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Title: Comparison of the characteristics of symptom-limited exercise tests between incremental and constant work rate protocols

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Body: Background: The endurance time during the constant high intensity exercise test (CET) on a cycle ergometer has been shown to be more sensitive to rehabilitation intervention than measures obtained from the incremental exercise test (IET). However, few studies have compared the limiting factors between the CET and IET. Objectives: The purpose of this study was to compare the limiting factors of exercise tests between the IET and CET in healthy humans. Methods: Untrained young men (n = 20) performed the IET and CET at 80% of the peak load on the IET to symptom limitation on a cycle ergometer. During both tests, ventilatory and metabolic variables were measured by using a breath-by-breath portable gas analyzer. Cardiovascular and muscle oxygenation were also measured. These variables were compared between the IET and CET at the end of the exercise by using the paired t-test. Results: Oxygen uptake was not significantly different between the tests, but cardiac output and tissue oxygen saturation were lower in the CET than in the IET. Conclusions: These results suggest that oxygen uptake is mainly provided by higher cardiac output in the IET and by higher muscle oxygen extraction in the CET. The improvement in muscle oxygen extraction may explain why the endurance time in the CET is more sensitive to rehabilitation intervention.