P9.2: VASCULAR ADAPTATIONS TO BODY SIZE AND COMPOSITION IN ADOLESCENTS

C. Palombo, C. Morizzo, V. Bianchi, B. Marchi, E. Randazzo, G. Federico, M. Kozakova


To link to this article: https://doi.org/10.1016/j.artres.2014.09.190

Published online: 7 December 2019
P8.13

ARTERIAL DISTENSION-PRESSURE LOOP ANALYSIS IN HYPERTENSIVE RATS: ADVANTAGES, PITFALLS AND POSSIBILITIES

C. Yassoullides-Courchay, C. Ragounet, G. Lindsay, S. Chimienti, M. Isabelle, J.-P. Vilain
Servier Research Institute, Suresnes, France

Arterial wall viscosity (AWV) of central arteries, as well as distensibility, is important to properly buffer systolic ejection pressure. AWV is measured either by the area within the hysteresis of distension-pressure (DD-P) loop, defined as the viscous energy (AWV = Ve) or the ratio of Ve/Ve-energy stored during systole (=AWV%). We record DD-P loop via echotrack; averaged over 30 cardiac cycles, AWV and AWV% are calculated via Matlab software. Here we perform a post analysis of the DD-P loop in 12 groups of rats (n=5-8): normo- or hypertensive, with and without arterial remodeling, at different operating blood pressures (BP), using different compounds. AWV decreases and DD-P loop is flattened with increased BP; moreover it is differently altered if pulse pressure (PP) is altered and remains low at any operating BP in models with vascular wall remodeling. However in all conditions the ratio AWV% is poorly modified. Our results suggest that the AWV as the Ve (hysteresis loop area) is the most relevant in defining the conditions the ratio AWV% is poorly modified. Our results suggest that the AWV as the Ve (hysteresis loop area) is the most relevant in defining the conditions the ratio AWV% is poorly modified.

P8.14

A 1-D MODEL OF THE SYSTEMIC ARTERIAL TREE IN MICE

L. Ailaniu 1, B. Trachet 2, P. Raymond 3, P. Segers 4, N. Stergiopulos 5
1EPFL, Lausanne, Switzerland
2Ghent University, Ghent, Belgium
3Regional Hospital Silkeborg, Silkeborg, Denmark
4University of Pisa, Pisa, Italy
5CNR Institute of Clinical Physiology, Pisa, Italy

Cardiovascular diseases are often studied at a pre-clinical stage using dedicated mouse models. However, non-invasive measurements in the murine cardiovascular system are difficult to obtain, limited to a restricted number of aortic locations, and need to be justified from an ethical perspective. In this work we present a 1-D model of the systemic circulation in mice. Murine arterial tree dimensions have been acquired and averaged from the segmentation of Micro-Computed Tomography (µ-CT) scans of 3 wild-type C57Bl/6 mice (12-15 weeks old). The resulting geometry consists of 85 arterial segments, including all major aortic branches as well as the tail and the cerebral tree. The remaining input to the model has been obtained from a wide range of literature data. An empirical relationship has been fitted to estimate the local arterial wall distensibility in all segments. Peripheral vessels are included into the models, it replaced FFM in model of cPP. Conclusion: adiposity-related changes in carotid function are depending on FFM-related increase in SV. Changes in carotid geometry also reflect an increase in body fat and plasma lipids.

P9.2

VASCULAR ADAPTATIONS TO BODY SIZE AND COMPOSITION IN ADOLESCENTS

C. Palombo, C. Morizzo, V. Bianchi, B. Marchi, E. Randazza, G. Federico, M. Kozakova
University of Pisa, Pisa, Italy

Background: increase in body mass index is accompanied by metabolic alterations but also by increased stroke volume (SV). Therefore, associated changes in vascular structure and function can not reflect only preclinical atherosclerosis but physiologic adaptation to body composition-related hemodynamic changes.

To evaluate the relationships between body composition and arterial structure and function without the influence of atherosclerotic risk factors, we assessed carotid intima-media thickness (IMT), luminal diameter (LD), wave speed (WS) and local pulse pressure (cPP)by radio-frequency based ultrasound (QIMT® and QAS®, Essato). In 80 healthy children-adolescents with wide range of age (8-16 years) and BMI (15-40 kg/m2). Body composition was assessed by bioimpedance, visceral fat (VF) by ultrasound, and SV by Doppler. Plasma lipids, glucose and insulin were determined.

Results: body weight (BW) and fat free mass (FFM) were related to IMT (r=0.61 and 0.50), LD (r=0.54 and 0.53), WS (r=0.43 and 0.56) and cPP (r=0.36 and 0.49); fat mass (FM) was related to IMT and LD (r=0.40 and 0.29), and VF to IMT (r=0.41), SV was more strongly related to FFM than to FM (r=0.70 and 0.24). In multivariate models, IMT was determined by BW and triglycerides (R2=0.44), LD by BW and male sex (R2=0.37), WS by FFM and systolic BP (R2=0.39), cPP by FFM (R2=0.24). When SV was included into the models, it replaced FFM in model of cPP. Conclusion: adiposity-related changes in carotid function are depending on FFM-related increase in SV. Changes in carotid geometry also reflect an increase in body fat and plasma lipids.

P9.3

LOWER SUBENDOCARDIAL VIABILITY RATIO IN DIABETIC WOMEN—CONTRIBUTING TO THE ABOGREGATED CARDIOPROTECTIVE EFFECT OF FEMALE GENDER IN DIABETES?

E. Laugesen 1,2, P. Hayem 3, S. Knudsen 4, K. Hansen 1, J. Christiansen 1, T. Hansen 1, P. Legstrup 1
1Aarhus University Hospital, Aarhus, Denmark
2The Danish Diabetes Academy, Odense, Denmark
3Regional Hospital Silkeborg, Silkeborg, Denmark

The cardioprotective effect of female gender is abrogated in the presence of type 2 diabetes, and female diabetic patients thus face comparable cardiovascular risk as men with type 2 diabetes. The SubEndocardial Viability Ratio (SEVR) is an index of myocardial oxygen supply and demand that can be assessed non-invasively by applanation tonometry. We hypothesized that diabetic women would have lower SEVR than diabetic men and non-diabetic subjects independently of conventional risk markers and arterial stiffness.