

Which sweetener?

With such a variety of sweeteners available these days, you need to be well informed to know what is natural and what is not and whether *any* added sweetener is actually good for your health.

Jo Immig reports.



David William Dufty released his seminal book *Sugar Blues* in 1975, which posed the controversial argument that refined sugar is an addictive and dangerous drug that causes countless diseases. The book was a bestseller and, not surprisingly, was criticised by the powerful sugar industry and processed food manufacturers, especially the sugary beverage makers, at the time.

Fast forward to the present day and amidst growing rates of obesity and a diabetes epidemic, particularly amongst children, another groundbreaking book on the dangers of sugar has been published: David Gillespie's *Sweet Poison: why sugar makes us fat*.

According to Gillespie, two decades ago one in 14 adult Australians were obese; that figure is now one in five. Over a similar period, refined sugar intake has also increased dramatically. Here is a brief look at the complex world of sweeteners and what they might be doing to your health.

Is sugar bad for you?

Sweet is one of the five basic tastes that occur naturally along with sour, salty, bitter and 'umami' or savouriness. Eastern health modalities such as Chinese medicine maintain that as long as all the tastes are balanced, good health will be maintained. Naturally occurring sugars found in wholefoods such as fruits, vegetables and grains are simple carbohydrates that break down in the body to form glucose, which is fundamental to all living cells as the primary source of energy and metabolism.

Natural sugars in wholefoods are balanced with minerals, vitamins and fibre, which aid the sugar's assimilation into the body in a constant way. Conversely, *refined* and *concentrated* sugars pass quickly into the bloodstream causing a spike in blood sugar, which taxes the body's organs and leads to disease. Research indicates that sugar is addictive, as the body doesn't seem to have an off switch for it. Excess sugar intake has been associated with a range of health impacts including obesity, diabetes,

hypoglycaemia, depressed immune function, heart disease, tooth decay and periodontal disease, yeast infections and a range of emotional disturbances such as anxiety and moodiness.

Refined sugar

White sugar, which many people use, is 99 per cent sucrose and is chemically refined from cane sugar or sugar beets. During refinement the cane sugar syrup is separated into sucrose and molasses of different strengths. Sucrose is composed of two simple monosaccharide sugars – fructose and glucose – joined together to form a crystalline disaccharide.

When sugar is refined, the process purifies the sucrose but, as in table salt production, processing also removes essential minerals, vitamins and fibre that the body uses to assimilate the energy from the sugar in a steady way.

The best parts of sugar end up as by-products such as blackstrap molasses, which contains up to 70 per cent sugar but retains essential vitamins and minerals.

Raw cane sugar, far from its wholesome image, is just slightly less refined white sugar, while brown sugar is usually just white sugar with molasses added to it for colour and flavour. Castor sugar is just very fine white sugar, while confectioner's sugar or icing is fine white sugar with cornstarch added to it.

Whole sugar

Not all sugar is highly refined. Many traditional cultures make unrefined sugar from plants including sugar cane, coconut, sago and date palm using simple methods of crushing and evaporation. Unrefined sugars you might have seen on the shelves include muscovado (or Barbados sugar), sucanat, rapadura, jaggery or gur, depending on the country of origin.

Unrefined sugars do not undergo chemical refinement and are considered more nutritious because of the mineral, vitamin and fibre content they retain. Unrefined sugars are becoming popular substitutes for refined sugar, but don't be fooled – the overall sugar intake in the diet still needs to be considered.

