CIRCADIAN VARIATION IN EXERCISE PERFORMANCE: HOW IMPORTANT IS THE BODY TEMPERATURE RHYTHM?

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Core body temperature varies by ≈0.4°C over 24 hours, peaking between 18:00 and 21:00 h, which is the period when exercise performance is generally superior. The temperature and performance rhythms both persist in a ‘constant routine’, suggesting common control by the molecular timekeeping mechanism sited in the suprachiasmatic nuclei of the hypothalamus. However, temperature and performance are not necessarily tightly coupled over a 24-hour period since it is difficult to ameliorate the morning deterioration in performance with active or passive heating. The circadian variation in body temperature is robust during and after exercise, depending on measurement site (intestinal, rectal, oesophageal) and exercise protocol (intermittent, continuous). Nevertheless, the links between these circadian temperature responses and diurnal variation in ultra-endurance performances in hot conditions have not been delineated. The circadian ‘zeitgebers’, melatonin and light, can influence thermoregulation during exercise, but only melatonin seems to significantly affect human performance. Therefore, despite clear evidence that the thermoregulatory responses to exercise show endogenously-mediated circadian variation, the causal nexus between performance and temperature rhythms is still unclear.