ACUTE RESPONSES OF HEAT ACCLIMATISED CYCLISTS TO INTERMITTENT SPRINTS IN TEMPERATE AND WARM CONDITIONS

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The performance and the acute physiological responses of heat acclimatised cyclists were measured during intermittent sprints in temperate and warm conditions. While the effects of heat on submaximal exercise have been well studied, there are few reports of its effects on intermittent high intensity exercise. Performance has variously been unaffected (Falk et al. 1998) improved (Ball et al.), or decreased (Maxwell et al. 1999) in the heat. Furthermore, none of these studies involved heat acclimatised subjects. Accordingly, ten heat acclimatised cyclists (mean ± standard deviation age 34 ± 6 yr; body mass 73.4 ± 7.0 kg; $\dot{V}O_{2peak}$ 52.8 ± 5.8 $ml.kg^{-1}.min^{-1}$) were recruited from a Darwin cycling club. An initial familiarisation session was conducted during which subjects pedalled the ergometer at the approximate test intensities. Steady state submaximal $\dot{V}O_2$ and $\dot{V}O_{2peak}$ were measured during a subsequent visit. During the final two visits the experimental treatments were conducted. Treatments consisted of 3 sets of 5 x 20 s cycling sprints followed by a sprint to voluntary exhaustion (TTE). Temperate conditions were 20.2 ± 0.4°C; 46 ± 2 % humidity, 108.5 ± 1.4 kPa water vapour pressure and warm conditions 30.5 ± 0.4°C; 47 ± 10 % humidity, 206.8 ± 6.4 kPa water vapour pressure and were administered in a randomised order. Oxygen consumption was greater in the warm condition ($p=0.02$), pulmonary ventilation was greater in the TTE sprint only $p=0.00$), and heart rates were greater in the warm condition ($p=0.02$). Blood lactate and respiratory exchange ratios were not significantly different between conditions. Subjects lost 2.1 ± 0.2 % of body mass in the warm condition and their time to exhaustion in the final sprint was 50 ± 13 s in the warm condition compared with 60 ± 7 s for the temperate condition ($p=0.02$). We conclude that the elevated oxygen consumption reported for submaximal exercise in the heat also occurs during high intensity intermittent exercise for heat acclimatised athletes. There was no evidence of the increased reliance on anaerobic metabolism that has been reported for sub maximal exercise in the heat. The mild level of hypohydration induced by 3 sets of 20 s sprints in 30°C heat may be sufficient to limit the time to exhaustion of a subsequent sprint.

Ball, D. *et al*., 1999. Human power output during repeated sprint cycle exercise: the influence of thermal stress. Eur. J. Appl. Physiol. 79: 360-366.

Falk, B. *et al*., 1998. The effect of heat exposure on performance of and recovery from high-intensity, intermittent exercise. Int. J. Sports Med. 19: 1-6.

Maxwell, N.S., *et al*., 1999. Intermittent running: muscle metabolism in the heat and effect of hypohydration. Med. Sci. Sports Exer. 231: 675-683.

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