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Body Sweat Mapping of Male Athletes following Acclimation to a Hot-Dry Environment

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Heat acclimation typically focuses on whole body sweat losses, with limited regional data available. **PURPOSE:** Our aim was to investigate changes in regional sweat rates (RSR) and distribution at multiple sites over a large surface area in young, trained male athletes following six days of exercise-heat acclimation in a hot-dry environment. **METHODS:** Six male subjects (25 ± 4 yrs) completed a 90 minute constant heat strain intermittent exercise-acclimation protocol for six consecutive days in an environmental chamber set at 45°C, 20% relative humidity, 1 m.s⁻¹ air velocity with a target increase in core temperature (Tre) of 1.4°C above baseline. RSR were measured at two exercise intensities (I1, 55% VO₂max, I2, 75% VO₂max) on the torso and arms prior to and following heat acclimation using a modified absorbent technique. **RESULTS:** By design, heart rate (HR), Tre, and skin temperature were similar between heat acclimation days. Work rate increased from day one to six to elicit the same increase in Tre, but not significantly. Gross sweat loss (GSL) increased significantly from day one to six of acclimation (656 ± 77 to 708 ± 80 g.m⁻².h⁻¹; P<0.001). During pre and post acclimation experiments, relative workloads were similar for I1 and I2 (Pre I1 54±3, I2 57±5 %VO₂max; Post I1 73±4, I2 76±7 %VO₂max). GSL was significantly higher following acclimation (Pre 449±90 g.m⁻².h⁻¹, Post 546 g.m⁻².h⁻¹; P<0.01). Highest RSR were observed on the central back both pre and post acclimation at I1 (pre 854 ± 269 vs. post 1178 ± 402 g.m⁻².h⁻¹) and I2 (pre 1221 ± 351 vs. post 1772 ± 396 g.m⁻².h⁻¹). Absolute RSR increased significantly at 12 of the 17 regions tested at I1 following acclimation. I2 ratio values significantly decreased at the lateral upper back (p<0.01) and increased at the anterior and posterior upper arm, and anterior lower arm (p<0.05) versus pre-acclimation values. **CONCLUSION:** Controlled hyperthermia exercise-heat acclimation significantly increases GSL and absolute RSR, with a preferential redistribution of sweating towards the periphery at a higher exercise intensity. Highest and lowest RSR were consistently observed on the central back versus the anterior lower torso and arms, respectively.

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