

**Distinguishing Increased Adiposity and/or Aerobic Deconditioning as Moderators of Low  $\dot{V}O_{2peak}$  in Obese Men**

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**ABSTRACT**

Peak oxygen uptake ( $\dot{V}O_{2peak}$ ) in a cardiopulmonary exercise test (CPET) is a strong predictor of morbidity, mortality, and quality of life.  $\dot{V}O_{2peak}$  in obese individuals is typically below the lower limit of normal (<LLN). This could be due to: increased adiposity i.e. a greater fraction of body mass not engaged in exercise; reduced  $O_2$  transport and utilization, i.e. aerobic deconditioning; or both. We hypothesized a modified CPET, to measure the fraction of maximum isokinetic power that can be supported by aerobic metabolism, will distinguish between adiposity and deconditioning effects on  $\dot{V}O_{2peak}$ . **PURPOSE:** To compare  $\dot{V}O_{2peak}$  and isokinetic neuromuscular performance in obese vs non-obese men. **METHODS:** A modified CPET with maximal (3 s) isokinetic cycling power at baseline and the limit of ramp-incremental (RI) exercise was used to calculate: A) baseline maximum isokinetic power (Piso); B) tolerance index (TI), % of Piso at  $\dot{V}O_{2peak}$ ; C) fatigue index (FI), % reduction in Piso per RI-watt at  $\dot{V}O_{2peak}$ ; D) power reserve (PR), isokinetic power available at  $\dot{V}O_{2peak}$  expressed as % RI-watt<sub>peak</sub>. The FRIEND nomogram was used to predict  $\dot{V}O_{2peak}$ . Data are mean(SD) and were assessed by t-test. **RESULTS:** Compared to controls (n=24), obese men (n=20) were older (32(5) vs 26(7) yr), had greater BMI (38(6) vs 23(2) kg/m<sup>2</sup>), but were not different in stature (177(5) vs 180(7) cm) or predicted  $\dot{V}O_{2peak}$  (3.49(0.49) vs 3.58(0.36) L/min). Obese men had lower  $\dot{V}O_{2peak}$  (2.84(0.42) vs 3.71(0.45) L/min, p<.001) and achieved a lower percent of predicted  $\dot{V}O_{2peak}$  (82(15) vs 104(12) %, p<.001; n=8 vs 0 <LLN), even when adjusting for ideal body weight (82(10) vs 100(12) %, p<.001). Piso was not different between groups (717(167) vs 768(139) W, p=.270), but obese men had lower TI (30(10) vs 40(6) %, p<.001), greater FI (0.32(0.19) vs 0.17(0.04) %/W, p<.001), and greater PR (123(132) vs 23(19) %, p<.001). **CONCLUSION:** Independent of body mass, obese men had preserved leg strength (normal Piso), but the fraction of maximum isokinetic power supported by aerobic metabolism at RI intolerance was reduced (low TI) with greater fatigability (high FI); each consistent with aerobic deconditioning. A modified CPET with maximal isokinetic power measurements can distinguish the effects of increased adiposity from aerobic deconditioning on  $\dot{V}O_{2peak}$  in obese men.