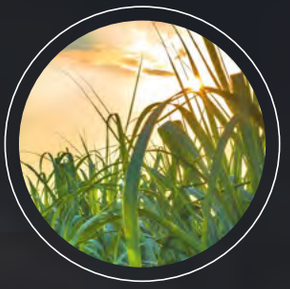
the Sugar association



How well do you know SUGAR?

THERE'S MORE TO SUGAR THAN YOU MIGHT THINK

SUGAR.ORG

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How Well Do You Know Sugar?
By Sugar Association, Inc., 2019
Washington, DC
SECOND EDITION

THE BASICS

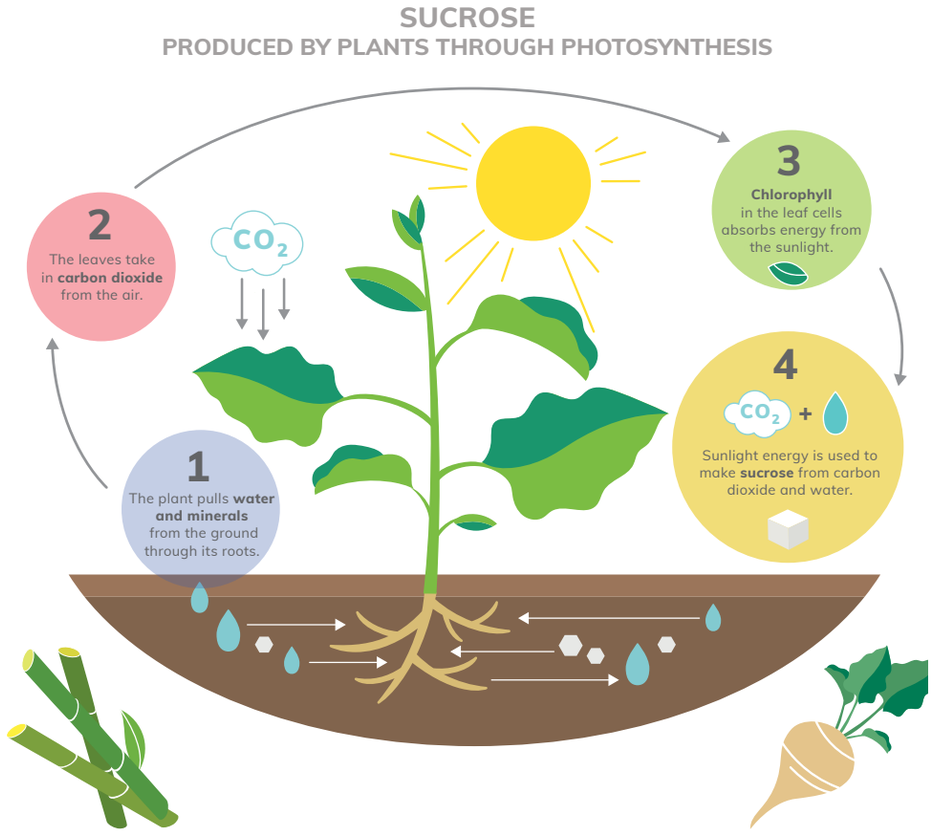
What Is Sugar?

A Closer Look at Its Origin and Structure

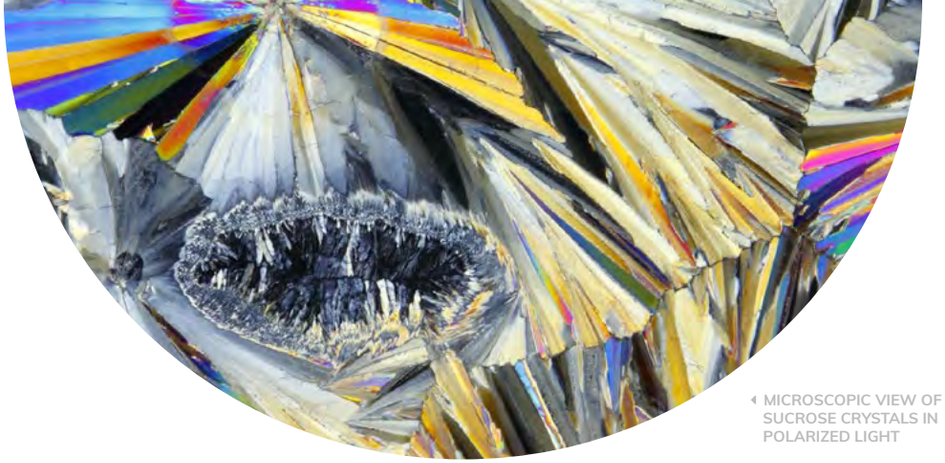
You may have heard the term “sucrose” at one point or another—but what is that, really? While it might sound overly technical or even man-made, sucrose is simply the chemical name for sugar, the simple carbohydrate we know and love that is produced naturally in all plants, including fruits, vegetables and even nuts.

