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How Artificial Sweeteners May Cause Us to Eat More

Like a freshly cracked diet soda, suspicions have been fizzing away for years that artificial sweeteners may not be the best way to slim down

BY [BRET STETKA](#)



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A vast body of research suggests that sugar substitutes, despite having far fewer calories than sugar itself, can wreak various forms of metabolic havoc such as upping diabetes risk and—perhaps paradoxically—causing weight gain in the long term. A new study published Tuesday in *Cell Metabolism* suggests that artificial sweeteners mimic a starvation state in the brain, causing some organisms to seek energy by eating more food.

In the study—a collaboration between researchers from the University of Sydney's Charles Perkins Center and the [Garvan Institute of Medical Research](#)—fruit flies were fed either a diet of yeast and sucrose or one with the synthetic sweetener sucralose, used in a variety of low-calorie foods. Flies fed the sugar-free diet for five or more days consumed 30 percent more calories than those on sugar. When sucralose was removed from their diet, calorie consumption in the formerly sugar-free group fell back to normal.

Using a technique called the proboscis extension response (PER) assay—essentially a taste test that can determine a fly's interest in ingesting a certain

food—the authors also found that sucralose consumption resulted in an increased motivation to eat real sugar. What’s more, by recording electrical activity in a fly’s sensillas—structures that house their taste receptors—it also appeared that a prolonged sucralose diet actually increased the insects’ sensitivity to sugar, meaning they presumably grew to find it more pleasurable. “After sustained consumption of artificial sweetener, the animals could detect much smaller concentrations of real sugar, would eat more of it and respond to it physiologically with much more intensity,” associate professor of genomics and study lead author Greg Neely explained in an e-mail.

By monitoring the expression and effects of compounds involved in appetite and energy regulation—including various enzymes and neurotransmitters—Neely and his colleagues were able to identify a neural network in the brain that appears responsible for the hunger-inducing effects of artificial sweeteners. In short, the compounds interfere with an evolutionarily ancient interplay between insulin, taste neurons and the brain’s reward circuitry that normally drives us to seek out life-sustaining food when nutrients are scarce. “We found that inside the brain’s reward centers sweet sensation is integrated with energy content,” Neely was quoted as saying separately in a press release. “When sweetness versus energy is out of balance for a period of time, the brain recalibrates and increases total calories consumed.” In other words, when the brain detects sweetness in the absence of actual caloric energy, it compensates by increasing the palatability of sugar, driving increased food consumption. “The pathway we discovered is part of a starvation response that actually makes nutritious food taste better when you are starving,” Neely said in the press release.

It appears that Neely’s findings may not be limited to fruit flies. His team was able to replicate the findings in mice: After seven days on a sucralose diet the rodents showed a 50 percent increase in food consumption, partly due to the activity of a neurotransmitter called neuropeptide Y that drives hunger during fasting. Yet it is too early to fully extrapolate these results to humans. Whereas a number of past studies suggest that artificial sweeteners can prompt us to eat more, the literature is inconsistent when it comes to people. And sweetener research, like other dietary investigations, is an easy target for the sort of embellished science and science reporting so [expertly eviscerated](#) by *Last Week Tonight* host John Oliver back in May.

Still, the evidence that synthetic “sugars” are in some way metabolically detrimental via a variety of mechanisms is getting stronger. Research [published](#) in *Nature* in 2014 reported that some artificial sweeteners can alter the gut microbe population in both mice and humans to promote calorie absorption. Another [recent study](#) found that sucralose ingestion impairs the body’s ability to process regular sugar. As *Scientific American* contributing writer Ferris Jabr [reported](#) earlier this year, overindulging in sweet and fatty foods alters brain chemistry in the reward system, driving us to overeat.

If artificial sweeteners render these foods even more palatable than usual, we could be setting ourselves up for a losing battle between Whoppers and willpower. But none of this is to say doctors should start recommending that people give up artificially sweetened food in favor of sugary alternatives; excess sugar intake comes with its own set of ills.

As Neely puts it, “I think the basic message here is that we know the artificial sweetener sucralose is not totally inert—at least in animals. This justifies more research into how these compounds affect people as well.”

Bret Stetka is an editorial director at [Medscape](#) (a subsidiary of WebMD), a freelance health, science and food writer, and a former diet soda drinker. He received his MD in 2005 from the University of Virginia and has written for WIRED, NPR.com, and TheAtlantic.com. Follow Bret on Twitter [@BretStetka](#)

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BRET STETKA was a writer based in New York City and editorial director of Medscape Neurology (a subsidiary of WebMD). His work has appeared in *Wired*, NPR and the *Atlantic*. He graduated from the University of Virginia School of Medicine in 2005. Stetka died in 2022.

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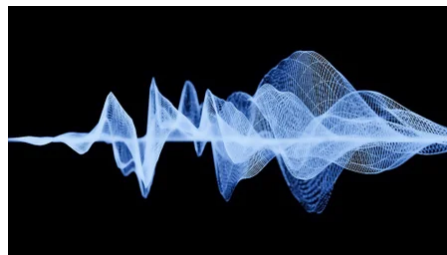


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