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Background

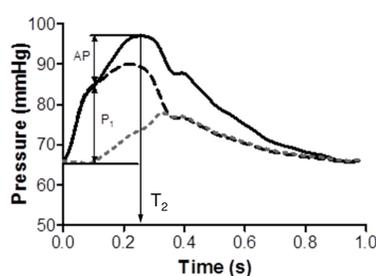
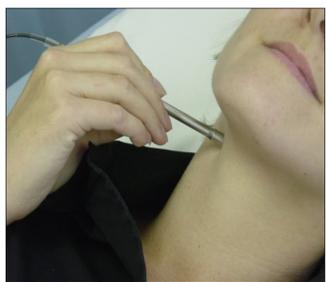
Widening of pulse pressure contributing to systolic hypertension in older subjects could result from arterial stiffening, increased peripheral pressure wave reflection and/or an altered pattern of ventricular ejection.

Aim

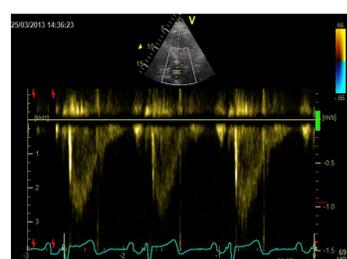
To evaluate the roles of arterial stiffening, increased peripheral wave reflection and pattern of ventricular ejection in contributing to central pulse pressure during a 5-year follow-up period in healthy women

Methods

Subjects comprised 329 unselected women from the Twins UK cohort who had central blood pressure measurements performed between 2006 and 2013 and with a follow-up visit approximately 5 years later (age 58 ± 8 years at first visit).



Carotid tonometry



Doppler ultrasound

P1, the first systolic shoulder; AP, the difference between pressure at the second systolic peak (P2) and that at the first shoulder/peak. Wave decomposition was based on the conservation of mass and momentum, and performed using Parker's time-domain approach to obtain forward (P_f) and backward (P_b) pressure components of central pulse pressure.

$$P_f = \frac{1}{2} \sum [(dP + \rho cdU)]$$

$$P_b = \frac{1}{2} \sum [(dP - \rho cdU)]$$

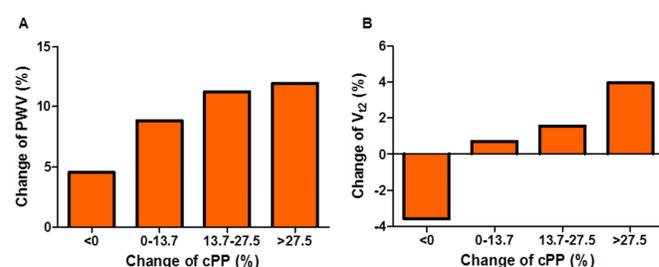
$$R = P_b/P_f$$

$$Aix = AP/cPP$$

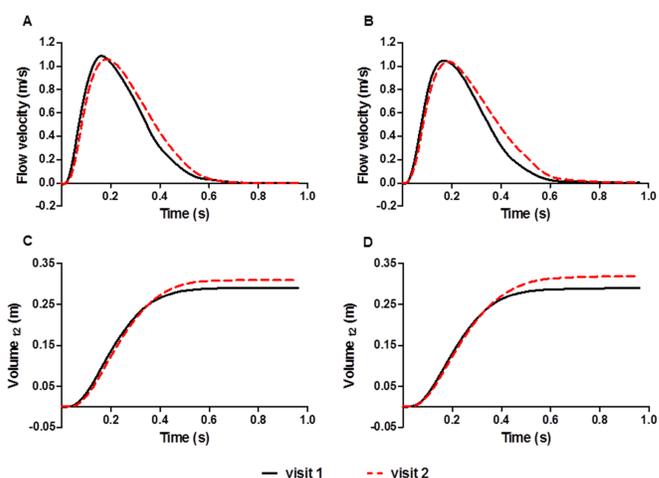
Results

Table 1 Characteristics of subjects

Characteristics	Visit 1	Visit 2	P value
n	329	329	
Age (yrs)	58±8	63±8	0.001
Height (cm)	162±11.0	160±18.9	0.034
Weight (kg)	66.5±11.9	66.5±11.6	0.974
BMI (kg/m ²)	25.1±4.2	25.3±4.4	0.663
Current smoker	21 (6.4%)	19 (5.8%)	0.744
Diabetes mellitus	56 (17.0%)	53 (16.1%)	0.753
Antihypertensive treatment	61 (18.5%)	79 (24.0%)	0.086
Lipid-lowering treatment	39 (11.9%)	67 (20.4%)	0.003
Peripheral SBP (mmHg)	123.1±17.3	129.6±18.5	0.001
Peripheral DBP (mmHg)	71.1±8.6	74.8±8.7	<0.001
Heart rate (bpm)	60.5±9.7	61.9±10.8	0.074
MAP (mmHg)	90.6±11.5	95.8±11.6	<0.001
Central SBP (mmHg)	115.8±17.9	123.4±18.4	<0.001
P1 (mmHg)	104.9±13.5	110.9±14.5	<0.001
AP (mmHg)	10.7±7.6	12.3±8.1	0.011
Aix (%)	22.7±13.3	24.4±12.8	0.505
R	0.32±0.12	0.27±0.11	0.001



Progression (between visits) of A) PWV and B) ejection volume at T2 versus progression of cPP.



Flow velocity and volume at visit 1 (black solid line) and visit 2 (red dash line) for lowest (A, C) and highest (C, D) groups for progression of cPP.

Conclusion

This 5 year follow-up study suggests that in women, increased pulse wave velocity and ejection volume rather than wave reflection are the major determinants of the age-related widening of central pulse pressure.