Brought to You by Nature

All green plants make sugar or sucrose (sugar’s molecular name) through photosynthesis, the process plants use to transform the sun’s energy into food.



Of all plant types, sugar beets and sugar cane make the greatest quantities of sugar, which is why they are the most efficient choices from which to extract sugar. The sugar that’s extracted from sugar beet or sugar cane plants is identical to the sugar that’s still found intact when you bite into fruits and vegetables. Sugar is completely pure, and contains no preservatives or additives of any kind. That means the sugar we keep in our pantry, the sugar added to bread to help it rise and the sugar in sweet treats we enjoy in moderation is exactly the same as sugar that’s naturally in peaches, almonds, sweet peas and more.[1]



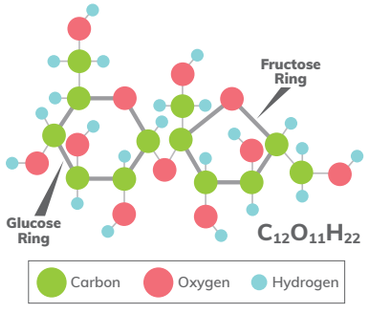
MICROSCOPIC VIEW OF SUCROSE CRYSTALS IN POLARIZED LIGHT

Chemical Structure

Sugar is sucrose, but what does it look like? Sugar's chemical structure is quite simple, as far as molecules go. It contains just two molecules, bound together by Mother Nature: one molecule of glucose is bound to one molecule of fructose.

Glucose, fructose and galactose are the three building blocks that make up all forms of carbohydrates. These three simple sugars are also known as monosaccharides. They bond with each other and themselves to make more complex carbohydrates. All carbohydrates are made up of one or more molecules of those simple sugars. No matter how complex a carbohydrate is to start with, once in the body, all carbohydrates are broken down to these three simple sugars: glucose, fructose and galactose.

SUGAR MOLECULE



SUGARS, BROKEN DOWN

MONOSACCHARIDES
(one-molecule sugars)

- **Glucose** (dextrose)
- **Fructose** (levulose or fruit sugar)
- **Galactose** (occurs in milk)

DISACCHARIDES
(two monosaccharides linked together)

- **Sucrose** (table sugar) = glucose + fructose
- **Lactose** (milk sugar) = glucose + galactose
- **Maltose** (malt sugar) = glucose + glucose

