

High Fructose Corn Syrup Hiding in Popular American Foods and Drinks

Caitlin Schober
Beloit College, Beloit, WI

Abstract

High fructose corn syrup (HFCS) is a processed form of sugar that is commonly used to sweeten a food product at less cost. HFCS can be found as a major ingredient in sweetened beverages such as Gatorade and Propel, and can also be found in food products such as fruit snacks and cereals. My hypothesis is that the amount of HFCS in one bottle of Gatorade can increase a person's blood sugar levels enough to turn on insulin secretion and increase the chance for obesity and diabetes. Information and citations from peer-reviewed articles are presented. It has been shown that high levels of HFCS can lead to higher risks of obesity because of the rate at which this sugar absorbs into the bloodstream, and the body's weak resistance in controlling the amount absorbed. The concentration of sugar in HFCS and the rate of consumption has climbed in correlation with the rates of obesity and diabetes. It remains undecided whether consumption of HFCS causes or just correlates with obesity and diabetes.

Introduction

It is statistically and visually obvious that the United States of America is becoming unhealthier and is developing an increasing rate of obesity and diabetes. This is related to the food industry using cheaper ingredients in their products that have a negative impact on human bodies. One main ingredient in food that stands out on the labels is high fructose corn syrup. HFCS is highly processed corn syrup with raised fructose levels mixed with pure corn syrup which is glucose.

Most brands of sports drink such as Gatorade have a high concentration of HFCS, which is really a concentrated mixture of fructose and glucose (see Table 1). Some of these brands are starting to offer variations of their drink that contain no HFCS. PowerAde now offers PowerAde Zero that contains no sugar and zero calories.

Besides providing Calories, the effects of HFCS on the body are not beneficial to health and increase chances for diseases. I hypothesize that the amount of HFCS in one bottle of Gatorade can increase a person's blood sugar levels enough to turn on insulin production and increase chances for obesity and/or diabetes.

Method

A majority of the information and research on HFCS, including the graphs, was taken from articles on the web. Information posted on the web is not always reliable and recent, so I was very careful in choosing which websites would give me accurate information. I looked at the publishers or sponsors of the websites to determine whether the information given was tainted by food industries' efforts to sell their products and try to prove they are "natural" or "organic". I used websites and articles that were peer-reviewed. I also used books with peer-reviewed citations such as The China Study and The Culprit and The Cure.

Results

Table 1: Examples of HFCS product nutritional information (6)

