFR in the renal circulation and cPP of large arteries are earlier detectable than vascular remodeling of the micro- (WLR, RCF, UACR) and macrocirculation (cSBP) in patients with T2DM.