

LOW CALORIE SWEETENERS



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The liking for sweet items is universal. Unfortunately, excessive consumption of sugars may have health consequences. The information in this article covers both sugars and low calorie sweeteners.

Humans have an innate liking for sweet things and the liking for sweet items in babies is well known and also universal. This liking for sweet items is often lost as people grow to adulthood, but regained as people age (1).

Human taste buds are sensitive to different flavours. There are five basic tastes:

- **Sweet** - sugar which is associated with calorie rich foods
- **Umami** - soy which is associated with amino acids and hence protein rich foods
- **Sour** - lemons associated with potentially poisonous items
- **Bitter** - coffee also associated with potentially poisonous items
- **Salt** - table salt associated with salt and hence the correct electrolyte balance (2)

Thus, it is considered by many anthropologists that this liking for sweet-ness equates with a past desire for foods that are often more calorie dense. Unfortunately for some, this liking for sweet items can mean that some take sugars in excess and this is associated with health issues such as obesity (which is associated with Type 2 diabetes and coronary heart disease) as well as dental caries (3).

SUGARS

Sugars are forms of carbohydrate which

are naturally found in many foods. However, sugars are added to lots of foods such as cakes, pastries, soft drinks, confectionery, ketchups and sauces, desserts like ice cream, as well as in some savoury items. The range of types of sugar which are added to food-stuff include the following:

- **Glucose** - a monosaccharide found in starches, plus maltose.
- **Galactose** - a monosaccharide found in lactose.
- **Fructose** - a monosaccharide from fruits.
- **Table sugar or sucrose** - a disaccharide which consists of 50 percent glucose and 50 percent fructose.
- **Brown sugar** - mainly sucrose with a small amount of molasses to give colour and flavour
- **Lactose** - a disaccharide which consists of glucose and galactose.
- **Maltose** - a disaccharide consisting of two glucose monosaccharides.
- **Honey** - contains a mixture of fructose and glucose and is thus similar in composition to sucrose.
- **Maple syrup** - contains 66 percent sucrose and the rest is maple sap which gives flavor.
- **Molasses** - contains a mixture of sucrose, glucose and fructose.
- **Agave sugar** - derived from cacti containing 70 to 100 percent fructose and 0 to 30 percent glucose. ▶

As a Registered Dietitian, Mabel is enthusiastic about all aspects of nutrition. She is very interested in the use of low calorie sweeteners, especially with diabetes management. Mabel has researched and been involved in training on this subject.

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- **Corn syrup** - made by hydrolysing corn and contains 40 to 65 percent fructose and 35 to 60 percent glucose. It tastes six times sweeter than sucrose.
- **Rice syrup** - consists of 45 percent maltose, three percent glucose and 52 percent maltotriose.
- **Hydrolysed starch** - usually corn syrup which has been broken down by enzymes.
- **Invert sugar** - made by splitting sucrose into the two component monosaccharides and has a sweeter taste than sugar.

SUGAR CONSUMPTION

It is considered that added sugars should not make up more than 10 percent of the energy requirements each day. While there are variations, in general, this is 70g for men and 50g for women per day of added sugar which is referred to as extrinsic sugar.

The Guideline Daily Amounts for total sugar are 90g per day for women and 120g per day for men, as well as 85g per day for children age five to 10 years of age. These figures include both intrinsic and extrinsic sugars (4).

At present the UK population take in excess of this amount of sugar. The WHO's current recommendation, from 2002, is that sugars should make up less than 10 percent of total energy intake per day, which is in line with that advocated in the UK. New draft guidelines from the WHO proposes that sugars should be less than 10 percent of total energy intake per day. It further suggests that a reduction to below five percent of total energy intake per day would have additional benefits (5). This recommended reduction in sugar consumption hit the headlines in newspapers with 'Sugar is the new tobacco' (6).

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CONDITIONS WHERE A REDUCTION OF SUGARS IS HELPFUL

In the EU, 17 percent of the adult population is obese and 52 percent overweight, which is linked

with numerous health issues such as Type 2 diabetes, coronary heart disease, stroke, raised blood pressure, joint and muscle disorders (especially osteoarthritis) and some cancers (8). However, in the knowledge that humans have a liking for sugar, alternatives, such as sweeteners, can be helpful. There are two groups of sweeteners: intense low calorie sweeteners and alternatives to sucrose which still provide calories.

