Human anatomy, neurology. Head profile and brain side section. (Anatomy Image/Shutterstock)

SUGAR

How Sugar Changes Your Brain

The brain is the most energy-demanding organ, which uses about half of all the sugar energy in the body.

THE ULTIMATE GUIDE TO KICKING SUGAR • PART 1

By Flora Zhao | August 25, 2023 Updated: January 15, 2024

This is Part 1 in the series "The Ultimate Guide to Kicking Sugar"

In this series, we will explore the good and bad sweeteners, uncover the unexpected outcomes of cutting out sugar, and discover the ultimate way to achieve this.

Our brains often instinctively crave sugar. It could be a slice of cake during times of stress, a bar of chocolate when bored, or a sweetened coffee when needing a pick-me-up. The inability to quit sugar may not stem from a lack of willpower but rather from not fully grasping the nature of sugar and not finding the most effective methods to quit.

Sweet Cravings: The Instinct for Survival and Growth

"Sugar is very important for our body and our brain. And I think this is where a lot of the difficulty (in cutting out sugar) lies," Jessica Russo,

a clinical psychologist from Philadelphia, told The Epoch Times during an interview.

Sugar serves as the primary energy source for every cell in our body and much of the food we eat is broken down into various sugars.

"The brain is the most energy-demanding organ, which uses about half of all the sugar energy in the body."

"We're biologically driven toward sweet foods," as this is a survival mechanism, Ms. Russo said, explaining that in nature, sweet-tasting foods are generally healthy, while toxic foods may taste bitter, and spoiled or rotten foods may taste sour, both of which lack sweetness.

Therefore, when we taste something sweet, our brains signal, "Oh, this is good!"

Besides helping us identify safe food, sweetness also plays a role in human survival and growth.

"We see babies being born with the ability to detect sweet taste and to prefer it," Julie A. Mennella, a scientist at the Monell Chemical Senses Center in Philadelphia, during an interview. It indicates that sweetness is associated with the quality of breast milk, which can attract infants to suckle.

There is evidence to suggest that children's preference for sweet foods may be linked to their higher caloric needs during the growth stage, which typically continues from infancy until the end of puberty, she told The Epoch

The Effect of Sugar on Our Brains

When we consume sugar, the receptors on our tongues send sweet signals to the brain, triggering the release of dopamine, which can

induce feelings of joy and happiness.

“We taste with our brains,” Ms. Mennella explained. Sweetness makes us feel good because these signals are sent to various parts of the brain, many of which are associated with rewards.

“The brain pathways used are significant for pleasure, memory, and reward,” she said.

This means that when we engage in activities that trigger dopamine release, we experience joy, form memories, and look forward to doing it again.

“In the brain, it has very specific actions and is the most important molecule in the brain that’s involved in bringing about well-being,” said Kenneth Blum, a renowned scientist with a doctorate in neuropharmacology.

Dopamine can also counteract stress, said Mr. Blum, who is a professor at the Western University of Health Sciences’ Graduate School of Biomedical Science, and a part-time professor at the University of Vermont and Wright University.

“When you have stress, the dopamine is released 100 times above the normal rate.” It can block the action of stress hormones such as adrenaline.

However, Mr. Blum emphasized the importance of maintaining a balance for this crucial molecule; otherwise, the brain could suffer severe negative consequences.

Many people are unaware that excessive sugar consumption can lead to consequences very similar to drug abuse.

Mr. Blum explained that excessive sugar consumption can trigger acute dopamine release.

