Scientists offer sweet solution to marathon fatigue

November 30 2015, by Andy Dunne

Our health researchers have analysed the effect of different energy drinks in staving off tiredness during a big race.

It turns out a spoonful of sugar might not just help the medicine go down, but could also help stave off tiredness faced by weary marathon runners – or other long-distance athletes – when they hit the wall.

According to researchers based within our Department for Health, stirring in table sugar from the baking cupboard into a water bottle before a big physical event could be the difference between success and failure.

In their new study, published in the leading international journal the *American Journal of Physiology—Endocrinology & Metabolism*, the scientists assessed the impact of endurance exercise on liver glycogen levels (stored carbohydrates in the body) and tested what could be done

to prevent fatigue.

Sucrose vs glucose drinks

They tested various sucrose- and glucose-based drinks to see how different carbohydrates could help. Their experiment, conducted on long-distance cyclists, showed that ingesting carbohydrates in the form of either glucose or sucrose prevents the decline in liver glycogen 'carbohydrate stores' and can avert tiredness.

Both sucrose - in the form of table sugar - and glucose are important carbohydrates often referred to as 'simple sugars'. The major difference between them is that each sucrose molecule is made up of one glucose and one fructose molecule linked together. It appears combining different sources of sugars improves the rate at which we can absorb these from the gut.

Although an increasing number of sports-performance drinks designed to provide energy during exercise now use sucrose, or mixtures of glucose and fructose, many still rely on glucose alone. The researchers warn that such glucose-only drinks could produce gut discomfort and suggest sucrose-based alternatives, or sugar in water, can help make exercise easier.

Lead researcher Dr Javier Gonzalez explained: "The carbohydrate stores in our liver are vitally important when it comes to endurance exercise as they help us to maintain a stable blood sugar level. However, whilst we have a relatively good understanding of the changes in our muscle carbohydrate stores with exercise and nutrition, we know very little about optimising liver carbohydrate stores during and after exercise.

"Our study showed that ingesting carbohydrates during exercise can prevent the depletion of carbohydrate stores in the liver but not in

muscle. This may be one of the ways in which carbohydrate ingestion improves endurance performance.

"We also found that the exercise felt easier, and the gut comfort of the cyclists was better, when they ingested sucrose compared to glucose. This suggests that, when your goal is to maximise carbohydrate availability, sucrose is probably a better source of carbohydrate to ingest than glucose."

The scientists behind the new study recommend that if your goal is optimal performance during exercise lasting over two and half hours then consume up to 90g of sugar per hour – diluted to 8g sugar per 100ml.

More information: Javier T. Gonzalez et al. Ingestion of Glucose or Sucrose Prevents Liver but not Muscle Glycogen Depletion During Prolonged Endurance-type Exercise in Trained Cyclists, *American Journal of Physiology - Endocrinology And Metabolism* (2015). DOI: 10.1152/ajpendo.00376.2015

Provided by University of Bath