

From the 1960s to Today:

EXPLORING THE HEALTH EFFECTS OF ARTIFICIAL SWEETENERS



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DISCOVERY & EARLY USE

Artificial sweeteners may seem like a modern invention, but they actually have a history dating back to the late 1800s when the earliest versions were introduced to the food industry. In the 1960s, accidental discoveries by researchers led to the emergence of well-known sweeteners, such as aspartame. Their popularity continued to increase into the 2000s as they became **key ingredients in diet sodas, lower-calorie foods, and medications** designed to enhance flavor. However, concerns began early on about whether artificial sweeteners could cause cancer, especially when studies started to show a connection between the sweetener Cyclamate and bladder cancer in animals. As a result, the US banned Cyclamate in 1969, although later reviews raised doubts about its effects.

Controversy surrounding the artificial sweetener industry has increased since the 1960s Cyclamate studies, with other sweeteners like saccharin and aspartame facing similar criticism. **Despite claims from manufacturers and the food industry that artificial sweeteners are harmless, studies on FDA-approved sweeteners are inconsistent and have limited evidence.** On the other hand, organizations like the World Health Organization, cancer experts, and consumer advocacy groups have expressed concerns over artificial sweeteners' safety and long-term effects. Interestingly, the American Heart Association and American Diabetes Association have not said much about using artificial sweeteners instead of sugar to tackle obesity, metabolic syndrome, or diabetes. The wide range of opinions shows more research is needed to fully understand how sugar substitutes might affect human health over a long time.



UNDERSTANDING ARTIFICIAL SWEETENERS

Overview

Artificial sweeteners, also known as non-nutritive sweeteners, are substances that are much sweeter than regular sugar but contain few to no calories. They are typically 200 to 20,000 times sweeter than sugar and are commonly used as a way to reduce the calories and sugar content in foods. Artificial sweeteners can be found in a wide range of products, from sugar-free gum to diet sodas and even medications. **While they provide sweetness without calories or sugar, they lack beneficial nutrients like vitamins and fiber.**

The FDA has approved 6 artificial sweeteners including aspartame, sucralose, saccharin, acesulfame potassium, neotame, and advantame. Additionally, the FDA has approved 3 natural sweeteners, including stevia, which are also much sweeter than sugar. Stevia gained popularity as a sugar substitute due to its natural origin and potential health benefits, such as not spiking blood sugar levels. Some sweeteners combine stevia with artificial ones to mimic sugar taste with fewer calories, though they're not as natural as pure stevia.

Artificial sweeteners may heighten sugar receptors, which may lower tolerance for complex tastes & potentially change food preferences. Concerns also exist regarding their addictive nature, which have been seen in several animal studies.

Their use may also promote the consumption of foods with artificial flavors that lack essential nutrients, which may reduce the intake of healthier options.

This shift in diet could impact how the body controls calories, which has again been shown in animal studies. There's some evidence, like MRI scans, suggesting that artificial sweeteners might change how our brains react to sweet tastes.



UNDERSTANDING ARTIFICIAL SWEETENERS

Role in Weight Loss Efforts

The role of artificial sweeteners in weight management has been heavily debated. Despite earlier beliefs that artificial sweeteners might help with weight loss, recent reports from the World Health Organization suggest they may not actually aid with weight loss and protect against chronic conditions. However,

the long-term effects of sugar substitutes on weight management are still unclear. While some studies have looked into how artificial sweeteners affect weight loss in people, many are short-term and don't have much real-world meaning.

A study with over 400,000 individuals found no major impact of artificial sweeteners on body mass index (BMI). But when the same researchers looked at studies that followed people over time, they found that those who consumed artificial sweeteners tended to gain more weight, have bigger waists, and were more likely to become obese. This suggests that **artificial sweeteners might not actually help with weight loss and could even make things worse**. In the end, **sticking to a healthy diet and exercising regularly are still the most important things for managing weight in the long run**, no matter if you use artificial sweeteners or not.

Role in Gut Microbiome & Inflammation

Recent research has found that **artificial sweeteners can have a big impact on both gut health and how the body reacts to inflammation**. Scientists discovered in a recent study that these sweeteners may throw off the balance of bacteria in the gut. This disruption might cause weight gain and could play a role in conditions like type 2 diabetes and obesity.

Many artificial sweetener products you can buy in stores have a mix of different sweeteners and other fillers added in. Some of these additives have been proven to cause inflammation in the intestines and change the types of bacteria in the gut. However, because artificial sweeteners are made up of different chemicals, it's tough to figure out exactly how they connect to inflammation. Right now, scientists are studying how using sugar substitutes for a long time affects gut health, cravings, hunger, and how the body regulates blood sugar.

