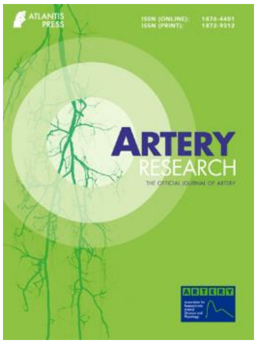


Artery Research

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

# 10.6: VARIATION OF THE ASYMPTOTIC DIASTOLIC PRESSURE WITH DIFFERENT FITTING TECHNIQUES IN HEALTHY HUMANS

Nicola Pomella, Christina Kolyva, Ernst Rietzschel, Patrick Segers, Ashraf W. Khir, Madalina Negoita

**To cite this article**: Nicola Pomella, Christina Kolyva, Ernst Rietzschel, Patrick Segers, Ashraf W. Khir, Madalina Negoita (2016) 10.6: VARIATION OF THE ASYMPTOTIC DIASTOLIC PRESSURE WITH DIFFERENT FITTING TECHNIQUES IN HEALTHY HUMANS, Artery Research 16:C, 72–72, DOI: https://doi.org/10.1016/j.artres.2016.10.084

**To link to this article**: https://doi.org/10.1016/j.artres.2016.10.084

Published online: 7 December 2019

95 % Limits of Agreement (LoA) for the mean interarm difference for a single measurement was 13.2 mmHg.
**Conclusion**: Microlife WatchBP measurement is a feasible method to determine IAD in a clinical setting. Bilateral BP measurements should be performed at first visit to help the clinician choose the right arm for further BP evaluations.

## 10.4
## COMPARISON OF BLOOD PRESSURE VARIABILITY CALCULATED FROM PERIPHERAL AND DERIVED AORTIC BLOOD PRESSURE

Zahra Kouchaki, Mark Butlin, Ahmad Qasem, Alberto Avolio
Macquarie University, Sydney, Australia

**Background**: Systolic blood pressure variability (SBPV), conventionally calculated from peripheral sites such as the arm or finger, may be of more utility when computed from central aortic values, as this has greater applicability to the heart and the baroreceptor function, due to central location of baroreceptors. As the relationship between aortic and peripheral blood pressure is frequency dependent, particularly in the range of physiological heart rate frequencies, peripheral and aortic SBPV may not be identical. Differences between peripheral and aortic SBPV have not been previously quantified.
**Methods**: In this study, peripheral and derived aortic SBPV was calculated in 30 healthy subjects (25- 62 years). Continuous finger blood pressure was measured for 10 minutes in each subject (Finapres) and aortic blood pressure derived using a general transfer function. SBPV was quantified using a Short Time Fourier Transform in a time-frequency method to calculate the ratio of average power across the low frequency power band (0.05-0.15 Hz) to the high frequency power band (0.15-0.4 Hz).
**Results**: Aortic SBPV (power band ratio) was correlated with peripheral SBPV ($r^2$=0.961, $p<0.001$) with a mean difference of -0.67±2.07. However, there was a bias toward peripheral SBPV overestimation compared to aortic SBPV for higher values of SBPV.
**Conclusions**: This study demonstrates that peripheral SBPV cannot be taken as equivalent to aortic SBPV, particularly where the low frequency to high frequency power ratio of SBPV is of higher magnitude.

## 10.5
## COMPARISON OF ARTERIAL STIFFNESS ASSESSED BY POPMÈTRE® WITH ARTERIAL STIFFNESS ASSESSED BY APPLANATION TONOMETRY: A CLINICAL STUDY

Hasan Obeid [1], Hakim Khettab [1], Pierre Boutouyrie [1], Stephane Laurent [1], Magid Hallab [2,3]
[1]*Paris Descartes University, Paris, France*
[2]*Georges Pompidou European Hospital, Paris, France*
[3]*Axelife and University Hospital of Nantes, France*

**Background**: Large artery stiffness is recognized as a strong, independent marker of cardiovascular risk, mainly through aortic pulse wave velocity (PWV). pOpmètre® is a new non-invasive method, which estimates aortic PWV through finger-toe (FT) wave analysis. In a previous study, Alivon et al. have shown an acceptable correlation ($r^2$ = 0.43 for PWV) between pOpmètre® and the reference method Sphygmocor. However this study led to the necessity to optimize the algorithm and the procedures because of the presence of several outliers involving mainly obese and elderly subjects.
**Materials and Methods**: The pOpmètre® has 2 photodiodes sensors, positioned on the finger and on the toe. A particular attention was drawn on positioning of the toe sensor so that the pulp was in contact with the photodiode. Different signal processing chains were applied and no cut-off value was used for pulse height. Applanation tonometry was performed for CF PWV measurements.
**Results**: 45 subjects were included: 18 healthy subjects and 27 patients with essential hypertension aged 32± 7 years and 58 ±18 years respectively. The correlation between FT PWV and CF PWV was good and significant ($r^2$ = 0.77 $p<0.0001$). A better correlation was found in terms of transit time ($r^2$ = 0.83 $p<0.0001$). The standard deviation of the difference was 0.87 m/s versus 6.73 ms, classifying the device as good agreement with reference (Wilkinson, ARTERY RES 2010).
**Conclusion**: pOpmètre® with optimized algorithm and procedure qualifies as excellent agreement with the reference technique for PWV assessment, however, outcome studies must confirm the value of this new device.

