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THE NUANCE

**This Is Your Gut on Sugar**

**Researchers are finally uncovering the exact ways that sugar disrupts the GI tract**

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In 1776, at the start of the Revolutionary War, the average person consumed about four pounds of sugar each year. Today, [per capita sugar](https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=95264) intake in the U.S. exceeds 120 pounds.

Roughly 75% of all foods and beverages in this country contain added sugar. According to the American Heart Association, the average adult swallows the equivalent of six bowling balls of the stuff each year. Meanwhile, the average child downs enough added sugar to fill a bathtub.

Researchers have long suspected that sugar — in particular the added sugar that doesn’t occur naturally in whole fruits or vegetables — is a major contributor to this country’s exceedingly high rates of obesity, type 2 diabetes, and other metabolic conditions.

More recently, they’ve speculated that sugar may also contribute to the development of inflammatory bowel disease, gut-related autoimmune disorders, and food allergies or sensitivities — all of which are on the rise. But experts have struggled to determine just how sugar causes or contributes to these health problems.

That’s changing. Recent work has revealed some of the ways that sugar disrupts, imbalances, and harms the gut.

From the microbiome to the lining of the small intestine, sugar seems to imperil the healthy workings of the human gastrointestinal tract in multiple ways.

Robert Lustig, MD, is an endocrinologist and professor emeritus of pediatrics at the University of California, San Francisco. He’s also the author of *[Metabolical](https://www.amazon.com/Metabolical-Processed-Nutrition-Modern-Medicine/dp/B08LP21JLQ)*, a book that examines the ways processed foods and sugar make people sick.

“There are at least three processes that are going on that sugar seems to have a role in,” he says.

The first has to do with the way the gut and liver handle the sugar you eat. “Up to a point, the intestine has the ability to turn fructose into downstream byproducts that you don’t absorb,” he explains. In other words, if your sugar intake is low, your gut will pass most of that sweet stuff along so that it ends up in your feces. The little bit of sugar you do absorb will end up in your liver, which will convert it into energy.

But if you eat a diet high in sugar, your gut adjusts to this by producing enzymes that facilitate sugar’s breakdown and absorption. “You create a positive feedback system where the more of it you eat, the more you absorb,” Lustig explains. That means more sugar ends up in your liver, which will struggle to convert it into energy. “What happens then is your liver turns it into fat,” he says. “That fat either gets exported out as triglycerides, which increases your risk for heart disease or obesity, or it doesn’t make it out, and contributes to fatty liver disease and other chronic diseases — especially diabetes.”

The second sugar-related problem has to do with the semipermeable lining of the gut. This lining is designed to be a dynamic, highly selective barrier that allows nutrients to pass through while keeping out harmful bacteria, large food molecules, and other inappropriate material.

“There are proteins that maintain the tight junctions that make your intestine impermeable to that bad stuff,” Lustig explains. “If those proteins fail, the tight junctions fail, and the bad stuff that gets through could generate an immune response.” This immune response manifests as food allergies, autoimmune disorders such as Crohn’s disease, and other gut-related health problems.

While experts are still trying to iron out the specifics, there’s evidence that sugar interferes with those proteins or draws resources from the cells of the intestine in ways that weaken its junctions. “Sugar looks like a primary driver of increased gut permeability,” he says. “We know that any time you give a person or an animal a high-sugar meal, there are going to be alterations in gut permeability. We just don’t have all the answers yet.”

The third way that sugar harms the gut has to do with the microbiome — the billions of bacteria that populate the GI tract. While some of these bacteria are good for us, others are associated with diabetes, autoimmune disorders, and the other health problems mentioned above. The types and numbers of these bacteria that live inside a person’s gut depend in part on that person’s diet.

“There’s always a war going on between good bacteria and bad bacteria,” Lustig says. “In general, good bacteria do not feed on sugar. Bad bacteria do. And so when you eat sugar, you’re arming the enemy.”

As the population of bad bacteria swells, this appears to cause trouble by triggering an immune system response. “Immune cells know what kind of bacteria are in the gut because they’re sampling them all the time — they’re doing surveillance,” says Karen Madsen, PhD, a researcher and professor of gastroenterology at the University of Alberta. The immune system recognizes that sugar-loving bacteria are trouble, and so it ramps up its defensive activity. This translates to inflammation, which can trigger or worsen gut-related pathology

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All of these problematic changes may stack up in ways that lead to accumulating harm and dysfunction. And they may not be the extent of the sugar-related damage. A 2018 study in the *Proceedings of the National Academy of Sciences*found evidence that sugar may “silence” gut proteins that support populations of healthy bacteria.

So, sugar is bad for you. And it’s bad for you in multiple ways. But considering its near ubiquity in today’s packaged offerings, what are you supposed to eat?

“Eat whole foods instead of processed foods,” Lustig says. “That’s what matters most of all.”

That means whole fruits, vegetables, nuts, seeds, healthy oils, meats, dairy, and anything else that has not been broken down and packaged. Basically, think about what people ate 100 years ago, and try to eat that.

“Do that, and you’re way ahead of the game,” he says. “Everything else you do is gravy.”