



## MYTHS AND FACTS ABOUT ASPARTAME AND SUCRALOSE: A CRITICAL REVIEW

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### ABSTRACT

Earlier, a clinical research gave a clean chit to the artificial sweeteners, dismissing allegations that these sweeteners induce certain ailments. Aspartame has been found to be safe for human consumption by more than ninety countries worldwide, with FDA officials describing aspartame as “one of the most thoroughly tested and studied food additives the agency have ever approved” and its safety as “clearcut”. The dangers of aspartame are now widely known, but the risks of using sucralose are not documented-until now. When deciding between sucralose and aspartame, it is important to remember that studies conclude that both are safe when consumed with in reasonable limits. However, some consumers reported symptoms which were believed to be associated with these sweeteners. When FDA probed in to the matter, it came with the conclusion that there is no enough medical evidence that suggests a link between these sweeteners and alleged illnesses. Thus, it can be deduced that artificial sweeteners can be safely consumed in moderate doses.

**Keywords:** Aspartame, Sucralose, Splenda, Carcinogenicity, safety.

### INTRODUCTION

#### Aspartame

Aspartame is one of the most common artificial sweeteners in use today. It is an artificial, non-saccharide sweetener used as a sugar substitute in some foods and beverages. It is about 200 times sweeter than sucrose or table sugar. Aspartame was discovered in 1965 by James M. Schlatter, a chemist working for G.D.Searl&company. Schlatter had synthesized aspartame in the course of producing an antiulcer drug candidate and the patent expired in 1992. It was first sold under the brand name Nutra sweet since 2009 it also has been sold under the brand name AminoSweet. It is sold under the trade names Equal, canderel. Aspartame is ingredient of approximately 6,000 consumer foods and beverages sold worldwide, including (but not limited to) diet sodas and other soft drinks. Sweetness of aspartame lasts longer than sucrose<sup>1</sup>, so it is often blended with other artificial sweeteners such as acesulfame potassium. People reported a bitter taste after eating foods made with aspartame.



Figure 1: Aspartame Chemistry

#### Chemistry

Aspartame is a methyl ester of the dipeptide of the natural aminoacids L-aspartic acid and L-phenylalanine. Under strongly acidic or alkaline conditions, aspartame may produce highly toxic methanol after the process of hydrolysis. Like many other peptides, aspartame may

hydrolyze in to its constituent amino acids under conditions of elevated temperature or high pH<sup>2</sup>. This makes aspartame undesirable as a baking sweetener, and prone to degradation in products hosting a high pH, as required for a long shelf life. The stability of aspartame under heating can be improved to some extent by encasing it in fats or in maltodextrin.

#### Sucralose

Discovered in 1976, Sucralose is 600 times sweeter than sugar and does not metabolize to produce energy, thus it does not contain calories. It is heat stable and can be used in cooking and baking or anywhere one would use sugar without losing its sweetness. Sucralose is currently used in more than 30 countries and the FDA approved it in 1998 as a table top sweetener. In 1998, it was approved for limited use, and in 1999, it was given approval for use as a general-purpose sweetener<sup>3</sup>. It is currently found in over 4,500 products, including foods that are cooked or baked. Splenda is a product that contains the artificial sweetener sucralose. The other two ingredients in Splenda are dextrose and maltodextrin, which are used to increase bulk and are carbohydrates that do have calories. Splenda has the added advantage of being stable when heated. The acceptable daily intake (ADI) for sucralose was set at 5 mg/kg of body weight/day. Splenda has no reported aftertaste.

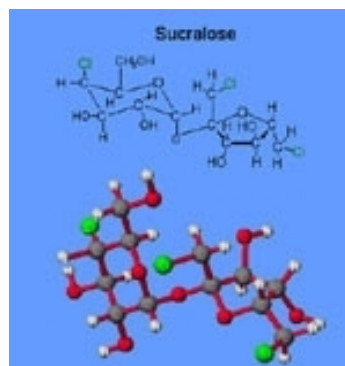


Figure 2: Sucralose Chemistry

## Chemistry

Substituting for three alcohol groups on the sugar molecule with three chlorine atoms creates sucralose<sup>4</sup>. Since, chlorine is something we consume every day in our water and other foods we eat, it is safe in this. The chlorine composition of sucralose makes it particularly dangerous as chlorine is highly reactive element.

## MYTHS ABOUT ASPARTAME

### Does it cause Cancer

**Fact:** Rumors claiming that aspartame causes a number of health problems, including cancer, have been around for many years. Many of these continue to circulate on the Internet. Reviews<sup>10,11</sup> have found no association between aspartame and cancer. These reviews have looked at numerous carcinogenicity studies in animals, epidemiologic studies in humans, as well as in vitro genotoxicity studies. In 1980, the FDA convened a Public Board of Inquiry (PBOI) consisting of independent advisors charged with examining the purported relationship between aspartame and brain cancer. The PBOI concluded aspartame does not cause brain damage<sup>5-9</sup>.

### Does it cause Headache

**Fact:** Headaches are the most common symptom reported by consumers. While one small review noted aspartame is likely one of many dietary triggers of migraines.

