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LETTER TO THE EDITOR

Is urinary specific gravity a useful simple marker of fluid depletion in athletes?

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Hamouti et al. (2013) rightly draw attention to the need for a simple field measure of dehydration, an index that can be used by those monitoring athletes who are performing endurance exercise under hot conditions. They also note some of the limitations of drawing inferences from changes in body mass, although they do not discuss the potential complication that up to 2 l of water are liberated during the metabolism of glycogen, and an equal change occurs in the opposite sense as intramuscular glycogen reserves are replenished.

The current paper of Hamouti et al. (2013) examines the ability to detect moderate dehydration by looking at the individual's urinary specific gravity. This approach was previously questioned by Popowski et al. (2001) and Oppliger et al. (2005), in part because the response lagged behind plasma osmolality and in part because changes showed a poor sensitivity and specificity relative to the plasma criterion. At the most accurate of possible cut-points, urinary measures correctly classified hydration status in less than two-thirds of athletes, whether examining urinary specific gravity or urinary osmolality (Oppliger et al. 2005).

Nevertheless, Hamouti et al. (2013) suggested that urinary specific gravity was "as sensitive as S_{OSM} for the detection of low levels of exercise-induced dehydration (i.e., 2 %) reported to affect athletic performance." They reached this conclusion based upon the testing of a group of 18 aerobically trained male athletes; each of their subjects undertook repeated 20 min bouts of exercise at some 60 % of their $\dot{V}O_{2peak}$ under hot conditions (32 °C, 46 % RH) until their body mass had decreased by 3 %. Already, at a 2 % decrease in body mass, the average urinary specific gravity for the group (1.023) was significantly above its baseline value of 1.018 ($p < 0.05$).

Unfortunately, this observation does not prove the value of urinary specific gravity measurements when advising the individual competitor. Inspection of the authors' Fig. 1 shows a substantial variation in both baseline and dehydration data; assuming a normal data distribution, the respective 95 % confidence limits would approximate 1.010–1.026 and 1.017–1.029. Given this degree of overlap, it would seem very difficult to draw conclusions about the hydration status of an individual athlete. Possibly, some of the inter-individual variability could be eliminated and a clearer distinction between euhydration and dehydration would become possible if the authors were to calculate the *change* of urinary specific gravity within each subject. I would encourage them to pursue such an analysis.

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