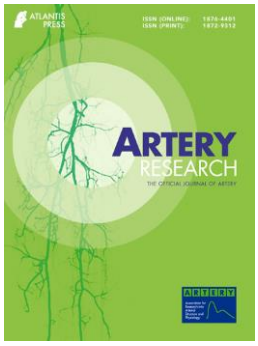

Artery Research

ISSN (Online): 1876-4401 **ISSN (Print): 1872-9312**
Journal Home Page: https://www.atlantis-press.com/journals/artres

P6.12: CORRELATION OF PULSE WAVE VELOCITY AND ANGIOGRAPHICALLY PROVED CORONARY ARTERY STENOSIS

M. Berzina, A. Krallisa, G. Latkovskis, M. Zabunova, I. Mintale, A. Erglis

To cite this article: M. Berzina, A. Krallisa, G. Latkovskis, M. Zabunova, I. Mintale, A. Erglis (2011) P6.12: CORRELATION OF PULSE WAVE VELOCITY AND ANGIOGRAPHICALLY PROVED CORONARY ARTERY STENOSIS, Artery Research 5:4, 174–175, DOI: https://doi.org/10.1016/j.artres.2011.10.097

To link to this article: https://doi.org/10.1016/j.artres.2011.10.097

Published online: 14 December 2019

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Objectives: Carotid-femoral pulse wave velocity (cfPWV) is considered the gold standard measurement for assessment of aortic stiffness. cfPWV is increased in women at risk of developing, and those with, preeclampsia. We aimed to compare measurements obtained by SphygmoCor and Vicorder devices that use ECG/tonometry and compression techniques, respectively.
Methods: 57 consecutive women were recruited from the high risk obstetric ultrasound clinic. Smokers were excluded. Age:19-42yrs (Mean: 32.6yrs), Gestation: 24^{+0}—30^{+6} (Mean: 26^{+6} weeks). Women were rested supine for 10 minutes in 30° left lateral position. SphygmoCor readings were performed first followed, within 5 minutes, by Vicorder readings. Left side femoral and carotid were used for all readings. All readings were performed three times and a mean value calculated. In order to avoid false prolongation of path length, calipers were used to measure distances.
Results: Mean SphygmoCor cfPWV: 5.51m/s (95%CI:5.32-5.70m/s). Mean Vicorder PWV: 5.34m/s (95%CI:5.06-5.61m/s). There was significant inter-device correlation ($r=0.56$, $P<0.0001$) (Fig.1). Bland-Altman analysis showed a mean difference of 0.17m/s (95% limits of agreement: -1.52 to 1.86m/s) (Fig.2)
Conclusions: In the second trimester of pregnancy, both devices produce similar readings and the mean difference is unlikely to be of clinical significance. SphygmoCor measurements require a skilled operator, application of ECG leads and palpation of the femoral pulse. The Vicorder device requires less skill and is less intrusive to the subject. These are important considerations for regular use in a clinical setting. Notably the cfPWV in our study is lower than the general population and agreement at <4.5m/s appears unreliable.

