Study suggests effect of fructose on brain may promote overeating

Yale UniversityYale University

The brain processes fructose and glucose, the two forms of simple sugars, differently — impacting appetite, feelings of satisfaction, fullness, and potential weight gain, according to a study by Yale School of Medicine researchers published in the Journal of the American Medical Association.

Glucose, but not fructose, suppresses brain activity in regions that promote the desire to eat, whereas fructose feeding may promote overeating through its inability to effectively suppress food-seeking behavior, the scientists found.

Glucose and fructose are found in many fruits and vegetables, and they combine in table sugar. Fructose, however, is also found in another common sweetener, high-fructose corn syrup, which can be found in certain soft drinks and processed foods. Fructose consumption has increased over the past few decades, as have rates of obesity.

The researchers, led by corresponding author Dr. Robert Sherwin, professor and section chief of endocrinology at Yale School of Medicine, conducted functional magnetic resonance imaging studies of healthy non-obese participants' brains to assess relative changes in cerebral blood flow in the brain after glucose or fructose ingestion. They found that ingestion of glucose reduced cerebral blood flow and activity in brain regions that regulate appetite, but fructose did not. Ingestion of glucose also produced increased feelings of satisfaction and fullness, but fructose did not.

The authors write, “Glucose but not fructose ingestion reduced the activation of the hypothalamus, insula, and striatum — brain regions that regulate appetite, motivation, and reward processing; glucose ingestion also increased functional connections between the hypothalamic-striatal network and increased satiety.”

They offer some background in the study, writing, “Increases in fructose consumption have paralleled the increasing prevalence of obesity, and high-fructose diets are thought to promote weight gain and insulin resistance. Fructose ingestion produces smaller increases in circulating satiety hormones compared with glucose ingestion, and central administration of fructose provokes feeding in rodents, whereas centrally administered glucose promotes satiety. Thus, fructose possibly increases food-seeking behavior and increases food intake.”

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