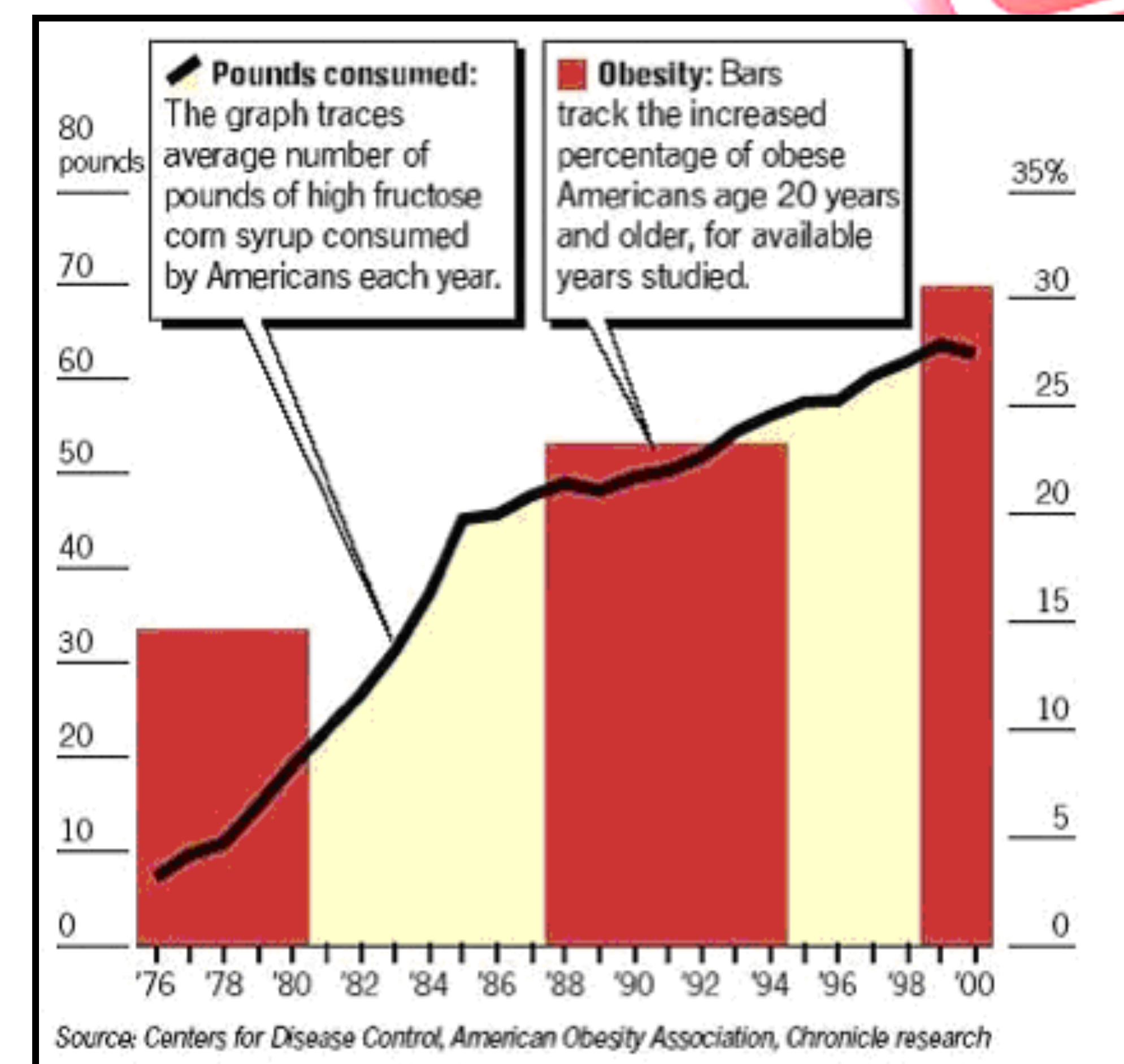
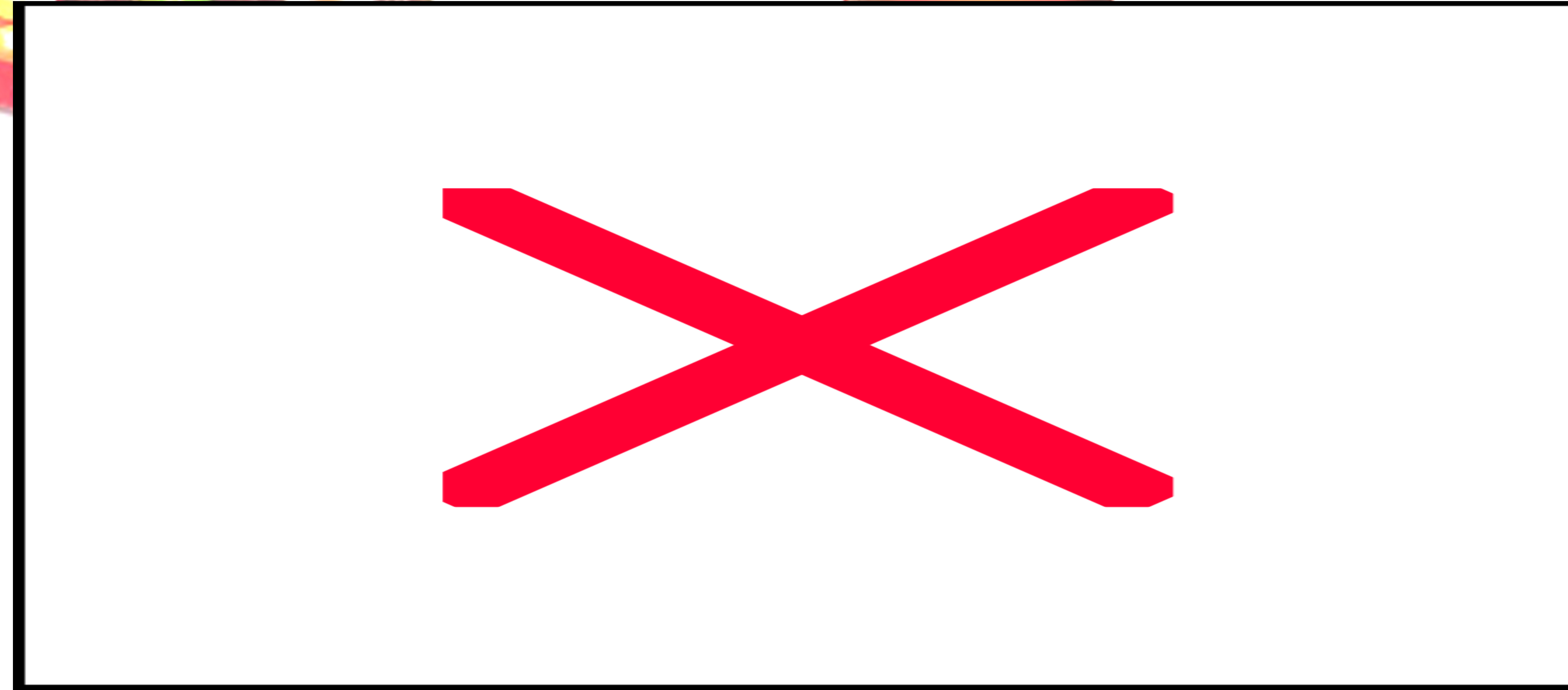
