1 A comparison of low and high intensity exercise strategies on heat acclimatisation

B. O'Brien*, N. Gill & R. English
Waikato Institute Of Technology

This investigation compared physiological responses during a standard exercise task (cycle ergometry for 1 h at 60% VO2 max) between a high intensity short duration (HISD), and a low intensity long duration, heat acclimatization protocol (LILD). Seven men (age 27.8 years, range 23-35, body mass 80.5 kg, range 61-98 kg, VO2 max 44.7 mL.kg.minute-1, 37-55 range) randomly completed both protocols, which were separated by four weeks. Ambient conditions were maintained at 35°C and 50% relative humidity. LILD required participants to cycle at 50% VO2 max for 60 minutes on a Monark ergometer over 10 days. HISD required participants to cycle at 50%VO2 max for 60 minutes on days 1 and 10 and at 85%VO2 max for 15 minutes on days 2-9. Rectal temperature and heart rate were measured prior to exercise and at the completion of exercise. Body mass was recorded before and immediately after exercise to estimate sweat excretion. Core temperature decreased by 1.5% in LILD (38.3 ± 0.6 to 37.7 ± 0.4 °C, $p<0.005$) but was not different in HISD over time. Heart rate decreased by 10.2% in LILD (157 ± 15 to 141 ± 17 b.min-1, $p<0.05$) but was not different in HISD over time. Sweat excretion was 21% greater after exercise in the LILD (1128 ±125 to 894 ±125 g, $p<0.05$) but was unchanged in HISD over time. Our data indicate that LILD should be used in preference to HISD during low intensity, long duration exercise in the heat as it resulted in improved thermoregulaton.

2 Regional variations in skin blood flow under hot and humid conditions

W. Sinclair* & M. Crowe
James Cook University

Forearm skin blood flow has often been adopted in environmental studies to represent skin blood flow (SKBF) distribution to the whole body. In part, this can be attributed to the use of venous occlusion plethysmography which is commonly performed on the arm. However, more recently the use of non-invasive laser Doppler flowmetry has been employed to measure SKBF. Pre-pubertal children (5 female, 6 male; mean age 9.5 yr, range 7-12 yr) undertook a 45 min lower body intermittent exercise protocol under hot and humid conditions (32.5 ± 0.1 C, 70.6 ± 0.8% r.h.). The protocol included 10 min seated rest followed by three bouts of cycling separated by 5 min rest. Each exercise bout consisted of 5 min continuous cycling at 60% HRMAX followed by three 20 s sprints. Laser Doppler SKBF assessments were taken after each workload at four sites including forehead, back, forearm and medial calf. SKBF significantly increased after each of the workloads when compared to resting levels ($p<0.01$). Skin blood flow of the forearm (59.79 ± 5.85 mV) and calf (51.11 ± 6.94 mV) were significantly less than the forehead (119.83 ± 11.01 mV) and back (101.23 ± 8.24 mV; $p<0.01$). Additionally, calf SKBF was lower than head SKBF after workloads 2 and 3 while forearm and calf SKBF were lower than back SKBF after the final workload ($p<0.05$). These results suggest that employing forearm SKBF may not provide an accurate portrayal of SKBF to other body sites in children exercising under hot and humid conditions.