LOW CALORIE SWEETENERS

Some low calorie sweeteners, such as saccharin, have been used for over 100 years. Today, all low calorie sweeteners are covered by EU legislation which includes their usage in products and labeling requirements. Low calorie sweeteners are also given an E number which is an indication that they have undergone rigorous testing (9).

While at times there is controversy regarding all types of additives, including low calorie sweeteners, a recent conference organised by the International Sweeteners Association held in 2014 looked at all aspects and concluded there were no safety issues (10).

Low calorie sweeteners include the following:

- **Saccharin E954** - discovered in 1879 and used for many years used in foods. It is up to 500 times sweeter than sugar. It is used in sweeteners for home consumption and in drinks, desserts and confectionery. Some people experience a bitter after taste. It is not metabolised and excreted unchanged.
- **Acetosulfame E950** - up to 200 times sweeter than sugar. It is used in sweeteners for home consumption and in drinks, oral care products and is suitable for home baking as it is heat stable. It is not metabolised and excreted unchanged.
- **Aspartame E951** - consists of 2 amino acids phenylalanine and aspartic acid which are naturally found in foods. Due to the phenylalanine content this is indicated on food labels for information for those with phenylketonuria. It is widely used particularly in soft drinks, but, ▶

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as it is not stable at high temperatures, it is not used in baked items. It is broken down during digestion into the component amino acids.

- **Cyclamate E952** - is up to 50 times sweeter than sugar. It is used in sweeteners for home consumption, soft drinks, salad dressings and chewing gums. As it is stable at high temperatures, it is well used in baked items. It is not metabolised and excreted unchanged.
- **Sucralose E955** - is derived from sugar and is up to 600 times sweeter. It is used in sweeteners for home consumption, baked items, ice creams and dairy desserts and confectionery. It is not metabolised and excreted unchanged.
- **Steviol Glycosides E960** - a new sweetener only approved in the EU since 2011. It is derived from a plant traditionally grown in South America which has intensely sweet tasting leaves. It is up to 300 times sweeter than sugar. It is used in sweeteners for home consumption, baked items, ice creams and dairy desserts and confectionery. It is produced in a granular form which can be attractive for some consumers. As it is derived from plants it is often regarded as 'natural'. It is broken down to steviol in the gut and then excreted in the urine.

BENEFITS OF LOW CALORIE SWEETENERS

Low calorie sweeteners can be useful in reducing the energy content of the diet without compromising the desire for something sweet to eat or drink. This is particularly helpful in the diets of those who are overweight or obese (11).

For those with diabetes, especially Type 2 diabetes, weight loss is commonly an important aspect of the management and, again, low calorie sweeteners and products containing them can be helpful.

Individuals with Type 1 diabetes who are carbohydrate counting, can find that low calorie sweeteners and foods and drinks containing them can be useful in moderating carbohydrate levels and thus inducing a lower blood glucose level (12). For women who are pregnant (including those who have gestational diabetes), low calorie sweeteners and products such as drinks and desserts containing them, can be useful in managing weight gain, plus dealing with cravings for sweet items (13).

SUMMARY

Low calorie sweeteners can be especially useful in assisting individuals to manage a calorie and carbohydrate reduction in their diets. Therefore, they will be of particular help in obesity and diabetes management.

It is helpful if dietitians can provide advice on the use of sweeteners to various groups, including where they may not be appropriate, for example, with those suffering from phenylketonuria.

Dietitians can provide information on the use of sweeteners in various products, what to look for on labels, usage in the home of low calorie sweeteners, calorie counting and carbohydrate management, what the E numbers mean and a reassurance regarding the safety of products.

References

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Questions relating to: *Low calorie sweeteners*

Type your answers below and then **print for your records** or print and complete answers by hand.

Q.1	The sensation of taste in humans can be categorised in five headings. Please explain all five.
A	
Q.2	What is a monosaccharide? Please give examples in your answer of the types of monosaccharides added to foodstuffs.
A	
Q.3	What other types of sugars are found in foodstuffs?
A	
Q.4	What are the current UK recommendations and guidelines on sugar intakes?
A	
Q.5	Explain the benefits of low calorie sweeteners.
A	
Q.6	Describe two low calorie sweeteners and their uses.
A	
Q.7	The oldest artificial sweetener is saccharin. Describe what it is and how it was discovered.
A	
Q.8	Give details of the latest plant-derived low-calorie sweetener to come onto the market.
A	
Q.9	What role can the dietitian play in managing a patient's sugar intake in order to maintain calorie and carbohydrate reduction?
A	

Please type additional notes here . . .