POTENTIAL LINKS TO CHRONIC ILLNESSES

Overview

Many animal and observational human studies suggest a link between artificial sweetener consumption and an increased risk of conditions such as glucose intolerance, weight gain, diabetes, and cardiovascular disease. Yet, the conclusions drawn from these studies are still debated because of potential conflicts of interest. This happens because the companies that make artificial sweeteners often provide funding for the research. Also, there are other environmental factors that can make it hard to figure out if there's a direct cause-and-effect relationship. A majority of studies have only focused on adults, so the long-term health consequences are still unknown in children. Although the evidence on artificial sweeteners is limited, worries about their long term effects continue across society.

Cancers

Specifically concerning cancer, aspartame, a commonly used artificial sweetener, has been at the center of debate. Animal studies conducted by Italian researchers from 2005 to 2010 suggested a link between aspartame and cancer, although these findings were heavily criticized by the FDA. The research institution has defended its work over the years despite facing backlash from industry and governmental bodies. In July 2023, the World Health Organization classified aspartame as possibly causing cancer, which was a big deal in terms of public awareness about its potential health impacts. However, a couple of months later, another WHO committee identified safe levels for using aspartame, suggesting that moderate intake might not be too risky. The FDA responded by emphasizing that the WHO's findings did not mean there was a definite link to cancer and stated that much higher levels of consumption would be needed for there to be any real risk.



Artificial Sweeteners SIDE EFFECTS

ASPARTAME	Saccharin	Sucratose
Migraines	Saccharin	Headaches
Dizziness		Altered taste buds
Cancer		Hypothyroidism
Breathing Problems		Lung Problems
Toxic Liver		Toxic Kidneys
Diarrhea		Eczema
Bloating		Nerve Damage

POTENTIAL LINKS TO CHRONIC ILLNESSES

Obesity

Worries about artificial sweeteners also involve obesity as some people use them to cut down on calories and avoid gaining weight. However, **studies don't agree on whether they actually help with obesity**. Some studies say they might even raise the risk for the development of obesity. For example, in a small study, people who drank drinks with certain artificial sweeteners didn't gain weight like those who had sugary drinks. However, in May 2023, the WHO advised to not use these sugar substitutes for weight control after reviewing a lot of evidence from a number of studies.

Other Chronic Diseases

Additionally, **artificial sweeteners have been associated with other diseases, like metabolic syndrome and type 2 diabetes**. Some studies have found a greater risk of these conditions with daily consumption of diet drinks. Even after considering other factors that might affect the results, studies following people for a long time still find this connection. Despite ongoing research, the full knowledge of the impact of artificial sweeteners on human health remains puzzling.



GENERAL ADVICE ON CONSUMPTION

When looking for alternatives to artificial sweeteners and ways to cut down on using them, recommendations from groups like the World Health Organization advise **reducing the amount of aspartame by switching to water or other drinks without added sugar**. It's generally thought that artificial sweeteners are okay in small amounts for most healthy people, but those with certain conditions like phenylketonuria or certain bowel diseases should stay away from them as they could be risky for their health. The FDA and other food safety groups set limits for how much sweetener you can safely have each day, depending on your weight and the type of sweetener. Since the acceptable daily intake of artificial sweeteners varies from person to person, a helpful tool to find yours can be found [here](#). **Consuming small amounts of sugar substitutes for short periods or occasionally is generally thought of as the safest approach**. Relying too heavily on these products could lead to misunderstandings about the nutritional value of processed foods. Plus, it's important to pay attention to how sugar substitutes can change your taste preferences, which might make you drink more sweet drinks and less water. **Some practical tips for cutting back on refined sugar include eating whole foods like fruits, veggies, whole grains, and lean proteins, staying away from sugary drinks, and using whole fruit as a natural sweetener**.

Safe Levels of Sweeteners

How many packets can a person consume and still be at the safe level for each sweetener based on its sweetness intensity?



Examples of Brand Names Containing Sweetener	Sweetener	Number of Sweetener Packets a Person Would Need to Consume in a Day to Reach the Acceptable Daily Intake (ADI) *
Nutrasweet® Equal® Sugar Twin®	ASPARTAME	75
Sweet One® Sunett®	ACESULFAME POTASSIUM (ACE-K)	23
Splenda®	SUGRALOSE	23
Newtame®	NEOTAME	23 (sweetness intensity at 10,000 times sucrose)
Advantame®	ADVANTAME	4,920
Sweet and Low® Sweet Twin® Sweet'N Low® Necta Sweet®	SACCHARIN	45 (sweetness intensity at 400 times sucrose)
Truvia® PureVia® Enlite®	REBAUDIOSIDE A	27 (sweetness intensity at 300 times sucrose)



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