THE RESPONSE OF CARDIAC AUTONOMIC ACTIVITY AT REST AND AFTER AN INTERVAL TRAINING SESSION 5*600m IN TOP-CLASS MARATHON SWIMMERS: RELATIONSHIPS WITH PHYSIOLOGICAL PARAMETERS

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Purpose: The aim of the current study was to evaluate the changes in autonomic nervous system activity induced by an interval training session 5*600 m (IT5*600) in marathon swimmers, by measuring the heart rate variability (HRV) indices. A secondary purpose was to investigate the relationships between HRV changes and physiological variables obtained during the incremental test and the IT5*600 session in these swimmers. Methods: Sixteen open water swimmers competing nationally and internationally, 7 female (21.4 ± 3.2 yr, 166.7 ± 5.0 cm, 60.2 ± 3.3 kg) and 9 male (21.8 ± 3.9 yr, 179.2 ± 4.6 cm, 69.9 ± 5.6 kg) were tested within the framework of four days training/preparing period. Their best times of 800m and 1500m freestyle swim were expressed as a percentage of the world record (WR). The swimmers performed two experimental sessions in a 50-m indoor pool. The first test consisted of a stepwise maximal incremental test to exhaustion (gradual 6*300 m) for the assessment of maximal oxygen uptake (VO2max; ml/kg/min), the velocity associated with the lactate threshold (vLT), and the minimal velocity associated with VO2max (vVO2max; m.s⁻¹). The second test involved an interval training session 5*600 m (IT5*600) at a velocity representing on average 96.7% ± 2.2 of v max. During the incremental test and the IT5*600 session, both oxygen uptake (VO2) and heart rate (HR) were measured. The HRV recordings were performed in the lying position at rest during uncontrolled breathing for 6 min, between 08:00 and 12:00 AM and 2:00 and 6:00 PM. The swimmers were tested just before the IT5*600 (Pre_IT5*600) and 12 min after the completion of the IT5*600 (Post_IT5*600). The swimmers performed a 5-km indoor competition swim. Results: From before to after IT5*600 session, HR increased significantly. The parasympathetic cardiac modulations (RMSSD and HFnu) decreased (P < 0.05) while the sympathetic cardiac modulations (LFnu and LF/HF) tended to increase. The changes in HR were negatively related to the changes in RMSSD (r = -0.72; P < 0.01) and HFnu (r = -0.63; P < 0.02) and positively to LF/HF (r = 0.53; P < 0.05). HFnu Post_IT5*600 was negatively correlated with the vVO2max (r = -0.55; P < 0.04) and vLT (r = -0.67; P < 0.01). The lower the parasympathetic activity after IT5*600, the higher the vLT and the vVO2max. On the other hand, HFnu Post_IT5*600 was correlated with 5km swimming performance (r = 0.55; P < 0.05), 800m % WR (r = -0.59; P < 0.03) and 1500 % WR (r = -0.54; P = 0.05). Conclusion: In

highly trained endurance swimmers, parasympathetic activity was diminished after the IT5*600. The changes in parasympathetic activity was related to the HR changes. On the other hand, the swimmers with lower parasympathetic activity after the IT5*600 session exhibited elevated vVO2max and vLT and swam the fastest (scored the best times) during the competition.

Keywords: Swimming, Endurance Training, Heart Rate Variability

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