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**Influence of hydration status on thermoregulation and cycling hill climbing.**

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**PURPOSE:** Although dehydration can impair endurance performance, a reduced body mass may benefit uphill cycling by increasing the power-to-mass ratio. This study examined the effects of a reduction in body mass attributable to unreplaced sweat losses on simulated cycling hill-climbing performance in the heat. **METHODS:** Eight well-trained male cyclists (mean  $\pm$  SD: 28.4  $\pm$  5.7 yr; 71.0  $\pm$  5.9 kg; 176.7  $\pm$  4.7 cm;  $\text{VO}_{2\text{peak}}$ : 66.2  $\pm$  5.8 mL  $\times$  kg<sup>-1</sup>  $\times$  min<sup>-1</sup>) completed a maximal graded cycling test on a stationary ergometer to determine maximal aerobic power (MAP). In a randomized crossover design, cyclists performed a 2-h ride at 53% MAP on a stationary ergometer, immediately followed by a cycling hill-climb time-to-exhaustion trial (88% MAP) on their own bicycle on an inclined treadmill (8%) at approximately 30 degrees C. During the 2-h ride, they consumed either 2.4 L of a 7% carbohydrate (CHO) drink (HIGH) or 0.4 L of water (LOW) with sport gels to match for CHO content. **RESULTS:** After the 2-h ride and before the hill climb, drinking strategies influenced body mass (LOW -2.5  $\pm$  0.5% vs HIGH 0.3  $\pm$  0.4%;  $P < 0.001$ ), HR (LOW 158  $\pm$  15 vs HIGH 146  $\pm$  15 bpm;  $P = 0.03$ ), and rectal temperature ( $T_{\text{re}}$ ): LOW 38.9  $\pm$  0.2 vs HIGH 38.3  $\pm$  0.2 degrees C;  $P = 0.001$ ). Despite being approximately 1.9 kg lighter, time to exhaustion was significantly reduced by 28.6  $\pm$  13.8% in the LOW treatment (LOW 13.9  $\pm$  5.5 vs HIGH 19.5  $\pm$  6.0 min,  $P = 0.002$ ), as was the power output for a fixed speed (LOW 308  $\pm$  28 vs HIGH 313  $\pm$  28 W,  $P = 0.003$ ). At exhaustion,  $T_{\text{re}}$  was higher in the LOW treatment (39.5 vs HIGH 39.1 degrees C;  $P < 0.001$ ), yet peak HR, blood lactate, and glucose were similar. **CONCLUSION:** Exercise-induced dehydration in a warm environment is detrimental to laboratory cycling hill-climbing performance despite reducing the power output required for a given speed.