Fructose

Fructose is a sugar that's getting a lot of bad press. Why? Fructose is a naturally

Artificial sweeteners

Acesulfame potassium (<i>Acesulfame K</i> or <i>Ace K</i>)	Synthesised	Often blended with other artificial sweeteners, e.g. aspartame and sucralose. Health concerns.
Aspartame	Synthesised	People with PKU must avoid, as phenylalanine is a metabolite. Formaldehyde is a metabolite. Highly controversial regarding health concerns esp. cancer and neurotoxicity.
Cyclamate	Synthesised	Often used in combination with saccharin. Highly controversial regarding health concerns, esp. cancer.
Neotame	Synthesised	Newer to the market. Similar structure to aspartame. Made by the same company as aspartame. Up to 13,000 times sweeter than sugar. Formaldehyde is a metabolite.
Sucralose	Synthesised	A chlorinated product. Bulking agents maltodextrin and glucose (dextrose) made from corn often added. Health concerns.
Saccharin	Synthesised	Often blended with other artificial sweeteners such as aspartame. Can trigger release of insulin. Those with 'sulfa' allergy should avoid. Highly controversial regarding health concerns, esp. cancer.

occurring sugar in wholefoods and it's the other half of sucrose (sugar) along with glucose.

While our bodies are used to taking in small amounts of fructose balanced with glucose from natural sources such as whole fruits and vegetables, the consumption of *isolated* and *refined* fructose has increased dramatically and herein lies the problem. Unfortunately specific labelling of the ratio of types of sugars in substitutes is not required, so there's no way of knowing exactly how much fructose you're taking in.

Fructose is concentrated in fruit juices and dried fruits and also turns up in sugar substitutes such as isomaltulose, tagatose or sorbitol.

This is a real concern for people who must avoid fructose because they have metabolic fructose disorders or fructose malabsorption. Like lactose (milk sugar) intolerance, which many people have, fructose malabsorption impairs a person's ability to process fructose and results in symptoms such as bloating, cramps and abdominal pain.

Most fructose is metabolised in the liver. When too much fructose enters the liver and it can't process it quickly enough, it makes fats instead and sends them into the bloodstream as triglycerides. High blood triglycerides are a risk factor for heart disease and may lead to other problems such as insulin resistance.

Which sweetener?

Sweetener isn't just sugar anymore. The sheer variety of sweeteners – artificial and natural – and the number of products

they're added to is mind-boggling.

The explosion of 'diet' and 'lite' products made with no- or low-calorie sweeteners has ironically come about, in part, due to the over consumption of sugar. While these sugar substitutes might not have the calories, there are other concerns to weigh up (See Tables).

It's a relatively new phenomenon that so many things in our diet come with *added* sweetener. Gillespie points out in *Sweet Poison* that in the space of about 150 years, we've gone from eating no added sugar to eating more than a kilogram a week. Just read the labels and you'll be shocked – bread, sauces, soups, yoghurts and many other processed foods often contain added sugar.

Sugar substitutes

Food manufacturers use sugar substitutes, such as high fructose corn syrup or polyols (See Tables) because they're cheap and add the sweet flavour to foods that many have become accustomed to. Some manufacturers may be exploiting the diet market because some sugar substitutes offer fewer calories than natural sweeteners do.

Sugar substitutes fall into three broad camps: They are either naturally derived sweeteners, although some natural sweeteners, such as cane sugar, still undergo various levels of chemical processing; synthetically processed sugar alcohols and substitutes of natural origin, such as xylitol; and artificial sweeteners that are new compounds synthesised in the laboratory. (See Tables)

There is certainly a lot of controversy concerning the potential health impacts of artificial sweeteners such as aspartame

and saccharin. There's also a grey area with the newer chemically processed sugar substitutes such as the sugar alcohols called polyols because it's often difficult to determine what they are made from and whether genetic engineering has been used in their manufacture.

Xylitol, for instance, is a sugar alcohol that occurs in small amounts in berries, mushrooms, fruits and vegetables. It offers about the same sweetness as sucrose but has 40 per cent fewer calories. While some manufacturers claim that xylitol is processed from birch trees, others say it comes from beet or corn plants and is largely produced in China. There is some concern that the corn sources could be genetically engineered.

Some natural sweeteners, such as agave syrup from Mexico, are under question because of the production methods used to make them as well as accusations that they might be watered down with other sweeteners such as corn syrup.

There's no easy answer to the question: 'which sugar substitute is healthy and safe?' What's safe for one person could be poison for another and just because it's 'naturally derived' doesn't mean it's healthy. You also need to question the carbon footprint of importing many of the sugar substitutes, which have travelled large distances.

