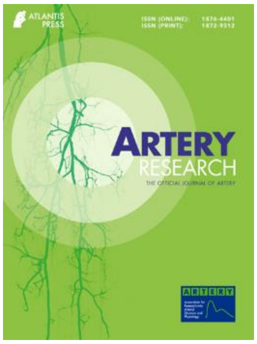

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3.1: NEW INSIGHTS INTO ARTERIAL STRUCTURAL-FUNCTIONAL INTERACTIONS AND THE IMPLICATIONS FOR PRESSURE AUGMENTATION IN HUMANS: A META REGRESSION ANALYSIS IN 8336 SUBJECTS

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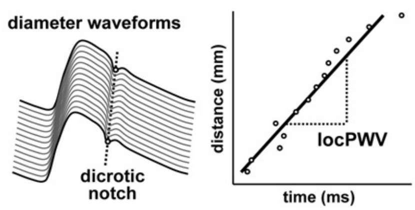
calculated as the slope of the regression line between M-line positions and time-points of 14 parallel diameter waveforms (Figure). Beat estimates were accepted when regression root mean square error (RMSE) was below 0.07, 0.10 or 0.15 ms, affecting acceptance rate and within-subject reproducibility (Table). Overall, on-line feedback significantly improved reproducibility by about 50%, enabling good discrimination between subjects: within-subject reproducibility < between-subject SD (Table). LocPWV appeared higher when measured without feedback due to low numbers of estimates in some subjects.

Conclusions: On-line visual feedback improves the quality of local pulse wave velocity measurements. With feedback, an RMSE threshold of 0.10 ms appears optimal in trading off measurement acceptance rate and reproducibility.



feed-back	maxRMSE allowed (ms)	accept. rate (%)	reprod. (m/s)	locPWV (m/s)
yes	0.07	47 ± 29 #	0.59 *	4.4 ± 2.1 §
	0.10	71 ± 33 #	0.69 *	4.3 ± 2.0 §
	0.15	87 ± 31	0.85 *	4.3 ± 2.0 §
no	0.07	37 ± 24	1.38	5.7 ± 2.5
	0.10	52 ± 26	1.28	5.1 ± 2.5
	0.15	83 ± 31	1.40	5.1 ± 2.0

Values given as mean±SD. *p<0.001, §p<0.03, #p=0.08 yes vs. no.

3.1
NEW INSIGHTS INTO ARTERIAL STRUCTURAL-FUNCTIONAL INTERACTIONS AND THE IMPLICATIONS FOR PRESSURE AUGMENTATION IN HUMANS: A META REGRESSION ANALYSIS IN 8336 SUBJECTS

M. Shanmuganathan [1,*], A. J. Baksi [1], T. Treibel [2], T. Tillin [1,2], D. P. Francis [1,2], J. Mayet [1,2], K. Parker [2], A. D. Hughes [1,2], J. E. Davies [1,2]
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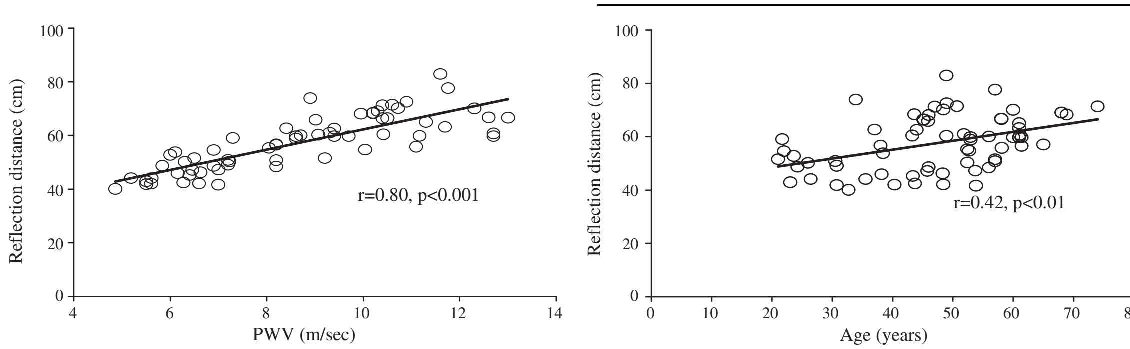
Introduction: Pressure augmentation is thought to arise as aortic stiffening leads to the progressively earlier return of waves from fixed distal reflection sites. However, several studies dispute this central tenet of pressure augmentation, and instead report variation in reflection site with ageing and arterial stiffness.