### Neurological and Psychiatric Symptoms

**Fact:** Numerous allegations have been made on the Internet and in consumer magazines purporting neurotoxic effects of aspartame leading to neurological or psychiatric symptoms such as seizures, headaches and mood changes<sup>12</sup>. Review of biochemistry of aspartame have found no evidence that the doses consumed lead to neurotoxic effect.

### Weight change and Hunger

**Fact:** Since the caloric contribution of aspartame is negligible, it has been used as a means for weight loss through its role as a sugar substitute. Although there have been claims that aspartame contributes to weight gain and obesity as well as increased hunger, comprehensive reviews on this subject have concluded there is little to no data to support the assertion that aspartame contributes to weight gain.

### Side Effects of Aspartame

There are over 92 different health side effects as adverse reactions and side effects of aspartame include:

**Eye:** decreased vision and/or other eye problems such as: blurring, bright flashes, squiggly lines, tunnel vision, decreased night vision, pain in one or both eyes, decreased tears and trouble with contact lenses.

**Ear:** tinnitus - ringing or buzzing sound and severe intolerance of noise.

**Neurologic:** epileptic seizures, headaches, migraines and (some severe), dizziness Psychological / Psychiatric severe depression, irritability, aggression and anxiety

Aspartame poisoning is commonly misdiagnosed because aspartame symptoms mock textbook 'disease' symptoms, such as Grave's Disease, Alzheimers disease and lyme disease

A 2007 medical review on the subject concluded that "the weight of existing scientific evidence indicates that

aspartame is safe<sup>13</sup> at current levels of consumption as a non-nutritive sweetener". However, because its breakdown products include phenyl alanine, aspartame must be avoided by people with the genetic condition phenyl ketonuria (PKU).

## MYTHS ABOUT SUCRALOSE

### Sucralose is'nt safe because it contains Chlorine

**Fact:** The sucralose molecule contains three atoms of chlorine, which helps intensify the sweetness of sugar and remove the calories. The chlorine in sucralose does not separate in the body, nor does sucralose accumulate in the body. In fact, it is the presence of these chlorine atoms that prevents sucralose from being broken down in the body for energy thus making sucralose non-caloric.

### Sucralose is not safe for Children

**Fact:** Studies have documented that sucralose is safe for use by children of all ages. In fact, sucralose can be part of the solution to the growing problem of childhood obesity by helping to reduce the amount of added sugars children consume daily.

### Sucralose causes various Side Effects including Headaches, Allergies and Gastrointestinal issues

**Fact:** Scientists have conducted many studies on sucralose to determine whether it had any effect on a number of different health conditions including growth and development, risk of cancer, any side effects when consumed, developmental abnormalities such as birth defects and effects on the nervous system. Researchers have concluded that there are no known side effects.

A recent study found that Splenda affected the absorption of medications in rats. They also found that Splenda interferes with the absorption of prescription medications. The only way to know for sure is to perform long-term studies in humans. Unfortunately, this takes time. It can also be dangerous if this is actually happening.

### Women who are Pregnant or Breast Feeding should not consume Sucralose

**Fact:** Research has shown that sucralose does not have harmful effects on pregnant women or their babies. A number of studies required by the U.S. Food and Drug Administration (FDA) were conducted, with results supporting the safety of sucralose during pregnancy and nursing. This includes studies that specifically examined the potential effects of sucralose<sup>14</sup> on embryo-fetal development, which showed no birth defects or any other effect that would compromise normal development. Although sucralose can be safely consumed as part of a healthful prenatal and postnatal diet, any expectant mother should talk to her physician or health care provider about consuming the necessary nutrients to support her and her baby's health throughout pregnancy and infancy.

### Cons of Sucralose

Although sucralose has a structure like sugar and a sugar-like taste, it is not natural.

The inventors of Splenda admit around fifteen percent (15%) of sucralose is absorbed by the body, but they cannot guarantee us (out of this fifteen percent) what amount of chlorine stays in the body and what percent flushes out.

The name sucralose is misleading. The suffix -ose is used to name sugars, not additives. Sucralose sounds very close to sucrose, table sugar, and can be confusing for consumers. A more accurate name for the structure of sucralose was proposed. The name would have been trichlorogalactosucrose, but the FDA did not believe that it was necessary to use this so sucralose was allowed.

#### Side Effects of Sucralose

The presence of chlorine is thought to be the most dangerous component of sucralose. Chlorine is considered a carcinogen.

The alleged symptoms associated with sucralose are gastrointestinal problems (bloating, gas, diarrhea, nausea), skin irritations (rash, hives, redness, itching, swelling), wheezing, cough, runny nose, chest pains, palpitations, anxiety, anger, mood swings, depression, and itchy eyes. Splenda can adversely affect the body in several ways because it is a chemical substance and not natural sugar.

#### CONCLUSION

By going through the above myths and facts about Aspartame and Sucralose each of them have their own advantages and disadvantages. Even though Sucralose has a slightly upper hand over aspartame the only limitation of sucralose is its cost. It is almost 200 times costlier than aspartame. Hence one should take this into consideration before using the above sweetening agents.

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