VENTILATORY RESPONSES ANALYSIS IN SHORT VS. LONG INTERVAL TRAINING SESSIONS IN ELITE MARATHON SWIMMERS.

Philippe Hellard1, Dekerle Jeanne2, Nesi Xavier3, Atlaoui Djamila4, Brickley Gary3, Nicolas Houel1, Hausswirth Christophe5

(Département recherche, Federation Française de Natation1, France, Chelsea School, University of Brighton,2, United Kingdom, Chelsea School, University of Brighton3, United Kingdom, Laboratory of Physiology, Jean Monnet University, Saint Etienne4, France, Département des Sciences du Sport5, France)

Introduction

The ten kilometres swimming race will introduce in the 2008 Beijing Olympic Games. For long distance swimmers, the racing speed is very close to the speed determined to the lactate threshold (vLT) (Zamparo et al., 2005). In running, cycling and skiing, vLT was shown to be highly and positively correlated to long duration performance. Few studies dealt with the differences between short and long interval training at vLT (Billat et al., 2001). Thus, the aim of the present study was to compare the physiological responses and the time sustained near max between short and long interval training (IT) sessions swam at vLT in top class marathon male swimmers.

Methods

Seven open water elite swimmers (Mean±SD: age 22±3 yrs; body mass 71±5 kg; height 180±5 cm) achieved three experimental sessions over a one week period. The first test consisted in a 6x300-m incremental test to exhaustion for determination of the maximal oxygen uptake (max = 68.7±5.2 ml.min-1.kg-1), the velocity associated with max (v max = 1.51±0.02 m.s-1), the blood lactate threshold (3.0±1.2 mmol.l-1), the and the velocity associated to LT (respectively, 60.1±6.4 ml.kg-1.min-1 and 1.46±0.07 ms-1, corresponding to 96.7±0.5% v max). The remaining experimental tests were two IT sessions consisting of 6x500 m and 30x100 m at vLT (IT5x600 and IT30x100, respectively). The IT5x600 and IT30x100 were performed in a randomised order with the same work to rest ratio (60 vs. 15 sec). During the IT sessions, oxygen consumption ( ), carbon dioxide production, minute ventilation and heart rate (HR) were measured. The stroke rate and the stroke length were also assessed. During IT6x500 session, oxygen uptake slow component was calculated as the difference between the mean value of the last 15s of the exercise and that of the last 15 s of the 3rd min of the test (Demarie et al., 2001).

Results

Mean velocity computed in the IT6x500 and IT30x100 session was not significantly different (1.45 ± 0.06 m.s-1 vs. 1.44 ± 0.06 m.s-1, P=0.6). Time sustained above 90% of max, mean and HR values were significantly higher in the IT6x500 session compared with the IT30x100 session (1357±288 vs. 562 ±326 sec; 63.8 ± 3.9 vs. 57.3 ± 3.1 ml.min.-1.kg-1; 180±6 vs. 175±9 batt.mn-1; respectively; P<0.05).The stroke length was significantly higher for IT30x100 than for IT5x600 (2.45±0.16 vs. 2.30±0.16 m; P<0.05). During the IT6x500 session, a slow component was observed (5.96 ml.min.kg-1; P<0.05), and a significant correlation was also found between the distance per stroke decrease and increase (r=0.79, P<0.05).

Conclusion

The sets of IT5x600 at a lactate threshold velocity were characterised by a greater ventilatory responses compared with the IT30x100 exercise. Moreover, the higher physiological responses during long interval training sessions seemed to be associated with lower distance per stroke, and so, to the increase in stroke rate to maintain the target velocity.

References


Keywords: Swimming