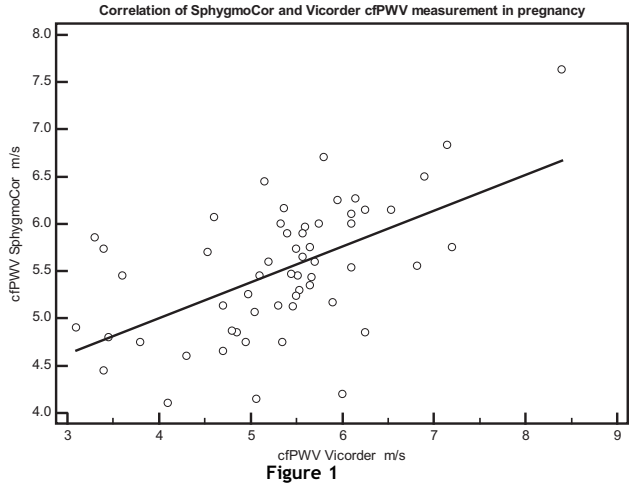

Figure 1

$r=0.56$, $P=0.0001$

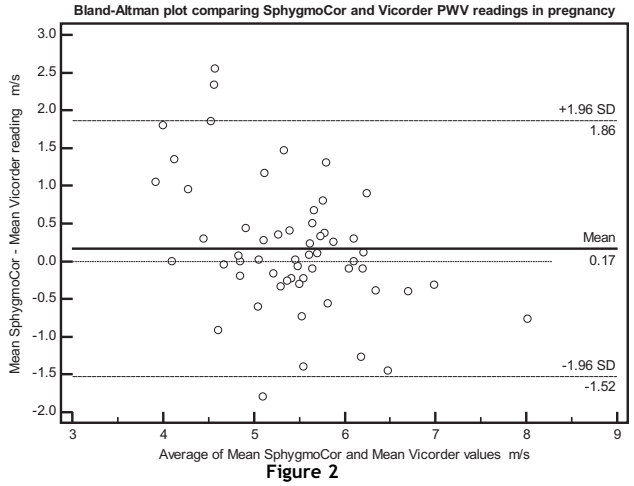

Figure 2

P6.11
RETINAL PULSE WAVE VELOCITY IN YOUNG NORMOTENSIVE AND MILDLY HYPERTENSIVE SUBJECTS

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Hypertension is characterized by microvascular remodeling resulting in an increased wall/lumen ratio. Increased microvascular stiffness contributes to an increase in wall/lumen ratio. We aimed to investigate the possibility to transform the measurement of macrovascular stiffness into a microvascular environment. We assessed retinal pulse wave velocity (rPWV) non-invasively in 65 male normoalbuminuric normotensive to mildly hypertensive subjects (age: 28.7±6.0 years). Time dependent alterations of retinal arterial diameter were measured by the Dynamic Vessel Analyzer. The data was filtered and evaluated by methods of signal analysis and rPWV was computed using three different methods. 'Method1' used filtration at heart rate (HR), 'Method2' filtered at higher HR multiples and 'Method3' used additionally linear fit for data averaging. Besides, office blood pressure (BP) and urinary albumine/creatinine ratio were assessed. 'Method1' was not associated with BP, while both methods applying filtration at high HR multiples showed a strong association with systolic BP throughout the cohort ($r=0.49$, $r=0.63$ $P<0.001$). Based on the highest association, 'Method3' was proposed to characterize rPWV. As the cohort was divided according to BP, mildly hypertensive patients showed significantly higher rPWV (1243±694 units/second) than subjects with high-normal BP (786±486 units/second, $P<0.01$) or normotensive subjects (442±148 units/second, $P<0.001$). Applying methodological principles for aortic PWV we consider rPWV as a non-invasive measure of microvascular stiffness. Our data suggests that filtration at higher HR multiples and linear fit result in strong association with BP. As our study was performed in normoalbuminuric subjects, rPWV may add detailed insights to early microvascular pathophysiology, potentially beyond microalbuminuria.

