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, VO₂max 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; VO₂max 39 ± 2 ml/kg/min) adults. MA/O endurance-trained (MA/O-T, n=15, age 61± 2 yrs, VO₂max 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.