

ASPARTAME: SWEET OR BITTER?

The information explosion in the science of nutrition very often creates the impression that available information is contradictory. Consequently, it is no longer easy to distinguish between fact, misinformation and fiction. The Nutrition Information Centre of the University of Stellenbosch (NICUS) was established to act as a reliable and independent source of nutrition information.

Aspartame is one of the most widely used artificial sweeteners and can be found in products like Canderel, Equal, Sweetex Natriblend, Nutrasweet, Natreen and Pick and Pay Sweetener as well as in diet cooldrinks and other “diet products”. The main purpose of artificial sweeteners, like aspartame, is to provide sweetness to foods and beverages without adding to their energy content or increasing blood glucose concentration. These products are widely used in the diabetic and slimming markets. They are incorporated in the diets of many people, but they do not contribute meaningfully to their diets, since they are consumed in small amounts.

Aspartame is 200 times as sweet as sugar (sucrose), enhances and intensifies flavours, particularly citrus and other fruits, and has no after taste. Aspartame provides 4kCal/g in energy; however, because of the intense sweetness of aspartame, the amount of energy derived from it is negligible.

Composition of aspartame:

Aspartame is made up of components found naturally in common foods. Upon digestion, it is completely metabolized to two amino acids (building blocks of protein) and methanol (approximately 50% phenylalanine, 40% aspartic acid and 10% methanol). These amino acids are derived from dietary sources (such as meats, milk, fruit and vegetables) and are consumed in much larger quantities as part of a normal balanced diet.

Phenylalanine is one of the ten amino acids that are considered to be essential in the human diet, since it cannot be synthesized in the body, and therefore must be present in sufficient amounts in the daily diet to prevent deficiencies. The estimated requirement for phenylalanine is 14mg/kg/day for adults. The average adult diet can provide anything from 80g – 140g of protein (plant and animal sources) per day. This results in an approximate phenylalanine intake of 3 – 5g per day. A person weighing 60kg and eating a typical well-balanced, moderate to high protein diet is therefore consuming between 50mg and 84mg of phenylalanine per kg of body weight daily.

Aspartic acid is considered as a non-essential amino acid, because it can be synthesized in the body from other amino acids. Essential and nonessential amino acids are utilised by the body to build proteins, promote growth and maintain bodily functions. When aspartame is digested, the body handles these amino acids in the same way as those in foods that we eat every day.

Is consumption of aspartame associated with ill health or “health problems”?

It is imperative that we, individually and collectively, guard against any adverse effects that may arise from the consumption of substances, or indeed from the excessive use of nutrients themselves, that find their way into our daily diet by accident or by design. It is also very unfortunate that from time to time unsubstantiated reports based on no or anecdotal evidence is published in the media creating fear and confusion among consumers. In the case of aspartame, such anecdotal and ill-founded reports include:

◆ Epileptic seizures:

Extensive studies have failed to demonstrate an association between epileptic seizures in children and adults and the ingestion of aspartame even in large dosages of 50mg/kg.

◆ **Multiple Sclerosis:**

The senior medical adviser of the Multiple Sclerosis Foundation in the USA, having reviewed the available scientific evidence, has categorically denied any association between the consumption of aspartame and the disease. Also, the disease has existed long before aspartame came onto the market.

◆ **Hyperactivity and attention deficit disorder in children:**

Several studies in children have shown no relationship between aggressive, hyperactive or cognitive function problems and aspartame.

◆ **Depression, headache or behavioral functioning in adults:**

Large daily doses (600mg/day) of aspartame had no effect on the brain's psychological- and physiological functions, or behavioral functioning in healthy adults. However, one study (the results of which have not been confirmed) in a small number of subjects reported a worsening in depression when depressed patients did consume aspartame.

◆ **Hypersensitive- and allergic reactions:**

There is no scientific basis for an association between aspartame and allergic reactions or hypersensitivity reactions. Subjects who believed themselves to be allergic to aspartame did not have reproducible reactions to it. It should however be borne in mind that individuals who have a history of allergy should be particularly careful *at all times*, when they introduce any new foods or substances in their diet.

◆ **Brain tumors:**

There is no known association between an increased incidence of brain tumors and the intake of aspartame. The Food and Drug Administration (FDA) of the USA "stands behind its original approval decision (*on the safety of aspartame*), but the Agency remains ready to act, if credible scientific evidence (*to the contrary*) is presented to it – as would be the case for any product approved by the FDA" (*FDA official statement on aspartame*).