P6.12
CORRELATION OF PULSE WAVE VELOCITY AND ANGIOGRAPHICALLY PROVED CORONARY ARTERY STENOSIS

M. Berzina [1,2], A. Krallisa [1,2], G. Latkovskis [1,2], M. Zabunova [1,2], I. Mintale [1,2], A. Erglis [1,2]
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Background: Carotid-femoral pulse wave velocity (PWV), a direct measure of aortic stiffness, has become increasingly important for total cardiovascular risk estimation. The aim of our study was to evaluate the correlation of PWV among the other cardiovascular risk factors with significance of the angiographically proved coronary artery disease (CAD).
Methods: The group of 66 patients referred for scheduled coronary angiography at Paul Stradins Clinical University Hospital Latvian Centre of Cardiology was analyzed. The mean age of patients was 62.1±11.7 years, 47% of them were male. The data about case history, cardiovascular risk factors, previous and concomitant therapy were collected. The applanation tonometry with Sphygmocor device, including radial pulse wave analysis (PWA), carotid PWA, carotid-femoral PWV, was done. Coronary angiography was done for determination of presence and degree of coronary artery stenosis (CAS). The CAS of $\geq$ 50% was defined as significant.
Results: PWV was significantly higher in the patients with significant CAS (12.7±2.8 m/s vs. 11.0±2.2 m/s, $p=0.013$). In binary logistic regression model, including age, gender, smoking habit, presence of arterial hypertension, diabetes, hypercholesterolemia, PWV, aortal augmentation, central augmentation index, only PWV correlated significantly with presence of significant CAS with odds ratio 1.30 ($p=0.022$). After adjustment for statins, ß-blockers, angiotensin converting enzyme inhibitors, calcium channel blockers and nitrates PWV still correlated significantly with presence of significant CAS with odds ratio 1.33 ($p=0.024$).

Parameter	P value	Odds ratio
PWV	0.024	1.329
Use of BAB	0.560	0.671
Use of ACE-I	0.186	0.428
Use of CCB	0.027	4.131
Use of nitrates	0.570	1.555
Use of statins	0.854	0.857

Conclusions. Increased aortic PWV correlates significantly with the presence of significant CAS and may be important integrative marker for CAD.

P6.13
IMPACT OF CALIBRATION ON ESTIMATES OF CENTRAL BLOOD PRESSURE

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[2]*Heymans Institute of Pharmacology, Gent University, Gent, Belgium*
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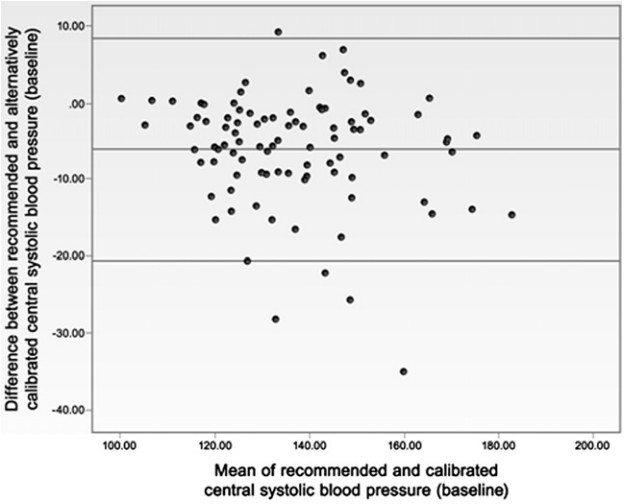
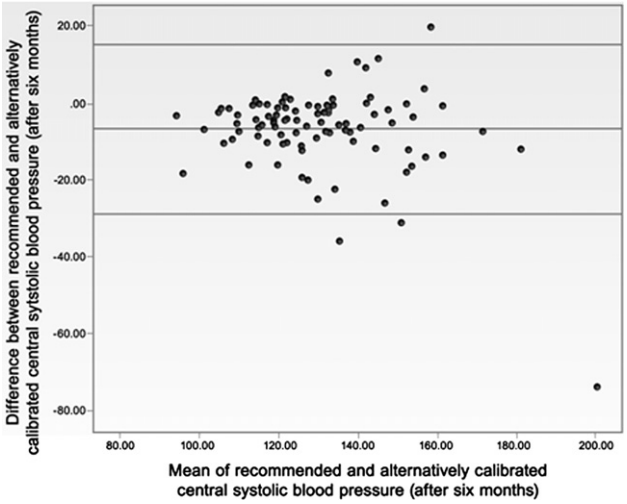
[4]*Department of Endocrinology, University Hospital of Odense, Svendborg, Denmark*
[5]*Department of Cardiology, University Hospital of Copenhagen, Rigshopsitalet, Copenhagen, Denmark Objective: To examine effects of calibration on estimates of central blood pressure (CBP)*

