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INSIGHTS

Ultra-processed food: Five things to know

By John Sanford

A Stanford Medicine research dietitian spells out what ultra-processed means, why such foods are unhealthy and how to eat a healthy diet in a world filled with them.

Nutrition | July 15, 2025

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Most nutrition scientists agree that occasionally eating ultra-processed food, also called highly processed food, is no big deal. But, statistics show, that occasional part is no easy trick.

Such food now accounts for nearly 60% of U.S. adults' calorie consumption. Among American children, that portion is close to 70%. In other words, ultra-processed food is starting to overwhelm the American diet.

The trend is alarming because these types of food — things like packaged snacks, sodas, frozen pizzas, sweetened cereals and instant soups — are often crammed with saturated fat, salt and sugar. They've been linked to a variety of health problems, including obesity, diabetes, cardiovascular disease and cancer.

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"Also, it's not just about what's added to these foods; it's what's missing," said Dalia Perelman, a research dietitian with the Stanford Prevention Research Center. "They tend to be lower in fiber, micronutrients, phytochemicals" — naturally occurring compounds with potential health benefits.

Perelman has collaborated on dozens of health-related studies at Stanford Medicine and has worked with patients as a clinical dietitian at the Palo Alto Medical Foundation. She was the recipient of the 2009 Award for Excellence in Clinical Nutrition from the California Academy of Nutrition and Dietetics.

Perelman agreed to serve as a guide for our Insights readers through the corn maze that is ultra-processed food, providing insights about its origins, nature and potential health effects.

1) This isn't new: It's actually been going on for more than a century

It's hard to pinpoint the exact moment ultra-processed food was born. Stateside, artificial flavors and chemical additives have been used in foods since at least the 19th century. Saccharin was invented in 1879. The first iteration of Coca-Cola syrup, which contained a slew of ingredients, was invented in 1886 and sold as a soda-fountain drink by adding carbonated water to it. But the watershed moment may have been the invention of artificial trans fatty acids by Wilhelm Normann, a German chemist who,

at the turn of the 20th century, discovered that adding hydrogen to vegetable or fish oils could solidify them.

Hydrogenated oils were cheaper than animal fats, such as lard and butter, and could increase a food's shelf life significantly. Soon, trans fats found their way into everything from hot dogs and mayonnaise to Oreos, which became popular in the 1910s. (In 2015, the U.S. Food and Drug Administration essentially banned trans fats because they can substantially increase levels of low-density lipoprotein — LDL, the "bad" cholesterol — in the bloodstream, leading to cardiovascular disease.)

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Still, the vast majority of food consumed by Americans in the 20th century was minimally processed. The larger boom in highly processed food occurred after World War II, spurred in part by the military's need to transport rations over long distances while increasing their shelf life, palatability and calorie density. Advances made during the war in freeze-drying, dehydration, chemical preservatives and packaging carried over to food production for the growing U.S. population. These advances helped make a variety of foods more affordable and available nationwide.

2) How to know: If the ingredients aren't in your kitchen, it's likely ultra-processed

The term "ultra-processed food" first appeared in writing in the 1980s, but it didn't gain prominence until its use in a 2009 commentary by the Brazilian epidemiologist Carlos Monteiro,

MD, PhD, now a professor emeritus of nutrition and public health at the University of São Paulo.

These foods are generally understood to be mass-produced with some — or a lot — of industrially processed ingredients. "They're basically industrial formulations," Perelman said. "They contain ingredients you wouldn't find in a typical kitchen — things like emulsifiers, colorings, flavor enhancers, bulking agents, gels. And the other thing is that ultra-processed foods tend to be, in the majority of cases, higher in saturated fat, higher in salt and higher in sugar — which are the three things we know we should eat less of."

Monteiro and his colleagues developed a system for classifying food, called NOVA, that is used widely for scientific studies and by dietitians and nutritionists. It groups foods into four categories:

- **Unprocessed or minimally processed foods**: Examples are fruits, vegetables, beans, nuts, seeds, eggs, meat, poultry, pasta, plain yogurt and coffee.

- **Processed culinary ingredients**: These include sugar, honey, maple syrup, vegetable oils, butter and vinegar.

- **Processed foods**: Examples are salted nuts, cured meat, canned fish, canned vegetables, most cheeses and freshly made bread (such as from a local bakery).

· **Ultra-processed foods**: Examples are commercially produced breads, most breakfast cereals, flavored yogurts, hot dogs, frozen meals, potato chips, soft drinks and candy bars.

3) Obesity, anxiety, death: The adverse health effects are extreme, varied

"It's not like the industry is trying to kill us," Perelman said. "They're trying to make food more affordable, more convenient, tastier."

