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ELETE Electrolyte Add-In

Effects of Water and Water + Electrolytes on Changes in Body Temperature, Hydration Status, and Drinking Behaviors During Arduous Work.

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Our laboratory has recently demonstrated a mean rate of water turnover of 95±20 ml·kg^{-1}·24 h^{-1}) in elite wildland firefighters exposed to five days of extended work shifts (MSSE 35(10):176-65, 2003). **PURPOSE:** This study evaluated the effects of water (W) or water+supplemental electrolytes (W+E) on core body temperature, self-selected work, hydration, and drinking behavior during arduous wildfire suppression. **METHODOLOGY:** Subjects included male (n=16) and female (n=4) wildland firefighters from various Hot Shot and District crews during the 2004 Fischer fire. Subjects were randomly placed into W (n=10), which consumed water only during the entire workshift or a W+E (n=10). The W+E group consumed water that included an electrolyte additive (45 mg Magnesium, 125 mg Sodium, 390 mg Chloride, 130 mg Potassium, and 20 mg Sulfate per liter). Each subject was outfitted with a wireless data recording system for continuous measurement of core, skin, and ambient temperature and self-selected activity (Mini Mitter activity monitor). Nude body weight was recorded pre- and post- workshift. Urine specific gravity was measured at 2nd AM void, late AM, late afternoon, and post shift +1hr. Drinking behavior was measured with a previously validated drinking reservoir system (MSSE 33(5):S257, 2001). Data was analyzed using a mixed design ANOVA with repeated measures. **RESULTS:** The overall change in nude body weight showed a significant decrease across the workshift (79.8 and 79.1 kg for pre and post shift values, respectively) for the entire group (N=20). There were no differences between the two groups (Pre=79.8±16.6, Post=79.4±16.3 kg and Pre=78.0±12.1, Post=77.1±12.5 kg for W and W+E, respectively). There were no differences between the groups in ambient, core or skin temperature throughout the day. Average hourly self-selected work rate via activity monitor data was similar for both groups (439±341 and 487±341 counts·hr^{-1} for the W and W+E, respectively). Urine specific gravity was significantly increased across the workshift in the W+E group (1.019±0.007 and 1.025±0.008 for AM and PM samples, respectively). However, urine specific gravity was unchanged in the W group (1.019±0.004 and 1.021±0.011 for AM and PM samples, respectively). Total drinking volume was significantly higher for the W group (7.5±2.3 and 4.3±1.8 L for the W and W+E, respectively). **CONCLUSION:** Based on the disparity in drinking volume and the similarity in weight loss, these data indicate that W+E consumption may act to preserve total body water during arduous work in extreme environments when access to water may otherwise be limited. (Supported by a grant from Miniitter, Bend, OR, and Mineral Resources International, Ogden, UT)