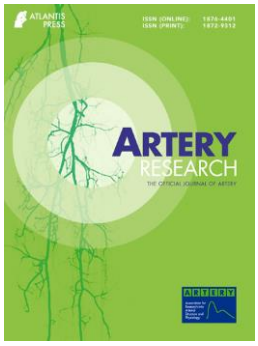

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P6.22: A NOVEL DEVICE FOR MEASURING ARTERIAL STIFFNESS USING THE FINGER-TOE PULSE WAVE VELOCITY: VALIDATION STUDY OF THE POPMÈTRE®

P.T. Vo-Duc, V. Vignon, E. Bozec, H. Khettab, O. Hanon, M. Hallab, P. Boutouyrie, S. Laurent

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properties of the arterial tree that determine the aortic pulse are still poorly understood. We used numerical modelling to predict aortic pulse morphology and the characteristics of the arterial tree that determine pulse wave morphology when modulated by pharmacological agents with differential actions on the myocardium and arterial tree. Healthy volunteers aged 35 to 63 received cumulative doses of nitroglycerin (NTG, n=8), dobutamine (DB, n=10) and nor-epinephrine (NE, n=9). Aortic pressure was measured by carotid tonometry. Aortic dimensions, pulse wave velocity (PWV), blood velocity and flow were measured by echocardiography. These parameters were used to calculate the input data of a single-vessel, nonlinear one-dimensional model of pulse wave propagation in the human aorta coupled to a three-element Windkessel model of the downstream vasculature. The simulated pressure waveforms relative to the clinical data were reproduced with a averaged normalised root-mean-square-error $<$ 10%, 7% and 6% for DB, NE and NTG groups respectively. By systematically and uniquely changing the parameters of the model by the amount measured clinically whilst keeping all other parameters at baseline conditions we identified the most significant determinant of the final pressure waveform to be total compliance and PWV for DB and peripheral vascular resistance for NTG and NE. Thus the majority of the change in aortic pulse morphology can be explained without invoking a change in the distributed characteristics of the arterial tree.

P6.22
A NOVEL DEVICE FOR MEASURING ARTERIAL STIFFNESS USING THE FINGER-TOE PULSE WAVE VELOCITY: VALIDATION STUDY OF THE POPMÈTRE®

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Background: Finger-toe pathway could represent a good alternative to assess the arterial stiffness conveniently. The aim of this study is to evaluate the accuracy of the pOpmètre which measures finger-toe pulse wave velocity (ft-PWV).
Methods: The pOpmètre® has 2 photodiodes sensors, positioned on the finger and on the toe, next to the pulp artery, and a cardiac activity electrode. Pulse waves were recorded continuously for 20 sec, and the difference (Dtf) between the toe pulse wave transit times (PWtt) and the finger PWtt was calculated relative to R-ECG. The travel distance was based on subject's height. Study 1 compared the ft-PWV to the carotid-femoral PWV (cf-PWV) obtained by the reference method SphygmoCor in 86 subjects (53±20 yrs) including 69 patients with various pathologies and 9 healthy normotensives. Study 2 compared the changes of ft-PWV and cf-PWV during a dynamic test in 10 healthy subjects.
Results: ft-PWV correlated significantly with cf-PWV (r^2 = 0.43, $p<0.0001$). The better correlation was found in terms of transit time (r^2 = 0.6, $p<0.0001$). The discrepancy between the transit times was related swith age. The Dtf also correlated with the transit time at lower limbs. During dynamic changes induced by cold pressor test, both cf-PWV and ft-PWV gave similar patterns, with increase following by a decrease PWV during recovery.
Conclusion: pOpmètre® may be a promising device to assess arterial stiffness in routine clinical practice. Further studies are needed to adjust the bias and to validate the pOpmètre in larger populations.

