

WATERLOGGED

We tote water bottles to the gym, strap them to our waists, and sip from them at our desks. But, as Alex Hutchinson reports, our modern obsession with hydration may depend more on what's in our heads than what our bodies really need

As British cyclist Alex Dowsett was preparing last winter for an assault on the one-hour timetrial world record, his sports science team was fretting over the details – like the optimal temperature at the velodrome in Manchester. Warm air lowers air resistance, but risks parching the cyclist, who can't drink during the race.

Meanwhile, Brock University physiologist Dr. Stephen Cheung, himself an accomplished cyclist and co-author of the book *Cut-ting-Edge Cycling*, was poring over the results of his surprising new study. The results showed that losing even three per cent of body mass through dehydration has no discernible effect on cycling performance. He shared the results, which had yet to be published, with Dr. Mikel Zabala, a friend who heads Dowsett's scientific team.

“He and I were batting around the idea over the winter of just how hot do we want to make the track,” Cheung recalls. “He was obviously worried that Dowsett was going to get really dehydrated. So I shared the data that I had, and perhaps it put his mind at rest.”

Dowsett went on to smash the record by nearly half a kilometre in May, covering 52.937 kilometres in 28 to 29 C. Later that month, Cheung's study was published in the *Scandinavian Journal of Medicine & Science in Sports*, garnering media attention around the world – and leaving everyone else confused. Hydration, after all, is a modern obsession: We tote water bottles to the gym, strap them to our waists as we run, and sip from them at our desks. By the time we feel thirst, we're told, it's already too late. So how could the new results be true?

Cheung's research is just the latest in a string of studies over the past decade that have upended our understanding of the body's fluid needs. Instead of striving to replace every drop that you sweat out, it now appears that a little thirst isn't the end of the world. That doesn't mean drinking during your workout is a waste of time – but it turns out that how much you need may depend less on the fluid levels in your body than on what's going on in your head. The prevailing rule of thumb is that you're in trouble if you sweat out more than 2 per cent of your body mass, based on U.S. military research preparing soldiers for desert or jungle combat in the Second World War. For a 75-kilogram man, that works out to a loss of 1.5 litres of sweat – a pretty big puddle under the elliptical.



CHIP EAST/REUTERS Runners receive water during a New York fun run. Research indicates performance is not as dependent on rehydration as once thought.

Still, depending on how hard you're working and how hot it is, it's possible to lose that much fluid in an hour. Even if you're sipping from a water bottle, studies have found that in activities such as running, where it's hard to drink on the go, people tend to replace less than half of their sweat losses.

A growing number of studies have hinted that the two-per-cent rule is flawed. For example, when French researchers weighed 643 runners before and after a marathon, the fastest runners lost the most fluid weight on average, and only the slowest runners kept their losses below 2 per cent. Another study found that star Ethiopian runner Haile Gebrselassie lost as much as 10 per cent of his starting weight while running marathons – and he was nonetheless able to set two world records.

“Anyone who has worked in the field with athletes has probably realized years ago that a strict two-per-cent dehydration cut-off just doesn't work,” says Dr. Trent Stellingwerff, a physiologist at the Canadian Sport Institute in Victoria. In his work with elite marathoners, Stellingwerff aims for 3 to 6 per cent dehydration, depending on weather and individual tolerance.

One problem with the earlier studies is that they didn't distinguish between dehydration (the physiological fact of having lost fluids) and thirst (the psychological state of thinking you'd like a drink). Researchers deliberately dehydrated their subjects for hours using heat chambers or diuretics and then forced them to exercise without permitting them to drink. Under those circumstances, it's no surprise their performance suffered.

“When you drink, you’re also affecting your thirst, your perception, your psychology, your motivation,” Cheung says. What slows you down, in other words, is the distraction and unpleasantness of wanting to drink without being able to, rather than an actual shortage of fluid in your body.

The twist in Cheung’s study was that he used intravenous drips, inserted in his subjects’ arms, to hydrate them while they cycled. Since the study was double-blinded, neither the cyclists nor the scientists knew whether fluid was actually entering the I.V. in any given trial – only a paramedic behind a curtain knew the truth. And to explore the role of thirst, he allowed subjects to rinse their mouth with water then spit it out in half the trials. While this approach succeeded in lowering subjective thirst, it didn’t affect cycling performance.

However, it may be that you need to actually swallow fluid to fully eliminate thirst, notes Dr. Paul Laursen, an Ironman triathlete and physiologist at the Sports Performance Research Institute, New Zealand who published a similar I.V. hydration study in 2013. He points to a 2012 study in which swallowing small mouthfuls of water increased exercise performance by 17 per cent compared with rinsing and spitting the same volume of water.

An earlier study even used a nasogastric tube to suck water out of participants’ stomachs and found that the mere act of swallowing fluid quenched thirst, even if all the swallowed fluid was then vacuumed out.

So if thirst isn’t a reliable indicator of fluid losses, what is it telling us? One possibility is that, rather than total fluid levels, your body is more concerned with the concentration of your blood. As you sweat, you lose both fluid and electrolytes such as sodium, but your body adjusts to keep the relative balance of water and electrolytes in your blood plasma roughly constant. It’s only if you lose so much fluid that this balance is disrupted that your performance will be affected.

Taken together, these findings suggest that focusing on staying hydrated isn’t important ... until it is.

It’s worth remembering that drinking on a hot day is, if nothing else, a pleasant sensation. When Cheung goes for long bike rides, he takes two full water bottles; and he thinks that team sport athletes should continue sipping fluids when they’re on the bench. But keep the importance in context: For an average recreational runner in a half-marathon, for example, the amount you drink just doesn’t matter as much as we used to think.

That simple realization can itself be performance-enhancing, Cheung says, recalling the disappointing performance of American cyclist Taylor Phinney after he dropped a water bottle at the world championships in 2013. The race was only an hour long, so it shouldn’t have mattered – but since Phinney believed it was a problem, it hurt his performance.

That’s the message Cheung hopes people will take from his study – not that you shouldn’t drink when you have the chance, but that you shouldn’t obsess about it when you don’t. “It’s one less psychological crutch to hold you back from a top performance.”