

GRADUAL VERSUS CONTINUOUS WORKLOAD INCREASE IN ERGOMETRIC TESTS: COMPARABLE RESULTS?

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Background

Standard exercise testing (ET) comprises progressive exercise provocation with cardiovascular monitoring. The exercise tolerance is estimated from workload. Cardiopulmonary exercise testing (CPX) is a non-invasive measurement of ventilatory gas exchange which provides more accurate quantifications of cardiorespiratory fitness (CRF). To date, workload is usually increased stepwise in ET, while in CPX physical activity is increased continuously (ramp). Are the results of both methods comparable?

Methods

32 healthy volunteers (17 female/15 male, age 26.8 ± 6.1 , 75.1 ± 12.8 kg, BMI 24.5 ± 3.0) underwent exercise testing on a bicycle ergometer up to maximum physical exhaustion; first under ramp protocol (CPX) and 2-7 days later with stepwise increase of workload (ET). We compared physical performance under both methods according to maximum work load, PWC150, PWC170, and exercise duration using paired t-tests.

Results

There were no statistically significant differences in maximum heart rate (CPX: 177.1 ± 11.7 /min ET: 178.5 ± 11.2 /min, ns) or maximal workload: with CPX the output was about 10 watts higher (219.8 ± 50.6 vs. 209.4 ± 42.5 , ns). PWC150 and PWC150/kg were higher (156.6 ± 51 vs. 146.4 ± 42.3 , $p < 0.001$ and 2.1 ± 0.5 vs. 1.9 ± 0.4 , $p < 0.001$). The exercise duration was almost equal (12.1 vs. 11.3 min, ns).

Conclusions

There were only slightly differences in the parameters measured. Overall physical performance was higher with CPX, which is explainable, since peak power must be held for a shorter time than in ET. Since the results are similar, we recommend the CPX: wattage and other parameters in performance assessment are to be determined directly, interpolations are obsolete.