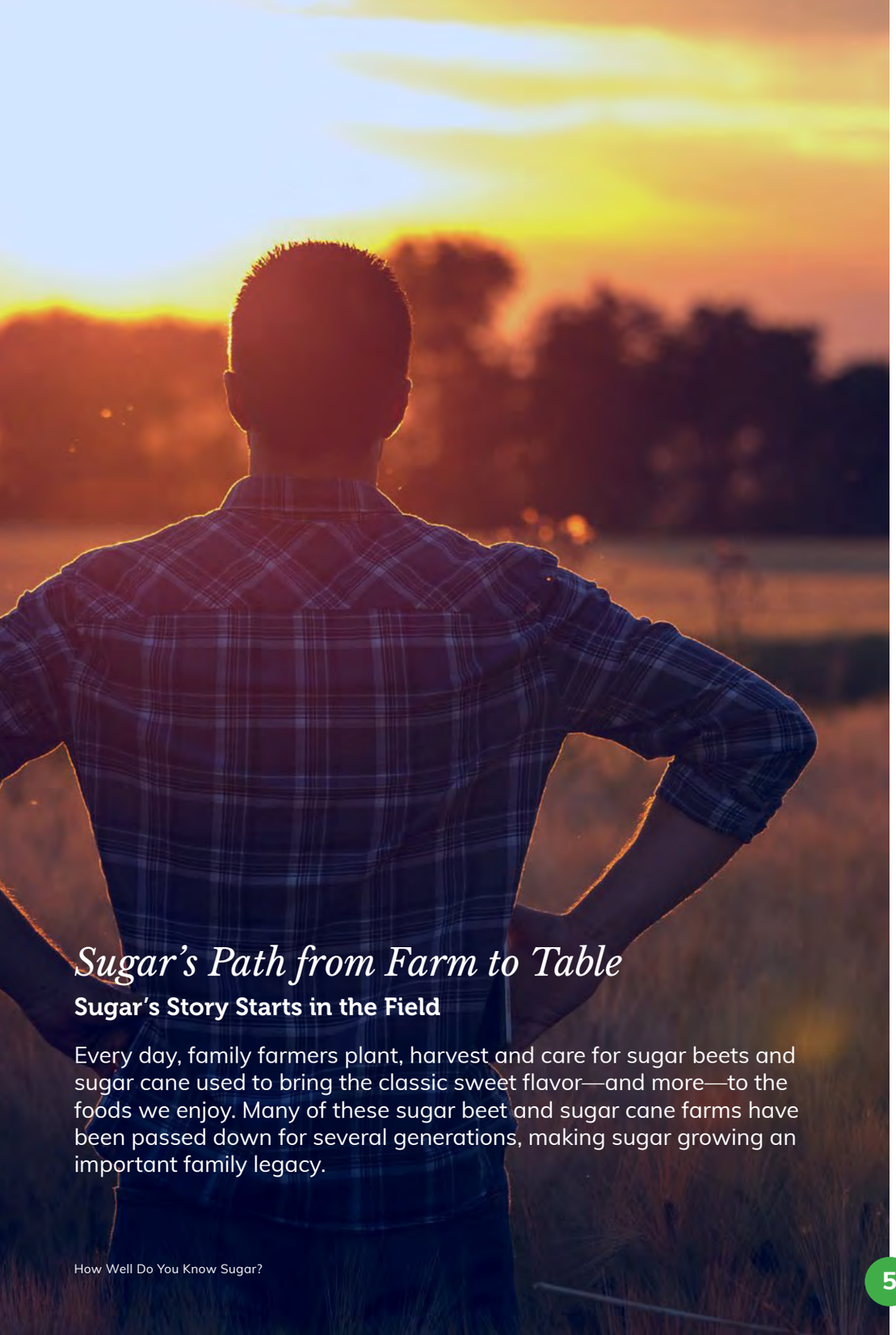
POLYSACCHARIDES
(more than 10 monosaccharides linked together)

- **Starch** (glucose polymer)

So, Sugar Is Just a Carbohydrate

Carbohydrates, along with fat and protein, are macronutrients that provide the body with energy. Carbohydrates are found in all plant and dairy foods and beverages that provide your body with calories.

Carbohydrates are the preferred energy source for the body because the majority contain glucose. Glucose is the fuel your brain, organs and muscles need to function and engage in everyday activities.[2]



