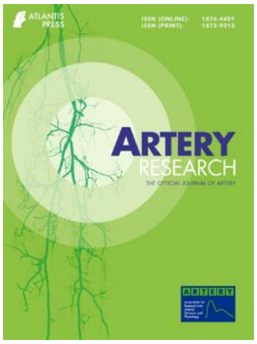

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P5.1: FROM AORTIC FLOW VELOCITY TO CENTRAL PRESSURE: A NON-INVASIVE PROOF OF CONCEPT

Samuel Vennin*, Jordi Alastruey, Phil Chowienczyk

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levels, and lipids profile were measured. Ambulatory blood pressure measurements and echocardiography were performed.
Results: LVH was detected in 34 out of 71 children. In children with LVH, significantly higher values of BP were observed in 24-hour measurements: systolic (119 vs. 109 mm Hg; p=0.002), diastolic BP (73 vs. 65 mm Hg; p=0.009) and MAP (89 vs. 81 mm Hg, p=0.004). These significantly higher BP values were observed within day and night. Increased cholesterol level was found in 25, LDL in 12, TGL in 28, and a decreased HDL in 20 children.
In children with LVH higher BMI (18.6 vs. 16.7 kg/m^2;p=0.039) and lower albumin (41.5 vs. 45.4 g/l; p=0.013), HDL (1.14 vs. 1.5 mmol/l; p=0.001) and Ca levels (2.36 vs. 2.47 mmol/l; p=0.03) were found. Obesity and low HDL level were independent LVH risk factors. The results indicate a 3-fold increase in the risk of LVH in children with hypertension (OR 3.18, p=0.045), rising up when 2-3 risk factors were present (OR 6, p=0.015).
Conclusions: Hypertension, a decreased HDL cholesterol level and overhydration have significant impact on the development of LVH in CKD children.

P4.20
ASSESSMENT OF BODY COMPOSITION USING BIOELECTRICAL IMPEDANCE ANALYSIS AND BLOOD PRESSURE IN HEALTHY SCHOOL CHILDREN

Monika Latka [1], Dorota Drozdz [2,*], Tomasz Drozdz [1], Kinga Wojtowicz [3], Przemko Kwinta [4], Jacek Antoni Pietrzyk [2]
[1]*Students' Scientific Group by the Dialysis Unit, Department of Pediatrics, Jagiellonian University Medical College, Krakow, Poland*
[2]*Dialysis Unit, Department of Pediatrics, Jagiellonian University Medical College, Krakow, Poland*
[3]*Institute of Health Sciences, State Higher Vocational School, Tarnow, Poland*
[4]*Department of Pediatrics, Jagiellonian University Medical College, Krakow, Poland*

Introduction: Bioimpedance analysis (BIA) is becoming more widely used in clinical practice to measure water body compartments. BIA allows to calculate: total body water (TBW), lean body mass (LBM), fat mass (FM), intra- and extracellular water (ICW, ECW).
Aim: The aim of this study was to evaluate the influence of body composition, measured by electrical bioimpedance, on blood pressure (BP) in children.
Methods: The study was performed in 72 children (32 girls and 40 boys) aged: 6-7 and 12-13 years. BIA measurements were taken using Nutriguard Data Input device. Blood pressure was measured twice using oscillometric method.
Results: 8 studied children had body weight <3rd percentile; 1 girl >97th percentile. A statistically significant correlation between systolic BP and TBW (r = 0.4023, p <0.000), LBM (r = 0.3600, p = 0.002), FM (r = 0.4725, p <0.000) ECW (r = 0.4598 p <0.000) and BMI (r = 0.4089 p <0.000) was found. Furthermore, diastolic BP significantly correlated with TBW (r = 0.3056, p = 0.011), LBM (r = 0.2783, p = 0.021), FM (r = 0.3956, p <0.000) ECW (r = 0.3869 p = 0.001) and BMI (r = 0.3550, p = 0.002). Elevated BP values > 95th percentile for gender, age and height were observed in 5 girls and 4 boys.
Conclusions: In the studied children systolic and diastolic BP values correlated with body composition parameters. The problem of unrecognized hypertension and malnutrition in children and adolescents is still underestimated in the Polish population.

