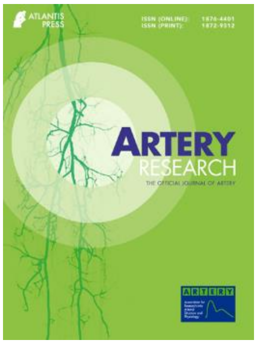

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10.3: USE OF MICROLIFE BP WATCH IS A FEASIBLE APPROACH TO DETERMINE INTER-ARM BLOOD PRESSURE DIFFERENCES IN A CLINICAL SETTING

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carotid remodeling, independently of age and BP, suggests that it corresponds to the muscular transition of an elastic artery [1]. The association of TS with circular collagen stiffness suggests that TS has subtle but measurable mechanical consequences.

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9.11
VASCULAR PHENOTYPING BY MEANS OF VERY HIGH-RESOLUTION ULTRASOUND IMAGING: A FEASIBILITY ANALYSIS

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Background: The study of medium and small-size arteries might be useful in the characterization of vascular adaptation, remodeling and wall ultrastructure modifications occurring with aging and in the presence of cardiovascular risk factors. However, to date, these districts have not been extensively explored non-invasively, due to limited spatial resolution power of standard ultrasound (US) machines.
Methods: High-frequency US examination by Vevo MD (FUJIFILM, VisualSonics, Toronto, Canada) was performed in 5 healthy volunteers (2 men, mean age: 26.4±3.3 years). Images were obtained at the carotid, brachial and radial artery level, using the 48 MHz (for carotid and brachial) and 70 MHz (for radial) US probes. Mean diameter, relative distension and intima-media thickness (IMT) were obtained using edge detection and contour tracking techniques. Texture analysis was performed on carotid, brachial and radial US images. Contrast, correlation, energy and homogeneity were evaluated from the grey-level co-occurrence matrix calculated on the pixels belonging to the IMT.
Results: IMT and relative distension, as well as texture analysis, could be successfully assessed in all the arterial districts evaluated. Correspondent results are reported in Table 1.
Conclusions: The multidistrict assessment of wall ultrastructure and mechanics in medium- and small-size arteries is highly feasible in healthy individuals. This kind of analysis might provide novel insight on the development of vascular alterations in previously neglected arterial districts, as well as their clinical significance.

	Carotid artery	Brachial Artery	Radial Artery
Mean Diameter (mm)	5.9±0.74	3.22±0.65	2.03±0.24
IMT (mm)	0.42±0.05	0.14±0.02	0.12±0.01
Relative distension (%)	10.6±1.8	4±1.7	7.4±2.5
Contrast	0.05±0.008	0.04±0.01	0.05±0.01
Correlation	0.99±0.001	0.99±0.003	0.99±0.001
Energy	0.19±0.05	0.33±0.17	0.23±0.07
Homogeneity	0.97±0.004	0.97±0.005	0.97±0.005

10.1
OPTIMAL AUTOMATED UNOBSERVED OFFICE BLOOD PRESSURE PROTOCOL: ONLY 6-MINUTES AND TWO READINGS MAY BE NEEDED

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Background: Automated office blood pressure (AutoBP) involving repeated, unobserved blood pressure (BP) readings during one clinic visit provides a practical alternative to daytime ambulatory blood pressure (ABP). However, the number of reading taken and measurement duration have varied across previously used AutoBP protocols. Therefore, the optimal AutoBP protocol taken in the least amount of time with the fewest BP readings is yet to be determined and was the aim of this study.
Methods: 117 patients (mean age 61.5±12.5 years) referred to a specialist BP clinic underwent AutoBP in a quiet room alone. Eight BP measurements were taken at 2-minute intervals immediately after sitting. The optimal AutoBP protocol with the highest concordance to daytime ABP was defined by smallest mean difference and highest intra-class correlation coefficient (ICC). The same BP device (Mobil-o-graph, IEM) was used for both AutoBP and daytime ABP.
Results: Average 15-minute AutoBP and daytime ABP were 138.4±18.1/84.8±12.2 mmHg and 140.9±15.2/86.2±10.6 mmHg, respectively. The AutoBP protocol with the highest concordance to daytime ABP was the average of two measures taken between two and six minutes of seated rest (systolic BP: mean difference = 0.3 (95%CI -3.0,2.4) mmHg, p=0.84; ICC=0.80; diastolic BP: mean difference = -0.42 (95%CI -2.0,1.1) mmHg, p=0.60; ICC=0.85). Daytime ABP tended to be overestimated by individual and the average of more than one AutoBP recorded before six minutes, however daytime ABP was underestimated after this time.
Conclusion: Only six minutes and two AutoBP readings may be needed to be comparable with daytime ABP.

