Editor, SparkPeople.com
support@sparkpeople.com
RE: "Diet danger: High fructose corn syrup. The effects of corn syrup aren't so sweet."

To the Editor:

I am writing in response to an article authored by Becky Hand appearing on the SparkPeople.com website entitled, "Diet danger: High fructose corn syrup. The effects of corn syrup aren't so sweet."
[URL: http://www.sparkpeople.com/resource/Nutrition_articles.asp?id=486&page=2]

I am responding to the article as a biochemist with more than 25 years experience in the production, composition, functionality, consumption and metabolism of nutritive sweeteners, including sucrose (table sugar), glucose, fructose and high fructose corn syrup (HFCS).

I recognize that the article was written some time ago (September, 2005). However, since the article is accessible on your website and via Internet search engines, it is important that it be factual and current. I draw your attention to the following specific points that require updating:

"Trying to save money, food companies introduced [HFCS] into the food market in the 1970s. Sweetening manufactured foods this way is profitable, because it is less expensive and much sweeter than sugar, yet easy to transport because of its liquid state."

While cost savings was a key reason for switching to HFCS, there were 4 other important reasons (1):

- Stability in acidic products vs. sucrose, principally carbonated soft drinks;
- Ease of handling vs. sucrose: readily pumped from delivery vehicle to storage tank to mixing vessel, and easily diluted to desired solids with measurable savings in manpower and energy;
- Stable supply vs. sugar: political and meteorological instability in cane-growing geographic regions led to periodic and significant price spikes and supply disruptions.
- HFCS-55 and sucrose have the same sweetness intensity (2). It is incorrect to state that HFCS is "much sweeter [than sucrose]":

"The interesting fact about fructose is that it is metabolized in a totally different way than other carbohydrates. It does not stimulate or require insulin for transportation to the cells. Since there is no need for insulin release, there is also no secretion of leptin. Therefore the feeling of satiety is altered – you continue to eat and possible [sic] overeat."

- Actually, fructose does cause a modest insulin release which will presumably stimulate modest leptin production.
- Nevertheless, this is a moot point since we do not eat a diet rich in fructose and devoid of glucose. Our diet is comprised of both fructose and glucose at a ratio of 0.7-0.8 (3), which would stimulate both serum insulin and leptin release. A recent paper by Melanson reported no difference in leptin production in subjects receiving HFCS-55 vs. sucrose-sweetened soft drinks (4).

"A few studies have demonstrated that participants who consumed soda sweetened with HFCS did not reduce their total caloric intake to compensate for excess calories consumed as HFCS.… The data suggests that HFCS does not provide the body with a sense of fullness. This may cause an increase in excess calorie intake, leading to weight gain."

- Ms. Hand relies on oft-cited research conducted at very high fructose levels in the absence of glucose, purporting to show lack of compensation for liquid fructose calories at subsequent meals. The tide is beginning to turn in this area, however, with 2003 research by Almiron-Roig & Drewnowski (5) gaining increasing credibility with substantiation from a just-published follow-up study by Monsivais et al. (6). Both conclude there is no difference in satiety or feelings of fullness between beverages sweetened with HFCS-55 vs. sucrose.

"A recent study conducted by the University of Cincinnati [Jurgens et al, (7)] provided additional information. Mice freely consumed water, fructose-sweetened water, or soft drinks. The researchers found increased body fat in the mice that drank the fructose-sweetened water and soft drinks – even though these animals decreased the amount of calories they ate from solid foods."

- These researchers make the same error many experimentalists have made: they confuse pure fructose with HFCS. HFCS used in U.S. caloric soft drinks is either 55% or 42% fructose – not the 100% fructose that was used in this study. HFCS also importantly contains glucose in about the same proportions as in both the sucrose-sweetened soft drink in Jurgen's study and in table sugar. By contrast, the pure fructose used in the study contained no glucose.
- The absence of glucose makes pure fructose fundamentally different from HFCS. This is because glucose has been shown to have a tempering effect on adiposity (gain in fat). Once the combination of glucose and fructose found in HFCS and sucrose are absorbed into the blood stream – and regardless of whether they come from soft drinks sweetened with HFCS or with sucrose – they are indistinguishable from each other. They are metabolized according to pathways designed to utilize them effectively and efficiently.
- And finally, this study is at odds with a just-published University of Barcelona study, which showed excellent compensation between liquid and solid calories in rats. Rats given a liquid supplement of fructose or glucose (both about 20% of calories) showed no weight gain over the course of the experiment and actually reduced the amount of solid food consumed in comparison with the water-only rats (8).

"Take inventory of your refrigerator, freezer, and pantry. Start reading the fool [sic] labels. If HFCS is one of the main ingredients…, scratch it off your grocery list – permanently. Try to limit foods that have "sugar" as one of the first ingredients."

This advice is both unnecessary and inconsistent.

- Neither HFCS nor fructose has been shown to uniquely affect obesity;
- And simply replacing HFCS with sucrose (sugar) would result in a metabolic wash: no change in calories or metabolism.

Thank you for the opportunity to comment on the article by Becky Hand. I look forward to reading an updated article on SparkPeople.com in the near future.

With best regards,

John S. White, Ph.D.
President, White Technical Research
8895 Hickory Hills Drive, Argenta, IL
217-795-4437 white.tech.res@gmail.com

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