Methods: We included 122 patients with type-II-diabetes and hypertension. They were characterized as having controlled (CH), uncontrolled (UH) or resistant (RH) hypertension based on ambulatory blood pressure measurement and number of antihypertensive agents. CBP was estimated using Sphygmocor. We calibrated the radial pressure wave as recommended by the manufacturer using brachial systolic (BSBP) and diastolic (BDBP) BP and used the generalized transfer function for estimation of the aortic pressure waveform. Afterwards we recalibrated the radial pressure wave using BDBP and mean arterial pressure (BMAP). Data were analyzed offline in customized software.
Results: Estimates of CSBP were significantly correlated ($R2=0.83$, $P<0.0001$ at baseline and $R2=0.71$, $P<0.0001$ after six months). As shown in figures 1 and 2 CSBP was 6.1 mmHg to 6.6 mmHg lower when calibrated with BSBP and BDBP and variation of difference ranged from 14.6 mmHg to 22 mmHg.
Differences between BSBP and CSBP lost significance in patients with RH after six months when alternatively calibrated with BDBP and BMAP as did reduction in CSBP.
Conclusion: Although we found good correlation between estimates of CBP using either calibration, variation of difference was high suggesting that the difference between the 2 calibration methods is more than a systematic error. And our results show that it could be important to take into account measures used for calibration when interpreting clinical effect on non-invasive estimates of CBP.





P6.14
WHICH ESTIMATE OF MEAN ARTERIAL PRESSURE IS TO BE USED FOR ADJUSTMENT FOR PULSE WAVE VELOCITY?

T. K. Soender [1], L. M. Van Bortel [2], J. Lambrechtsen [3], J. Hangaard [4], J. Moeller [5], K. Egstrup [1]
[1]*Department of Medical Research, University Hospital of Odense, Svendborg, Denmark*
[2]*Heymans Institute of Pharmacology, Gent university, Gent, Belgium*
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[4]*Department of Endocrinology, University Hospital of Odense, Svendborg, Denmark*
[5]*Department of Cardiology, University Hospital of Copenhagen, Rigshospitalet, Copenhagen, Denmark Objective: To examine correlation of different estimates of mean arterial pressure (MAP) to pulse wave velocity (PWV) and their effect on statistical adjustment*

Methods: Patients with hypertension and type-II-DM were included. They were characterized as having controlled (CH), uncontrolled (UH) or resistant hypertension (RH). Patients with UH and RH received intensified antihypertensive treatment for six months.
We measured clinic BP using Omron HEM 757, ABPM rmed using Kivex TM 2430 and Spacelab 90217devices and PWV using Sphygmocor.
Results: We included 108 patients.
MAP measured immediately before measurement of PWV correlated to PWV ($R^2=0.1$, $P=0.001$ at baseline and $R^2=0.16$, $P<0.0001$ after six months) whereas ABPM MAP did not ($R^2=0.01$, $P=0.31$ at baseline and $R^2=0.01$, $P=0.25$ after six months).
PWV was significantly higher in patients with RH than in patients with CH ($P=0.001$) but we found no significant reduction in PWV after six months ($P=0.16$). Reduction in PWV in patients with UH was significant ($P=0.02$). PWV remained significantly higher in patients with RH ($P=0.05$) as did reduction in PWV in patients with UH ($P=0.05$) when including ABPM MAP in the statistical model. However when including clinic MAP, PWV was no longer significantly higher in patients with RH ($P=0.08$) and reduction in PWV in patients with UH lost significance ($P=0.33$).
Conclusion: Clinic MAP correlates best with PWV and using clinic MAP for statistical adjustment produces different results from using ABPM MAP. As PWV has a diurnal variation, MAP taken at the same time as PWV is likely the better to correct for.