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About Cancer Types Research Grants & Training News & Events About NCI

Cancer Causes and Prevention	Artificial Sweeteners and Cancer
Risk Factors	
Age	 ON THIS PAGE What are artificial sweeteners? Do animal studies suggest a possible association between artificial sweeteners and cancer? What have studies shown about possible associations between artificial sweeteners and cancer in people? Do artificial sweeteners contribute to/play a role in obesity?
Alcohol	
Cancer-Causing Substances	
Chronic Inflammation	
Common Cancer Myths and Misconceptions	
Diet	What are artificial sweeteners?
Hormones	Artificial sweeteners are chemically synthesized substances that are used instead of sucrose (table sugar) to sweeten foods and beverages.
Immunosuppression	
Infectious Agents	Because artificial sweeteners are many times sweeter than table sugar, much smaller amounts (200 to 20,000 times less) are needed to create the same level of sweetness. The caloric content of sweeteners used in such tiny amounts is negligible, which is why they are sometimes described as nonnutritive.
Obesity	
Radiation	
Sunlight	Six artificial sweeteners are approved by the US Food and Drug Administration (FDA) as food additives: saccharin, aspartame, acesulfame potassium (acesulfame-K, or Ace-K) sucralose, neotame, and advantame. Before approving these sweeteners, the EDA
Tobacco	reviewed numerous safety studies that were conducted on each sweetener to identify possible health harms. The results of these studies showed no evidence that these sweeteners cause cancer or other harms in people.
Genetics	
Cancer Prevention Overview	Do animal studies suagest a possible association between artificial sweeteners and
Research	cancer?

Concerns about artificial sweeteners and cancer initially arose when early studies linked the combination of cyclamate plus saccharin (and, to a lesser extent, cyclamate alone) with the development of bladder cancer in laboratory animals, particularly male rats.

Most studies of the other approved artificial sweeteners have provided no evidence that they cause cancer or other adverse health effects in lab animals.

Cyclamate

As a result of the findings of early studies of cyclamate, it was banned in the United States in 1969. Although subsequent reviews of those experimental data and evaluation of additional data led scientists to conclude that cyclamate does not cause cancer, it has not been reapproved in the United States (although it is approved in many other countries).

Saccharin

Laboratory studies have linked saccharin at high doses with the development of bladder cancer in rats, and, as a result, in 1981 saccharin was listed in the US National Toxicology Program's Report on Carcinogens as a substance reasonably anticipated to be a human carcinogen. However, mechanistic studies (studies that examine how a substance works in the body) have shown that the ways in which saccharin causes cancer in rats do not apply in humans, and in 2000 it was removed from the list. (For more information on the delisting of saccharin, see the *Report on Carcinogens, Fifteenth Edition*.)

Aspartame

Español

Search

In 2019, an international scientific advisory group gave aspartame a high priority for review by the International Agency for Research on Cancer (IARC) Monographs program during 2020–2024 (1). At a June 2023 meeting, an international expert working group classified aspartame as Group 2B, "possibly carcinogenic to humans." This category is used when there is limited, but not convincing, evidence for cancer in humans or convincing evidence for cancer in experimental animals, but not both. In the case of aspartame, IARC found "limited" evidence of an association with liver cancer in humans and "limited" evidence from animal studies and studies of a possible mechanism (2).

The Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives (JECFA) also met in June 2023 to perform an independent risk assessment of aspartame to potentially update the findings of its 2016 evaluation. Based on the evidence from animal and human studies, JECFA concluded that aspartame has not been found to have adverse effects after ingestion and did not change its recommendations on acceptable daily intake 🗹 . It noted that aspartame is broken down in the gastrointestinal tract into metabolites that are identical to those of common foods and that no mechanism has been identified by which oral exposure to aspartame could induce cancer, thus it concluded that a link between aspartame exposure in animals and cancer could not be established.

In response to the IARC categorization, the FDA noted that it had identified significant shortcomings in the studies on which IARC based its conclusions and that it disagreed with IARC's conclusion that the data support classifying aspartame as a possible carcinogen.

What have studies shown about possible associations between artificial sweeteners and cancer in people?

Epidemiologic studies (studies of patterns, causes, and control of diseases in groups of people) have examined possible associations between intakes of artificial sweeteners and risks of several cancers in people. Although studies of this type are essential in identifying exposures that are associated with cancer, they have limitations in establishing a causal relationship. For example, people who differ in their consumption of artificial sweeteners may also differ in other ways, and it could be these other differences that account for their different cancer risks. Evidence for a causal relationship is stronger when multiple studies have generally similar results and when there is evidence for a biological mechanism that accounts for the connection.

