P38: DIFFERENCES IN FORM FACTOR CALCULATED FROM OSCILLOMETRIC OR WAVEFORM MEAN ARTERIAL PRESSURE

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historical and contemporaneous values of PP and MAP as well as age and heart rate, PWV was significantly associated with PP_C, MAP_C and PP_H but not with MAP_H. In the sub-study in which historical values of PWV were available, PWV increased by 0.75 ± 1.42 m/s, over an average of 5.5 ± 1.7years. The change in PWV was associated with MAP_C and with PP_H ($\beta = 0.144$, $p < 0.001$).
Conclusions: These results are consistent with strong dependence of PWV on contemporaneous BP but also historical values of pulse pressure which may drive arterial stiffening.

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Background: Oscillometric mean arterial pressure (MAP) agrees closely with invasive MAP, [1] but most devices do not report MAP and it is usually estimated by a form factor (FF). However, blood pressure (BP) measurement errors will affect FF, its correlations with exposures, and introduce errors into MAP estimated from the BP waveform.
Methods: Brachial BP was measured using a Pulsecor device in 1,112 participants in the Southall and Brent Revisited study (68.8 ± 6.1 y; 78.2% male; 47.4% White-European; 38.3% South-Asian; 14.3% African-Caribbean). Form factors (FFosc and FFwave) were calculated as (MAP-diastolic BP)/(systolic BP-diastolic BP) by oscillometry (MAPosc) or from the BP waveform (MAPwave).
Results: FFosc and FFwave differed (0.28 (SD = 0.02) vs. 0.36 (SD = 0.04); p <0.001) and were negligibly correlated (r = 0.07). Neither FF_{osc} nor FF_{wave} were associated with ethnicity, prevalent cardiovascular disease or current smoking status, and neither showed significant correlations with age, total- or HDL-cholesterol, or physical activity. Both FF_{osc} and FF_{wave} were lower in men (difference (Δ) = -0.005(95% CI = -0.007, -0.002) vs -0.015(95% CI = -0.020, 0.009) respectively) and were negatively correlated with height (r = -0.14 both), but only FF_{wave} correlated with body mass index (r = 0.02 vs r = 0.10) and heart rate (r = -0.06 vs r = 0.20). ΔMAP_{osc}-MAP_{wave} correlated with age (r = 0.10), height (r=0.15) and heart rate (0.17) and was greater in women (0.9(95% CI = 0.5, 1.3) mmHg).
Conclusions: FF_{wave} agrees poorly with FF_{osc} probably due to measurement errors. This creates spurious associations between exposures and FF and causes systematic errors in estimated MAP_{wave}. These errors have the potential to confound associations in epidemiological studies.

References
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ACUTE RESPONSES OF PULSE WAVE REFLECTION AFTER AEROBIC EXERCISE WITH DIFFERENT VOLUMES

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Background: Although Aerobic Exercise (AE) has been recognized for lowering Blood Pressure (BP), little is known about the alterations in aortic BP after exercise (1,2). PURPOSE: To investigate the acute pulse wave reflection responses induced by AE with different volumes in normotensive and hypertensive men.
Methods: We included 12 normotensives [aged: 38.3 ± 10.1 years, body mass index (BMI): 25.9 ± 3.6 kg/m^2, maximal oxygen uptake (VO2max): 31.4 ± 6.9 mL·kg^{-1}·min^{-1}, systolic/diastolic BP (SBP/DBP): 121 ± 6/74 ± 4 mmHg] and 7 hypertensive men [aged: 39.1 ± 6.0 years, BMI: 29.4 ± 3.1 kg/m^2, VO2max: 26.1±1.8 mL·kg^{-1}·min^{-1}, SBP/DBP: 140 ± 8/88 ± 7 mmHg]. The participants were submitted to a maximal cardiopulmonary exercise test, a non-exercise control session (CTL), and two bouts of continuous cycling at 50% VO2 reserve (150 vs. 300 kcal) in a randomized, counter-balanced order. Aortic systolic pressure, aortic pulse pressure, augmentation pressure, and augmentation index (AIx) were determined 10 min before and 70 min after the CTL and the two exercise bouts in a supine position by applanation tonometry (SphygmoCor v7).
Results: Central pressures and AIx were different between normotensive and hypertensive men after the two AE bouts as shown in table 1.
Conclusion: Although both AE were able to reduce pulse wave reflection in hypertensive men, only the major volume has attenuated the increase in central aortic BP observed in the control session.

