Relationships between peak oxygen uptake and arterial function: a preliminary study.

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INTRODUCTION: Aerobic fitness, as measured by VO$_{2\text{peak}}$, is a well-validated predictor of morbidity and mortality in healthy individuals and those with cardiovascular disease. Resting arterial function, as indicated by carotid to femoral pulse wave velocity (cfPWV: arterial stiffness), and arterial structure as indicated by intima-media thickness (IMT), and carotid diameter (Dc), are correlated to cardiovascular risk. As alterations in arterial health likely impact aerobic capacity, identifying arterial parameters that predict cardiovascular fitness are necessary; however, this relationship has not been fully investigated.

PURPOSE: This preliminarily cross-sectional study examined the relationship between relative peak VO$_2$ and resting arterial function of 51 subjects without overt cardiovascular disease (CVD) (mean age 44.9 ± 11.6). METHODS: VO$_{2\text{peak}}$ was assessed using a staged graded exercise test on a semi-recumbent bicycle until volitional fatigue. cfPWV was measured with Applanation tonometry; IMT and Dc were measured with B mode ultrasound. To account for individual differences in CVD risk each individual was assigned a metabolic risk score based on their age, sex, blood pressure, BMI, triglycerides, HDL, and glucose. RESULTS: Univariate regression models indicated that VO$_{2\text{peak}}$ is significantly related to cfPWV [r = -0.43, p = 0.002], IMT [r = -0.46, p = 0.001], and Dc [r = -0.30, p = 0.035]. For multivariate analysis adjusted for age, sex, and metabolic risk scores, VO$_{2\text{peak}}$ remained significantly related to cfPWV [r = -0.29, p = 0.036], IMT [r = -0.32, p = 0.012], and Dc [r = -0.25, p = 0.037]. CONCLUSION: Preliminary data suggest that peak oxygen uptake is independently correlated with arterial health in populations free of overt CVD. These results suggest that improving peak oxygen uptake may have a favorable effect on arterial function and vice versa.

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