

## How fructose and HFCS increase uric acid and give you high blood pressure

So this article below introduces the idea of fructose and its effects on Uric acid. It also mentions some things I've talked about before about how fructose doesn't provoke an insulin response.

Fructose elevates uric acid, which decreases nitric oxide, raises angiotensin, and causes your smooth muscle cells to contract, thereby raising your blood pressure and potentially damaging your kidneys. Increased uric acid also leads to chronic, low-level inflammation, which has far-reaching consequences for your health. For example, chronically inflamed blood vessels lead to heart attacks and strokes; also, a good deal of evidence exists that some cancers are caused by chronic inflammation.

Fructose does not appropriately stimulate insulin, which in turn does not suppress ghrelin (the "hunger hormone") and doesn't stimulate leptin (the "satiety hormone"), which together result in your eating more and developing insulin resistance.

glucose actually accelerates fructose absorption, making the potential health risks from HFCS even more profound.

There are more than 3,500 articles to date showing a strong relationship between uric acid and obesity, heart disease, hypertension, stroke, kidney disease, and other conditions. In fact, a number of studies have confirmed that people with elevated serum uric acid are at risk for high blood pressure, even if they otherwise appear to be perfectly healthy.

Uric acid levels among Americans have risen significantly since the early half of the 20th Century. In the 1920s, average uric acid levels were about 3.5 ml/dl. By 1980, average uric acid levels had climbed into the range of 6.0 to 6.5 ml/dl and are probably much higher now.

How Does Your Body Produce Uric Acid?

It's a byproduct of cellular breakdown. As cells die off, DNA and RNA degrade into chemicals called purines. Purines are further broken down into uric acid.

Fructose increases uric acid through a complex process that causes cells to burn up their ATP rapidly, leading to "cell shock" and increased cell death. After eating excessive amounts of fructose, cells become starved of energy and enter a state of shock, just as if they have lost their blood supply. Massive cellular die-off leads to increased uric acid levels.

According to Dr. Johnson<sup>1</sup>, sugar activates its own pathways in your body—those metabolic pathways become "upregulated." In other words, the more sugar you eat, the more effective your body is in absorbing it; and the more you absorb, the more damage you'll do.

You become “sensitized” to sugar as time goes by, and more sensitive to its toxic effects as well.

The flip side is, when people are given even a brief sugar holiday, sugar sensitization rapidly decreases and those metabolic pathways become “downregulated.” Research tells us that even two weeks without consuming sugar will cause your body to be less reactive to it.

This video adds a bit. Here are my very rough notes, which may be imperfect.

Fructose is 7 times more likely to brown, and form AGE -advanced glycation end products than glucose

Fructose does not suppress ghrelin (because it does not cause an insulin spike).

If you eat glucose it gets used all over your body. 80% of glucose gets used in the body. 20% gets used in the liver and most gets converted to glycogen. Your liver can store unlimited amounts of glycogen without toxicity.

Some portion of the glucose will get converted into fat/VLDL. (maybe 0.5% depending)

When you drink alcohol.

80% of ethanol calories hit the liver.

Ethanol generates reactive oxygen species which damage proteins in the liver.

You get a lot of VLDL /fat from ethanol.

100% of fructose gets metabolized by the liver.

Uric acid gets created as a waste product as fructose is metabolized.

Uric acid contributes to gout.

Uric acid blocks the synthesis of Nitric Oxide. Nitric Oxide lowers blood pressure. So the result is that your blood pressure rises.

Another fructose by-product is xylose-5-phosphate, which stimulates pp2a which then activates lipogenesis (new fat making).

With glucose almost none of it ends up as fat. With fructose 30% ends up as fat.

In 6 days of med students drinking lots of fructose, triglyceride levels doubled.

One of the byproducts of fructose metabolism limits the effectiveness of insulin in the liver. via JNC1 IRS1

The higher insulin levels go, the less well the brain recognizes leptin. So the brain gets confused - thinks it's starving despite high fat stores.

Fiber is the antidote for high sugar levels. Fiber reduces the rate of intestinal carbohydrate absorption.

Downside: “In life you’ve got 2 choices - fat or fart.”

Fiber increases the speed of transit of intestinal contents to the ileum which raises PYY and produces a satiety signal.

Inhibits absorption of some free fatty acids in the colon which are metabolized by colonic bacteria to short chain fatty acids which suppress insulin levels.

As pubmed says

Gout is a kind of arthritis that occurs when uric acid builds up in the joints.

Here is a good powerpoint presentation on what happens to fructose in liver cells.

Fructose + ATP => Fructose1P + ADP

ADP=>IMP=>IMP=>Uric acid

As wikipedia explains, fructose is absorbed more rapidly if glucose is present, leading to a more rapid increase in triglyceride levels and the by products of fructose metabolism:

Studies show the greatest absorption rate occurs when glucose and fructose are administered in equal quantities.[24] When fructose is ingested as part of the disaccharide sucrose, absorption capacity is much higher because fructose exists in a 1:1 ratio with glucose. It appears that the GLUT5 transfer rate may be saturated at low levels, and absorption is increased through joint absorption with glucose. One proposed mechanism for this phenomenon is a glucose-dependent cotransport of fructose.

This is yet another reason to limit fructose consumption. Please see this post of mine on fructose if you haven't already.