In October 2000, the French Consumer Affairs Ministry asked the French Food Safety Agency (AFSSA) to form an expert committee to study any possible link between exposure to aspartame and the occurrence of brain tumors. On the basis of a comprehensive analysis of the current scientific data, the expert committee concluded that there is no relationship between aspartame consumption and brain tumors in humans or animals.

On balance, therefore, there is an almost total lack of credible scientific evidence that proves that aspartame is not safe for human consumption. Extensive product research has been done and the controlling bodies all over the world have approved the product. Until such time that there is evidence of health risks associated with the consumption of aspartame, it can be considered as safe.

According to the World Health Organization, the estimated amount of aspartame that can be ingested daily over a lifetime without appreciable risk for a healthy adult is 0-40 mg/kg/day (it is considered that a 60kg adult consuming 2400 mg aspartame per day for life, which is equal to 12 cans of diet soft drink, will have no adverse effects). Daily intake of aspartame in the United States is approximately 3mg/kg/day, Canada 6 mg/kg/day, UK 2 mg/kg/day and Germany 3 mg/kg/day (data not available in South Africa.) For a person weighing 60kg this translates to an intake of approximately 180-360 mg per day.

Health myths about aspartame uncovered:

- Does aspartame contain methanol?

Aspartame itself does not contain methanol. A very small amount of methanol (10% by weight) is formed when aspartame is digested. The amount of methanol therefore produced from aspartame

is very small and, in general, it is less than the amounts found in many fruits and vegetables. The body converts the methanol to formaldehyde, which is instantly converted to formic acid. Formic acid is then quickly eliminated by the body in the form of carbon dioxide and water.

- Is aspartame safe during pregnancy?

There have been no reports of adverse fetal or maternal effects from the use of aspartame, either in laboratory animals or humans. Nevertheless and as a general rule, it is always safer to avoid an excessive intake of any nutrient or substance during pregnancy.

- Is aspartame safe in phenylketonuria?

People with phenylketonuria (PKU) should not consume aspartame (or any other sources of phenylalanine) because of its phenylalanine content. PKU is a rare hereditary metabolic disorder. Such individuals have elevated blood levels of phenylalanine, since their body has insufficient enzymes to metabolise phenylalanine. In these individuals, therefore phenylalanine intake is always restricted as part of their treatment.

- Is aspartame safe in diabetes?

Sweeteners can be considered as a convenient alternative to sugar in the diabetic diet, since it allows them to enjoy sweetened foods without affecting their control of diabetes. The position of the American Diabetes Association is that aspartame is safe and can be included in a diabetic meal plan. There are no reports to indicate that the moderate use of aspartame by these individuals is not safe. Care should be taken regarding commercially available “diabetic” products where sugar is substituted for artificial sweeteners, as the fat content might still be high so to provide a more palatable product.

- Will aspartame increase one’s appetite or induce carbohydrate cravings?

Available data indicate that participation in a weight management program, based on a well balanced diet, which included aspartame, resulted in long-term maintenance of reduced body weight. Aspartame was not associated with an increase in hunger at any time.

GUIDELINES FOR USING ASPARTAME:

- ◆ As part of a healthy balanced diet, moderate amounts of aspartame can provide a little sweetness without added energy.
- ◆ When aspartame is heated for long periods, loss of sweetness may occur. Rather add the sweetener at the end of the cooking process when the food is removed from the heat.
- ◆ Always use a variety of artificial sweeteners and do not use a particular one for long periods. Read the labels of products to identify the sweetener that has been used.
- ◆ People diagnosed with the metabolic disorder, phenylketonuria, must restrict their intake of phenylalanine from all dietary sources as their treatment requires them to do.
- ◆ As a general rule and as a precautionary measure, individuals with a history of allergy should be careful when introducing any new foods or substances in their diet.
- ◆ Individuals who suffer from depression should consult their doctors before they introduce aspartame or alter its current intake in their diets.

For further, personal and more detailed information, please contact NICUS or a dietitian registered with the Health Professions Council of South Africa (previously known as the South African Medical and Dental Council).

References from the scientific literature used to compile this document are available on request.

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