Should you swap sugar for artificial sweetener? Maybe not if you're a mouse, but what if you're a human?

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Image from: http://www.life-enhancement.com

Unless you've been hiding under a rock lately, you'll be aware that sugar and its negative impact on dental caries, body weight, and other long-term health conditions such as diabetes, is highly topical. The World Health Organization has recently announced that we should reduce our daily sugar intake to less than 5% of total energy. In this blog, we consider two new articles assessing the evidence for artificial sweeteners and their impact on body weight and metabolism – one a lab experiment on mice published in Nature that was widely covered in the media, and one a systematic review of human studies published in the American Journal of Clinical Nutrition. The former shows deleterious effects of artificial sweeteners on the glucose metabolism of mice, but the later net benefits of artificially sweetened beverages on body weight among humans.

So, if you're going to reduce sugar intake, should you replace it with artificial sweetener? If you're a mouse – no. If you're a human – they might help with short-term weight loss, but there is a lot more to it than that.

If you're a mouse

The first study, published in Nature, takes a look at three types of artificial sweeteners – saccharin, sucralose, and aspartame, all commonly found in confectionary and drinks. To test the theory that these artificial sweeteners might interfere with glucose metabolism by influencing important bacteria in the gut (our gut microbiome), researchers fed these sweeteners to mice and compared them with mice that were fed only water or water supplemented with either glucose or sucrose (sugar). After 11 weeks, the mice fed sweeteners were displaying glucose intolerance (insulin resistance) i.e. the cells of these mice were not able to respond to insulin (the mice fed only water or water supplemented with sugar were fine). Insulin's role in the body is to shuttle sugar from the blood stream to the liver and tissues for storage. Glucose intolerance results in high amounts of sugar circulating in the blood, which in humans at least can lead to the aforementioned undesirable long term health conditions.

To see whether the gut bacteria of the mice were the reason for this glucose intolerance, researchers transplanted faeces of the glucose intolerant mice into mice with sterile intestines. Sure enough – the new mice now also exhibited insulin resistance.

But I'm not a mouse

However, mice and humans are obviously not the same. For starters, the average mouse in the laboratory is likely to have quite a different diet to the average free-living human; their gut microbiome is also probably quite different. So the Nature researchers took their experiment to humans to find out more.

Seven healthy lean volunteers were fed the maximum acceptable dose of saccharin for one week. Four of the seven became glucose intolerant and had altered gut microbiomes. This finding is certainly interesting, but the small sample size does not allow us to conclude cause and effect. More importantly, very few people would consume the maximum acceptable dose of an artificial sweetener on any given day, let alone for a whole week (our Food Standards Agency ensures that's not easy to do).

We really need to see this experiment repeated in a properly powered (larger) study with a more realistic daily dose and a control group, before we can say that artificial sweeteners alter glucose metabolism.

I'm a human!

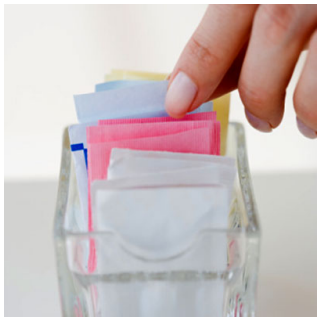
So this brings us to the systematic review of low calorie sweeteners and their impact on body weight and composition. Systematic reviews sit at the top of the evidence hierarchy, and this was a robust review including 15 randomised controlled trials and 9 prospective cohort studies (humans only!). The aggregated trials, which are our strongest study design for determining cause and effect, found a small but significant reduction in body weight (-0.80 kg; 95% CI -1.17 to -0.43), BMI (-0.24 kgm^2; 95% CI -0.41 to -0.07), fat mass (-1.10 kg; 95% CI -1.77 to -0.44), and waist circumference (-0.83 cm; 95% CI -1.29 to -0.37).

What about safety?

If you take the evidence from the review you might decide that artificial sweeteners are helpful for weight loss and move on. But, you might want to know a bit more. For example, are artificial sweeteners safe? Do they cause cancer? The two new studies don't attempt to

answer these questions, but there is insufficient evidence from other studies to suggest a link. The problem is that null findings can be reinterpreted as ‘not disproving a link’. Accordingly, the International Agency for Research on Cancer is re-examining this issue.

What’s the take home message?



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In the perfect world we’d all eat whole natural foods, and our main beverage would be water. In such a world artificial sweeteners wouldn’t feature. However, you don’t have to be a nutritionist to know that our world has moved far beyond this scenario and it is clear that people are struggling to decide what to eat in an increasingly confusing food environment. Advice to simply drink water might be seen as idealistic in the food environment we live in. Nonetheless, keep an eye out for future research on this topic, as there is still a lot we don’t know about artificial sweeteners and their effect on the body.

Taking that into account, based on our current knowledge: If you’re a mouse – you probably wouldn’t take artificial sweeteners… If you’re a human – they might help with short-term weight loss, but remember that they are not the ideal choice.

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