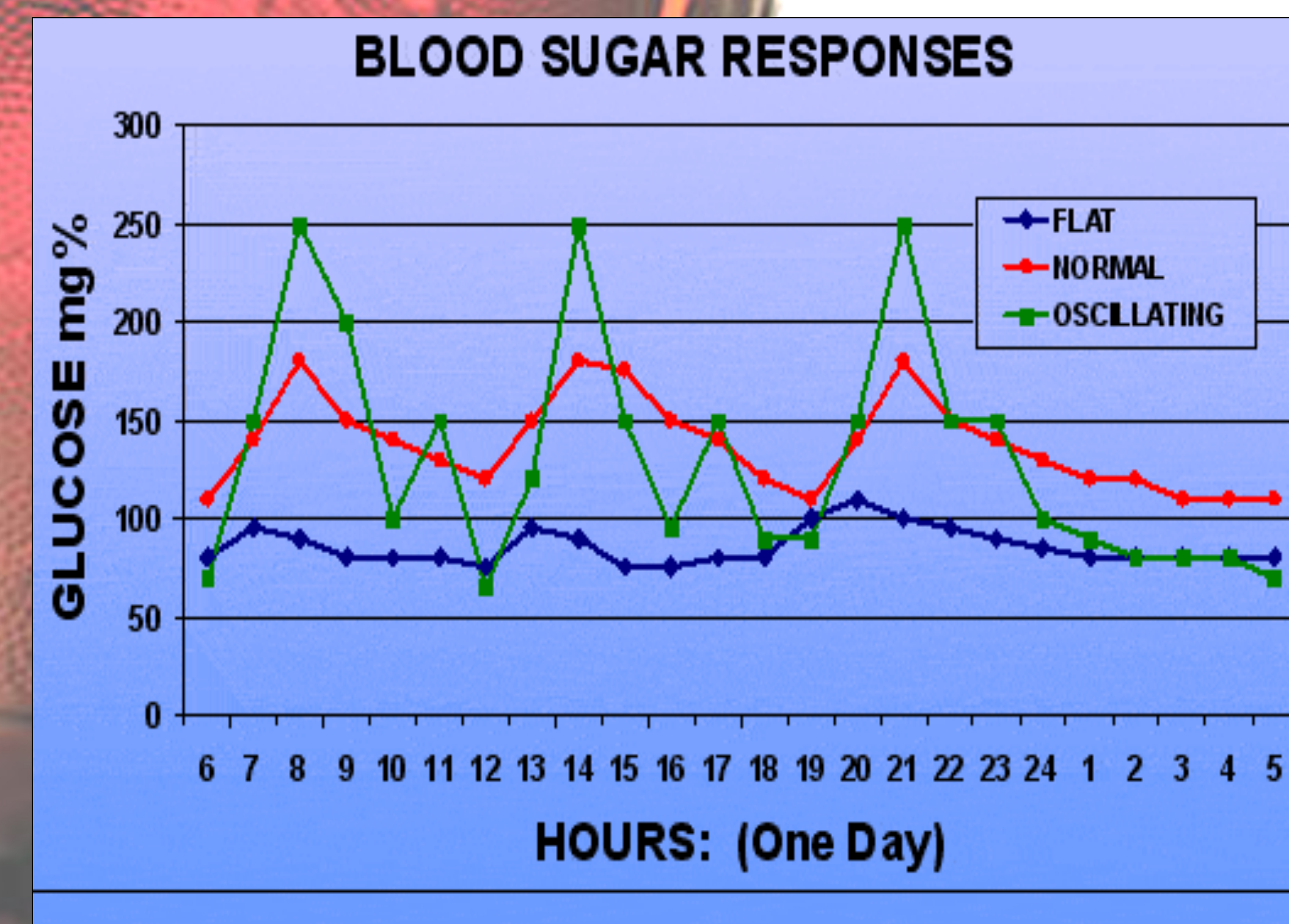


