TACSM Abstract

The Effect of Eccentric Muscle-Damaging Exercise in the Heat on Perceptual Stress Measures During Future Exertional-Heat Exposure

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ABSTRACT

Multiple bouts of exertional-heat exposure can assist in reducing the magnitude of perceived stress during future heat exposures. Recently, eccentric muscle-damaging exercise has also been proposed as a beneficial preconditioning modality to assist with exercise in the heat due to the potential effects on improving physiological and thermoregulatory responses during exercise. **PURPOSE**: This study investigated the effect of muscle-damaging exercise in the heat, compared to a thermoneutral condition, on minimizing perceptual stress during future exertional-heat exposure. **METHODS**: Ten physically active males (mean ± SD; age, 23 ± 3 years; body mass, 78.7 ± 11.5 kg; height, 176.9 ± 4.7 cm) completed a lactate threshold test using a graded exercise consisting of 2-minute incremental stages on a motorized treadmill. Then, in a randomized, counterbalanced order, participants performed two preconditioning trials, a) downhill running (DHR) in the heat (ambient temperature [T_{amb}], 35°C; relative humidity [RH], 40%), and b) DHR in a thermoneutral environment (T_{amb}, 20°C; RH, 20%) for 30-minutes at lactate threshold with a -10% gradient to evoke muscle damage. Seven days following preconditioning, participants performed a 45-minute flat run in the heat (T_{amb}, 35°C; RH, 40%) at a velocity attributed to their lactate threshold. During exercise trials, ratings of perceived exertion (RPE), thermal sensation (TS), thirst, and fatigue were recorded at baseline and every 5-minutes. Differences in perceptual stress measures between conditions during flat running in the heat at each timepoint were analyzed using repeated-measures analysis of variance, with Bonferroni corrections for post hoc analysis. **RESULTS**: TS and fatigue were significantly (*ps* < 0.05) greater during DHR in the heat (5.8 ± 0.3 and 3 ± 1, respectively) compared to DHR in a thermoneutral condition (4.5 ± 0.8 and 2 ± 1, respectively). However, no significant differences were observed in RPE, TS, thirst, or fatigue between hot and thermoneutral DHR conditions during flat running exercise in the heat at either timepoint (*ps* > 0.05). **CONCLUSION**: These findings indicate that a singular bout of eccentric muscle-damaging exercise in the heat elicited no further benefit to perceptual stress measures during future exertional-heat exposure compared to being performed in a thermoneutral condition.