EFFECT OF ACUTE INTENSE EXERCISE ON ARTERIAL STIFFNESS

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Background: Aortic stiffness and wave reflections are determinants of left ventricular performance and independent predictors of cardiovascular risk. Though it is well recognized that regular aerobic exercise can affect arterial stiffness and wave reflections, the acute effect of intense aerobic exercise has not been defined. In this study we examined the acute effect of marathon race on the arterial elastic properties in highly trained athletes.

Methods: We studied 20 healthy, regularly trained (5±2.5 hours/week for 12.4±7.4 years) marathon runners (mean age: 36±10yrs, 16M/4F) before and after the race. Aortic stiffness was evaluated with pulse wave velocity (PWV) with a validated noninvasive device and wave reflections with augmentation index (Alx) of the aortic pressure waveform using a validated, commercially available system.

Results: Marathon race led to a significant fall in Alx corrected for the heart rate (6.96±13.3 vs. 0.04±10.9, P=0.01) indicating reduced heart afterload. Mean pressure (94±14 vs. 85±9, P=0.05), systolic brachial (127±16 vs. 122±11, P<0.05), systolic aortic pressure (113±16 vs. 102±10, P=0.01), as well as diastolic brachial (78±12 vs. 70±8, P=0.01), diastolic aortic pressures (79±12 vs. 73±8, P<0.05), were also decreased, whereas heart rate was significantly increased (62±9 vs. 90±9, P<0.01). PWV did not differ before and after marathon race (6.65±0.9vs.6.74±1.2,P=NS).

Conclusions: Marathon race results in an acute decrease of wave reflections. This indicates reduced afterload that facilitates left ventricular performance. Since there is no effect on PW, it is caused most likely by peripheral vasodilation. These findings elucidate the interrelations between biophysical properties of the arteries and exercise capacity.