Yet, she notes, dozens of studies have provided evidence suggesting that high ultra-processed food consumption is associated with a range of adverse health outcomes, including obesity, metabolic syndrome, heart disease, cerebrovascular disease, depression, anxiety, cancer and mortality from all causes.

A 2024 review of 45 metanalyses, covering nearly 10 million study participants, found "convincing" evidence that a diet high in ultra-processed foods increases the risk of death from cardiovascular disease by 50% and the risk of anxiety by 48%. It found "highly suggestive" evidence that greater consumption of these foods increases the risk of death from heart disease by 66%, the risk of obesity by 55%, sleep disorders by 41%, Type 2 diabetes by 40%, early death from any cause by 21% and depression by 20%.

A study published in 2022 in *The BMJ* found that men who ate the most ultra-processed foods had a 29% higher risk of developing colorectal cancer.

Research has shown that eating ultra-processed foods, which are generally low in fiber, is detrimental to gut health. This is because they tend to be easily digested, their components absorbed quickly into the bloodstream, Perelman said. The microbes in our large intestine eat fiber and scraps of food, like pieces of partially digested nuts that make it through the stomach and small intestine. Without them, "the microbes starve," she said. Or some may start eating the organ's mucus lining, which serves as a protective barrier. This increases the gut's susceptibility to pathogens and inflammation.

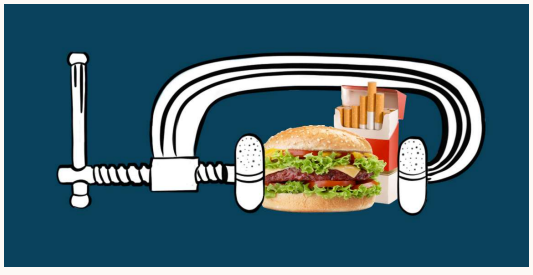
Additives can also harm gut health. Emulsifiers, which are used in food manufacturing to combine substances that would normally separate, can disrupt the gut microbiome and weaken

the intestinal barrier. In one randomized, controlled study published in *Gastroenterology* in 2022, participants who ate food with a widely used emulsifier, carboxymethylcellulose, experienced alterations in their intestinal microbiota; depletion of health-promoting small molecules found in the fecal metabolome, which provides a snapshot of metabolic activity in the gut; and increased stomach discomfort after eating. In two of the participants, microbiota invaded the normally sterile inner mucus layer of the large intestine, the study said. Such encroachment is a central feature of gut inflammation.

4) The real sneaky trick: They're designed to make you want more

Scientists working on formulations for highly processed foods are really good at their jobs, Perelman said. "They formulate the taste of the food to what is known as the 'bliss point'" — the precise combination of sugar, salt and fat to maximize palatability, which encourages overconsumption, she said. "When you hear a commercial about how you can't eat just one, they mean it. You know those ranch-flavored chips? They definitely trigger some of those neurotransmitters that are making you, like, 'Oh, my God, this is delicious.'"

When Monteiro, the epidemiologist, and his colleagues analyzed data on Brazilian household food expenditures they observed a paradox: As obesity was dramatically rising, Brazilians were buying less salt, sugar, and cooking fats and oils. They discovered that people were replacing home-cooked meals with ready-made foods, drinks and snacks that were high in fat, salt and sugar. They hypothesized that these foods, propelled by aggressive marketing and affordability, were displacing meals prepared with fresh ingredients. With the added flavors, the foods were designed to be hyperpalatable — even habit-forming — but less satiating, they said.



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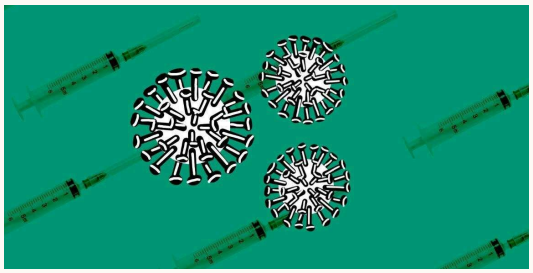

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In a small, randomized study published in *Cell Metabolism* in 2019, researchers found that over two weeks, participants assigned to an ultra-processed diet ate about 500 more calories

per day and gained about 2 pounds more than those on the unprocessed diet.

5) A super-surprising caveat: Not all ultra-processed food is unhealthy

Once a whole food is manipulated in some fashion — through the addition of salt or heat (our ancestors are believed to have started cooking food some 1.8 million years ago) — it has been processed, Perelman said.