The most useful information about added sweeteners, it would seem, is to cut them out of your diet wherever possible. This means steering clear of processed and concentrated foods and eating more wholefoods. If you must use a sweetener, choose one that's certified organic and has

Synthetically processed sweeteners from natural sources

<p>POLYOLS Erythritol Isomalt Lactitol Mannitol Maltitol Polydextrose Sorbitol Xylitol</p>	<p>Formed by the hydrogenation of various sugars such as glucose and sucrose.</p>	<p>Carbohydrates</p>	<p>Called sugar alcohols they are used as sugar replacers. Often found in 'sugar free' or 'no added sugar' products. Less calories and don't promote dental decay. Often combined with artificial sweeteners. Excessive consumption can cause gastrointestinal problems such as gas and bloating and can have a laxative effect.</p>
<p>Isomalulose</p>	<p>Manufactured from sucrose using enzymes.</p>	<p>Glucose and fructose</p>	<p>People with metabolic fructose disorders or fructose malabsorption should avoid.</p>
<p>Tagatose</p>	<p>Synthesised from lactose.</p>	<p>Similar structure to fructose</p>	<p>People with metabolic fructose disorders or fructose malabsorption should avoid.</p>

Naturally derived sweeteners

Agave nectar (syrup)*

Sap extracted from the core of certain Agave plants. It's filtered, heated and treated with enzymes to turn the starch into fructose. From Mexico
Up to 70% fructose, glucose, high fructose content
Some may be 'watered down' with corn syrup
* Controversy surrounding production methods and nutritional claims.

Amazake

Koji (*Aspergillus oryzae*) is added to wholegrain rice and fermented. Traditional Japanese drink
Up to 40% maltose, glucose
Although a drink, it can be used as a sweetening agent

Barley malt syrup

Made by soaking and sprouting barley to make malt, kiln roasted and cooked using the grains' own enzymes
65% maltose, 30% complex carbohydrate, 3% protein
Malty flavour used in beer making and cakes
Not good for the gluten intolerant

Corn syrup

Chemically processed
Made from adding the enzyme alpha amylase or acid to cornstarch and water. Mostly glucose (dextrose) and other sugars depending on the type of corn syrup. Also called glucose or dextrose syrup
Can be dark or light, which alters the sugar content and may have added preservatives

Fruit syrups

Concentrated juice made from fruits such as pear and apple
70% plus sucrose
Far more concentrated and sweeter than fruit

High fructose corn syrup (HFCS)

Chemically processed
Made from corn syrups that are processed with enzymes* to convert glucose into fructose
Some enzymes may be genetically engineered
Up to 90% fructose, glucose
Also called maize syrup, isoglucose, glucose-fructose syrup
Widely used in processed foods. High fructose. Health impacts including obesity

Honey

Made by bees from nectar in flowers
Approx 38% fructose, 30% glucose, 7% maltose, trace amounts of vitamins and minerals, antioxidants
Various types: pasteurised, raw, whipped, strained and filtered
Check to ensure other sugars haven't been added to 'stretch' the honey

Maple syrup

The concentrated sap of maple trees is tapped and heat treated
65% sucrose, rich in trace minerals
Takes 40 litres of sap to make 1 litre of syrup
Watch out for imitations containing other sugars and flavours
Comes from Canada

Rice syrup

Made from cooking rice flour or

brown rich starch with enzymes
45% maltose, 3% glucose, 50% soluble complex carbohydrates
Fructose and sucrose free
Enzymes could be synthetic or genetically engineered in conventional products

Stevia

A South American herb *Stevia rebaudiana* used for hundreds of years for its sweet leaves and flower buds that are dried and refined
Stevioside up to 300 times the sweetness of sugar with negligible calories
Available in powder and liquid form. A little goes a long way
Some controversy but many studies indicate its safety for human consumption
Used in Japan since 1970
Subject to controversial actions by the USA FDA to limit its availability