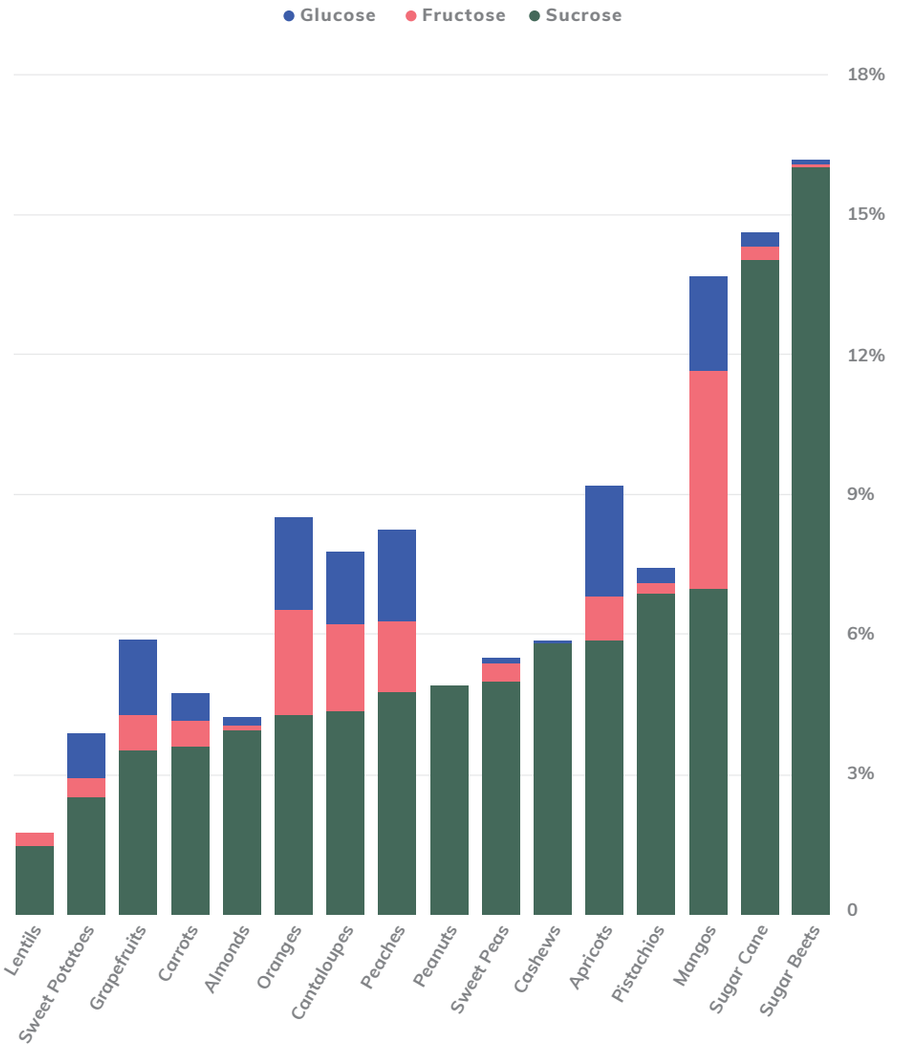
Sugar's Path from Farm to Table

Sugar's Story Starts in the Field

Every day, family farmers plant, harvest and care for sugar beets and sugar cane used to bring the classic sweet flavor—and more—to the foods we enjoy. Many of these sugar beet and sugar cane farms have been passed down for several generations, making sugar growing an important family legacy.

Many fruits, nuts and vegetables contain sugar, with some containing as much as 10% sucrose! However, nothing tops sugar beets and sugar cane, which contain about 16% and 14%, respectively, making them the most efficient way for farmers to grow and harvest sugar.

SUGAR/SUCROSE OCCURS NATURALLY IN FRUITS, VEGETABLES AND NUTS[1]*
***(PER 100 GRAMS, EDIBLE PORTION–RAW)**

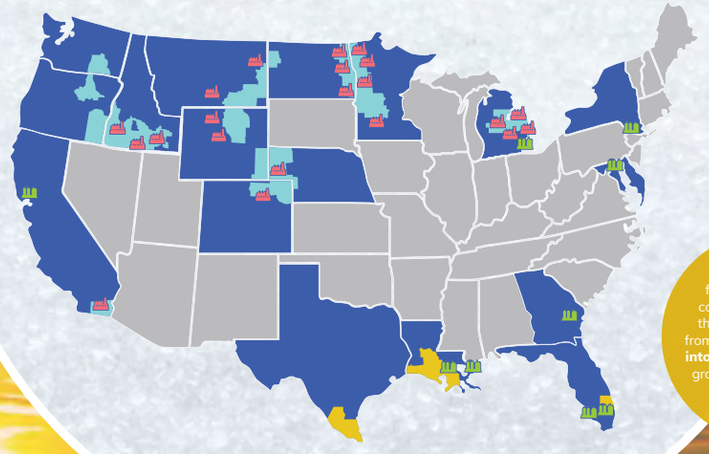


Sugar beets are a root crop, and they flourish in temperate climates where the soil is rich and the growing season is about 5 months long. They're much larger than the beets you might see in the produce section of the grocery store or the ones grown in backyard gardens, weighing a whopping 3–5 pounds when harvested. Today, sugar beet farms can be found in California, Colorado, Idaho, Michigan, Minnesota, Montana, Nebraska, North Dakota, Oregon, Washington and Wyoming .

Sugar cane is a tropical grass that grows 10–20 feet high. It's a perennial plant—which means it doesn't need to be replanted every year. When sugar cane is harvested, it's cut just above the root level so new sprouts will grow, ready to be harvested again in 10–12 months. Today, three U.S. states grow sugar cane: Florida, Louisiana and Texas. Raw sugar is refined in California, Florida, Louisiana, Georgia, Maryland, Michigan and New York.

