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## Time-Course of Diuresis During Sodium-Aided Hyperhydration Protocols With and Without Caffeine

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### ABSTRACT

When used alone, both caffeine and sodium-aided hyperhydration (SAH) are ergogenic. When caffeine is used in conjunction with SAH, diuresis occurs, but hyperhydration is still achieved albeit at lower levels when compared to SAH alone. Caffeine has been shown to be ergogenic when taken as little as 5 min, or as much as 6 hr prior to the start of exercise. Thus, determining the temporal aspects of caffeine induced diuresis when used in conjunction with SAH may lead to superior pre-exercise nutritional strategies.

**PURPOSE:** To investigate the time-course of caffeine-induced diuresis during a 90 min SAH protocol.

**METHODS** Subjects were 15 males ( $21 \pm 2$  yr,  $176 \pm 6$  cm,  $80.2 \pm 10.1$  kg) free from known renal, digestive, and cardiovascular disease. Each underwent 2 hyperhydration strategies in a randomized, double-blind fashion. Both protocols began with a complete bladder void and measurement of urine specific gravity (USG) followed immediately by ingestion of a bolus of  $20 \text{ mL H}_2\text{O} \cdot \text{kg bm}^{-1}$  combined with either  $110 \text{ mg NaCl} \cdot \text{kg bm}^{-1}$  (Na), or  $5 \text{ mg caffeine} \cdot \text{kg bm}^{-1} + 110 \text{ mg NaCl} \cdot \text{kg bm}^{-1}$  (CafNa). Subjects then rested quietly for 90 min, performing a measured bladder void every 15 min. Urine excretions were expressed as a percentage of the total fluid consumed during each of the hyperhydration protocols. USG and total urine excreted (TUE) during the trials were compared using paired t-tests. Urine excretion (UE) for each of the 15 min collection periods for the two conditions were compared using a two-way repeated measures ANOVA with Sidak post hoc analyses. Levels of significance were set *a priori* at  $P < 0.05$ . **RESULTS:** USGs were  $1.007 \pm 0.003$  (Na) and  $1.005 \pm 0.004$  (CafNa) ( $P=0.34$ ). TUE were  $62.7 \pm 13.2\%$  (Na) and  $78.7 \pm 12.5\%$  (CafNa) ( $P=0.001$ ). UE for the Na and CafNa for each collection period respectively were  $13.1 \pm 7.5\%$ ,  $21.9 \pm 12.9\%$  (15 min,  $P < 0.01$ ),  $11.7 \pm 3.3\%$ ,  $13.8 \pm 3.8\%$  (30 min,  $P=.30$ ),  $13.2 \pm 2.8\%$ ,  $15.3 \pm 2.4\%$  (45 min,  $P=0.32$ ),  $12.2 \pm 4.1\%$ ,  $13.7 \pm 5.1\%$  (60 min,  $P= 0.46$ ),  $8.4 \pm 6.3\%$ ,  $8.9 \pm 4\%$  (75 min,  $P= 0.80$ ) and  $4.7 \pm 3.6\%$ ,  $4.4 \pm 2.8\%$  (90 min  $P= 0.87$ ). **CONCLUSION:** TUE was significantly higher in CafNa compared to Na; however, caffeine induced diuresis occurred only during the initial 15 min following consumption of the treatments.