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P54 Age-specific, Pressure-independent Acute Changes in Carotid-femoral Pulse Wave Velocity During Head-up Tilt

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ABSTRACT

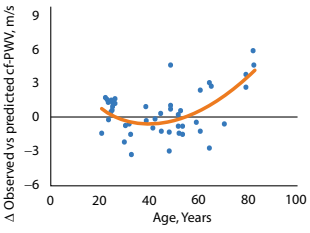
Introduction: Acute, gravity-induced blood pressure (BP) changes during head-up tilt may generate concomitant variations in carotid-femoral pulse wave velocity (cf-PWV). We aimed to separate the pressure-dependent and -independent components of cf-PWV changes observed during head-up tilt.

Methods: 30 healthy individuals (age 48 ± 18 years (mean ± SD), 38% males, BP 130/74 ± 12/8 mmHg) underwent head-up passive tilting at a = 0°, 30°, and 60°. BP was taken at the upper arm, constantly kept at heart level. Aortic BP was reconstructed from radial tonometry (SphygmoCor). Stiffness index b0 was estimated at 0°. 1 Assumptions: [1] from MRI2, the effective cf-PWV travel distance (ETD, 80% of straight carotid-to-femoral distance) begins at heart level; [2] the change in DBP along the aorta is predictable from the hydrostatic pressure gradient (0.73 mmHg/cm) 3; [3] cf-PWV and hydrostatic pressure relate linearly, hence predicted cf-PWV can be calculated as the average of aortic (PWVaorta, using b0 and aortic DBP) and femoral (PWVfem, using b0 and femoral DBP, corresponding to aortic DBP + (ETD × sin(a)*0.73)) PWVs.

Results: Both young (24–48 years) and old (48–82 years) individuals showed increasing trends for peripheral SBP, DBP, PP, and central DBP with tilting; central SBP remained unchanged. Heart rate (HR) and cf-PWV increased with body tilt in both groups (Figure, left). b0 linearly correlated with age (R = 0.70, p < 0.01). After adjustment for HR4, observed-vs-predicted cf-PWV exponentially increased as a function of age (R^2 = 0.38, p < 0.01 for quadratic equation, p = 0.04, vs. linear; Figure, right).

Conclusion: With aging, the acute relationship between BP and cf-PWV becomes progressively nonlinear.

	Young			Old			*P* (trend)	*P* (Young vs old)	*P* (Interaction)
	0°	30°	60°	0°	30°	60°			
Peripheral SBP, mmHg	125 (6)	126 (8)	126 (9)	135 (15)	142 (20)	142 (21)	<0.01	0.01	0.05
Peripheral DBP, mmHg	72 (7)	75 (8)	79 (9)	76 (9)	79 (10)	82 (10)	<0.01	0.30	0.94
Peripheral PP, mmHg	52 (8)	51 (9)	48 (9)	59 (13)	62 (14)	60 (14)	0.06	0.02	0.02
Central SBP, mmHg	107 (8)	107 (9)	107 (8)	125 (14)	127 (19)	125 (19)	0.64	0.01	0.92
Central DBP, mmHg	74 (7)	76 (8)	80 (9)	76 (8)	80 (10)	84 (11)	<0.01	0.25	0.54
HR bpm	62 (8)	65 (7)	74 (8)	63 (10)	65 (8)	73 (7)	<0.01	0.98	0.44
PWV, m/s	7.0 (1.3)	7.6 (1.3)	7.8 (1.7)	9.1 (1.9)	10.6 (2.8)	11.4 (3.4)	<0.01	<0.01	0.05



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