LETTER TO THE EDITOR

To the Editor:

In the recent article by P. A. Deuster et al. (1), the authors summarized their study by claiming that immersion diuresis occurs independently of water temperatures in the range 25°–35°C. Yet our data (2) have shown that 30°C water significantly changes the urinary response to immersion in 35°C water. Why the discrepancy in the findings?

In the Deuster study (1), immersed subjects drank fluids at a rate of 250 ml/h during 3-h immersions in 25° and 35°C water. In their Fig. 2 and Table 2 there were no significant effects of water temperature on the rates of urinary flow, free water clearance, osmolar clearance, and sodium excretion.

We compared the effects of cold vs. thermoneutral immersion in subjects who ingested nothing during 6-h exposures (2). Immersion in 30°C water induced shivering and lowered the mean rectal temperature 0.7°C below that recorded in 35°C water. Our data (Table 2 of ref. 2) showed that cold water significantly accelerates the natriuretic response to thermoneutral water.

Could it be that fluid ingestion overrides the effect of water temperatures on immersion diuresis? Mahan et al. observed that drinking fluids during thermoneutral immersion (35°C) increases urinary output to levels measured during cold immersion (24° and 29°C). Without fluid replacement, urinary flow was significantly higher in cold water than in thermonuclear water (Figs. 7 and 9 of ref. 3).

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Dr. Deuster responds:

The provision of fluids is the most reasonable explanation for the apparent discrepancies noted by Doctors Knight and Horvath in our recent paper (1); we did see statistically insignificant differences between the two water temperatures in total urine losses (1.5 ± 0.1 liter at 35°C vs. 1.8 ± 0.1 liter at 25°C) and urine flow rates (8.4 ± 0.4 ml/min at 35°C vs. 9.6 ± 0.6 ml/min at 25°C) over the 3-h immersions. We also tested "no fluid" conditions with both temperatures but had an insufficient number of subjects to reach definite conclusions—total urine losses and flow rates for 35°C (0.9 ± 0.2 liter and 5.0 ± 0.8 ml/min) were less than for 25°C water (1.0 ± 0.6 liter and 5.8 ± 0.3 ml/min).

Another paper (2) describes fluid losses in men submersed for 6 h in 5°C water while wearing thermal protection. No fluid was provided and rectal temperature declined by approximately 1°C over the course of the submersions. Total urine losses averaged 1.8 ± 0.1 liter and urine flow rates averaged 4.1 ± 0.4 ml/min, similar to data of Knight and Horvath (3), who reported total urine losses of 1.1 liter for 35°C and 1.4 liter for 30°C water; it does not appear that the values are different. The flow rates I calculated from Knight's Table 2 were 2.9 ml/min for the 35°C and 3.8 ml/min for the 30°C water; it is unlikely that this difference is significant. I conclude that the greater diuresis in cold water as compared to thermoneutral water has not been conclusively established. From our data it seems that there is more intra-subject variability than between-temperature variability.

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