A preference for sweetness and a dislike for bitter taste is an inborn human characteristic. Food acceptance, particularly in young children, is often influenced by sweet taste. Carbohydrates, including sugar, alongside fat, are the main source of energy within our diets, contributing to our overall calorie intake. Our lifestyles are becoming progressively more inactive, and with obesity rates rising, many consumers need to make lower calorie food choices. Low calorie sweeteners offer one possible way to achieve this. However, some people are unsure about their role in the diet and have concerns about their safety.

What are low calorie sweeteners?
Low calorie sweeteners provide a sweet taste to food or drinks with the benefit of little or no calories. Their intensely sweet taste means that they can be used in food products at low concentrations, providing fewer calories compared to sugar. Every low calorie sweetener has its own unique taste profile, characteristics and uses. Sweeteners can be used alone or in combination to meet specific taste requirements for a food or drink. They can be added to foods or drinks (in tea, coffee or cooking) or used as an ingredient in products such as soft drinks, chewing gum, confectionery, frozen desserts, dessert mixes, yogurts and other puddings. They are also used to make medicines more palatable.

Low calorie sweeteners can be divided into two main categories: *Intense sweeteners* and *bulk sweeteners*.

**Intense sweeteners**
- These taste much sweeter than sugar and provide virtually no calories because of the tiny amounts used.
- The most commonly used in the UK are aspartame, acesulfame K (ace-K), saccharin and sucralose.
- They are most often used in soft drinks, low calorie yogurts, chewing gum and as table top sweeteners.
**Bulk sweeteners**

- These are used in foods where volume (as would be provided by sugar) is required as well as sweetness.
- They are often sugar alcohols and examples are sorbitol, mannitol, xylitol, hydrogenated glucose syrup, and isomalt.
- They provide approximately 2 kcal/g compared to 4 kcal/g for sugar (sucrose).
- They are not as sweet as sucrose, with the exception of isomalt.
- They are used mainly in chewing gum and sugar-free confectionery.
- Excessive consumption can lead to gastrointestinal disturbances.

**Do foods and drinks have to specify whether they contain sweeteners on their labels?**

By law, the addition of low calorie sweeteners to food or drink products must be clearly labelled as ‘with sweetener(s)’ on the packaging. Sweeteners will also be listed by name or E number in the ingredients list where provided.

**What is an ‘E number’?**

Food additives are given an ‘E number’ when they are authorised and regarded as safe for use in Europe. The ‘E’ reference is only given to additives that are demonstrated to be harmless and useful. This approval is monitored, reviewed and amended in light of any new scientific data. Food additives must be included either by name or by an E number in the ingredient list.

**How is the safety of low calorie sweeteners assessed?**

All low calorie sweeteners have to undergo rigorous safety testing before being approved for human consumption. Within Europe, the European Food Safety Authority (EFSA) is responsible for the provision of scientific advice and technical support for the Community’s legislation and policies on food and food safety. Food ingredient manufacturers have to provide technical details about the ingredient and comprehensive data from safety studies showing that the sweetener in question does not cause any adverse effects, including cancer, that it does not affect reproduction, that it is not stored within the body or metabolised into other potentially unsafe products, and that it does not cause allergic reactions. Part of the approval process for each sweetener entails setting an **Acceptable Daily Intake (ADI)** level.

*The ADI is the estimated amount per kilogram of body weight that a person can consume, on average, every day over a lifetime without risk (it is usually 100 times less
than the maximum level at which no observable effect occurs in detailed studies in animals).

Once EFSA has published its scientific opinion, the European Commission drafts a proposal for authorisation of the use of the specific low calorie sweetener within foods and drinks on the European market. Member state authorities within the European Council and the European Parliament are then consulted and approval is given only if the regulators are fully satisfied that the product is safe and has a role in the food supply.

What is the average consumption of sweeteners in Europe?
The average intake of low calorie sweeteners amongst adults is well below Acceptable Daily Intake (ADI) levels\(^1\). Studies assessing intakes of low calorie sweeteners in different countries have shown the average and highest intakes (95\(^{th}\) percentile) amongst adults of ace-K, aspartame, cyclamate, saccharin and sucralose to be well below ADI levels \(^2\).

What are the potential benefits of using low calorie sweeteners?
The use of low calorie sweeteners is suggested to offer benefits in relation to weight management, diabetes management and dental health:

**Weight management**
Sugar provides a sweet taste to foods and drinks and contributes 4 kcal/g, whereas low calorie sweeteners provide sweetness with little or no calories. Research indicates that the use of low-calorie sweeteners can contribute to weight management\(^3,4\) but we do not yet have long term randomised controlled trials demonstrating this effect.

**Diabetes**
Low calorie sweeteners do not influence insulin or blood glucose levels and so can be useful in the diets of people with diabetes. They may also help people with type 2 diabetes to control their weight.

**Dental health**
When sugar-sweetened foods and drinks are consumed frequently, bacteria on the tooth surface convert the sugar into acid and cause the local pH to fall. Over time, especially if regular brushing with fluoride is not carried out, this can eventually wear away the surface of the enamel and cause dental cavities. Low calorie sweeteners are non-fermentable and so do not contribute to tooth decay.
Are low calorie sweeteners safe for children to consume?
Low calorie sweeteners are safe for children to consume and, as with adults, typical daily consumption from foods and drinks is well below the ADI. However, it is important to remember that young children need sufficient calories to support their rapid growth and development, and that low calorie foods and drinks are not always appropriate, particularly for children of pre-school age.

Are low calorie sweeteners safe for pregnant women to consume?
Consumption of approved low calorie sweeteners below the ADI level is safe during pregnancy. There is no evidence of any risks to the mother or fetus.

Are there any individuals who cannot consume low calorie sweeteners?
People with the rare genetic condition phenylketonuria (PKU) have to restrict their intake of the essential amino acid phenylalanine from any source. This protein component is found in many foods naturally and is also a component of the low calorie sweetener aspartame. To help suffers of this condition monitor their intake, all foods, drinks and healthcare products that contain aspartame must, by law, clearly state on the label that they contain a source of phenylalanine. PKU does not go undiagnosed because of the severity of this condition and is diagnosed at birth.

References

This factsheet has been prepared by the British Nutrition Foundation (BNF) in association with the BNF conference ‘The science of low calorie sweeteners – separating fact from fiction’ held in London on 15th April 2010.