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Effects of Environmental Temperature on Physiologic Measures and Reaction Time During Graded Leg Ergometry

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Exercise performed in a hot environment creates a variety of physiologic challenges. It is less clear, though, whether thermal conditions affect reaction time, a key component of success in many sporting tasks. **PURPOSE**: The study was designed to investigate whether thermal conditions might affect simple reaction time (SRT) and choice reaction time (CRT). **METHODS**: Ten college-aged (19-22 yrs.) female and male subjects performed a test battery on two occasions: hot environment (temperature 90°F) and room temperature environment (temperature 72°F). Subjects completed graded leg ergometry until 55% of heart rate reserve (HRR) was reached on both trials. Subjects performed a battery of tests three times on a testing day (baseline: upon arrival at the lab; after a 15-min seated acclimation period; and post-exercise) involving a collection of multiple physiological variables. The SRT test was computer based. The CRT test used a laser system that required hand or foot motions to stop a timer that was activated by verbal cues. **RESULTS**: Tympanic temperature was significantly elevated ($p < 0.05$) in the warm environment following the acclimation period and at post-exercise. Heart rate was significantly higher in the hot environment at min 4 of exercise (133.2±2.8 vs. 124.9±2.5 bpm). Post-exercise lactate was significantly greater in the room temperature environment (7.77±0.7 vs. 6.0±0.6 mmol/L). There was a trend ($p = 0.051$) for exercise duration to be longer in the room temperature environment (8.2±0.5 vs. 7.0±0.3 min). However, neither SRT nor CRT was affected by environmental conditions or the accompanying physiologic stress. **CONCLUSION**: Based on the results of this study, thermal condition was not found to significantly alter reaction time at rest or following acute exercise despite effects on other physiologic variables. A longer exercise testing session should be used to further assess whether thermal environmental conditions affect reaction time.