Figure 1: Obesity and High Fructose Corn Syrup (8)

This figure shows the correspondence between the increasing consumption of HFCS and the rising obesity rate throughout the years 1976-2000. The black line uses the left values of number of pounds consumed. The red bars use the right values of the percentage of obese Americans.

Figure 2: Blood Sugar Responses(6)

Figure 2 shows a graph of three typical sugar responses, flat, normal, and oscillating. Eating foods that have a lot of HFCS will affect the blood sugar response in a way that will look much more like the oscillating graph. HFCS absorbs rapidly into the bloodstream and can spike the blood sugar quickly to turn on insulin. Healthy glucose levels range from 80-120 mg%.



Results

Because there are such high doses of HFCS in commonly consumed foods, all of the sugar cannot be oxidized and instead, insulin is released causing cells to absorb sugar that is stored as glycogen in fat tissue. The insulin blocks the usage of energy from the fat cells, and thus the fat cells accumulate until the person starts to become obese and/or develop Type II diabetes mellitus, not having the ability to respond properly with insulin, causing that person to become hyperglycemic. This can be caused by an inability to produce insulin, or an inability of cells to respond to the insulin that is produced. It remains unclear whether the increase in HFCS consumption is a direct cause of the obesity epidemic as suggested by Bray et al (3), or simply another factor because of the over consumption of calorically sweetened beverages (2). Thus, the increase in consumption of HFCS has a temporal relation to the epidemic of obesity, and the over consumption of HFCS in calorically sweetened beverages may play a role in the epidemic of obesity(2).

Discussion

It is obvious in Table 1 that popular American foods contain a significant amount of HFCS. Graph 1 shows that increased amounts of HFCS correlate with increased rates of obesity. In other areas of my research on health, I studied the correlations between the rising obesity and diabetes rates in America. I cannot help but think that these three subjects all contribute to each other.

