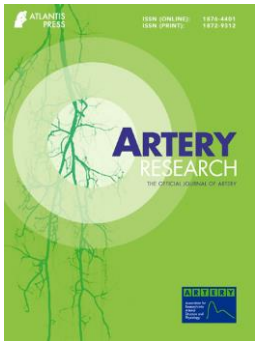


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# P2.31: COMPARISON OF TWO NONINVASIVE MEASUREMENTS FOR AORTIC PULSE WAVE VELOCITY: VASERA VERSUS SPHYGMOCOR

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elasticity can be calculated. When the PPG probe is attached to the fingertip or the second toe, the pulsations detected are from the cutaneous vascular bed. The factors that regulate that blood flow will have a profound effect on the photoplethysmogram, which depend on many factors of microcirculation. These components are not shown in the EMFi pulse wave. Analysis of these factors shows that the information contained in the PPG and EMFi is of great importance. In this paper we will combine arterial optical and mechanical elasticity measurements.

## P2.29
## COMPARISON OF ARTERIAL AUGMENTATION INDICES OBTAINED BY ULTRASOUND WALL TRACKING AND ARTERIAL TONOMETRY

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Arterial augmentation indices (AI, the ratios of differences in the components of arterial pressure during systole to pulse pressure) provide measures of pressure wave reflection and are usually estimated from arterial tonometry. High resolution ultrasound tracking of the arterial wall provides an alternative method for obtaining AI. The objective of the present study was to compare AI measured by tonometry and wall tracking at the carotid, brachial and radial arteries. Forty seven asymptomatic subjects (24 men), aged 23-84 years were studied. At each site, tonometry (SphymoCor system, Atcor medical, Australia) and wall tracking (Aloka $\alpha$10 ultrasound system with a 10MHz linear vascular transducer, Aloka, Japan) were performed in triplicate in random order. At the carotid artery, there was reasonably good agreement between AI obtained by wall tracking and tonometry ($R=0.82$, $P<0.0001$, mean difference$\pm$SD, 3.0$\pm$13.7%) but at brachial and radial sites agreement was poor ($R=0.33$, mean difference$\pm$SD, 17.7$\pm$24.2% at brachial, $R=0.48$, mean difference, 18.1$\pm$23.5% at radial). Wall tracking may be a reasonable surrogate for tonometry when measuring AI at the carotid artery but there is poor agreement between AI obtained by tonometry and wall tracking in smaller arteries.

## P2.30
## DOES OCCLUSION OF THE BRACHIAL ARTERY CAUSE LOCAL OSCILLATION OF ARTERIAL PRESSURE?

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One-dimensional (1D) models are useful to study pressure and flow waves in large arteries in cases where clinical measurements are not available. Using a simplified 1D model (1) we have modelled the pressure waveform in the brachial artery with and without occlusion, which is relevant to non-invasive measurement of blood pressure with cuff-based devices. The results show that occlusion of the brachial artery leads to superposed high frequency oscillations in local brachial blood pressure of up to 10mmHg (Fig.). A modelling study of brachial occlusion done independently by a group from Swansea University (2) has also shown similar results.
Preliminary data made with a fluid-filled catheter by collaborators in New Zealand (unpublished data) show much smaller pressure fluctuations during cuff occlusion, but the use of a fluid-filled catheter may have damped out the relatively high frequency waves that are predicted. Therefore, measurements of blood pressure using a high-fidelity catheter are being made in patients undergoing routine cardiac catheterization. Pressure waveforms recorded in the brachial, subclavian arteries and the ascending aorta with and without brachial artery occlusion are compared to the predictions of the 1D models.

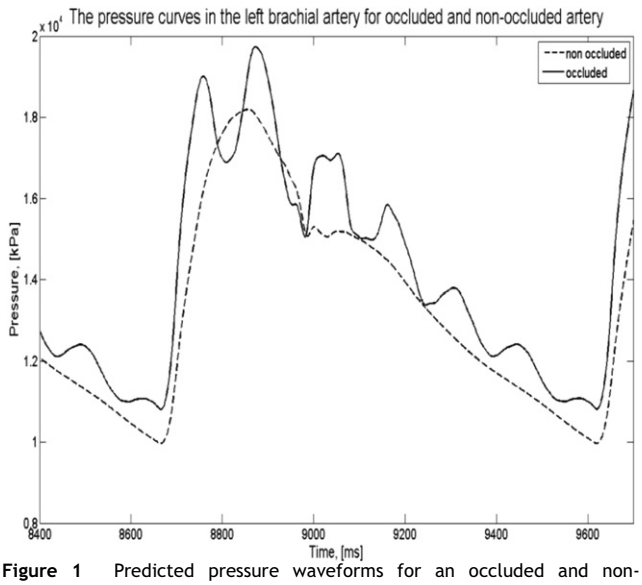


**Figure 1** Predicted pressure waveforms for an occluded and non-occluded brachial artery.

(1) Alastuey, J., Parker, K.H., Peiro, J.& Sherwin, S.J. (2009). J Eng Math, 64:331—51
(2) Mynard, J.P. & Nithiarasu, P. (2008) Comm. Num. Meth. Engg, 24:367—417.

## P2.31
## COMPARISON OF TWO NONINVASIVE MEASUREMENTS FOR AORTIC PULSE WAVE VELOCITY: VASERA VERSUS SPHYGMOCOR

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**Backgroud:** Aortic pulse wave velocity (aortic PWV) is the gold standard for evaluating arterial stiffness and can be measured using various noninvasive
**Methods:** However, there has been few data comparing the repeatability and agreement of different methods within the same individuals. The objective of this study is to assess the intra-observer variation and the agreement of aortic PWV measurements using Vasera and SphygmoCor.
**Methods:** Aortic PWV measurements were performed in 22 healthy individuals (38.3$\pm$16.2 yr) using both Vasera VS-1500N and SphygmoCor. Double recordings with an interval of 5 minutes were undertaken by an experienced observer. The interclass correlation (ICC), coefficient of variation (CV) were calculated. Intra-observer differences between repeated measurements and the agreement of the two methods were also assessed using Bland-Altman plots.
**Results:** The ICC of the repeated aortic PWV measurements was 0.942 (0.866-0.976, 95%CI) for Vasera and 0.843 (0.644-0.931, 95%CI) for SphygmoCor. The mean difference of repeated aortic PWV measurements was 0.018$\pm$0.488m/s for Vasera and 0.177$\pm$0.670 m/s for SphygmoCor. The limit of agreement was -0.958 to 0.994 m/s and -1.163 to 1.517 m/s for Vasera and SphygmoCor, respectively. The CV was 3.3$\pm$3.9% for Vasera and 6.3$\pm$4.2% for SphygmoCor. The two methods showed good agreement (ICC$=$0.921, 0.821-0.967; 95%CI). The limit of agreement between the two methods was -1.066 to 0.998 m/s.
**Conclusions:** Aortic PWV measurement using Vasera had a better repeatability than using SphygmoCor. However, the two methods for assessing aortic PWV showed a good agreement.