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### **Consumption of a Caffeinated Soft Drink during Exercise in the Heat Worsens Dehydration**

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Chronic dehydration is linked to kidney dysfunction in workers regularly exposed to hot environments. Sugar-rich beverages, such as soft drinks, are regularly consumed on work sites. Such hypertonic drinks decrease plasma and extracellular fluid volumes during rest. Consuming a soft drink-like beverage after resting heat exposure worsens dehydration in rats. It is unknown if drinking a caffeinated soft drink exacerbates dehydration during exercise in the heat. **PURPOSE:** Test the hypothesis that consuming a caffeinated soft drink during exercise in the heat increases the magnitude of dehydration. **METHODS:** Twelve healthy subjects (age:  $24 \pm 5$  y, 3 females) completed randomized soft drink (Mtn Dew, Soda) and water control (Water) trials. Subjects completed four 1 h work-rest cycles (45 min exercise, 15 min seated rest) in a  $35^{\circ}\text{C}$ , 65% RH environment. During rest, subjects drank 500 mL of the assigned rehydration beverage ( $\sim 11^{\circ}\text{C}$ ). Physiological variables, and venous blood and urine samples were taken pre- (PRE), and post-exercise (POST) after 15 min supine rest in a moderate environment. Percent changes in plasma volume were estimated from changes in hemoglobin and hematocrit. Data are reported as a change from Pre (mean $\pm$ SD). **RESULTS:** Increases in core temperature (Soda:  $0.8 \pm 0.3$ , Water:  $0.8 \pm 0.3^{\circ}\text{C}$ ,  $p=0.46$ ) and changes in nude body weight (Soda:  $-0.3 \pm 0.8$ , Water:  $0.0 \pm 0.7\%$ ,  $p=0.20$ ) were not different between trials. Urine specific gravity was higher at POST ( $p<0.05$ ), but there were no differences between trials (Soda:  $0.006 \pm 0.013$ , Water:  $0.007 \pm 0.009$ ,  $p=0.89$ ). At POST, plasma osmolality was elevated in Soda ( $2 \pm 3$  mOsm/kg) and reduced in Water ( $-6 \pm 3$  mOsm/kg,  $p<0.01$ ). Urine osmolality was higher at POST ( $p<0.01$ ), but there were no differences between trials (Soda:  $69 \pm 368$ , Water:  $185 \pm 311$  mOsm/kg,  $p=0.12$ ). Plasma volume was lower in Soda at POST ( $p<0.02$ ), but there were no differences between trials (Soda:  $-5 \pm 6$ , Water:  $-2 \pm 7\%$ ,  $p=0.15$ ). Elevations in heart rate were higher in Soda at POST (Soda:  $20 \pm 12$ , Water:  $12 \pm 12$  bpm,  $p<0.03$ ). Mean arterial pressure was elevated in Soda ( $p<0.01$ ) at POST, but was not different between trials (Soda:  $5 \pm 8$ , Water:  $2 \pm 5$  mmHg,  $p=0.33$ ). **CONCLUSIONS:** These data indicate that consuming a caffeinated soft drink during exercise in the heat worsens dehydration and elevates cardiovascular strain.