WHERE IN THE U.S. DOES SUGAR COME FROM?

sugar beet factory
sugar beet growth
sugar cane refinery
sugar cane growth



Sugar is grown and/or refined in **17 states** across the U.S.

Some raw **cane sugar** is also imported to the U.S. for refining.

Sugar beet factories are located near the farms to **shorten the distance farmers need to travel** with their beets.

At sugar beet factories and sugar cane refineries across the country, the sugar from the plants is **purified into the sugar** shipped to grocery stores and food manufacturers.

Refining and Processing

After sugar is harvested by farmers, it is processed and refined to ensure consistency and quality.

Whether sugar comes from sugar beets or sugar cane, the purification process is similar for each plant and the result is the same pure sucrose.

One difference in processing between the two plants is that sugar beets are processed at a single facility (a sugar beet factory) and sugar cane is refined at two facilities (the process starts at a raw sugar factory and finishes at a refinery).

Little Is Wasted in Sugar Processing

Most of the non-sugar materials generated in sugar processing are used for other purposes, recycled or reused.

- Molasses, used by bakers, distillers and pharmaceutical companies as well as for animal feed and more, is extracted through the beet and cane sugar refining processes. It takes about four rounds of extraction to remove the molasses to obtain the maximum amount of sucrose.
- The sugar cane stalk residue, called bagasse, is often used as fuel to run the cane factory. Many sugar cane mills and refineries produce their own electricity, and some even supply power to nearby towns.
- The sugar beet residue, or pulp, is generally used for animal feed or further processed for use as fiber or other carbohydrate-based products.
- Carbon chips, used in sugar cane filtration, are recharged (revivified) and reused too.
- In addition, much of the water removed along the way still contains sucrose (called “sweetwater”), so it’s pumped back into the stations to be used again.

History of Sugar

Journey to U.S. Cultivation

Sugar is one of the world's oldest documented commodities. While chewing sugar cane for its sweet taste was likely done in prehistory, the first indications of the domestication of sugar cane were around 8000 BCE. It spread from the Polynesian region across the world, with strides in cultivation and processing along with way (crystallization in 100 CE and large-scale refinement in 1455). Sugar cane was brought to the Americas in the 15th century. In 1747, German chemist Andreas Marggraf identified sugar in beet roots, and the first sugar beet processing facility was built in Poland in 1801. Sugar beets were brought to the United States shortly after, with the first successful U.S. commercial production of beet sugar in California in 1879. Sugar beets are now grown in 52 countries and sugar cane is grown in 80 countries.[3]

Types of Sugar

All sugar is made by first extracting sugar juice from sugar beet or sugar cane plants, and from there, many types of sugar can be produced. Through slight adjustments in the process of cleaning, crystallizing and drying the sugar and varying the level of molasses, different sugar varieties are possible. Sugar of varying crystal sizes produce unique functional characteristics that make the sugar suitable for different foods and beverages. Sugar color is primarily determined by the amount of molasses remaining on or added to the crystals, giving pleasurable flavors and altering moisture. Heating sugar also changes the color and flavor (yum, caramel!). Some types of sugar are used only by the food industry and are not available in the supermarket.

White Sugars (contain little or no molasses)

Granulated sugar (Table sugar)

- "Regular" or granulated sugar is what you typically find in your sugar bowl
- Granulated sugar is the most common sugar called for in recipes when cooking and baking
- "Regular" sugar granules are fine because small crystals are ideal for bulk handling and not susceptible to caking

Powdered sugar

- Powdered or confectioners sugar is simply granulated sugar ground to a smooth powder, mixed with a small amount of cornstarch to prevent caking and then sifted
- Powdered sugar is often used in icings, confections and whipping cream
- You can make it at home: blend 1 cup white sugar and 1 tablespoon cornstarch to get 1 cup of powdered sugar

Sanding sugar

- Used mainly in baking and confectionery as a sprinkle on top of baked goods, sanding sugar can have large or fine crystals
- This sugar reflects light and gives the products a sparkling appearance

Brown Sugars (contain varying levels of molasses)

Light and Dark Brown sugar

- Brown sugars are made by mixing white sugar with various amounts of molasses
- Light brown sugar is often used in sauces and most baked goods
- Dark brown sugar has a deeper color and stronger flavor than light brown sugar. The rich, full flavor makes it ideal for gingerbread, baked beans, barbecuing and other full-flavored foods
- Brown sugars tend to clump because they contain more moisture than white sugars, allowing baked goods to retain moisture well and stay chewy

