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## Dehydrated and Dominant?

New study shows mild dehydration has no effect on athletic performance.

By Emily Beers

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Mike Warkentin/CrossFit Journal

Researchers from Brock University in St. Catharines, Ontario, have discovered evidence that suggests being dehydrated doesn't hinder athletic performance.

Stephen Cheung is the lead author of "[Separate and Combined Effects of Dehydration and Thirst Sensation on Exercise](#)"

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**Performance in the Heat**," published in the June 2015 volume of the *Scandinavian Journal of Medicine and Science in Sports*. The study analyzed the performances of 11 experienced long-distance cyclists under different hydration conditions.

Testing was administered on a stationary bike in a laboratory set to 35 C (95 F), and participants were tested six times over the course of the study. Each time, they cycled at a steady pace for 90 minutes and then performed a 20-km time trial in which they pushed to race speed. In total, athletes rode for about two hours each time they were tested.

During the tests, each participant was connected to an IV. Some days, the IV replenished the participant's lost fluid with saline. Other days the IV did nothing and acted as a placebo. Participants were not told when saline was ensuring their hydration levels remained normal nor when their IV was a sham.

Cheung and his team analyzed each participant, comparing performance data between hydrated and dehydrated rides. On the days participants became dehydrated, they lost up to 3 percent of their pre-race body weight, Cheung said. However, results showed participants' performances were no different: Hydration status had no effect.

"There was no difference in average power output, no difference in time and no difference in their pacing," Cheung said.

Most hydration guidelines suggest performance will suffer if an athlete loses more than 2 percent of his body weight during exercise, Cheung explained.

"The ACSM's current guidelines say you don't want to go below 2 percent, and below that there's impairment of performance and physical stress," Cheung said, referencing "[American College of Sports Medicine Position Stand. Exercise and Fluid Replacement](#)."

"The goal of drinking during exercise is to prevent excessive (>2% body weight loss from water deficit) dehydration and excessive changes in electrolyte balance to avert compromised performance," the position stand reads.

Bottled-water and sports-drink companies regularly market their products by suggesting even a small amount of dehydration is a threat to athletic performance. In but one of many examples, [Gatorade's website](#) states,

"Consuming fluids during exercise keeps your blood volume up and your core temperature down. Both help you fight fatigue and perform better."

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A 2014 [Gatorade advertisement](#) noted the product is "created to help replace what you sweat out," with the clear implication that replacing lost fluid is critical for performance.

Cheung said part of the rationale behind the ACSM guidelines relates to core temperature during exercise. Scientists have commonly assumed athletes should try to stop their core temperature from rising by drinking more, Cheung explained. Participants' core temperatures did rise as they became dehydrated in his study, but Cheung said the increased temperature did not impair performance.

"And none of the subjects reached a dangerous level of core temperature," he said.

Nobody was forced to stop cycling because of the increased temperatures, Cheung added.

These laboratory results were put to the test in the real world on May 2, 2015, when British cyclist Alex Dowsett set a new Union Cycliste Internationale hour record by cycling 52.937 km (32.89 miles) in 60 minutes at the Manchester Velodrome in England.

Leading up to Dowsett's race, Cheung consulted with Mikel Zabala—a sport scientist from the University of Grenada in Spain—to help set the right conditions in the velodrome. Zabala knew a hotter velodrome would keep air density and resistance lower, which would be advantageous for Dowsett, but Zabala feared a velodrome set to 29 C (84.2 F) would produce dehydration that would hinder Dowsett's performance, Cheung said.



Courtesy of Stephen Cheung

***In his study of 11 experienced long-distance cyclists, Stephen Cheung found hydration had no effect on their performance.***

Cheung revealed the then-unpublished results of his study to Zabala and convinced the scientist to keep the velodrome hot without worrying about dehydration. Zabala listened to Cheung's advice: Dowsett rode in 29 C conditions and refrained from drinking during his race, as doing so would have slowed his pace, Cheung said. The result was a new record.

