

Fueling The Obesity Epidemic: High-Fructose Corn Syrup

Long-term consumption in lab animals spiked body fat & triglycerides

Fighting weight gain? Check your food and beverage labels. Princeton research showed that **every** lab rat in their study became obese by drinking high-fructose corn syrup (HFCS)—at levels far below those in that soda in your fridge.

Findings from the Princeton University research team—published in the March 18, 2010 issue of *Pharmacology, Biochemistry and Behavior*—directly refuted claims by the Corn Refiners Association and others that HFCS is safe, has many benefits and is no different than sugar. Their research was done with support from the U.S. Public Health Service.

The problem is, HFCS is everywhere, from sweetened drinks to cereal and ketchup. According to the Center for Disease Control and Prevention, Americans consume 60 pounds of HFCS annually.

Since the 1970s, when HFCS was introduced, use and consumption has risen. Perhaps not coincidentally, the level of obesity in the US has risen since then as well—CDC reports that obesity has jumped from 15% back then to 33% today.

“Some people have claimed that high-fructose corn syrup is no different than other sweeteners when it comes to weight gain and obesity, but our results make it clear that this just isn’t true,” said Bart Hoebel, psychology professor, research team participant.

Echoing that, visiting research associate Nicole Avena, who was affiliated with Rockefeller University during the study, said the Princeton team’s findings lend support to the theory that the “excessive consumption of high-fructose corn syrup found in many beverages may be an important factor in the obesity epidemic.”

According to Princeton University’s website, their research “complements previous work led by Hoebel and Avena demonstrating that sucrose can be addictive, having effects on the brain similar to some drugs of abuse.” In future research, their team intends to explore how animals respond to the consumption of HFCS in conjunction with high-fat, fast-food meals, equating to a burger, fries and soda.

The first experiment. A group of male rats consumed water sweetened with HFCS and kept on a standard diet of rat chow. A secondary group was the same diet, but their water was sweetened with table sugar (sucrose). To give HFCS a fighting chance, the amount used was reduced to 50% of that found in your typical soda. The secondary group was given the full amount of sugar in the sucrose solution. Still, the results were decidedly against HFCS and its negative effects on the study subjects.

“When rats are drinking high-fructose corn syrup at levels well below those in soda pop, they’re becoming obese—every single one, across the board. Even when rats are fed a high-fat diet you don’t see this; they don’t all gain extra weight,” said Hoebel.

Long-term study even worse. The research team conducted the first long-term study of the effects of HFCS in lab animals. They monitored weight gain, body fat and triglyceride levels over a six-month period. The rats with HFCS in their diet showed signs of human metabolic syndrome (increased risk of coronary heart disease, type 2 diabetes, plaque buildups in artery walls, etc). According to the American Heart Association, metabolic syndrome is rising, affecting an estimated 50 million Americans.

What is High-Fructose Corn Syrup?

- It’s a compound containing fructose and glucose.
- Made from corn, it contains either 42% or 55% fructose; the remainder is comprised of glucose and higher sugars.
- HFCS found in soft drinks is an estimated 55% fructose/45% glucose.
- HFCS in foods/baked goods is an estimated 42% fructose/58% glucose.
- Double whammy: The glucose ups insulin levels while the fructose increases triglycerides.
- Used as a sweetener, you can find HFCS in many food and beverages, such as sodas, yogurt, spaghetti sauces, breakfast bars, cereal, etc.
- According to the Mayo Clinic, consumption of HFCS can lead to obesity, type 2 diabetes, high blood pressure and coronary artery disease.

Researchers found the rats showed . . .

- Increased abdominal weight gain
- Significant increases in triglycerides
- Augmented fat deposition, including visceral fat around the belly, which has been linked to cardiovascular disease, diabetes and many other negative health issues.



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Here's the kicker. Animals with access to HFCS gained a whopping 48% more weight than those animals on a normal diet.

"These rats aren't just getting fat; they're demonstrating characteristics of obesity, including substantial increases in abdominal fat and circulating triglycerides," said Miriam Bocarsly, Princeton graduate student, research team participant. "In humans, these same characteristics are known risk factors for high blood pressure, coronary artery disease, cancer and diabetes."

Duke University study says HFCS can produce liver scarring. Researchers from Duke University Medical Center are linking the consumption of HFCS to scarring in the liver. The team of eight evaluated 427 adults with non-alcoholic liver disease (NALD) by collecting dietary questionnaires within three months of the participant's liver biopsies to calculate HFC consumption.

Just over half (52%) of the participants consumed 1-6 servings of HFCS each week and 29% consumed beverages containing HFCS on a daily basis. According to researchers, the fructose consumption increase correlated to increased liver fibrosis.

"We have identified an environmental risk factor that may contribute to the metabolic syndrome of insulin resistances and the complications of the metabolic syndrome, including liver injury," said Manal Abdelmalek, MD, MPH, associate professor of medicine in the Division of Gastroenterology/Hepatology at Duke University Medical Center.

A prevalent health issue. According to Abdelmalek, NALD is present in about 30% of Americans today. Back in 2008, Abdelmalek conducted a small study demonstrating that consumption of HFCS is associated with NALD and even more dangerous than previously shown. What can you do about it?

"Our findings suggest that we may need to go back to healthier diets that are more holistic," Abdelmalek said. "High-fructose corn syrup, which is predominately in soft-drinks and processed foods, may not be as benign as we previously thought. There is an increasing amount of data that suggests high-fructose corn syrup is fueling the fire of the obesity epidemic."

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