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a mean of 9.2 ± 3.5 years after transplantation. The first year decline was related to smoking and acute rejection but the later decline was significantly and exclusively associated with donor age and aortic stiffness. In hypertensive humans, the significant association between PP and GFR indicates a cross-talk between the two parameters with arterial stiffness, and not vascular resistance, as major mediator.

5.2

CUFF AND TONOMETER BASED DEVICE FOR ASSESSMENT OF CAROTID TO FEMORAL PULSE WAVE VELOCITY: VALIDATION ACCORDING TO ARTERY SOCIETY GUIDELINES

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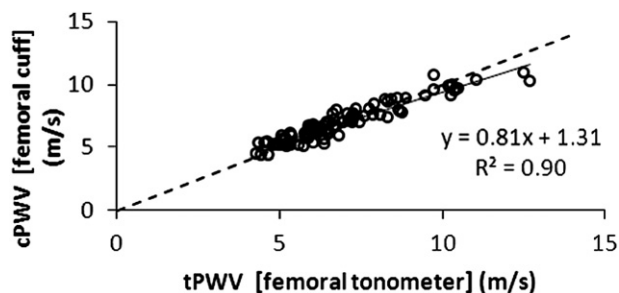
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Background: There is increasing interest in cuff-based devices for assessment of arterial pulse wave velocity (PWV). A recently developed device utilises a thigh cuff and carotid applanation tonometry for assessment of carotid to femoral PWV (cPWV; SphygmoCor XCEL, AtCor Medical; test device). Our aim was to validate the device against ECG gated tonometric measurement of PWV (tPWV) (SphygmoCor CvMS; control device) according to Artery Society Guidelines [1].

Methods: We recruited 94 subjects (48 female, 22-83 years, mean age 45.6 ± 19.4) in 3 centres (Australia, France, Italy). The thigh cuff was inflated automatically to sub-diastolic pressure and the cuff waveform was recorded simultaneously with the tonometric carotid waveform. Control and test devices were used in random order. PWV was determined from wave foot-to-foot delay and distance from suprasternal notch to femoral site or top of cuff, minus distance from suprasternal notch to carotid site. The average was computed of triplicate measurements by two operators.

Results: A high correlation was found between devices ($R^2=0.90$; Figure) with a mean difference of -0.02 ± 0.61 (SD) m/s. Mean difference and standard deviation (SD) between cPWV and tPWV was well within the "excellent" category acceptance criteria of the Artery Society guidelines (<0.5 m/sec and <0.80 m/sec, respectively).

Conclusion: The femoral cuff technique gives comparable PWV values to those acquired with the accepted standard ECG gated carotid/femoral tonometry PWV measurement technique.



[1] Wilkinson IB *et al.* Artery Society guidelines for validation of non-invasive haemodynamic measurement devices: Part 1, arterial pulse wave velocity. *Artery Research* 2010; 4:34-40

5.3

RELATIONSHIP BETWEEN SHORT-TERM BLOOD PRESSURE VARIABILITY AND LARGE-ARTERY STIFFNESS IN HUMAN HYPERTENSION

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Short-term blood pressure (BP) variability predicts cardiovascular complications in hypertension, but its association with large-artery stiffness is poorly understood and confounded by methodological issues related to the assessment of BP variations over 24h.

Carotid-femoral pulse wave velocity (cfPWV) assessment and 24-hour ambulatory BP monitoring were performed in 911 untreated, nondiabetic patients with uncomplicated hypertension (learning population) and in 2089 mostly treated hypertensive patients (test population). Short-term systolic BP (SBP) variability was calculated as the following: (1) SD of 24-hour, daytime, or nighttime SBP; (2) weighted SD of 24-hour SBP; and (3) average real variability (ARV), that is, the average of the absolute differences between consecutive SBP measurements over 24 hours. In the learning population, all of the measures of SBP variability showed a direct correlation with cfPWV (SD of 24-hour, daytime, and nighttime SBP, $r=0.17/0.19/0.13$; weighted SD of 24-hour SBP, $r=0.21$; ARV, $r=0.26$; all $P<0.001$). The relationship between cfPWV and ARV was stronger than that with 24-hour, daytime, or nighttime SBP ($P<0.05$) and similar to that with weighted SD of 24-hour SBP. In the test population, ARV and weighted SD of 24-hour SBP had stronger relationships with cfPWV than SD of 24-hour, daytime, or nighttime SBP. In both populations, SBP variability indices independently predicted cfPWV along with age, 24-hour SBP, and other factors.

We conclude that short-term variability of 24-hour SBP shows an independent relation to aortic stiffness in hypertension. This relationship is stronger with measures of BP variability focusing on short-term changes, such as ARV and weighted 24-hour SD.

5.4

HIGHER PULSE PRESSURE IN OLDER PEOPLE IS ASSOCIATED WITH SMALLER AORTIC LUMEN AREA

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High pulse pressure (PP) contributes to the pathogenesis of hypertension and is associated with adverse cardiovascular disease outcomes. There is consensus that aortic wall stiffening contributes to higher PP. However, the role of lumen size in the pathogenesis of elevated PP remains controversial. Prior studies showing an unexpected inverse association between PP and lumen area have been criticized for using echocardiography, which affords limited views of the thoracic aorta. Therefore, we performed cine magnetic resonance imaging (MRI) of the ascending aorta 5 mm above the aortic valve and the proximal and distal descending thoracic aorta in 423 older participants (age 72 to 94, mean 79 years; 57% women) in the Age, Gene/Environment Susceptibility-Reykjavik Study (AGES-Reykjavik). Immediately prior to MRI, supine auscultatory blood pressure ($141 \pm 19/64 \pm 9$, $PP = 77 \pm 18$ mmHg) and tonometry of brachial, radial, femoral and carotid arteries were performed. Mean aortic lumen area during the cardiac cycle was computed at each level and averaged across the 3 levels to give average lumen area (LA_M). Wall area (WA) and elastance ($E = PP \times A_D / (A_S - A_D)$) were similarly averaged. In linear regression models, LA_M was negatively related to PP when considered alone (Model 1) and in a model that adjusted for age, sex, height, weight, heart rate, total and HDL cholesterol, triglycerides, estimated GFR, diabetes, glucose, HbA1c and history of smoking (Model 2). The relation persisted after further adjustment for E and WA (Model 3). In our sample of older people, higher pulse pressure is associated with a smaller lumen area of the thoracic aorta.

Table Relations between pulse pressure and average aortic lumen area.

	Beta	SE	P
Model 1	4.5	0.9	<0.0001
Model 2	5.7	1.1	<0.0001
Model 3	5.9	1.2	<0.0001

Effects are expressed as pulse pressure increase per SD decrease in mean lumen area (mm Hg/SD).