

EFFECTS OF SIMULTANEOUS CHANGES IN EXERCISE AND AMBIENT TEMPERATURE ON BODY HEAT BALANCE

M. Mäntysaari, H. Rintamäki, T. Mäkinen, J. Oksa, S. Rissanen and E. Korhonen, Oulu Regional Institute of Occupational Health, Oulu, Finland.

The effect of simultaneous changes in exercise and ambient temperature on body heat balance and physiological strain were studied. The exercise/rest periods were either 10/10 minutes or 30/30 minutes, and the total duration of the protocol was 120 min. Exercise (walking 6 km/h on treadmill, slope 2°) was performed in cold environment (-15°C, air velocity 2.5 m/s). The resting periods were spent sitting at +10°C, air velocity 0.2 m/s, with the same clothing as during exercise. The subjects were 7 voluntary healthy young men. They were wearing Finnish military winter clothing (M91, thermal insulation about 2 clo) and rucksack (12 kg). During the rest periods drinking of water was allowed ad libitum. Data are given as mean \pm SE. The mean skin temperature during the 10/10 schedule was $31.7 \pm 0.2^\circ\text{C}$ and during the 30/30 schedule $31.3 \pm 0.3^\circ\text{C}$. Deep body temperature was in average 37.5°C during both schedules. At the end of the last exercise period oxygen consumption was 33.5 ± 0.9 ml/min/kg in the 10/10 schedule and 32.4 ± 3.8 ml/min/kg in the 30/30 schedule. During the exercise periods heart rate was in average 150 beats/min in both schedules. The amount of sweating was greater during the 10/10 schedule (809 ± 118 g) than during the 30/30 schedule (667 ± 182 g). Also the fluid intake was greater during the 10/10 schedule (457 ± 121 g) than during the 30/30 schedule (141 ± 41 g). In conclusion, the body heat balance and physiological strain were comparable in both exercise/rest schedules. The amount of sweating as well as fluid intake were greater during the 10/10 minutes exercise/rest schedule. This finding can be due to the fact that the number of rest periods was greater in the 10/10 schedule, and the transition from exercising in -15°C to resting in +10°C possibly promotes sweating. These findings suggest that specified instructions for clothing and fluid intake are needed for different combinations of exercise and rest in changing ambient temperatures.

matti.mantysaari@sotlaakl.inet.fi