OPTIMAL INTENSITY TO SPEND TIME AT VO2MAX DURING CYCLING

Leclair Erwan¹, Mucci Patrick¹, McGawley Kerry², Berthoin Serge¹
(Universite Lille2 – Faculte des sciences du sport¹, France, University of Brighton², United Kingdom)

Introduction: Increases in maximal oxygen uptake (VO2max), as a result of training, have been suggested to be linked with time spent at a high percentage of VO2max. The time spent between 90% and 100% of VO2max (tVO2max) depends upon the time to achieve VO2max and total exercise duration. During exercise in the severe exercise domain, VO2max is attained due to the VO2 slow component. The amplitude of the VO2 slow component is 40% lower during running compared with cycling exercise and as such, appears to be influenced by exercise modality [2]. Billat et al. [1] have shown that the running velocity associated with VO2max results in the longest time spent at VO2max. To our knowledge, no study has attempted to determine a cycling power that maximises tVO2max. Therefore, the aim of the present study was to determine the power that would allow the time spent at VO2max to be maximised for cycling exercise.

Methods: Using cycle ergometry, eleven male participants (24.1±3.5y) performed an incremental test to determine their VO2max (45.1±6.0ml.kg⁻¹.min⁻¹) and power at VO2max (PVO2max 302.3±34.4W) and four time to exhaustion tests (TTE) at different intensities: PΔ50, PΔ75, PVO2max and 110% of PVO2max (P110). PΔ50 and PΔ75 corresponded to the power at the first ventilatory threshold (PVT) plus 50% and 75% of the difference between PVT and PVO2max. The incremental test and each TTE test were followed by a test at 105% of PVO2max (P105) in order to determine the VO2max of the day. During TTE tests, the tVO2max was considered as the time spent at or above 90% of VO2max value of the day.

Results: The mean TTE and tVO2max values were 820.2s (±361.6) and 376.4s (±209.2) for PΔ50 ; 398.6s (±115.2) and 237.3s (±134.3) for PΔ75; 224.7s (±50.3) and 118.6s (±64.2) for P100 and 154.0 (±22.7) and 72.3s (±44.4) for P110. The longest tVO2max occurred during PΔ50, which corresponded to 80 ±5.0% of PVO2max.

Conclusion: The present study showed that, during cycling exercise, the power allowing the longest tVO2max was PΔ50 (around 80% of PVO2max. This intensity is lower than that reported for running. It may be explained by a higher VO2 slow component during cycling which could induce a faster attainment of VO2max.

References

Keywords: Oxygen Consumption, Training, Applied Physiology

12th Annual Congress of the ECSS, 11–14 July 2007, Jyvaskyla, Finland