

# Researchers examine how the brain and body respond to glucose and fructose

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The research is based on 24 healthy young people who came in for brain scans before breakfast. Credit: Jenn-Vargas

When it comes to sweeteners, one indulgence makes our brains predisposed to do it, according to a new study by researchers at Keck

Medicine of USC.

In a paper published in the *Proceedings of the National Academy of Sciences* early edition, Kathleen Page, assistant professor of medicine at the Keck School of Medicine of USC, details the results of a study that sought to better understand how sugar affects brain-reward pathways and the motivation to eat.

"The American diet is loaded with sugar," Page said.

## Glucose vs. fructose

In this study, researchers focused on how the brain and body respond to two types of sugar—[glucose](#) and fructose.

Glucose, which is found in nearly all carbohydrate-containing foods, such as bread and fruit, fuels all of the cells in the human body, including the brain.

Fructose is a simple sugar found in fruits and vegetables that is mainly metabolized in the liver. Foods with high levels of fructose include most soft drinks, honey and many salad dressings. Although tasty, foods with lots of fructose are often unhealthy.

"Fructose fails to stimulate hormones, like insulin, that are important in helping us feel full," Page noted.

When [study participants](#) consumed fructose compared to glucose, it led to greater activity in brain reward areas, greater ratings of hunger and more desire for food. This tendency played out the same even when participants were offered a monetary incentive not to indulge their sweet tooth.

"We gave the volunteers choices between being served tasty food immediately after the study or having money sent to them one month later," Page explained. "When the study participants consumed fructose, they had a greater willingness to give up the money to obtain immediate high-calorie foods, compared to when they consumed glucose."

## Healthy bodies

The research is based on 24 healthy young men and women who came in for [brain scans](#) in the mid-morning before they ate breakfast. On one occasion, they consumed a drink sweetened with fructose; on another day, they consumed a drink sweetened with glucose.

Researchers sampled blood for hormones that help control appetite and performed brain scans while the volunteers looked at pictures of tasty foods (like pizza) or objects (like a lamp) and rated their hunger and desire for food.

"This allowed us to see how consuming fructose compared to how glucose affected brain, hormone and hunger responses," Page explained.

The results suggest that consuming fructose relative to glucose activates [brain](#) reward regions and may promote feeding behavior.

So what should people do first if they want to reduce their fructose intake as part of controlling their diet and living a healthier life?

"The best way to reduce fructose intake is to decrease the consumption of added sugar sweeteners, which are the main source of [fructose](#) in the American diet," Page said.

**More information:** "Differential effects of fructose versus glucose on brain and appetitive responses to food cues and decisions for food

rewards." *PNAS* 2015 ; published ahead of print May 4, 2015, [DOI: 10.1073/pnas.1503358112](https://doi.org/10.1073/pnas.1503358112)

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