The Influence of Body Composition on Arterial Stiffness And Cardiorespiratory Fitness in Young Adults

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Objectives: Carotid-femoral pulse wave velocity (cfPWV) is associated with increased cardiovascular disease risk, which is due, in part, to reduced cardiorespiratory fitness (CRF). The influence of body composition on the relationship between cfPWV and CRF has been equivocal. Thus, identifying the influence of body composition on CRF in young adults for future prevention is clinically relevant. We hypothesized the inverse relation between cfPWV and CRF is due to greater fat mass (FM) and fat free mass (FFM) in young adult males.

Methods: Forty-three apparently healthy, young adult males (22.19 ± 0.49 yrs) were recruited. A resting measure of aortic stiffness (carotid-femoral pulse wave velocity, cfPWV) was acquired, and body composition was assessed with bioelectrical impedance analysis using a two-compartment model (FM and FFM). Subjects completed a maximal treadmill test to assess peak oxygen uptake (VO_2peak) as a measure of CRF.

Results: Relative VO_2peak (ml/kg/min), which accounts for overall body mass, was inversely associated with cfPWV ($P<0.001$). However, absolute VO_2peak (L/min) independent of body mass was not related to cfPWV ($P=0.34$). Subjects divided into tertiles based on absolute VO_2peak demonstrated no differences in cfPWV ($P=0.47$). However, an analysis of covariance (ANCOVA) revealed a significant main effect for total body fatness ($P<0.001$). Bivariate analyses with total body mass, total fat mass, total fat free mass, and percent fat mass were all positively associated with cfPWV ($P<0.05$, all). Percent fat free mass, however, was inversely related to cfPWV ($P<0.01$).

Conclusions: CRF is not associated with aortic stiffness in apparently healthy, young adult males after controlling for total body mass. An increase in either FM or FFM was associated with greater aortic stiffness, suggesting that total body mass – independent of its composition – modulates the aortic stiffness and CRF relationship. Thus, reducing body mass early in life may prevent aortic stiffness and early vascular aging.

Figure 1.

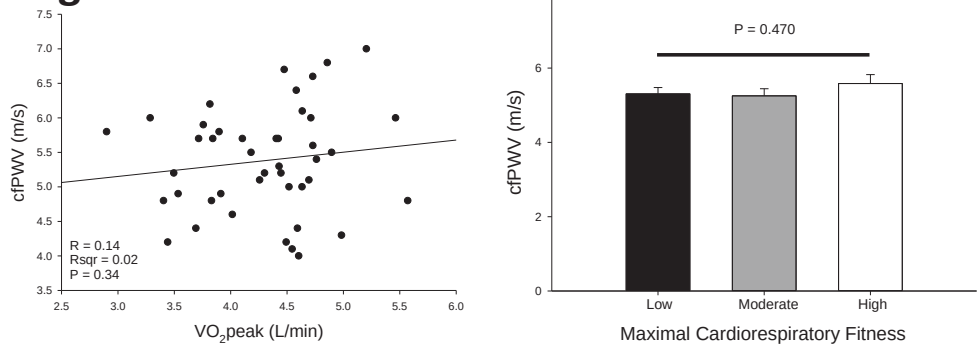

Figure 2.