Gatorade is now trying to inconspicuously hide the presence of HFCS in their drink by naming it "fructose-glucose syrup" or "high fructose corn syrup (fructose-glucose syrup)"⁴. Gatorade's competitor, PowerAde, also uses great amounts of HFCS in its drink, but now has presented PowerAde Zero, a variation of PowerAde with no HFCS. PowerAde Zero uses the two artificial sweeteners acesulfame potassium and sucralose. Acesulfame potassium is a zero calorie artificial sweetener that is 180-200x sweeter than sucrose (table sugar), as sweet as aspartame, and half as sweet as saccharin. Sucralose is a low-calorie artificial sweetener (known as Splenda) and is 600x sweeter than sucrose, 2x sweeter than saccharin, and 4x sweeter than aspartame⁹.

Our bodies need carbohydrates such as glucose for cellular respiration, which then create CO₂, H₂O, and ATP (our source for energy). When a person's body is running low on glucose to fuel cellular respiration, it becomes hypoglycemic, and needs to consume more sugar to raise the blood glucose level. This can happen if someone has been fasting or if s/he has been working out at a high intensity without replenishing blood sugar levels. The opposite of this can happen if someone consumes a great amount of glucose and does not burn the energy created. The blood sugar level then increases and this person becomes hyperglycemic, and this triggers insulin. The extra sugar is stored as glycogen then in muscle and fat cells⁹.

Now using all of this information, if someone were to eat a breakfast of two pop-tarts, a Yoplait Yogurt, and a Gatorade, they would be consuming over 50% of their RDA of carbohydrates. Eating all of this at once would spike their blood glucose levels, and if they were not beginning a long work-out, would trigger insulin. The insulin would then cause the body's cells to take up the glucose and would then store it as glycogen in the fat tissues.

- Aldana, Steven. The Culprit and the Cure : Why Lifestyle Is the Culprit Behind America's Poor Health and How Transforming that Lifestyle Can Be the Cure. New York: Wiley-Interscience, 2005.
- Anderson Harvey. (2007) "Much ado about high-fructose corn syrup in beverages: the meat of the matter." American Journal of Clinical Nutrition 86:1577-578.
- Bray, George A., Samara J. Nielson, and Barry M. Popkin. (2004) "Consumption of high-fructose corn syrup in beverages may play a role in the epidemic of obesity." American Journal of Clinical Nutrition 79: 537-43.
- Campbell, T. Colin, and Thomas M. Campbell. The China Study : The Most Comprehensive Study of Nutrition Ever Conducted and the Startling Implications for Diet, Weight Loss and Long-Term Health. New York: BenBella Books, 2005.
- "Gatorade Endurance Formula." Gatorade. http://gatorade.com/science_and_innovation/product_innovations/performance_series/endurance_formula/, accessed November, 2008.
- "Gatorade Energy Drink." Diet Facts: Look Before You Eat. <http://www.dietfacts.com/html/nutrition.html#gatorade-energy-drink-12-ounce-bottle-grape-or-wild-berry-flavored-11107.htm>, accessed November, 2008.
- "Low Blood Sugar." OptBio. <http://www.optbio.co.za/lowbloodsugar.html>. Figure 2, accessed November, 2008.
- Sisson, Mark. "Nutrition Facts." Nutrition Data: Know What You Eat. <http://www.nutritiondata.com/foods-0.html>, accessed November, 2008.
- "8 'Health Foods' That Contain High Fructose Corn Syrup!" Mark Daily Apple. <http://www.marksdailyapple.com/sneaky-syrup/>. Information Source for Graph: Centers For Disease Control, American Obesity Association, Chronicle Research, Figure 1, accessed November, 2008.
- Sizer, Frances S., and Eleanor Noss Whitney. Nutrition : Concepts and Controversies. Belmont: Wadsworth, 1999.
- Wikipedia: The Free Encyclopedia. <http://www.wikipedia.org/>, accessed November, 2008.