

Fructose: The Science of Slow

Key Points:

- Fructose is difficult to absorb and may lead to gas, bloating, and diarrhea
- Fructose raises blood sugar very slowly
- Fructose uses precious energy when metabolized, taxes the body of vitamins and minerals, and raises triglycerides, a form of fat in the blood

Fructose

Glucose and fructose share the same molecular formula: $C_6H_{12}O_6$; carbon, hydrogen and oxygen, but are arranged differently resulting in stark differences in their metabolism. Seemingly not a big deal, the arrangement of atoms in similar molecules makes a huge difference in how it is used. Glucose is the only immediate source of energy for working cells; it is metabolized in every cell of the body while fructose must be metabolized by the liver, prior to providing energy for working cells.¹ Fructose also robs energy stores in the liver during its metabolism.

Fructose is converted into fatty acids by the liver more quickly than other sugars, including glucose.² Unlike glucose, which is readily absorbed, fructose is slower to leave the GI tract, thereby slowing the availability of energy supply.³ In addition, roughly 37% of people are unable to fully absorb fructose when supplied in a solution, and some people can only absorb less than 15 grams of fructose at a given time.⁴ Gas and diarrhea are common occurrences due to malabsorption. Fructose can also slow digestion in general, leaving an athlete thirsty and running low on fuels. A common misconception regarding the preference of fructose during exercise is that fructose will not stimulate insulin release and consequently inhibit the use of fats for fuel in exercise. This is unfounded, as secretion of insulin does not occur during exercise.⁵

Furthermore, fructose taxes the body of its vitamins, minerals and enzymes during assimilation, as it contains none of these nutrients that are necessary for metabolism.⁶ Fructose is converted into fats more readily than other simple carbohydrates and raises triglycerides (a type of fat in the blood that causes negative health consequences).⁷ In people who tend to have more acidity in their body (diabetics, high stress, and high protein turnover [athletes]), fructose can lead to increases in blood lactic acid levels. And, in order for fructose to completely metabolize, it actually robs the liver of stored ATP energy.⁸

The food industry uses fructose, commonly in its processed form, high fructose corn syrup (HFCS) as an ingredient in many processed foods because it is the least expensive of the sweetening agents made today and because of its high solubility (ease with which it mixes in foods) and long shelf life. HFCS is found in many foods, from sauces, bread, bacon, and beer to many so-called "health foods" like sodas, sports beverages and energy bars.

While consumption of small amounts of fructose naturally found in fruits is completely acceptable, the side effects of fructose, especially in its processed form of high fructose corn syrup, are reason enough for anyone to avoid it as much as possible.

¹ Elliott S, Keim N, Stern J, Teff K, and Havel P. Fructose, weight gain, and the insulin resistance syndrome. *American Journal of Clinical Nutrition*, November 2002 Vol. 76, No. 5, 911-922.

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Gleukos Key Points:

Gleukos is based simply on glucose, the fastest way to deliver energy to your muscles. It does not contain any fructose, or high fructose corn syrup, and therefore will not create adverse side effects such as gas, diarrhea and cramping.