### **A New Message**

Cheung is hoping the results of his study can help change the information presented to the public about hydration and performance—information he believes is flawed.

"We're bombarded by public messages saying you need to drink all the time and any bit of dehydration is bad for your health and performance," Cheung said. "There's a disconnect between the public message and what elite performers are doing. Elite marathoners barely drink at all when they race."

(The April 2015 CrossFit Journal article "[Hydrating the Elite](#)" discusses this topic in depth.)

While elite marathoners, triathletes and cyclists keep their drinking to a minimum, Cheung noticed the "weekend warrior" still believes what the advertisements say: Drink at every opportunity and fuel with Gatorade to optimize performance.

As another example, CamelBak.com has an interactive page visitors can use to "determine how much water you need for maximum performance." CamelBak also widely uses the slogan "hydrate or die."

"Do you really need to stop at every aid station and wear a CamelBak? That was the context of my thinking (going into the study)," Cheung said.

One of the reasons Cheung's research is particularly groundbreaking is because it's the first time a study has prevented participants from knowing whether or not they became dehydrated.

"Most studies (have been) based on athletes coming into the lab and the researchers would let them drink while exercising one day, and then the next day they'd say, 'Tough luck, you're not going to drink today,'" Cheung explained.

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"Combine this with the fact that we have this constant bombardment of messages saying you need to drink, and then when you're not allowed to drink, it sets you up for a bad performance. It's a bit of a self-fulfilling prophecy. You (become) thirsty and grumpy because you don't get to drink," Cheung said.

His study, on the other hand, controlled variables by eliminating psychological factors so actual hydration status could be evaluated.

"We removed that psychological crutch that (causes athletes to believe) 'I always have to drink to be at peak performance,'" he said.

Cheung explained the crutch exists in many minds because of the message the public has heard for years from sports-science organizations they're told to trust. But science can sometimes suffer when marketing dollars are involved. The BMJ addressed the issue head on in the 2012 article "[The Truth About Sports Drinks](#)".

"There is an inherent conflict of interest with a lot of the people doing research or writing in the interest of being funded by the Gatorade Sport Science Institute (GSSI)," Cheung said.

He added: "Gatorade sponsors a lot of major organizations, like the ACSM, so that's always a potential issue."

Dr. Tamara Hew-Butler—an exercise physiologist from Oakland University in Rochester, Michigan—reiterated the point.



**Dr. Tamara Hew-Butler speaking at the 2015 CrossFit Conference on Exercise-Associated Hyponatremia in February.**

"(Sports-drink companies are) trying to sell products, so they'll do anything to convince you that you need (them) to perform," said Hew-Butler, who has dedicated her career to studying exercise-associated hyponatremia (EAH), a life-threatening condition that can be caused by drinking too much during exercise. EAH leaves an athlete with dangerously low blood-sodium levels, which in severe cases can lead to potentially fatal brain swelling called exercise-associated hyponatremic encephalopathy (EAHE).

In his book "Waterlogged: The Serious Problem With Overhydration in Endurance Sports," Dr. Tim Noakes noted 12 deaths from EAH or EAHE between 1981 and 2009. In August 2014, two high-school football players were killed by [EAHE after drinking too much water and Gatorade](#).

Despite the potentially serious consequences of drinking too much, Cheung said he believes most people continue to listen to the dehydration message.

"It's an easy message to broadcast for people to intuitively understand," Cheung said. "Water is our most important nutrient, and it's easy and logical to think you should drink."

It's much harder to send out a message that you can drink too much, Cheung explained. He's hoping his research can help change common perception so people understand sometimes less water is the best for great performance.

"The message from my study is that if you're peaking for a performance, like a half marathon, you don't need to overemphasize or obsess about hydration, and you can drink way less fluid than you think," Cheung said.

He added: "Maybe the message can become, 'It's not a big deal (if I can't drink). I can keep going. I can still do well.'"



### About the Author

*Emily Beers is a CrossFit Journal contributor and coach at CrossFit Vancouver. She finished 37th at the 2014 Reebok CrossFit Games.*