Turbinado sugar

- Turbinado sugar, sometimes known as Demerara sugar or Raw cane sugar, is a partially processed sugar which retains more of the naturally present molasses
- It has a blond color, mild brown sugar flavor and larger crystals than brown sugar used in baking
- Turbinado sugar is the sugar in your packet of "raw cane sugar." This type of sugar has been processed just enough to make it safe to eat

Muscovado sugar

- Muscovado sugar, also known as Barbados sugar, is an unrefined cane sugar in which the molasses has not been removed
- This sugar is very dark brown and has a particularly strong molasses flavor
- Muscovado sugar crystals are slightly coarser and stickier than regular brown sugar, giving it a sandy texture

Added sugars have been defined by the Food and Drug Administration to include caloric sweeteners that are added to foods and beverages during preparation or processing.[4] There are many types of sweeteners that can be added to foods and beverages. Sugar added to foods is considered an added sugar.

SUGAR AND THE DIET

Everything has a place in moderation. When it comes to sugar, it is an ingredient that plays many roles in nutritious foods and adds pleasure to life with occasional indulgences. It's true: a balanced life is a sweet life.

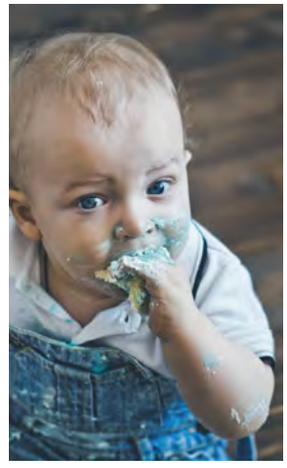
A Special Ingredient: Why Sugar Is in Foods

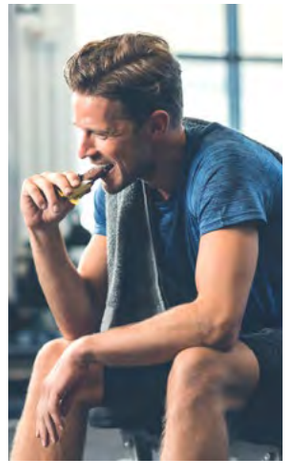
Sugar Can Give Foods the Sweet Taste We Know and Love—But There's Much More to It

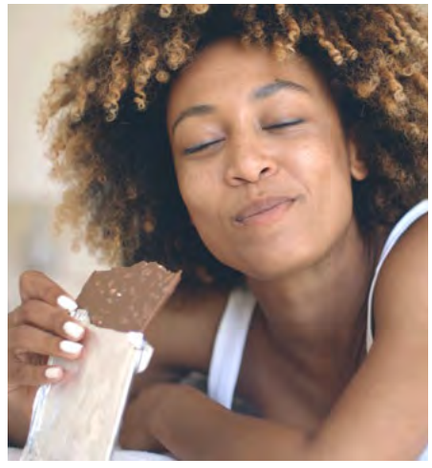
Sugar is a special ingredient that provides sweetness and so much more. Have you been surprised to find it in foods that don't necessarily taste sweet? There's a reason. Sugar has many functional properties that range from balancing acidity or adding bulk to preventing spoilage. It's been used in recipes for generations, often for reasons that have little to do with its sweet flavor.

SUGAR'S FUNCTIONAL ROLES IN FOOD BEYOND SWEETNESS

	FLAVOR ENHANCER/ BALANCER, AROMA	BULK	TEXTURE/ MOUTHFEEL	SHELF-LIFE/ MICROBIAL STABILITY	FERMENTATION	FREEZING POINT DEPRESSION	COLOR	MOISTURE RETENTION
Dairy Products	●	●	●		●			
Whole-Grain, Fiber-Rich Breads & Cereals	●	●	●	●	●		●	●
Breads	●	●	●	●	●		●	●
Bakery Products	●	●	●	●			●	●
Salad Dressings, Rubs and Sauces	●	●	●	●				
Preserves & Pickling	●	●	●	●				
Jams & Jellies	●	●	●	●			●	
Canned Fruits & Vegetables	●	●	●	●			●	
Prepared Foods	●	●	●	●			●	●
Beverages	●	●	●	●				
Frozen Beverages	●	●	●			●		
Fermented Beverages	●	●	●		●			
Ice Cream	●	●	●			●		
Confectionery	●	●	●	●			●	●







