SWACSM Abstract

The Effect of Training Status on Critical Power and Work Prime

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ABSTRACT

Critical Power (CP) represents a threshold of sustainable endurance exercise; work prime (W') represents the amount of metabolic disturbance one is capable of enduring above CP before exhaustion. CP increases with endurance training, but it is unclear how much of this can be explained by differences in muscle mass and body mass. **PURPOSE**: Characterize relationship between training status and CP and W when normalized for body and muscle mass. **METHODS**: We recruited 23 individuals (10 untrained individuals; 7 female, 3 male age= ~23.8yrs and 13 trained individuals; 7 female, 6 male, age= ~25.8yrs). A graded VO_2max test was conducted on a cycle ergometer; max work rate (WRmax) was defined as the maximum power output reached during VO_2max. The subjects performed a series of intense time-to-task failure tests on the cycle ergometer on two separate visits at different percentages of the WRmax. The relationship between time and work for the various time-to-task failure tests determined CP and W' through linear regression (work-time method). After CP had been determined, the subjects preformed a final time-to-task-failure test set at ~95% of the determined CP. **RESULTS**: Absolute CP was notably higher in trained individuals (189.71 ± 39.88 watts) than untrained (146.62 ± 46.85 watts) ($p<0.027$). Normalizing by leg lean mass, CP was still significantly higher in trained individuals (10.9 ± 1.39 Watts/kg) compared to untrained (8.4 ± 1.16 watts/kg) ($p<0.001$). This trend was also observed when controlling for total body mass ($p<0.001$). Absolute W' showed no difference between training status ($p<0.294$). W' normalized by total body mass, was significantly greater in trained individuals (201.71 ± 44. 27 J/kg) than untrained (154.56 ± 39.01 J/kg) ($p<0.012$); W' normalized by leg lean mass suggests influence ($p<0.096$ respectively). CP as a percent of WRmax was greater in trained individuals (70.97 ± 3.28 %) in contrast to untrained (65.23 ± 4.65 %) ($p=0.009$). During time to task failure test at ~95%-CP, trained individuals lasted longer (2327.71 ± 755.26 sec) than untrained (1674.30 ± 626.79 sec) ($p=0.047$). **CONCLUSION**: Training status appears to affect absolute CP, CP normalized by total body mass and leg lean mass. Furthermore, these trained individuals were able to sustain a power output near CP for a greater period of time.