Methods: We undertook a meta-analysis to assess the interaction between the aortic reflection site with ageing and arterial stiffness. Systematic literature review was performed to identify studies that published data on Pulse Wave Velocity (PWV) and reflection time, from which we calculated the distance to the reflection site.

Results: We identified 31 studies with 68 cohorts resulting in the inclusion of 8336 subjects (Age 47 ± 13 years). PWV ranged from 4.86 to 13 m/sec, reflection time from 94 to 176 ms and distance 0.40 to 0.82 metres. Reflection time decreased with PWV ($r = -0.74$, $p < 0.001$) and age ($r = -0.72$, $p < 0.001$), whereas reflection distance increased with PWV ($r = 0.80$, $p < 0.001$) and age ($r = 0.42$, $p < 0.01$). As PWV increased from 4.86–13 m/sec, reflection time decreased by 55ms, far less than predicted (106 ms), whilst the refection site appeared to move distally by 31 cm. Furthermore, reflection distance did not increase with subject height ($r = 0.12$, $p = 0.37$).

Conclusion: The aortic reflection site is not fixed to an anatomical location, as is widely believed, but instead appears to vary with changes in aortic stiffness and age. This challenges the conventional theory and suggests that wave reflection may not be the principal cause of systolic pressure augmentation.



3.2
A COMPARISON OF THE VICORDER APPARATUS WITH SPHYGMOCOR DEVICE FOR THE NON-INVASIVE ASSESSMENT OF AORTIC BLOOD PRESSURE: AN INVASIVE VALIDATION STUDY

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Background: Aortic/central blood pressure (cBP) is an important determinant of cardiovascular risk. The SphygmoCor device applies a transfer function to radial BP waveforms calibrated to brachial systolic and diastolic BP (bSBP/bDBP) to estimate cBP parameters. Radial waveforms can be also calibrated to brachial mean BP (bMBP) and bDBP. Vicorder is a new cuff-based, operator-independent device which converts bBP waveforms to aortic waveforms to derive cBP.

Objective: to compare cBP estimated by non-invasive (Vicorder & SphygmoCor) devices to invasive cBP at cardiac catheterization.

Methods: Invasive BP (iBP) was measured in 33 patients (59 ± 11 years, 63% males) undergoing diagnostic angiography, with a fluid-filled catheter at the aortic root. Simultaneous measurements were made using Vicorder and Sphygmocor. Brachial waveforms (Vicorder) were calibrated to oscillometric bSBP/bDBP; radial waveforms (Sphygmocor) were calibrated to oscillometric bSBP/bDBP and to bMBP/bDBP.

Results: Average (±SD) bSBP/bDBP was 145(±18)/81(±11) mmHg. iSBP/iDBP was 136/74(±18/9) mmHg; Vicorder-derived cSBP (137 ± 17 mmHg) was in agreement with iSBP (mean BP 0.3 ± 8.0 mmHg, p = n.s.), while Vicorder-derived cDBP (81 ± 11 mmHg) was higher than iDBP (mean BP 7.0 ± 7.4 mmHg, $p < 0.001$). SphygmoCor bSBP/bDBP-calibrated cSBP (131 ± 18 mmHg) under estimated iSBP (mean BP −5.7 ± 9.2 mmHg, p = 0.002). SphygmoCor bMBP/bDBP-calibrated cSBP was higher than iSBP (141 ± 17 mmHg, mean BP 4.3 ± 7.2, p=0.003).

Conclusions: Vicorder apparatus is highly accurate in non-invasive assessment of cBP compared with catheter-derived iSBP. SphygmoCor bSBP/bDBP-calibrated cSBP was lower than iSBP, while SphygmoCor bMBP/bDBP-calibrated cSBP was higher. Vicorder apparatus provides clinically useful values of cSBP.