

# Fructose vs. Glucose



Diffen > Health

While **fructose** and **glucose** have the same calorific value, the two sugars are metabolized differently in the body. Fructose has a lower **glycemic index** than glucose but has a much higher glycemic load. Fructose causes seven times as much cell damage as does glucose, because it binds to cellular proteins seven times faster; and it releases 100 times the number of oxygen radicals (such as hydrogen peroxide, which kills everything in sight).<sup>[1]</sup>

**Fructose** is a simple sugar commonly found in **fruits and vegetables**. Vast quantities are also manufactured in the lab. **Glucose**, also known as grape or blood sugar, is present in all major carbohydrates like starch and table sugar. While both are a good source of energy, excess of glucose can be fatal to diabetic patients, and excess of fructose can lead to **health** problems like insulin resistance and liver disease.

## Comparison chart

Differences —

Similarities —

	<b>Fructose</b>	<b>Glucose</b>
<b>Other names</b>	<b>Fruit sugar</b> , levulose, D-fructose	Blood sugar, dextrose, corn sugar, grape sugar
<b>Kind of sugar</b>	Simple sugar (monosaccharide)	Simple <b>sugar</b> (monosaccharide)
<b>Molecular formula</b>	C6H12O6	C6H12O6
<b>functional group</b>	ketone	aldehyde
<b>Uses</b>	Source of energy. Often added to food and drinks to improve taste.	Source of energy. Fuels cellular respiration.
<b>Produced by</b>	Photosynthesis, the breakdown of glycogen. Vast quantities produced artificially in the lab by the food industry.	Photosynthesis, the breakdown of glycogen.
<b>Sources</b>	Honey, flowers, berries, most root vegetables.	All major carbohydrates
<b>Molar mass</b>	180.16 g/mol	180.16 g/mol
<b>Density</b>	1.694 g/cm <sup>3</sup>	1.54 g/cm <sup>3</sup>

## Fructose

**Melting point** 103 °C

**CAS number** 57-48-7

## Glucose

$\alpha$ -D-glucose: 146 °C,  $\beta$ -D-glucose: 150 °C

50-99-7 Y



Fruits and vegetables are a natural source of fructose.

## Calories

1 ounce of fructose contains 104 [calories](#).

1 ounce of glucose contains 110 calories.

## Effects on the Body

Excessive consumption of fructose has been linked to insulin resistance, obesity and non-alcoholic liver disease. Studies suggest that it leads to added fat in the belly, which is linked to an increased [risk](#) for heart disease and diabetes. Fructose also leads to higher cholesterol. Studies suggest that fructose lowers [activity](#) in the cortical control areas of the brain.

An excessive amount of glucose in the [blood](#) can be fatal. However, this only occurs in diabetic individuals when their pancreas does not release enough insulin into the bloodstream. Most fat gained from excessive intake of glucose is subcutaneous, or under the skin, which is not connected to heart disease or [diabetes](#). Glucose is not linked to insulin resistance or higher cholesterol. Studies suggest that the consumption of glucose significantly raises the level of activity in the brain.

In a recent study conducted by [Lane MD at Johns Hopkins University School of Medicine in Baltimore, US](#) revealed that:

- Fructose increases food intake whereas glucose decreases food intake. This is because glucose leads to an increase in hypothalamic ATP which gives rise to a suppression of food intake. Whereas fructose requires an enzyme that requires ATP, which causes ATP depletion thereby giving rise to an increase in food intake.
- The rise in consumption of high-fructose sweeteners, soft drinks and corn syrup parallels the rise in the obesity [epidemic](#).
- High fructose diets promote insulin resistance and glucose [intolerance](#) which increases the rate of hepatic lipogenesis.

- On an average Americans consume 140lbs of high fructose sweeteners per year, of which 77lbs is [high fructose corn syrup](#).

## Beneficial uses in the human body

Fructose is used in respiration to produce ATP and to build glycogen. It can also produce fat to store [energy](#).

Cells also use glucose to fuel [respiration](#). It is also used in Vitamin A production and for the synthesis of several substances, including starch and glycogen.

## Sources of fructose and glucose

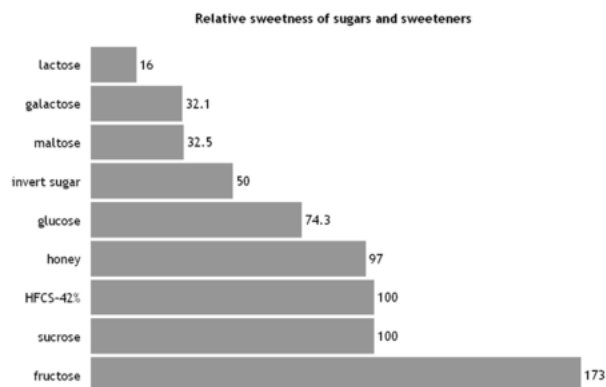
Fructose is naturally found in most fruits and vegetables (including sugar cane) and honey. Foods that contain table sugar, high-fructose corn syrup, [agave nectar](#), maple syrup and fruit juice also contain fructose.

All major carbohydrates contain glucose. Examples include starch and table sugar.

## Commercial use

Fructose is commercially added to many [foods](#) and [beverages](#) as a low cost sweetener. High fructose corn syrup is often added to processed food and drinks in the United States as a cheap sweetener, and has been the subject of many controversies, as it is allegedly associated with [obesity](#), cardiovascular disease, diabetes and non-alcoholic fatty liver [disease](#).

Glucose is also used as a sweetener in the form of corn syrup.



## Production

Fructose is produced by plants during [photosynthesis](#).

Glucose is naturally produced during photosynthesis in plants or during the breakdown of glycogen. It is also produced commercially through the enzymatic hydrolysis of starch.

## References

- [Effect of glucose and fructose on food intake via malonyl-CoA signaling in the brain.](#)  
- [PubMed.gov](#)
- [Wikipedia: Fructose](#)
- [Wikipedia: Glucose](#)
- [Glucose Nutrition](#) - [LuMriX.net](#)
- [Calories in Fructose, dry](#) - [CalorieKing](#)
- [Wikipedia: High-fructose corn syrup and health](#)
- [Study Shows More Insulin Resistance With Fructose-Sweetened Beverages](#) - [WebMD](#)
- [Metabolic syndrome: F stands for fructose and fat](#) - [Nature](#)
- [The Sugar Conspiracy](#) - [The Guardian](#)
- [Sugar: The Bitter Truth](#) - [YouTube](#)
- [Too much fructose can damage your liver, just like alcohol](#) - [SugarScience.org](#)