Table 1: Mean ± SD values for the pulse wave reflection indicators at baseline and post- CTL and AE bouts with 150 and 300 kcal.

Variables	Conditions	Normotensive		Hypertensive	
		Baseline	Recovery	Baseline	Recovery
Aortic Systolic Pressure (mmHg)	CTL	99.83 ± 4.46	104.75 ± 7.81†	113.71 ± 14.52	124.86 ± 18.90†
	150 kcal	98.17 ± 6.21	99.08 ± 7.99	114.71 ±11.14	124.43 ± 18.11*
	300 kcal	100.25 ± 5.34	100.00 ± 6.98	114.43 ±15.14	119.57 ± 13.37
Aortic Pulse Pressure (mmHg)	CTL	29.67 ± 3.72	28.67 ± 4.25	30.57 ± 7.48	35.29 ± 9.30
	150 kcal	28.00 ± 5.54	27.83 ± 3.56	31.29 ± 3.90	33.71 ± 5.99
	300 kcal	30.08 ± 3.31	27.75 ± 4.04	31.14 ± 7.75	32.29 ± 4.64
Aortic Augmentation Pressure (mmHg)	CTL	4.83 ± 4.42	3.75 ± 3.51	3.43 ± 5.22	7.86 ± 5.52†
	150 kcal	3.67 ± 5.08	1.58 ± 3.60	4.57 ± 3.10	6.86 ± 5.52
	300 kcal	3.08 ± 4.33	1.83 ± 3.83	4.00 ± 6.13	5.43 ± 3.59
Augmentation Index (%)	CTL	13.33 ± 10.22	11.83 ± 12.34	10.43 ± 12.52	20.43 ± 10.81†
	150 kcal	10.75 ±16.76	5.50 ± 12.91	14.29 ± 8.46	5.50 ± 12.91
	300 kcal	9.50 ± 13.54	5.75 ± 12.48	10.14 ± 13.69	5.75 ± 12.48

*: Significant difference compared baseline and recovery in the same condition, using paired t-test ($P < 0.05$)
†: Significant difference compared baseline and recovery in the same condition, using paired t-test ($P < 0.01$)

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INCREASED STIFFNESS IN THE DIGITAL ARTERIES OF ESSENTIAL HYPERTENSIVE WOMEN: THE FUCHSIA STUDY

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Rationale and Aim: Essential hypertension is characterized by extensive alterations of arterial geometry and mechanical properties: increased stiffness, dilation and wall of large arteries, increased thickness in muscular arteries, small artery remodeling. This study is aimed at exploring function and structure of the digital arteries of the hand, muscular arteries with an internal diameter of 500-1000 mm, easily accessible by ultrahigh frequency ultrasound.
Methods: 24 hypertensive women (HT) and 37 healthy controls (C) were recruited. 5'-videoclips of left palmar digital arteries were obtained by VevoMD (FUJIFILM, VisualSonics, Toronto, Canada), by means of a 70 MHz probe (axial-lateral resolution 30-65 μm). An automatic system (Cvsuite, Quipu srl; Pisa, Italy) was used to measure intima-media thickness (IMT) and diameter. Distensibility and stiffness were then calculated using left brachial pulse pressure (PP - oscillometric)
Results: HT and C had similar age (57 ± 11 vs 53 ± 11 years, p = 0.22), BMI (24.9 ± 4.6 vs 24.5 ± 4.2 vs kg/m^2, p = 0.80) and mean blood pressure (BP, 95 ± 12 vs 91 ± 12 mmHg, p = 0.24); HT showed slighlty higher PP (54 ± 14 vs 47 ± 10, p = 0.07). Palmar digital lumen tended to be higher in HT (804 ± 201 vs 696 ± 191 μm, p = 0.10), while IMT was similar (120 ± 23 vs 125 ± 36 μm, p = 0.81). Distensibility was reduced (21.4 ± 18.2 vs 29.0 ± 18.8 kPa $^{-1}$, p < 0.05), while stiffness was increased (7.95 ± 2.22 vs 6.72 ± 2.11 m/s, p < 0.005).
Conclusions: This is the first report of the presence of altered mechanical properties (i.e. increased stiffness) in muscular arteries with lumen <1000 mm of essential hypertensive women. These findings suggest that increased hemodynamic load characterizing hypertension lead to a different vascular phenotype in each arterial segment.

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MASKED HYPERTENSION AND RETINAL VESSEL STRUCTURE AND FUNCTION IN YOUNG HEALTHY ADULTS: THE AFRICAN-PREDICT STUDY

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