

Reduced Cardiac Baroreflex Sensitivity Is Associated with Greater Aortic Stiffness in Middle-Aged/Older Humans: Beneficial Effect of Habitual Aerobic Exercise

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Introduction: Sedentary aging is characterized by reduced cardiac baroreflex sensitivity (BRS) and increased aortic stiffness, both independent predictors of higher cardiovascular disease (CVD) risk in middle-aged/older (MA/O) adults. However, MA/O adults who perform habitual endurance exercise demonstrate lower CVD risk perhaps in part from reduced aortic stiffness and enhanced cardiac BRS.

Objectives: We hypothesized that reduced BRS (sequence technique derived from intra-brachial artery BP waveforms) is associated with greater aortic stiffness (aortic pulse wave velocity, aPWV) among sedentary and endurance-trained MA/O adults, and that endurance exercise training initiated in previously sedentary MA/O adults enhances BRS and reduces aPWV.

Methods and Results: In a cross-sectional study, MA/O sedentary (MA/O-S, n=24, age 62 ± 4 yrs, $VO_2\text{max}$ 26 ± 1 ml/kg/min) adults demonstrated reduced BRS (11.7 ± 1.5 vs 40.7 ± 8.6 ms/mmHg, $P < 0.05$) and greater aortic stiffness (aPWV 9.7 ± 0.8 vs 6.4 ± 0.8 m/sec, $P < 0.05$) compared with young sedentary (YS, n=6, age 22 ± 2 yrs; $VO_2\text{max}$ 39 ± 2 ml/kg/min) adults. MA/O endurance-trained (MA/O-T, n=15, age 61 ± 2 yrs, $VO_2\text{max}$ 46 ± 1 ml/kg/min, $P < 0.05$) adults had greater BRS (24.3 ± 4.0 ms/mmHg) and smaller aPWV (8.0 ± 0.3 m/sec, $P < 0.05$) than MA/O-S. In the entire cohort after adjustment for age and mean blood pressure, aPWV was inversely correlated with BRS ($r = -0.55$, $P < 0.05$). In a subset of MA/O-S adults (n=18), 8 weeks of aerobic exercise training (n=12, 6-7 days/week, 40-45 min/day, 60-80% HRmax) improved BRS (11.7 ± 2.1 vs 16.1 ± 2.7 ms/mmHg, $P < 0.05$) but not aPWV (9.8 ± 0.8 vs 9.2 ± 0.9 m/sec, $P = 0.08$), while there was no change in sedentary time-controls (n=6, $P > 0.05$).

Conclusions: Habitual aerobic exercise attenuates the age-related reduction in cardiac BRS and greater aortic stiffness in humans. However, short-term aerobic exercise training initiated in MA/O-S adults improves BRS but not aortic stiffness.