10.2
EFFECTS OF INTER-ARM DIFFERENCES OF BRACHIAL SYSTOLIC BLOOD PRESSURE ON THE DERIVATION OF AORTIC SYSTOLIC PRESSURE

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Background: Inter-arm differences in brachial systolic blood pressure (SBP) should not theoretically translate to differences in calculated aortic SBP, there being only a single value of aortic blood pressure (BP) at any time.
Methods: This study assessed seated brachial and derived aortic SBP in 79 subjects (36±16 years, 40 male) using oscillometric brachial BP measurement and cuff volumetric displacement waveform recording. Measurements were taken simultaneously in left and right arm using identical SphygmoCor XCEL units (AtCor Medical, Sydney). Measurements were taken four times in each subject, swapping BP devices between arms.
Results: Brachial SBP was significantly higher in 11 subjects (average difference 5.4±0.7 mmHg) and in 18 subjects for aortic SBP (average difference 3.1±0.6 mmHg). Across all subjects, absolute inter-arm brachial difference in SBP, irrespective of direction, was 3.2±0.3 mmHg ($p<0.001$) and inter-arm aortic SBP difference 2.1±0.3 mmHg ($p<0.001$). Inter-arm SBP differences for brachial and aortic sites were correlated ($r^2=0.74$, $p<0.001$). Arm dominance accounted for 1.1±0.5 mmHg of inter-arm brachial SBP difference ($p=0.032$) but did not account for inter-arm aortic SBP difference ($p=0.163$). Average left arm SBP was not different to average right arm SBP for the whole cohort for brachial ($p=0.083$) or aortic ($p=0.789$) measurement.
Conclusions: The inter-arm absolute difference in brachial SBP translates to a significant but small (2.1 mmHg) difference in derived aortic SBP. Further studies are required to establish if this artefactual difference in derived aortic SBP is predominantly due to arm dominance or other factors associated with left/right difference in vascular properties.

10.3
USE OF MICROLIFE BP WATCH IS A FEASIBLE APPROACH TO DETERMINE INTER-ARM BLOOD PRESSURE DIFFERENCES IN A CLINICAL SETTING

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Aim: The aim of this study is to evaluate the feasibility of Microlife Watch BP for measuring bilateral blood pressure (BP) in a clinical setting.
Method: 339 patients (85% diabetic) scheduled for ambulatory blood pressure monitoring at the outpatient clinic for endocrinology, Silkeborg Regional Hospital, were examined with simultaneously bilateral BP measurements. A fully automatic, oscillometric device was used and two successive measurements were made.
Results: 9,1% of the patients had a clinically significant inter-arm blood pressure difference (IAD) of ≥10mmHg in the first set of measurements. Mean IAD in the first measurement was -0,3mmHg 6.6. Twenty-three patients had a normal IAD in the first set of measurements but IAD ≥10mmHg in the second set of measurements. Only one of the patients with an IAD ≥10mmHg had a change in the arm with the highest blood pressure. The

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

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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

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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.

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

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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_∞ (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_∞ ,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_∞ , b and calculate Pr and Pex.
Results: Mean value of P_∞ 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_∞ and b values are method-dependent with a large variation between methods. P_∞ values in our study are higher than previously reported in literature, and variation in P_∞ and b values don't affect Pr- and Pex- peaks. Given the variability in the combination of P_∞ ,b in different subjects, the use of free-fitting is more appropriate.

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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)

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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.