2015–2020 Dietary Guidelines for Americans: Defining Moderation

Since 1980, the U.S. government has published the Dietary Guidelines for Americans, updating them every 5 years. Each version of the guidelines has included a general recommendation for Americans to moderate intake of sugars. The 2015–2020 Dietary Guidelines for Americans were the first to quantify moderation, recommending Americans limit added sugars to no more than 10% of calories per day (or 50 grams based on a 2000-calorie diet).[5] This recommendation is based on food pattern modeling (a tool used to figure out how you can meet all of your food group recommendations within calorie needs), and the 10% target is an attempt to help individuals move toward healthy eating patterns within calorie limits. For more information about the dietary guidelines, visit dietaryguidelines.gov.

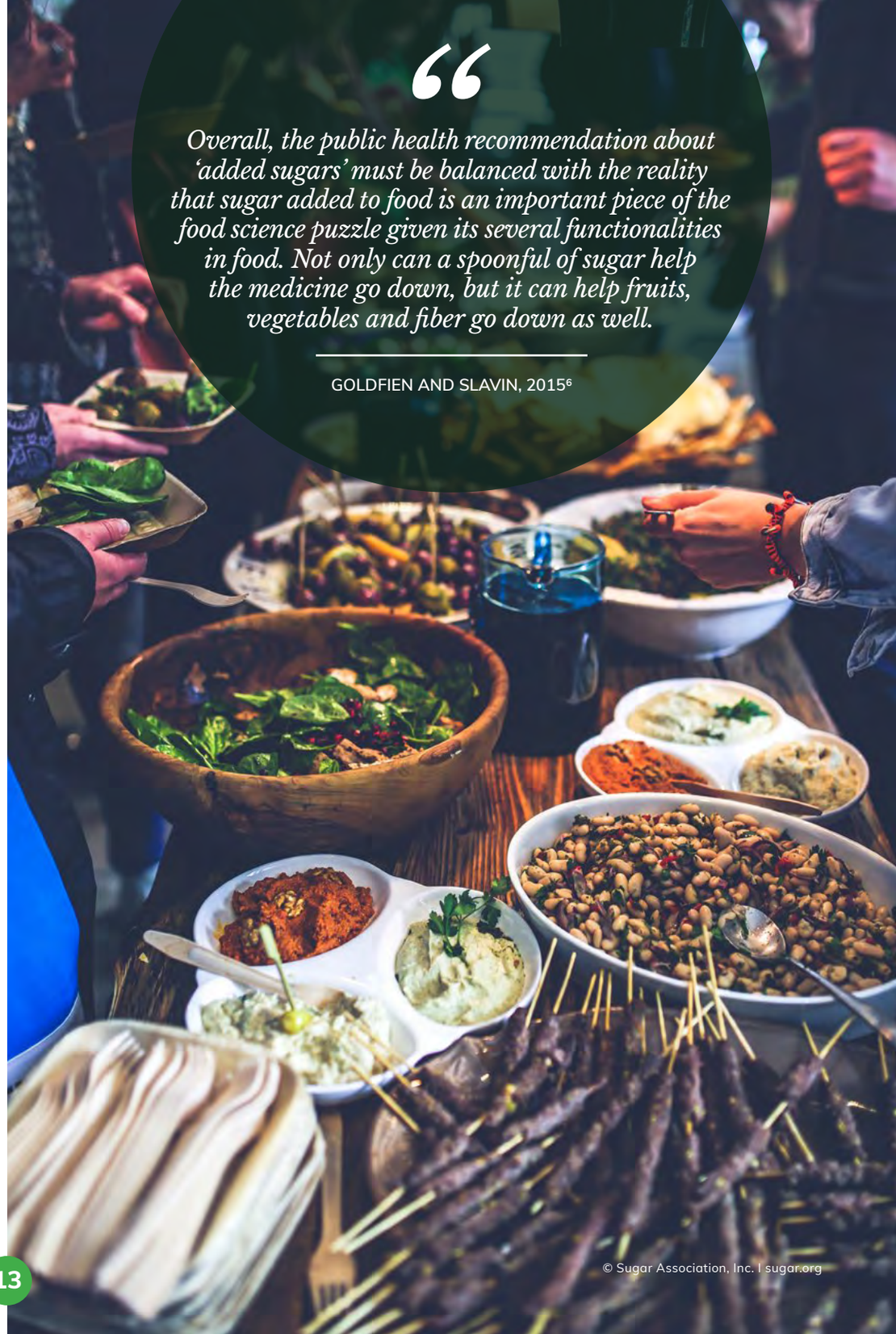
Consumption Trends

While added sugars consumption increased sharply in the 1990s, consumption has been on a significant decline in the United States for the past 20 years.[7–12] In 2015–2016, added sugars consumption was reported to be about 13% of total calories, or around 270 calories per day. [11,12] This is still slightly above the Dietary Guidelines for Americans recommendation of no more than 10% of calories from added sugars per day.

PERCENT OF CALORIES FROM ADDED SUGARS[7,11,12]

YEAR	% OF CALORIES FROM ADDED SUGARS
1999–2000	18.1
2001–2002	17.1
2003–2004	15.9
2005–2006	14.5
2007–2008	14.6
2009–2010	13.9
2011–2012	14.1
2013–2014	13.4
2015–2016	12.6