But where minimal processing ends and processing begins, as well as where processing ends and ultra-processing begins, is a matter of debate — as is whether certain highly processed foods actually qualify as unhealthy, in the sense they should be consumed infrequently. “It’s all semantics, and I think that’s part of the problem,” Perelman said. “It’s one reason this field is so hard to study; we don’t quite agree on what to call things.”

The question of how to label certain foods points to what some food scientists contend is a flaw in NOVA — namely, that the categories are oversimplified. They argue that some foods could fall into two of them, depending on who is making the assessment. Other criticisms are that NOVA focuses too heavily on processing and not enough on nutritional value, undermining efforts to improve global nutrition through fortified, shelf-stable products, especially in low-income regions.

“You don’t want to throw the baby out with the bathwater,” Perelman said. “Highly processed food has helped us feed a lot more people and reach populations that wouldn’t otherwise get a lot of food. We need to learn what it is about the ultra-processed foods that is harming our health.”

Perelman believes NOVA is an important heuristic, given that higher consumption of highly processed foods is clearly associated with a higher risk of adverse health outcomes. But she said it might be useful to subdivide the ultra-processed-foods category to acknowledge that some are healthier than others.

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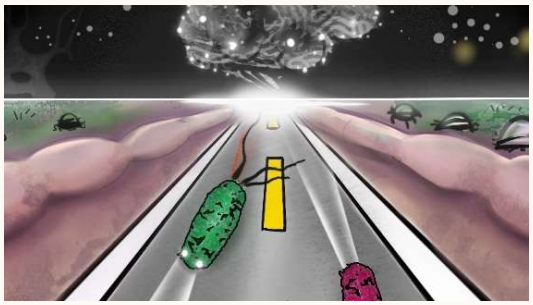

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What the Science Says: BMI, aka body mass index

For example, while Cheerios are ultra-processed, according to NOVA, they contain whole grain oats and are low in added sugar, making them more nutrient-dense than many other packaged cereals.

There is a large element of common sense at play when it comes to choosing healthy foods to eat, Perelman said. “People say, ‘Oh, nutrition is so confusing, and you scientists change your mind constantly,’” she said. “But that’s not really the case. We’ve been saying the same thing forever. It’s just that it’s boring and no one wants to hear it: balance and moderation.”

Given the time constraints and pressures of modern life, consumers shouldn’t feel like they’re failing if they can’t buy and cook exclusively with whole foods, Perelman said. Compromise is OK.

“The goal doesn’t have to be eliminating all highly processed foods, but to reduce the reliance on them,” she said. “Mix it up. People eat a lot of snacks that are ultra-processed. I’d ask myself, ‘Can I think of a snack that’s less processed that I would enjoy?’ Maybe I’ll just have a handful of nuts and maybe some dried fruit, instead of bar, which is way more processed. Read ingredient lists a little more carefully to find foods that have fewer additives. For example, buy a pasta sauce with simple, recognizable ingredients — tomatoes, olive oil, herbs — and not too much salt.”

Prioritizing fresh fruits and vegetables, beans, whole grains, nuts and seeds should still be the goal, though, she said.

“It’s like what Michael Pollan” — the journalist and author *of In Defense of Food* — “advised: ‘Eat food. Not too much. Mostly plants.’ That’s the essence of a very basic instruction from health scientists that hasn’t changed in a century.”

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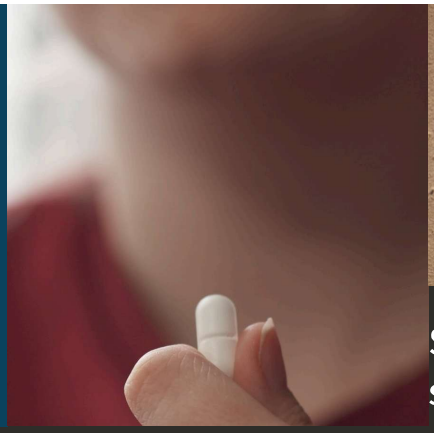

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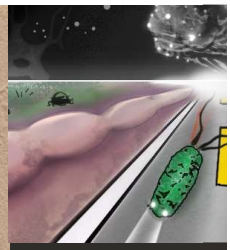

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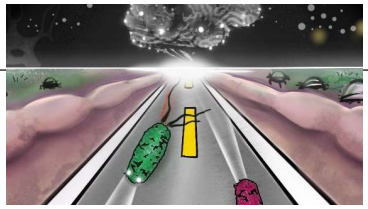

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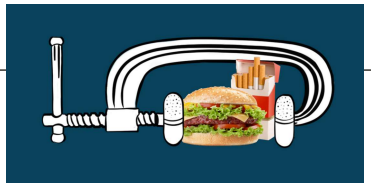

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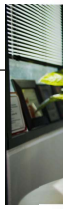

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