Ketone drinks: Do they really improve sports performance?

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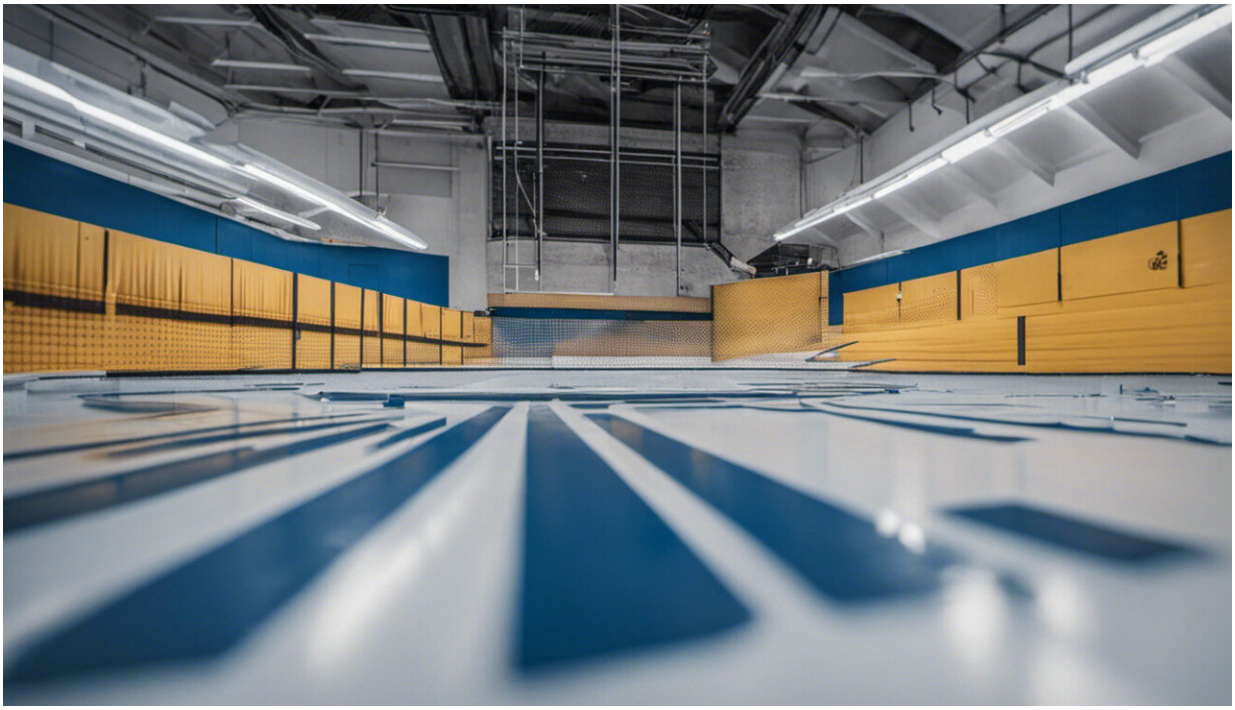

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The stories of Asterix and his friend Obelix introduced us to a magic potion that comes in a small bottle and doesn't taste good, but dramatically increases strength and fitness. Sports nutrition scientists have been trying to find or develop a compound with such characteristics for a long while.

Many supplements have been proposed, but few actually work.

The latest supplement receiving lots of attention is ketones. They come in small bottles and their taste is—to put it bluntly—horrible. Because of their high price and claimed improvement gains, many called for their ban. But do they really improve performance?

First, let's look at what ketones are.

During exercise, and also at rest, we get the required energy from breaking down carbohydrates and fats. While most tissues can use fats, the brain relies on glucose (a form of carbohydrate). Once carbohydrate stores in the body are exhausted, glucose starts being produced in limited amounts from other sources, including protein from skeletal muscle and byproducts of fat breakdown. This, however, provides less than what the brain needs, which is more than 100 grams of glucose daily.

When carbohydrate availability gets low, the liver starts converting fat into ketone bodies—as ketones are properly called—which provide an alternate source of fuel for the brain. Ketone bodies can also be used in other tissues, such as muscle, and could eventually be used as fuel during exercise.

One of the popular diets these days is the so-called keto diet. The idea behind it is that if carbohydrate intake is reduced to less than 50 grams a day, the body produces ketone bodies for brain fuel while making other tissues rely on fat as a fuel.

While this diet may work for weight loss, many studies have shown that sports performance is impaired. This is not surprising as carbohydrates are essential for sustaining high-intensity exercise.

Ketone supplements: The best of both worlds?

As ketone bodies can be a source of energy, just like carbohydrates and fats, scientists became interested in supplements that would increase ketone body concentrations in the blood without reducing carbohydrate availability. This way, at least in theory, sports people could benefit from using not only carbohydrates and fats but also ketone bodies—the use of which could spare precious carbohydrates that are stored in very limited quantities.

Many attempts have been made to develop a ketone supplement. Initially, most ketone supplements caused gastrointestinal issues and did not sufficiently increase ketone body availability.

For instance, an Australian study published in 2017 undertaken in professional cyclists used a ketone diester (a ketone body bound to a compound called diester) supplement and reported impaired time-trial performance, accompanied by significant gut discomfort and a limited increase in ketone body availability.

A newer ketone monoester (ketone body bound to a compound called monoester) drink was shown not to cause gastrointestinal discomfort and to sufficiently increase ketone body concentrations in the blood. However, this still didn't result in improved performance, as a new study by researchers at McMaster University in Canada showed. They found the ketone supplement impaired a 20-minute time-trial performance by 2.4% compared with a placebo.

The underlying mechanisms for these findings are not yet clear. The most likely explanation is that this reduction in exercise performance occurs because ketone supplements make the blood more acidic, something that has long been known to impair performance.

There is some limited evidence that combining ketones and sodium bicarbonate supplements could counteract this. However, the jury is still

out as not all the studies show this.

Ketones in recovery

It appears that consuming ketones before or during exercise does not provide any benefits to exercise performance. Indeed, it can impair it. However, there is some evidence from KU Leuven, a research university in Belgium, that taking ketone supplements when recovering from endurance exercise can help reduce the symptoms (called "overreaching") associated with overtraining. But there is no evidence suggesting that ketone supplementation would provide benefits to athletes during normal training.

It seems ketones are nowhere near as efficient as the magic potion that Asterix used, and we will continue to be searching for the lost recipe of the series' village druid Getafix.

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