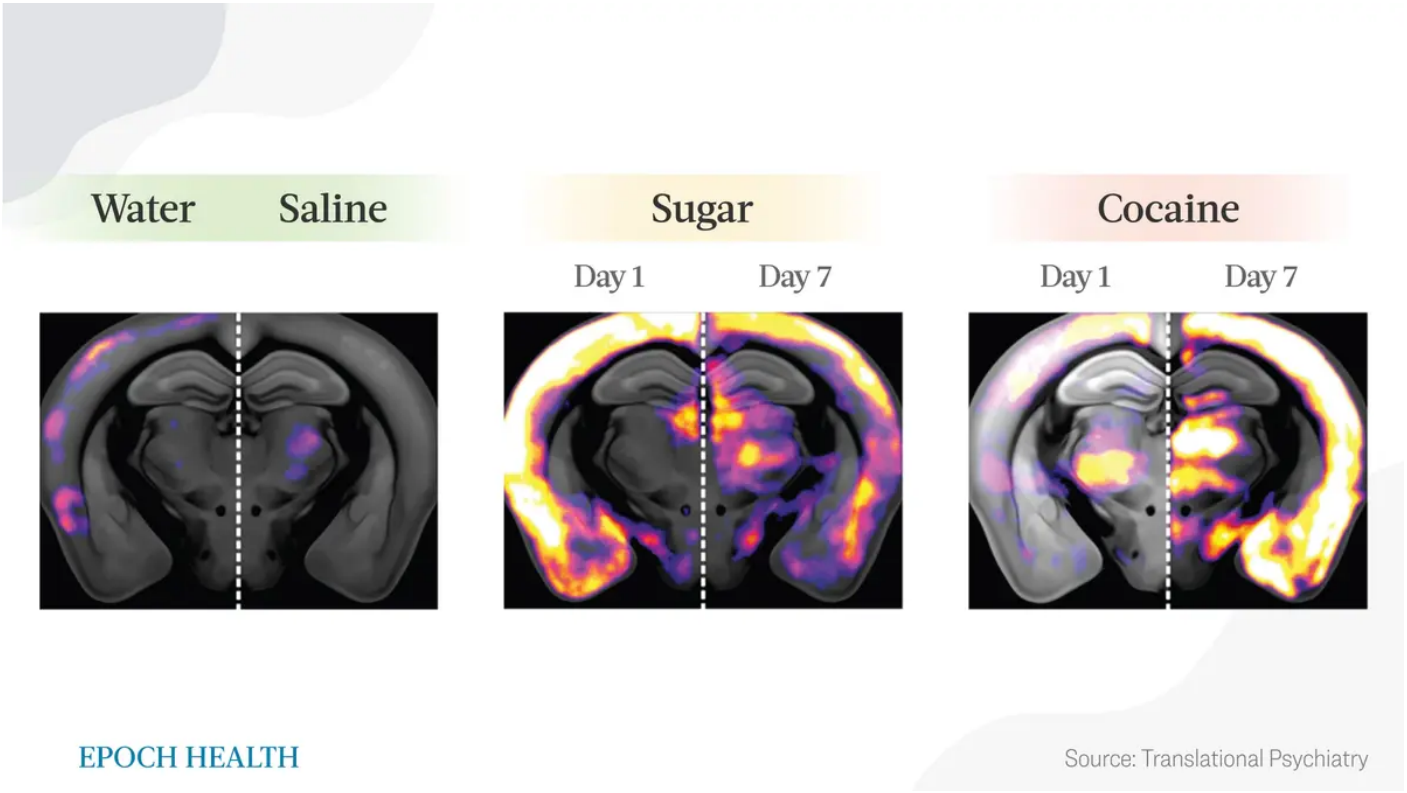
“It’s like abusing alcohol or other drugs of abuse,” he said.

Over time, that can result in a chronic decrease in dopamine levels. Consequently, individuals may seek larger quantities of sugar to experience the same level of pleasure, eventually leading to an addictive state where they consume more and more.

When you consume a large amount of refined sugar, “your brain lights up like a pinball machine due to the intense release of dopamine,” said James DiNicolantonio, a cardiovascular research scientist and doctor of pharmacy at Saint Luke’s Mid America Heart Institute in Kansas City, Missouri.

When ingesting refined sugar, the sweet receptors signal the brain’s reward system more effectively than when eating fruit. The levels of dopamine released by the brain far exceed what we can handle.

In 2023, a study published in the journal Translational Psychiatry revealed that when a mouse drinks water or is injected with saline, the brain remains relatively calm. However, when administered a sucrose solution or injected with cocaine, multiple regions of the brain’s neurons become activated (highlighted in the image). Multiple brain regions that respond to sugar signals also exhibit responses to cocaine signals.