**References**
1. Maureen ALIVON et al.2015 ARTERY research archives. Validation study of pOpmètre.

## 10.6
## VARIATION OF THE ASYMPTOTIC DIASTOLIC PRESSURE WITH DIFFERENT FITTING TECHNIQUES IN HEALTHY HUMANS

Nicola Pomella [1], Christina Kolyva [3], Ernst Rietzschel [2], Patrick Segers [2], Ashraf W. Khir [1], Madalina Negoita [1]
[1]*Brunel University, London, UK*
[2]*Universiteit Gent, Belgium*
[3]*Middlesex University, London, UK*

**Background**: Reservoir-wave model assumes the measured pressure (Pm) consists of two additive components: reservoir (Pr) and excess pressure (Pex)[1-2]. Calculation of Pr requires fitting the diastolic decay of Pm for calculating parameters $P_\infty$ (asymptotical value) and b (time constant)[1]. However, there is no consensus over the value of these parameters[1-3-4]. Although many investigators use free-fitting, different degrees of freedom (dof) could be used[1-2-5]. The aim of this study was to examine the effect of varying fitting method on $P_\infty$ ,b and calculate the peaks of Pr and Pex.
**Methods**: Pressure data from common carotid artery of 505 middle-aged healthy subjects were selected from the Asklepios dataset. Free-fitting methods with 3 dof (dicrotic notch not fixed) and 2 dof (dicrotic notch fixed) were used to obtain $P_\infty$ , b and calculate Pr and Pex.
**Results**: Mean value of $P_\infty$ change significantly between 3 dof and 2 dof (58 vs. 50 mmHg $p<0.01$) as well as b (2.3 vs. 1.9 $s^{-1}$ $p<0.01$). Pr- and Pex- peaks didn't significantly change (Pr= 105 mmHg for 3 dof and 2 dof $p>0.05$ Pex = 30 mmHg and 31 mmHg for 3 dof and 2 dof, respectively $p>0.05$).
**Conclusions**: $P_\infty$ and b values are method-dependent with a large variation between methods. $P_\infty$ values in our study are higher than previously reported in literature, and variation in $P_\infty$ and b values don't affect Pr- and Pex- peaks. Given the variability in the combination of $P_\infty$ ,b in different subjects, the use of free-fitting is more appropriate.

**References**
1. Aguado-Sierra J, Alastruey J, Wang JJ, Hadjiloizou N, Davies J, Parker KH. Separation of the reservoir and wave pressure and velocity from measurements at an arbitrary location in arteries. Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine. 2008 Apr 1222(4):403-16.
2. Wang JJ, O'Brien AB, Shrive NG, Parker KH, Tyberg JV. Time-domain representation of ventricular-arterial coupling as a windkessel and wave system. American Journal of Physiology-Heart and Circulatory Physiology. 2003 Apr 1284(4):H1358-68.
3.Vermeersch SJ, Rietzschel ER, De Buyzere ML, Van Bortel LM, Gillebert TC, Verdonck PR, Segers P. The reservoir pressure concept: the 3-element windkessel model revisited? Application to the Asklepios population study. Journal of Engineering Mathematics. 2009 Aug 164(4):417-28.
4. Sridharan SS, Burrowes LM, Bouwmeester JC, Wang JJ, Shrive NG, Tyberg JV. Classical electrical and hydraulic Windkessel models validate physiological calculations of Windkessel (reservoir) pressure. Canadian journal of physiology and pharmacology. 2012 Apr 390(5):579-85.
5. Wang JJ, Shrive NG, Parker KH, Hughes AD, Tyberg JV. Wave propagation and reflection in the canine aorta: analysis using a reservoir-wave approach. Canadian Journal of Cardiology. 2011 Jun 3027(3):389-e1.

## 10.7
## NON-INVASIVE ESTIMATION OF CENTRAL SYSTOLIC PRESSURE: A COMPARISON BETWEEN RADIAL ARTERY TONOMETRY AND A NEW DIRECT CENTRAL BLOOD PRESSURE ESTIMATION METHOD (DCBP)

Denis Chemla [2], Sandrine Millasseau [3], Edmund Lau [4], Nathalie Richard [3], Pierre Attal [1], Mabrouk Brahimi [1], Alain Nitenberg [1]
[1]*Paris South University-Inserm U999, Paris, France*
[2]*Assistance Publique Hopitaux de Paris, France*
[3]*Alam Medical, Vincennes, France*
[4]*University of Sydney, Australia*

**Background**: We have developed a new proprietary method (DCBP® Direct Central Blood Pressure) to estimate central systolic blood pressure (cSBP) directly from peripheral pressure. In a previous meta-analysis of published high-fidelity pressure studies with simultaneous aortic and brachial pressure recordings, negligible mean difference between DCBP and cSBP has been documented (1). The accuracy and precision of DCBP against arterial tonometry measurements remain to be documented.