Artificial sweeteners overall

A variety of individual studies and meta-analyses have evaluated associations of artificially sweetened beverages with the risk of cancer overall and with the risk of individual cancer types.

The results of these studies have been inconsistent. For example, intake of artificially sweetened beverages was associated with an increased risk of kidney cancer in a US cohort of postmenopausal women (3) but not in a European cohort of healthy adults (4). An "umbrella review" (a review of systematic reviews or meta-analyses) that took into account the quality of the included studies found only weak evidence for an association between intake of artificially sweetened beverages and either development of or death from any cancer (5).

A cohort study conducted in France called the NutriNet-Santé Study looked at intake of artificial sweeteners from all dietary sources and found that persons who consumed the greatest amounts of artificial sweeteners were slightly more likely to develop cancer than those who did not consume artificial sweeteners (6).

Because some studies have suggested that artificial sweeteners are associated with obesity, and obesity is in turn linked to at least 13 types of cancer, the NutriNet-Santé investigators also looked for associations between artificial sweetener intake and obesity-related cancers as a group. The risk of obesity-related cancers was slightly higher in people who consumed higher amounts of all artificial sweeteners than in those who did not consume artificial sweeteners. By contrast, an Australian cohort study found no association between artificially sweetened beverage intake and the risk of obesity-related cancers (7).

Saccharin

No clear evidence for an association between saccharin use and bladder cancer incidence in humans has emerged from epidemiologic studies. The results of these human studies contributed to the delisting of saccharin from the *Report on Carcinogens*.

Aspartame

The 2023 IARC finding of a possible association of aspartame with liver cancer in humans relied on data from three studies of four cohorts that looked at associations with artificially sweetened beverages during time periods in which such beverages mainly

contained aspartame (8–10). One of the studies (8) found an association with liver cancer risk in the whole cohort, whereas a second (9) found an association among persons with diabetes. The third found no association with liver cancer (10). After the IARC expert panel met, a fourth study that examined artificially sweetened beverages and the risk of liver cancer also found no association (11).

Other large cohort studies have not shown a clear association of aspartame with risk of cancer. These include the NIH-AARP Diet and Health Study, in which higher consumption of aspartame-containing beverages was not associated with the development of lymphoma, leukemia, or brain cancer during more than 5 years of follow-up (12). A 2013 review of the epidemiologic evidence published between January 1990 and November 2012 also found no consistent association between the use of aspartame and cancer risk (13).

The NutriNet-Santé cohort study, which looked at aspartame intake from all dietary sources, found that adults who consumed higher amounts of aspartame were slightly more likely to develop cancer overall, breast cancer, and obesity-related cancers than those who did not consume aspartame (6).

Sucralose

A range of studies have found no evidence that sucralose causes cancer in humans (14). The NutriNet-Santé cohort study did not find an association between sucralose intake and risk of cancer (6).

Acesulfame potassium

The NutriNet-Santé cohort study reported that adults who consumed acesulfame-K had a slightly higher risk of cancer overall as those who did not consume acesulfame-K (6). No other studies have examined whether acesulfame-K is associated with cancer in people.

Neotame and advantame

Neotame and advantame are derived from aspartame. No studies have reported on human cancer risks associated with either of these artificial sweeteners.

Do artificial sweeteners contribute to/play a role in obesity?

People may use artificial sweeteners to reduce the total calories they consume in their diet as part of an effort to avoid overweight and obesity, conditions that have been linked to at least 13 types of cancer. Concerns have been raised that some artificial sweeteners might increase obesity, potentially having an indirect effect on cancer risk, although the findings are mixed (15). For example, in a small randomized clinical trial of adults with overweight or obesity, participants who drank beverages containing sucrose or saccharin had a significant increase in body weight whereas those who drank beverages containing aspartame, rebA (highly purified stevia, a natural plant-based sweetener), or sucralose did not (16). However, a systematic review and meta-analysis of 17 randomized controlled trials found that substituting low- and no-calorie sweetened beverages for sugar-sweetened beverages was associated with small improvements in body weight (17).

In May 2023, the World Health Organization recommended against the use of non-sugar sweeteners to control body weight 🗹 , based on a systematic review of the evidence.

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