Activation of brain neurons in specific regions upon sucrose and cocaine administration. (The Epoch Times)

"Our research shows how similarly both additive and nonadditive rewards are processed by our brains, both on the whole-brain scale and on a cellular level," said Anna Beroun, the study's lead author and the head of the Laboratory of Neuronal Plasticity at the Nencki-EMBL Center of Excellence for Neural Plasticity and Brain Disorders (BRAINCITY) of the Nencki Institute of Experimental Biology of the Polish Academy of Sciences in Warsaw, Poland.

"Sugar/food becomes addictive if we value it over other rewards."

Is Sugar More Addictive Than Drugs?

Sugar is irresistibly alluring, not only because it stimulates the brain to produce dopamine, which brings joy, but also because it triggers the production of endogenous opioids in the brain, which can lead to addiction and dependence.

Mr. Blum said that the brain has glucose receptors, and when they are stimulated by sugar, it triggers a series of signaling pathways that

ultimately lead to the production of addictive substances. This mechanism is inherently present "so that if you abuse sugar, you're going to order the brain–reward circuitry in a negative way, as if you use heroin."

An experiment revealed that mice fed large amounts of sugar intermittently exhibited withdrawal symptoms when injected with a drug that blocks opioids. These symptoms included teeth chattering, forepaw tremors, and headshakes.

Sugar's effect on the brain not only shares similarities with drugs but also, in certain circumstances, is even more alluring.

Over the years, French researchers have conducted a series of animal experiments, with the results revealing that when given the choice between cocaine and sucrose, rodents consistently preferred sucrose over cocaine. This preference held even for mice previously addicted to cocaine before the experiments.

"When we over-consume sugar, there is a release of dopamine and endogenous opioids that cause a 'high,' but then we get a 'low.' If we do this over a prolonged period of time, this can lead to dependency on sugar, especially in those who are vulnerable," said Mr. DiNicolantonio, summarizing the addictive mechanism of sugar.

When there is a deficiency of dopamine and endogenous opioids, one may feel sad, confused, sluggish, and unable to concentrate, all of which can further drive the desire to consume more sugar.

Additionally, numerous human experiments have demonstrated the link between sugar and addiction.

For example, a prospective observational study published in Addiction Biology in 2021 revealed that a significant proportion of individuals with alcohol use disorder (40 percent) experienced an increased craving for sugar during their inpatient alcohol detoxification.

Additionally, a study published in the journal Addiction showed that children with a family history of alcoholism and depression were

likelier to prefer intense sweetness. On average, these children opted for water with a sucrose concentration of 24 percent, equivalent to about 14 teaspoons of sugar in a glass of water—more than twice the sugar concentration found in regular soda water.

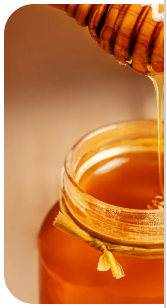
In contrast, children without such familial backgrounds preferred water with a sucrose concentration of 18 percent.

The Ultimate Guide to Kicking Sugar

Part 1
How Sugar Changes Your Brain

Part 2
Stevia: A Popular Sweetener That Lowers Blood Sugar, Fights Diabetes

Part 3
A Natural Sweetener That Could Combat COVID, Diabetes, and Cancer



Part 4
Can Honey F Diabetes?

More from this series

Know Your Sugars: The Key to Overcoming Addiction

Sugar and the brain share an innate strong connection. Unfortunately, modern diets are filled with highly refined sugars that evoke drug-like allure. In fact, the sweetness we consume today differs significantly from what our ancestors once had.

Ms. Russo vividly described the body and brain's conflicting views on sugar with a lively scene, noting that our bodies resist certain sugars while are more receptive to others.

She says, “The brain says, ‘We need sugar; we must have sugar; we can’t survive without it.’ On the other hand, the body disagrees, saying, ‘We don’t like all types of sugar.’”

There is an ancient Chinese saying: “If you know the enemy and know yourself, you need not fear the result of a hundred battles.” To quit sugar, one must first understand sugar. However, the truth is some sugars and sweet substances are natural and even beneficial to the body.

Next: Part 2 - Stevia: A Popular Sweetener That Lowers Blood Sugar, Fights Diabetes

Stevia has recently become one of the most popular natural sugar substitutes. While sugar is known to raise blood sugar levels, stevia has the opposite effect and can actually lower them.

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