

Maximal oxygen uptake capacity (VO₂max) can be predicted by fixed-rate step tests. It remains however to be analyzed what exercise intensities are reached during such tests to address medical safety. In this study, we compared the physiological response to a standardized fixed-rate step test with maximal cardiopulmonary exercise testing (CPET).

Methods: 113 healthy adults executed a maximal CPET on bike, followed by a standardized fixed-rate step test one week later. During these tests heart rate

(HR) and oxygen uptake (VO₂) was monitored continuously. From the maximal CPET, the ventilatory threshold (VT) was calculated. Next, the physiological response between maximal CPET and step testing was compared.

Results: The step test intensity was $85 \pm 24\%$ CPET VO₂max and $88 \pm 11\%$ CPET HRmax. The step test VO₂ was significantly higher when compared to CPET VT ($p < 0.01$). In 41% of the total population, step test exercise intensities $>95\%$ CPET VO₂max were noted. A greater step testing exercise intensity (%CPET VO₂max) was independently related to higher body mass index, and lower body height, exercise capacity ($p < 0.05$).

Conclusions: Standardized fixed-rate step tests elicit vigorous exercise intensities, especially in small, obese, and/or physically deconditioned subjects. Medical supervision seems therefore required during these tests.