OPTIMAL HEALTH UNIVERSITY™

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High Fructose Corn Syrup: Harmful or Not?

High fructose corn syrup (HFCS) is a hidden source of sugar in a plethora of foods. Opponents of HFCS uphold that ubiquitous use of the product is to blame for the rocketing rates of diabetes and obesity. European countries have even banned widespread production of HFCS due to health concerns.

But HFCS is big business in other countries, including the US and Canada. When consumers began questioning the use of this product, manufacturers became up in arms. One response is an aggressive marketing campaign launched by the Corn Refiners Association, which centers on television commercials positioning HFCS as a "natural" product that is healthy in moderation.

HFCS opponents argue that because HFCS is "hidden" in so many foods, many of which are marketed to children, it is difficult to limit its intake. What's more, they maintain that HFCS is not "natural," but instead a science experiment gone awry: one with deadly consequences.

Your doctor at Spinal and Sports Care Clinic wants patients to be aware of research about the health effects of HFCS.

Money Over Health?

The beverage industry uses the most HFCS, followed by the manufacturers of processed food, cereal and bakery products. Even the dairy industry uses the sweetener (*J Am Diet Assoc* 2002;102:351).

HFCS's rise in popularity has more to do with economics than taste. First of all, it's cheaper to convert cornstarch into HFCS than it is to use cane or beet sugar. Second, it's easier to transport. And third, it has a longer shelf life (*J Am Diet* Assoc 2002;102:351).

If HFCS was taken off the market in the US, it would throw the soft-drink industry into a tailspin, along with virtually every other food manufacturer.

Is it "Natural"?

Chiropractors, like your doctor at Spinal and Sports Care Clinic, are concerned about the indiscriminate use of the term "natural."

The HFCS marketing campaigns focus on promoting the product as "natural" because it is derived from corn.

However, HFCS is synthesized by scientific technology called enzymatic processing. The product made its debut in the late 1960s when scientists developed a process that transformed dextrose (glucose) from corn meal into a mixture of fructose and glucose. This process is not natural, rather it is one developed in the laboratory that involves multiple chemical processes.

The Food and Drug administration does not regulate the use of the term "natural," so products labeled as such may still contain HFCS.

Does the Body Process HFCS Differently?

A major component to the controversy is that researchers disagree on whether or not the body processes HFCS in a significantly different way than it processes table sugar or sugars in fruits and vegetables.

Complex sugars and carbohydrates are broken down in the digestive tract, transported to the liver and released into the bloodstream as glucose. In order for the body to convert glucose into energy, the pancreas needs to produce a corresponding amount of insulin. When the production of insulin consistently falls behind the ingestion of glucose, diabetes ensues.

Those who are skeptical of HFCS argue that fructose and HFCS, on the other hand, are predominantly metabolized in the liver. Unlike glucose, they do not require insulin to be used by the body.

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This alternate route — straight to the liver — discourages fat cells' production of leptin, the chemical substance that lets your brain know you're full.

Because fructose does not stimulate insulin secretion or enhance leptin production — both of which help regulate food intake and body weight — "this suggests that dietary fructose may contribute to increased energy intake and weight gain." (*Am J Clin Nutr* 2004;79:537-43.)

Other research indicates that the liver plays a key role in managing obesity. When the scientists fed a starch- and sugar-rich diet to mice lacking a specific gene called SCD-1 in the liver, the extra carbohydrates were broken down rather than being converted into fat and stored — keeping the mice skinny. Meanwhile, control mice with normal gene activity grew plump on the same food.

"It looks like the SCD gene in the liver is responsible for causing weight gain in response to a high-carbohydrate diet, because when we take away the gene's activity the animals no longer gain the weight," says study author James Ntambi. "These findings are telling us that the liver is a key tissue in mediating weight gain induced by excess carbohydrates." (*Cell Met* 2007;6:484-96.)

Does the Brain Process HFCS Differently?

Critics of HFCS are also concerned that the brain may process it differently than other sugars, in a way that triggers overeating and obesity.

For a recent study, scientists genetically altered mice to make them "sweet-blind," lacking a key component of taste receptor cells that enabled them to detect the sweet taste (*Neuron* 2008;57:930-41).

The researchers next performed behavioral tests in which they compared normal and sweet-blind mice in their preference for sugar solutions and those containing the noncaloric sweetener sucralose. In those tests, the sweet-blind mice showed a preference for calorie-containing sugar water that did not depend on their ability to taste, but on the calorie content.

In analyzing the brains of the sweet-blind mice, the researchers showed that the animals' reward circuitry was switched on by caloric intake, independent of the animals' ability to taste. Those analyses showed that levels of the brain chemical dopamine, known to be central to activating the reward circuitry, increased with caloric intake. Also, electrophysiological studies showed that neurons in the food-reward region, called the nucleus accumbens, were activated by caloric intake, independent of taste.

Bottom line: When the rats ate sugar, their brains registered the "reward" and told their bodies they were full. But this communication between brain and body did not function properly with the chemically altered sucralose, and wouldn't with HFCS either, argue the researchers.

The study's authors write: "For example, high-fructose corn syrup is a ubiquitous sweetener in American society, and evidence suggests that fructose is not as effective as sucrose in terminating a meal. It may be that fructose produces stronger activation of the reward system and that removing high-fructose corn syrup as a sweetener will curb some desire for these products. Regardless, the present study alone will further galvanize the scientific community to understand how higher cognitive centers in the brain control food intake and body weight regulation."

Diabetes Link

Excessive fructose consumption has been shown to induce insulin resistance and impaired glucose tolerance in animal models: both of which are linked to type 2 diabetes (*Am J Clin Nutr* 2002;76:911-22).

Obesity Link

What would happen if someone drank four, 10-ounce glasses of a HFCS-sweetened soft drink for three weeks? That's exactly what researchers hoped to determine when they asked 21 men and nine women to do just that.

Not surprisingly, both the male and female volunteers showed a significant increase in their caloric intake and body weight (*Am J Clin Nutr* 1990;51:963-9).

Added Source of Sugar

Even if researchers determine that HFCS is no more harmful to the body than table sugar, the fact remains that it is a significant source of "hidden" sugar in a vast array of foods. As a result, it's likely that allowing HFCS in our foods increases overall sugar consumption. And there is no argument that a high-sugar diet is associated with obesity, diabetes and other chronic diseases.

There are currently no guidelines as to how much sugar — including HFCS — is too much of a sweet thing. The National Academy of Sciences' Institute of Medicine has found, however, that diets with more than 25 percent of caloric intake from added sugars (excluding those in fruits and vegetables) are associated with significantly depressed levels of the following essential nutrients: calcium, magnesium and zinc.

Learn More

If you or someone in your family has a weight issue, talk with the doctor about a temporary and supervised ban on HFCS. Based on the results, you can judge for yourself whether HFCS is guilty or innocent.