

The HelpDesk Search Strategy

HelpDesk Answers are intended to provide the same quality response to a clinical question as would be achieved by a search-savvy physician spending an hour or so on the Internet. Authors of HelpDesk Answers are required to search PrimeEvidence (<http://www.primeanswers.org>) and the TRIP database (www.tripdatabase.com). These portals provide access to more than a dozen sources of the highest quality evidence-based clinical information, including BMJ Clinical Evidence, the Guide to Clinical Preventive Services, AHRQ Evidence Reports, and others. Searches of the Cochrane Database, Medline, and other databases are also included, as needed.

How common is symptomatic hyponatremia in endurance athletes?

Evidence-Based Answer

Among trained athletes completing a major endurance event such as a marathon, triathlon, or 100-mile bicycle ride, 2% to 22% will develop a serum sodium concentration <135 mmol/L and approximately 1% will have exercise-associated hyponatremic encephalopathy (EAHE) (SOR **A**, based on multiple cohort studies). Avoiding weight gain (a sign of overhydration) during an event should reduce the risk of EAHE (SOR **C**, based on expert opinion).

Endurance event athletes who drink ad libitum fluids will usually replace no more than 75% of net body water losses.¹⁻³ "Pushing fluids" is a relatively recent cultural development among endurance athletes. Drinking with the goal of maintaining clear, copious urine is flawed advice because exercise may cause inappropriate antidiuretic hormone secretion.¹

In a recent observational study of 96 nonelite marathon runners, 22% had biochemical hyponatremia at the completion of the event. None had serum sodium concentrations <129 mmol/L and none had symptoms. Hyponatremia was more common in participants who lost less than 0.75 kg during the event (relative risk=7.0; 95% confidence interval, 1.8–26.6) compared with participants who lost more than 0.75 kg.⁴

A review of 2,135 athletes in 8 competitive endurance events revealed that 11% became overhydrated (gained weight), 39% euhydrated (defined as up to 3% weight loss), and 50% were dehydrated (>3% weight loss). Among overhy-

drated athletes, 19% (44/231) were hyponatremic at the end of the event, 11% (25/231) had a serum sodium <129 mmol/L, and 7% (17/231) were diagnosed with

EAHE. Among euhydrated athletes, 5% (41/827) were hyponatremic, 0.7% (6/827) had a serum sodium <129 mmol/L, and 0.6% (5/827) were diagnosed with EAHE. Among dehydrated athletes, only 3.5% (38/1,077) were hyponatremic, none had a serum sodium <129 mmol/L, and 0.2% (2/1,077) had EAHE.

Overall, 1.1% of athletes (24/2,135) were diagnosed with EAHE, 79% (19/24) of whom had serum sodium <129 mmol/L, and 71% (17/24) of whom had gained weight during the event.¹

The International Marathon Medical Directors Association (IMMDA) recommends athletes drink to satisfy thirst.⁵ An accurate digital scale should be used to learn how to avoid weight gain during events. Athletes should be advised that lack of urine production, even up to hours after an event is over, is not necessarily a sign of dehydration. The IMMDA recommends that for marathon participants any weight gain constitutes justification for a medical consultation.

David A. Mark, PhD*

Maynard, Mass

*Disclosure: David A. Mark has no consulting clients that sell hydration products or sports drinks.

Signs and symptoms of hyponatremia include:

- Nausea
- Headache
- Muscle cramps
- Confusion
- Seizures

1. Noakes TD, Sharwood K, Speedy D, et al. Three independent biological mechanisms cause exercise-associated hyponatremia: evidence from 2,135 weighed competitive athletic performances. *Proc Natl Acad Sci U S A* 2005; 102:18550–18555. [LOE 2c]
2. Rosner MH, Kirven J. Exercise-associated hyponatremia. *Clin J Am Soc Nephrol* 2007; 2:151–161. [LOE 2c]
3. Weschler LB. Exercise-associated hyponatremia: a mathematical review. *Sports Med* 2005; 35:899–922. [LOE 2c]
4. Chorley J, Cianca J, Divine J. Risk factors for exercise-associated hyponatremia in non-elite marathon runners. *Clin J Sport Med* 2007; 17:471–477. [LOE 2c]
5. Hew-Butler T, Verbalis JG, Noakes TD; for the International Marathon Medical Directors Association. Updated fluid recommendation: position statement from the International Marathon Medical Directors Association (IMMDA). *Clin J Sport Med* 2006; 16:283–292. [LOE 5]