P6.23
ARTERIAL STIFFNESS MEASUREMENT IN OBESE PATIENTS WITH A NEW DEVICE: POPMETRE®

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Introduction: Obesity is associated with increased cardiovascular morbidity and mortality. Arterial stiffness (AS) is an independent cardiovascular risk factor. The objective of this study was to evaluate the SA in obese patients.
Patients and methods: AS was measured in 212 participants divided into four groups: non-obese non-diabetic controls (n=114). non-diabetic subjects with obesity (n=37), obese and type 2 diabetic patients (n=34), non-obese type 2 diabetic subjects (n=27). AS was assessed by measuring the pulse wave velocity (PWV) using a new device: pOpmètre® (Axelife sas-France) at the right and the left side.
Results: PWV values were increased in obese subjects compared to controls (obese and diabetic patients: 18.18±1.08, non-diabetic obese subjects: 11.32±1.04, non-obese diabetic patients: 15.58±1.21 and controls: 8.39±0.59 m/s, mean±SEM, $p<0.001$). Similar results were observed in the left side ($p=0.0005$). This increase was more pronounced in obese and diabetic patients. After stratification on the presence of diabetes, we observed an increase of PWV in non-obese diabetic patients, compared to non-diabetic subjects ($p=0.001$ and 0.0001). Stratification on the presence of obesity shown no difference in non-diabetic obese subjects compared to non-obese subjects. Adjustment for sex, age, blood pressure and tobacco, confirmed the increase of PWV in obese and diabetic patients compared to controls (odds ratio: 1.31, 95% CI 1.15—1.51, $p=0.0002$) and increased PWV in non-diabetic obese subjects compared to controls (odds ratio: 1.25, 95% CI 1.09—1.46, $p=0.003$). We observed a positive correlation between age and PWV ($r^2=0.24$ and 0.25, for right and left limbs).
Conclusion: PWV is increased in obese patients, particularly in those with type 2 diabetes. PWV is positively correlated to ageing.

P6.24
CLINICAL FEASIBILITY OF THE NEW PULSE TIME INDEX OF NORM (PTIN) AND ITS CORRELATION TO LEFT VENTRICULAR MASS INDEX

I. N. Posokhov [1], J. Baulmann [2], Z. D. Kobalava [3], Y. V. Kotovskaya [3], A. O. Konradi [4], E. V. Shlyakhto [4], O. V. Mamontov [4], V. A. Korneva [5], T. Y. Kuznetsova [5], N. N. Kulikova [6], I. V. Starchenkova [6], E. A. Grigoricheva [7], V. V. Evdokimov [7], A. V. Orlov [8], A. N. Rogoza [8]
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Background: Recently the pulse wave velocity (PWV) threshold of hypertensive target organ damage (TOD) was set at 10 m/s. New 24 — h monitors (e.g., BPLab-Vasotens) provide not only 1 PWV but several PWV measurements over a 24 — h period. The new Pulse Time Index of Norm (PTIN) can be calculated from these data. The PTIN is defined as the percentage of a 24 — h period during which the PWV does not exceed 10 m/s. The idea is to adopt the new PWV measurements for the definition of TOD and sharpen its level of detection. The aim of the present study is to test the new PTIN for clinical feasibility and its correlation to left ventricular mass index (LVMI).
Methods: Oscillometrically generated waveform files (n=510, measurements ranging from a single point to 72 hours), which were previously used for clinical research, were re-analysed using the new 2013 software version of the Vasotens technology program, which enables PTIN calculation.
Results: The cut-off point at 10 m/s in the ROC curve showed a sensitivity of 93.3% and a specificity of 81.5% for single measurements of PWV compared to SphygmoCor. The reference interval of PTIN was equal to 83.2% (lower limit). Reliability statistics showed Cronbach's alpha was 0.967 for day-to-day repeatability (i.e., excellent internal consistency of PTIN). Good correlation (r=-0.72) between PTIN and LVMI was shown, and it was significantly above the blood pressure load (r=0.41).
Conclusion: Calculating PTIN from Vasotens technology is clinically feasible and seems to enhance the discriminatory power of detecting TOD.