

## **Kraft Foods Global Nutrition Based In Science — Areas of Research: Performance**

**Presented at the 2005 American College of Sports Medicine meeting.**

### **Voluntary fluid intake and core temperature responses in children during exercise in the heat.**

Elaina L. Hall<sup>1</sup>, Michael F. Bergeron, FACSM<sup>1</sup>, Joel S. Brenner<sup>1</sup>, David A. Ludwig<sup>1</sup>, Xin Wang<sup>2</sup>,  
<sup>1</sup>Medical College of Georgia, Augusta, GA, <sup>2</sup>Kraft Foods Global, Inc., 801 Waukegan Rd.,  
Glenview, IL 60025

Hydration can play an important role in maintaining performance and reducing clinical risk related to heat strain in young athletes. However, there remain a limited number of studies that describe core body temperature and other related responses to voluntary fluid intake in children during exercise in the heat.

**Purpose.** To examine the effects of *ad libitum* fluid intake, using chilled (~10°C) water (W) vs. an 8% carbohydrate-electrolyte ([Na<sup>+</sup>]: 11.8 mmol·l<sup>-1</sup>) solution (CHO-8%), on core temperature and other physiological, behavioral and perceptual responses in children during exercise in a hot environment.

**Methods.** 29 healthy, active children (14 boys, 15 girls; age: 11.4 ± 1.2 y, 9-12 y; height: 151.4 ± 7.8 cm; weight: 42.4 ± 6.6 kg; BMI: 18.4 ± 1.7) completed two 80-min intermittent exercise (treadmill: 70% VO<sub>2max</sub>; cycle ergometer: 60% VO<sub>2max</sub>) sessions (using W or CHO-8%) on separate days (randomized, crossover design) in a hot (33°C) and humid (relative humidity: 54.7 ± 3.8%) environment. During each exercise session, fluid intake, urine volume, body weight (BW), core temperature, heart rate (HR), perceived exertion (RPE), thirst, taste and gastrointestinal discomfort were measured at selected time points. Pre- and post-exercise urine specific gravity and osmolality were also determined.

**Results.** CHO-8% consumption was greater compared to W (838.5 ± 50.7 g vs. 560.4 ± 47.9 g; p<0.0001). Accordingly, with a similar post-exercise urine output (CHO-8%: 75.0 ± 12.7 g; W: 88.5 ± 13.5 g; p=0.3358), there was greater fluid retention during exercise in the CHO-8% trial compared to W (763.5 ± 49.0 g vs. 471.9 ± 49.6 g; p<0.0001). Estimated sweat loss (by BW) was similar in both trials (CHO-8%: 591.8 ± 22.6 g; W: 568.8 ± 25.2 g; p=0.2634), resulting in a positive BW change (adjusted for urine output) in the CHO-8% trial and a fluid deficit in the W trial (+171.7 ± 56.4 g vs. -106.4 ± 52.6 g; p=0.0001). Core temperature was slightly higher (0.16 ± 0.01°C; p=0.0125) during CHO-8%, though the rate of change was similar in both trials. Moreover, this subtle difference did not translate into any statistical difference in physiological stress between trials, as indicated by HR or RPE. CHO-8% was consistently preferred over W (p<0.001) in all selected taste perception categories.

**Conclusion.** CHO-8% appears more effective than W in keeping healthy, active children hydrated, by encouraging greater fluid intake and maintaining body weight, during exercise in the heat. However, greater consumption and retention of CHO-8% did not provide any measurable thermoregulatory or perceived exertion advantages over W during this exercise protocol. Supported by Kraft Foods Global, Inc.