

# Normal and reference values for MRI-based pulse wave velocity in the middle-aged general population

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**Background:** Aortic stiffness, assessed through pulse wave velocity (PWV), is an independent predictor for cardiovascular (CV) risk. However, the scarce availability of normal and reference values for magnetic resonance imaging (MRI) based PWV is limiting clinical implementation.

**Purpose:** The aim of this study was to determine normal and reference values for MRI-PWV in the general population.

**Methods:** From the 2,484 participants of the NEO study that have available MRI-PWV data, we selected 1,639 participants that were free from CV disease or treatment for diabetes, hypertension or dyslipidaemia (age range 45–65 years, 51% male). Participants were categorized by sex, age and blood pressure (BP) subgroups. Normal values were specified for healthy (<130/80 mmHg) and elevated BP ( $\geq$ 130/80 and <140/90 mmHg) and reference values for high BP ( $\geq$ 140/90 mmHg) subgroups. Differences be-

tween groups were tested with either an independent samples t-test or ANOVA.

**Results:** Overall mean PWV was 6.5 m/s [95% CI 6.4–6.6]. PWV increased significantly with advancing age and BP categories (both  $p<0.001$ ). There was no difference in PWV between men and women, however a stronger increasing trend for women above 55 years old was observed (figure). The 95% CI's were smaller for participants <55 years old as compared to participants >55, indicating an increasing variability of PWV with age. The elevated PWV upper limits for the higher blood pressure subgroups are particularly evident in participants above 55 years old.

**Conclusion:** This study provides normal and reference values for MRI-assessed PWV per sex, age and blood pressure category.

PWV values per sex, age and blood pressure category				
Age (years)	Healthy BP <130/80	Elevated BP $\geq$ 130/80, <140/90	High BP $\geq$ 140/90 mmHg	p-value
Men				
45.0 to 49.9	5.6 [5.3–5.9]	5.7 [5.5–5.8]	6.1 [5.9–6.3]	0.001
50.0 to 54.9	5.8 [5.5–6.1]	5.9 [5.7–6.2]	6.4 [6.1–6.7]	0.009
55.0 to 59.9	6.3 [6.0–6.6]	6.6 [6.0–7.1]	7.1 [6.8–7.5]	0.005
60.0 to 64.9	6.6 [6.2–6.9]	7.1 [6.7–7.5]	7.4 [7.0–7.8]	0.010
Women				
45.0 to 49.9	5.4 [5.2–5.5]	5.8 [5.5–6.0]	6.3 [6.1–6.5]	<0.001
50.0 to 54.9	5.7 [5.5–5.9]	6.3 [6.0–6.6]	6.6 [6.3–7.0]	<0.001
55.0 to 59.9	6.2 [5.8–6.6]	6.9 [6.5–7.2]	7.3 [6.9–7.6]	<0.001
60.0 to 64.9	6.8 [6.5–7.1]	7.3 [6.8–7.7]	8.5 [7.7–9.2]	<0.001

Mean (95% CI). Abbreviations: BP = blood pressure.

