

## Sweeteners and Cancer

### Origin of the myth

Aspartame [additive #951] is an artificial (non-nutritive) sweetener used to replace sugar in food and drinks. Early animal studies showed varied results about the safety of aspartame. There was a large controversy regarding the approval of aspartame in the US. In 1981, the head of the FDA was fired, allegedly after refusing to approve the legalisation of aspartame. His successor legalised it and later accepted a job offer with Searle, the company which owned aspartame.

Aspartame was later rebranded to NutraSweet®. This controversy has created further suspicion that aspartame is unsafe. Equal® also contains aspartame.

There are four other major commercial sweeteners, sucralose [955] (Splenda®), saccharin [954] (Sweet'n Low™), cyclamate [952] and acesulphame potassium [950] (Ace K, Twinsweet™).

In recent times we have seen the introduction of steviol glycoside, which is a natural, intense sweetener known as 'Stevia'.

### Current evidence

#### Aspartame

In 2006, the European Ramazzini Foundation published a study on aspartame consumption in rats and linked its consumption to an increase in the incidence of cancer.<sup>1</sup>

The European Food and Safety Authority (EFSA) requested all unpublished data from the study and re-evaluated all current evidence. They maintained that the Acceptable Daily Intake (ADI) for aspartame (40 mg/kg body weight/day) was still safe. A full risk assessment was published in 2013 and concluded that aspartame and its breakdown products are safe for the general population.<sup>2</sup>

A survey conducted by Food Standards Australia and New Zealand (FSANZ) in 2003 examined the amount of aspartame eaten in Australia. It was found that average consumers of aspartame were eating 6% of the ADI, and high consumers were eating 15% of the ADI. It was concluded that Australian consumption was well below the levels at which adverse health effects could occur.<sup>3</sup>

A large safety evaluation published in *Critical Reviews in Toxicology* in 2007 reviewed the health effects experienced at typical consumption levels. No credible evidence indicating the carcinogenicity of aspartame was found.<sup>4</sup>

After ingestion, aspartame breaks down into three products: aspartic acid, methanol and phenylalanine. Compared with other foods, such as milk, the amount of these chemicals is comparatively low. Some people with a genetic disorder called *phenylketonuria* (or PKU) cannot metabolise phenylalanine. However, these three products are safe for the general population.<sup>5</sup>

There have been cases in which sufferers of birth defects, brain cancer, Alzheimer's disease, multiple sclerosis and seizures have attributed their condition to aspartame consumption. These claims are anecdotal and not based on scientific evidence.<sup>4</sup>

## Saccharin

A few decades ago, saccharin was seen as an unsafe alternative to sugar and aspartame. During the 1970s, many animal studies linked high saccharin consumption with increased risk of bladder cancer. As a result of these studies, Saccharin was banned in Canada in 1977. In 1980, the World Health Organization's (WHO) International Agency for Research on Cancer (IARC) listed saccharin as a *possible carcinogen in humans*.<sup>6</sup>

The Report on Carcinogens (RoC) is a list of known or reasonably anticipated human carcinogens (cancer causing substances). Saccharin was added to the RoC (second edition) in 1981 as *reasonably anticipated to be a human carcinogen*.<sup>7</sup>

Since then, the carcinogenicity of saccharin has undergone review based on the results of several studies. First, some studies reviewed by the US National Toxicology Program (NTP) found that the results in rats could not be replicated in mice. These studies indicate that the increase in bladder cancers in rats is due to the physiology of the rat urinary system. Another study examined the rates of cancer among diabetics, who are more likely to consume artificial sweeteners. The risk of bladder cancer was found to be no higher among diabetics than in the general population.<sup>8</sup>

As a result of these data, saccharin was removed from the RoC in 2000<sup>7</sup>. The IARC re-evaluated saccharin and removed the *possible carcinogen* label<sup>9</sup>.

## Cyclamates

Cyclamates have been the subject of controversy and were banned in the US in 1969 by the Food and Drug Administration (FDA).<sup>10</sup> They are still banned in the US.<sup>11</sup>

According to the IARC, there is insufficient evidence that cyclamates cause cancer in either humans or animals. Studies reviewed by the IARC indicate that cyclamates are largely excreted in urine unchanged, apart from small amounts which are converted to another chemical and absorbed.<sup>9</sup>

Cyclamates are not listed in the US Report on Carcinogens (RoC).<sup>12</sup>

The Joint FAO (Food and Agriculture Organization)/WHO (World Health Organization) Expert Committee on Food Additives (JECFA) has recommended an ADI (acceptable daily intake) for cyclamates of 11 mg/kg body weight.<sup>13</sup>

Food Standards Australia and New Zealand (FSANZ) has also conducted a safety assessment of cyclamates, and has concluded that this ADI adequately protects consumers. Exposure assessments by FSANZ have found that all people over 12 years of age and 95% of children aged 2-11 consume cyclamates within this ADI. To remedy the over-consumption of the remaining 5% of children, FSANZ reduced the maximum amount of cyclamates allowed in flavoured drinks by almost half.<sup>14</sup>

## Sucralose

The concern for the safety of sucralose is based on the class of chemicals it belongs to, known as organochlorides. Some organochlorides are known to have toxic effects, even in small concentrations. The safety of sucralose has been evaluated, and approved, by the Joint FAO/WHO Expert Committee of Food Additives (JECFA), the FDA, Health Canada and the Scientific Committee on Food of the European Commission (SCF).<sup>15-18</sup> Food Standards Australia New Zealand (FSANZ) has found that dietary intake of sucralose in Australian is within recommended levels.<sup>3</sup>

Sucralose is not listed in the US Report on Carcinogens.<sup>12</sup>

## Acesulphame potassium

Acesulphame potassium (Ace K) is a newer artificial sweetener that is used in many of the new generation soft drinks. Twinsweet™ is the trade name for the combination of Ace K and aspartame. Like other artificial sweeteners, concerns exist about the safety of Ace K. The safety of Ace K has been evaluated, and approved, by the Joint FAO/WHO Expert Committee of Food Additives (JECFA), the FDA, FSANZ and the Scientific Committee on Food of the European Commission (SCF).<sup>19-22</sup> Food Standards Australia and New Zealand (FSANZ) have found that dietary intake of Ace K in Australia is well within recommended levels.<sup>3</sup>

## Steviol glycoside

Steviol glycoside is a natural sweetener derived from the Stevia Rebaudiana plant.<sup>24</sup> It is known as 'Stevia' in Australia. FSANZ conducted a comprehensive risk assessment prior to its approval in 2008 and concluded that it is unlikely to have adverse effects on health at doses up to 11mg/kg body weight.<sup>25</sup>

## Summary

Despite public concern, there is no evidence that artificial sweeteners cause cancer, or unsafe in the doses typically consumed.<sup>23</sup> A recent review concluded that, except for one cancer study with "unusual methodology" which is being reviewed, no other issue about the safety of these artificial sweeteners remains unresolved.<sup>24</sup>

As with all additives, however, presence of sweeteners indicates that food is more heavily processed. Artificial sweeteners are usually present in foods which should not be consumed in large amounts anyway - the extras group of the Australian Guide to Healthy Eating. Concerned parents should try to choose foods sold without a label; unprocessed foods like fruit and vegetables. This will help to prevent overweight and obesity and lead to a reduction in risk for many chronic diseases and cancer.

## References

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