

“Sugar or Sweetener? Sucrose has its Problems, But so do Artificial Substitutes,” by Brian C. Howard, *The Environmental Magazine*, March 1, 2006.

The article appearing in *The Environmental Magazine* (March 1, 2006) entitled, “Sugar Or Sweetener? Sucrose Has Its Problems, But So Do Artificial Substitutes,” by Brian C. Howard is to be complemented for identifying excess calorie intake relative to caloric expenditure (exercise) as a dominant contributor to the current obesity. Readers should be aware, however, that Howard’s article promotes several misunderstandings about sweeteners that warrant correction:

- High fructose corn syrup (HFCS) is a highly functional food ingredient. Much of this functionality is derived from unique properties inherent in the fructose molecule: it possesses a pleasing sweetness; it enhances food flavors; it retains product freshness and extends shelf-life without the use of traditional additives; it makes possible the new “soft/moist” cookie and bar food category that did not previously exist; it promotes pleasing surface browning and aromas characteristic of baked goods and cooked meats; it stabilizes sweetness and flavor in acidic products; it controls freezing point in ice creams, creates “pourable” juices straight from the freezer and reduces fruit tissue damage in frozen fruits; and it readily ferments in yeast-raised baked goods and cultured dairy products.

Thus, HFCS is ubiquitous in food products not because of some sinister plot to fatten the world, but because its functional properties perform well in specific food applications.

- While it is generally true that all nutritive sweeteners are cariogenic to one degree or another, fructose is proven to be less cariogenic than sucrose or glucose.
- Howard’s statement about HFCS being made from genetically engineered corn is misleading. An estimated 52% of *all* corn grown in the US has been genetically modified in some way. And not for some insidious reason, as implied by Howard, but to reduce our use of pesticides and herbicides, improve agricultural yields and subsequent processing, and maintain low food prices — all admirable goals, even Mr. Howard should agree.
- Howard and others (notably Bray, 2004) wrongly claim that HFCS has greater sweetness than sucrose, due to confusion between crystalline and aqueous sweetness measurements. In fact, expert sweetness panels have established that HFCS and sucrose have the same sweetness at room temperature and 10% dry solids (Hanover & White, 1993).

- Howard confuses HFCS with regular corn syrup (all glucose or glucose polymers). In fact, there continues to be less HFCS than sucrose available annually for use in foods and beverages (ERS/USDA, 2006).
- And finally, Peter Havel of U.C. Davis is quoted in Howard's article as an authority on fructose and high fructose corn syrup. In fact, Havel has not studied HFCS, but rather extrapolated data gathered under highly artificial and prejudicial conditions in drawing conclusions about fructose and HFCS.

According to Havel's own estimate (2005), Americans consume on average 12% of daily calories as fructose, generally in the presence of glucose in some form (cereal grains, starch, maltodextrin, glucose-based corn syrup, sucrose, honey, fruit/fruit juice, etc.). Rare and extreme consumers of sugars might receive up to 20% of calories from fructose, but again predominantly in the presence of glucose-containing carbohydrates (Park & Yetley, 1993).

It is important to recognize (1) that fructose fed to healthy subjects at 12% of calories (typical of the overwhelming majority of Americans) has little untoward metabolic effect (Hallfrisch, 1983; Osei, 1987; Thorburn, 1989); and (2) that glucose is so ubiquitous in the human diet that fructose fed to test subjects *at any level* in the absence of some form of glucose represents a diet consumed by no population on Earth – it is a highly contrived diet and one that quite predictably produces exaggerated metabolic consequences. Studies in which fructose is fed to subjects *with* glucose at typically consumed levels commonly produces little metabolic effect, even in persons with triglyceride and insulin abnormalities (Turner, 1979; Koivisto, 1993). Why? Because glucose metabolized simultaneously with fructose appears to have a tempering or leveling effect on overall metabolism.

Havel's statement regarding fructose and HFCS effects on insulin, leptin, ghrelin and weight gain is clearly unacceptable, based as it is on inappropriate extrapolation from unnatural and contrived diets that obviously misrepresent those of virtually all human populations.

Howard's article, while appearing to alert Americans to a serious health threat, has purposefully cast sweeteners in the unwarranted role of unique contributors to obesity. This is a popular and trendy position, but it is simply not backed by careful and rational science. Obesity is caused by a host of environmental, psychological and physiological factors. All macronutrient food ingredients — fats, protein and

carbohydrates — will contribute to weight gain when consumed to excess. Better advice from Mr. Howard would have been to caution Americans to watch their entire diet and to get more exercise.

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