

## Position Paper on Fructose

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Fructose (“fruit sugar”) is an all-natural compound found in many fruits and vegetables. Although fructose is sweeter than glucose or sucrose, its glycemic index (GI)—the extent to which it affects an individual’s blood glucose levels immediately after ingestion—is much lower than that of glucose or sucrose. In fact, fructose is known to have the lowest GI of any of the simple sugars.<sup>1</sup> Because pure, crystalline fructose results in lower blood glucose levels after ingestion, it has long been considered the preferred sweetener for individuals with diabetes and other insulin-related problems.<sup>2,3</sup>

### Fructose as Part of a Healthy Diet

When consumed as part of a low-GI diet, no adverse effects have been associated with modest fructose intake. Quite the contrary, research demonstrates that moderate levels of fructose—when substituted for sucrose and glucose in a low-GI diet—can improve insulin sensitivity and glycemic control in both healthy and diabetic individuals.<sup>4-11</sup>

Because fructose is sweeter than glucose or sucrose, less fructose—and therefore fewer calories—are required for the same sweetness effect.

When analyzing the effects of fructose intake, factors such as dietary composition (including total glycemic load), nutritional status, and genetic uniqueness must be considered before reaching concrete conclusions on the metabolic effects of fructose. The recent widespread use of high fructose corn syrup (HFCS)—as opposed to crystalline fructose—in many common food products has led to confusion regarding the potentially adverse physiological effects of fructose ingestion. Because the differences between HFCS and crystalline fructose are often undisclosed, many of the negative findings related to elevated HFCS consumption are mistakenly associated with crystalline fructose.

### Crystalline Fructose versus HFCS

Before conclusions regarding the safety of fructose consumption can be made, two significant distinctions between crystalline fructose and HFCS must be noted.

1. HFCS is manufactured from cornstarch after the removal of protein and fiber. The cornstarch is hydrolyzed to form dextrose, which then undergoes an isomerization process to yield different forms of HFCS that vary depending on the final fructose content. HFCS therefore contains other components in addition to fructose, the majority of which is glucose with minor contributions of other substances including maltose, maltotriose, and polydextrose. In contrast, crystalline fructose is purified and does not contain appreciable amounts of other components.
2. An excessive intake of HFCS is easily achieved and is relatively common today due to the high per-serving content of HFCS in many popular food items.

Research has shown a direct correlation between high levels of dietary HFCS and the prevalence of metabolic changes. Crystalline fructose, on the other hand, is usually found in or added to certain foods in much lower levels.

**CONCLUSION:** Due to the varying structural features and average intake levels of HFCS and crystalline fructose, the physiological results of HFCS consumption differ from those of crystalline fructose consumption. For example, when patients with type 2 diabetes were given equicaloric amounts of HFCS or fructose, blood glucose and insulin levels were significantly increased with the HFCS over the fructose.<sup>12,13</sup> Therefore, it is important to identify studies using non-HFCS sources of fructose to accurately assess the effects of fructose in humans.

Since many factors can influence blood glucose and insulin responses, the best course of action for individuals that are sensitive to sugars is to choose products—such as pure, crystalline fructose—that have been tested and shown to have a low GI response when consumed in moderation.<sup>1</sup>

## References

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