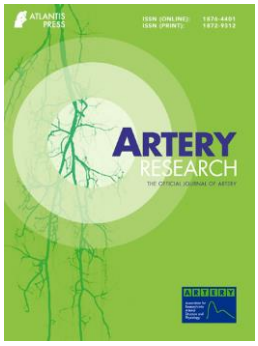

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P2.38: COMPARISON BETWEEN TWO INDIRECT METHODS FOR PULSE WAVEFORM ANALYSIS

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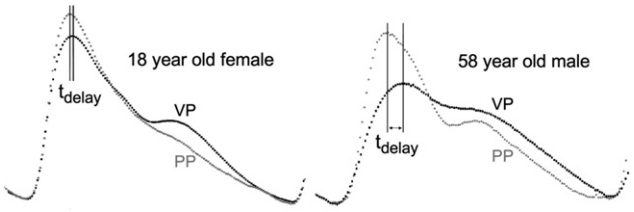

Figure 1

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VALIDATION OF AORTIC PULSE WAVE VELOCITY ESTIMATION FROM BRACHIAL ARTERY AND FINGER BLOOD PRESSURE WAVEFORMS IN HUMANS: ABILITY TO DETECT AGE- AND EXERCISE TRAINING- RELATED DIFFERENCES IN EFFECTIVE REFLECTING DISTANCE AND AORTIC PULSE WAVE VELOCITY

G. L. Pierce [1], D. P. Casey [2], J. G. Fiedorowicz [1], D. R. Seals [3], T. B. Curry [2], J. N. Barnes [2], D. R. Wilson [1], H. M. Stauss [1]
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It has been argued that aortic pulse wave velocity (APWV) cannot be determined from the reflected wave transit time (Δt) because the effective reflecting distance (EfRD, aortic valve to distal reflecting site) is not defined anatomically. We hypothesized that EfRD can be estimated from demographic/anthropometric data and used to indirectly determine APWV from peripheral blood pressure (BP) waveforms in humans. Invasive (n=25, brachial artery) and non-invasive (n=15, EndoPAT) BP waveforms were converted into aortic BP waveforms (transfer function) and Δt computed from decomposed forward and reflected waves. True EfRD was determined from measured carotid-femoral pulse wave velocity (CF-PWV) (SphygmoCor) and Δt. Stepwise regression analysis resulted in the equation: EfRD= 0.173*age+0.661*BMI+34.548 cm, used to indirectly estimate EfRD and APWV in the original 40 healthy adults, and in a separate cohort of young sedentary (YS, n=6; 22±2 years; VO_{2max} 39±2 ml/kg/min), older sedentary (OS, n=24; 62±1 years; VO_{2max} 27±1 ml/kg/min), and older endurance-trained (OT, n=14; 61±2 years; VO_{2max} 46±2 ml/kg/min) subjects. CF-PWV and indirectly determined APWV were highly correlated (n=40, Pearson's R=0.65, P<0.01; interclass correlation coefficient ICC=0.64, P<0.01). In YS, OS and OT, EfRD and APWV were 52.0±0.5, 61.8±0.4 and 60.6±0.5 cm (all P<0.05) and 6.4±0.3, 9.6±0.2, and 8.1±0.2 m/s (all P<0.05), respectively. In healthy adults, APWV can be reliably derived from invasive and non-invasive peripheral BP waveforms using age and BMI to determine EfRD. This method can detect the distal shift of the reflecting site with age and the increase in APWV with sedentary aging that is attenuated with endurance exercise.

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COMPARISON BETWEEN TWO INDIRECT METHODS FOR PULSE WAVEFORM ANALYSIS

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Introduction: The prognostic value of arterial stiffness has been shown in different groups of patients and also in apparently healthy populations. Several studies have already pointed out the prognostic importance of central Systolic Blood Pressure (cSBP)
Aim: To compare two devices that use indirect methods to asses central blood pressure: The SphygmoCor and OMROM HEM-9000AI.
Inclusion criteria
Age ≥18 years, Males and females, Arterial Hypertension
Methods: Eighty-four hypertensive subjects, mean age 58 ± 12 years were examined. Radial artery waveform recording at the left wrist was performed, patients with arrhythmias, severe hypertension, absence of radial pulse, diabetes were excluded.
Statistical software version 9.0 was used. Pearson's correlations and Bland−Altman plots were used to assess the agreement between methods.
Results: cSBP measured with both devices values showed a significant correlation, r= 0.76; r^2=0.58. cSBP values recorded with OMRON device were 16 mmHg higher (SD of difference = 13 mmHg) cSBP (Sphy) and pSBP2 (Omr) values showed a significant correlation (r= 0.74; r^2=0.55, P <0.001) (Figure 1) mean difference was of -0.8 , SD = 13 mmHg.
Conclusion: When compared both devices they offer discordant results, and this discrepancy tends to be larger at higher BP levels. In absence of invasive measurements of central aortic pressure, it is impossible to conclude which of the two systems provides cSBP values closer to true aortic cSBP. Our data suggest that pSBP2 reported by the Omron device more closely reflects the cSBP value assessed by the Sphygmocor device.

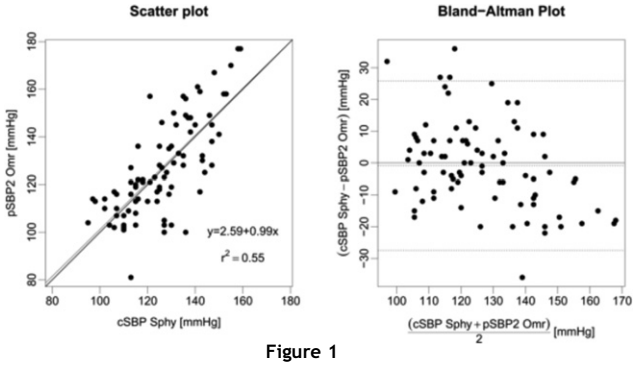

Figure 1

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ASSESSMENT OF FLOW MEDIATED DILATION. COMPARISON BETWEEN TWO METHODS ART LAB VS. FMD STUDIO

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Introduction an Aim. The ultrasound assessment of flow-mediated dilation (FMD) of the brachial artery is a non-invasive and reproducible technique to evaluate the endothelial function. FMD is classically expressed as a percentage rise of the change in diameter from the baseline after ischemia or administration of sublingual nitroglycerin (NTG).
We compared FMD and internal diameter measurements obtained with an echotracking system (ART.LAB; Esaote BV, Maastricht, the Netherlands), to those obtained with a new, image-based, system for real time measurement of FMD (FMD Studio, Pisa, Italy).
Methods: FMD studio-ART.LAB mean difference of FMD after ischemia and internal brachial diameter at baseline, peak and post-ischemia were tested in 30 subject. Moreover, in a subgroup of 16 subjects, we measured FMD after NTG administration. All measurements were performed simultaneously by ART.LAB and FMD studio.
Results: Mean difference of internal diameter was 0.27±0.24 mm at baseline (7% of mean value), 0.33±0.25 mm at peak (8% of mean value), and 0.30±0.23 mm after ischemia (8% of mean value); mean difference of FMD after ischemia was 0.89±3.97%, corresponding to 15% of mean value. Mean difference of FMD post-NTG was 0.85±4.85%, (5% of mean value). All the values obtained by FMD studio were not significantly different (P=NS) to those obtained by ART.LAB.
Conclusions: We reported a good agreement of FMD and internal diameter measurements between an echotracking device, which represents the gold standard for arterial parameters measurements, and a new, image-based, system for real time measurement of FMD.