Aortic Pulse Wave Velocity Evaluation With 5-year Followup

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Aortic compliance can be evaluated noninvasively and its reduction with age in normals has been demonstrated with both MRI and Doppler echo methods. Aortic pulse wave velocity (PWV), a measurement of the flow pulse traveling along aorta as a surrogate for aortic compliance, can be assessed using a single breath-hold phase contrast imaging technique. Repeated study in the same age group can provide us valuable information on the evolution of normal aortic stiffness with ageing. We repeated our studies at 5-year intervals on normal volunteers and evaluated the relationship of aortic PWV to age over time.

Methods Twenty eight healthy volunteers gave informed consent (11 male, age: 61.3±14.2) and were screened to exclude hypertension, hyperlipidemia, and cardiovascular disease. Using the 'candy cane' view of aorta, an axial plane through the ascending and descending aorta at the pulmonary artery level was prescribed and a through-plane velocity encoded PC cine imaging was acquired with VENC of 150 cm/s, TR/TE/FA = 98ms/2.9ms/15° and voxel spatial resolution 1.3×2×6 mm^3 on a 1.5T MRI scanner. The distance traveled by the aortic pulse wave, ΔD, was determined as the distance along the central line between the sections imaged in the ascending and descending aorta in the 'candy cane' image. For flow pulse onset, the cross correlation between the first halves of the ascending and descending aortic flow curves was calculated by varying the relative time shift between them. The Δt was the time shift at the maximal correlation. We then calculated PWV=ΔD/Δt. Linear regression was used to determine the relationships between PWV and age at both visits.

RESULTS: The mean and std of PWV, changed little between visits, but showed a stronger correlation with age at 5 years than at intake (**Table**), due to the change in slope between age 70-75 and the larger number of subjects > 75 at 5 years, as illustrated in F**igure**.

CONCLUSIONS: The rate of change in aortic stiffness with age increases markedly above age 70.

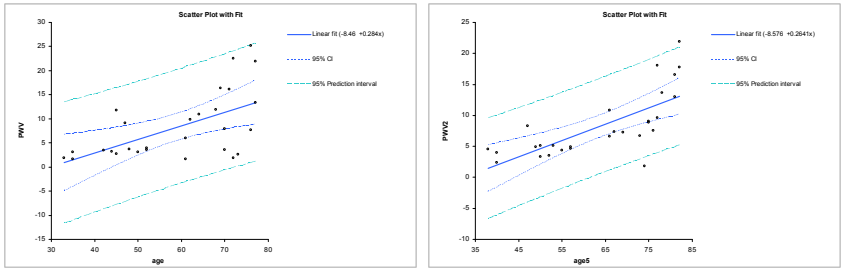

Figure. The scatter plot of the fitting curve between pulse wave velocity and age on subjects 1st visit (a), with R^2=0.35, and (b) 2nd visit with R^2=0.52, p<.001 for both.

Age versus PWV in 5 years (n=28)		
	1st visit	**2nd visit**
PWV (mean±std)	8.24±6.91	8.28±5.23
R^2	0.35	0.52
p	<.001	<.001

Table. The pulse wave velocity range and its correlation with age measured in 5 year apart.