P4.21
MICROCIRCULATION EFFECTS OF OBESITY AND/OR DIET: A PRELIMINARY STUDY IN MICE

Nicole Di Lascio [1,2,*], Francesca Lenzarini [4,2], Cristina Barsanti [2], Francesco Stea [3,2], Claudia Kusmic [2], Francesco Faita [2]
[1]*Institute of Life Science, Scuola Superiore Sant'Anna, Pisa, Italy*
[2]*Institute of Clinical Physiology, National Research Council, Pisa, Italy*
[3]*Department of Internal Medicine, University of Pisa, Pisa, Italy*
[4]*Fondazione G. Monasterio CNR, Regione Toscana, Pisa, Italy*

Obesity is becoming a global epidemic and is associated with cardiovascular disease. Genetic factors play a significant role in the disease etiology but less is known about the interaction between genes and diet composition. This study is aimed to investigate the effect of diet and/or genotype on microcirculation in mice.
Five groups of male mice (28 weeks) were examined using micro-ultrasound (Vevo2100, VisualSonics): 5 wild type mice on standard diet (WT_DS), 7 wild type mice on high-fat diet (WT_HF), 7 OB/+ mice on standard diet (OB/+_SD), 5 OB/+ mice on high-fat diet (OB/+_HF) and 4 OB/OB mice on standard diet (OB/OB_SD). The high-fat diet (45% energy as fat) groups were treated for 18 weeks before US scans. Infrarenal vasculature was imaged using Power-Doppler mode and Pulsed-Wave Doppler signals were acquired at the segmental level; Resistivity Index (RI) and Pulsatility Index (PI) were then assessed.
Both RI and PI were significantly lower in WT_DS than in WT_HF (0.57±0.03vs0.67±0.06 and 0.86±0.04vs1.10±0.09, respectively). The same result was found for the comparison between OB/+_SD and OB/+_HF (0.63±0.06vs0.72±0.04 and 1±0.12vs1.22±0.09, respectively). RI and PI values were significantly different between WT_HF and OB/+_HF mice, while no differences were found for WT_DS-OB/+_DS, WT_HF-OB/OB_SD and OB/+_HF-OB/OB_SD comparisons.
The high-fat diet has effects on the microvasculature of both WT and OB/+ mice. The two genotypes respond differently to the high-fat diet but not to the standard one. Moreover, if treated with high-fat diet, WT and OB/+ animals are not different from OB/OB mice (standard diet) in terms of microcirculation.

P5.1
FROM AORTIC FLOW VELOCITY TO CENTRAL PRESSURE: A NON-INVASIVE PROOF OF CONCEPT

Samuel Vennin [*], Jordi Alastruey, Phil Chowienczyk
King's College London, London, UK

Estimation of aortic and left ventricular (LV) pressure usually requires measurements that are difficult to acquire during the imaging required to obtain concurrent LV dimensions essential for determination of LV mechanical properties. We describe a novel method for deriving aortic pressure from the aortic flow velocity. The target pressure waveform is divided into an early systolic upstroke and a diastolic decay, interposed by a late systolic portion described by a second-order polynomial. Pulse wave velocity (PWV), mean arterial pressure, diastolic pressure and diastolic decay are required inputs for the algorithm. The algorithm was tested using a) pressure data derived theoretically from pre-specified flow waveforms and properties of the arterial tree using a single-tube 1-D model of the arterial tree and b) experimental data acquired from a pressure/Doppler flow velocity transducer placed in the ascending aorta (n=18, mean+/-SD, age: 63+/-11 years, aortic BP: 136+/-23 / 73+/-13 mmHg) at the time of cardiac catheterisation. For experimental data, PWV was calculated from measured pressures/flows and mean, diastolic pressures and diastolic decay were taken from measured pressure. Pressure reconstructed from measured flow agreed well with theoretical pressure: mean+/-SD root mean square (RMS) error 0.7+/-0.1 mmHg. Similarly, for experimental data, pressure reconstructed from measured flow agreed well with measured pressure (mean RMS error 2.4+/-1.0 mmHg). First systolic shoulder and systolic peak pressures were also accurately rendered (mean+/-SD difference 1.4+/-2.0 mmHg for peak systolic pressure). This is the first non-invasive derivation of aortic pressure based on fluid dynamics (flow and wave speed) in the aorta itself.

P5.2
FROM THE WAVE PROPAGATION MODEL TO A TRANSFER FUNCTION: A POSSIBILITY FOR PERSONALISATION

Bernhard Hametner [1,*], Stephanie Parragh [1,2], Anita Gerstenmayer [1,2], Thomas Weber [3], Siegfried Wassertheurer [1]
[1]*AIT Austrian Institute of Technology, Vienna, Austria*
[2]*Vienna University of Technology, Vienna, Austria*
[3]*Klinikum Wels-Grieskirchen, Wels, Austria*

Since aortic pressure cannot be measured noninvasively, pressure signals are often measured at more superficial arteries and a transfer function is applied to obtain a surrogate for the central pressure curve. These transformations are usually derived from measurements in a specific group of subjects and a generalised transfer function is calculated thereof. In contrast, in this work a one-dimensional wave propagation model is used to derive a patient-specific transfer function.
A model of the arterial tree is combined with the theory from Womersley for blood flow in elastic vessels. This approach allows an explicit solution of the wave equations. Thus the pressure at each location in the arterial tree can be calculated from a stationary component and forward and backward travelling waves. To obtain a transfer function, it is sufficient to derive the transfer function from one arterial segment to its parent vessel by relating forward and backward travelling waves via the reflection coefficient of the