Dietary data are frequently reported as total added sugars, a combination of the intakes of all caloric sweeteners: sugar, high-fructose corn syrup, honey, maple syrup and so forth. If we look at just sugar intake, consumption of sugar (sucrose) from sugar beets and sugar cane, there has been a decrease of about 30% from 1970 to 2016, which is a drop from 283 calories (17.7 teaspoons) per day to 193.7 calories (12.1 teaspoons) per day.[13]



Overall, the public health recommendation about 'added sugars' must be balanced with the reality that sugar added to food is an important piece of the food science puzzle given its several functionalities in food. Not only can a spoonful of sugar help the medicine go down, but it can help fruits, vegetables and fiber go down as well.

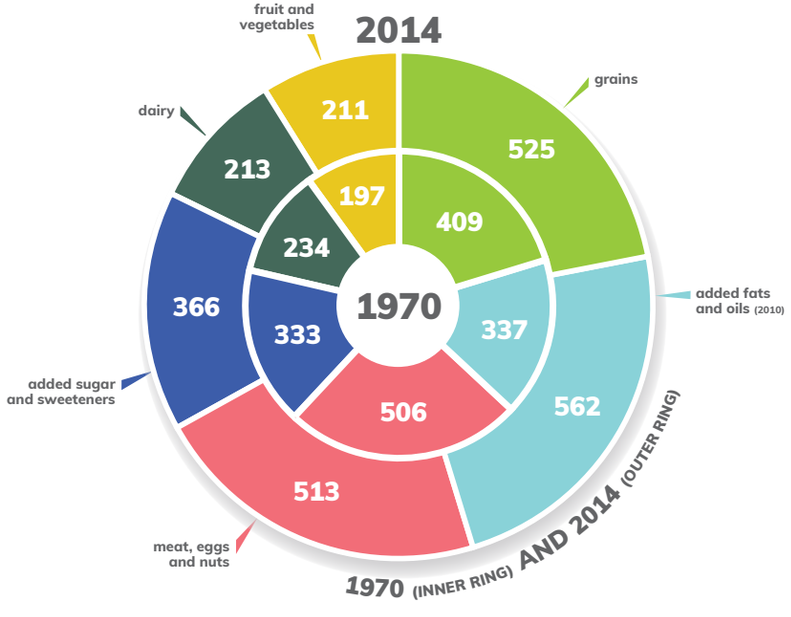
GOLDFIEN AND SLAVIN, 2015[6]

Putting Added Sugars and Sugar Intake into Perspective of the Total Diet

We all know that there is a serious obesity problem in the United States. With that in mind, it should come as no surprise that during a 40-year period, Americans' daily consumption went up by more than 450 calories.[13] Not to mention that as a society, we move a lot less.[14,15]

In 1970, people were consuming 2024 calories each day. Fast-forward to 2010 (the most recent calorie availability data), and that figure jumped to 2476—nearly a 25% increase in calories. But added sugars didn't make up a very big percentage of the increased intake. Over that same period, added sugars consumption increased by only 12 calories per day (a 4% increase), from 20.8 teaspoons per day to 21.6 teaspoons per day in 2017.[16–18] Calories from added fats and oils have increased by 225 calories per day (a 66% increase) and calories from grains have increased by 116 calories per day (a 28% increase).[13,19]

CALORIES BY FOOD GROUP[19]



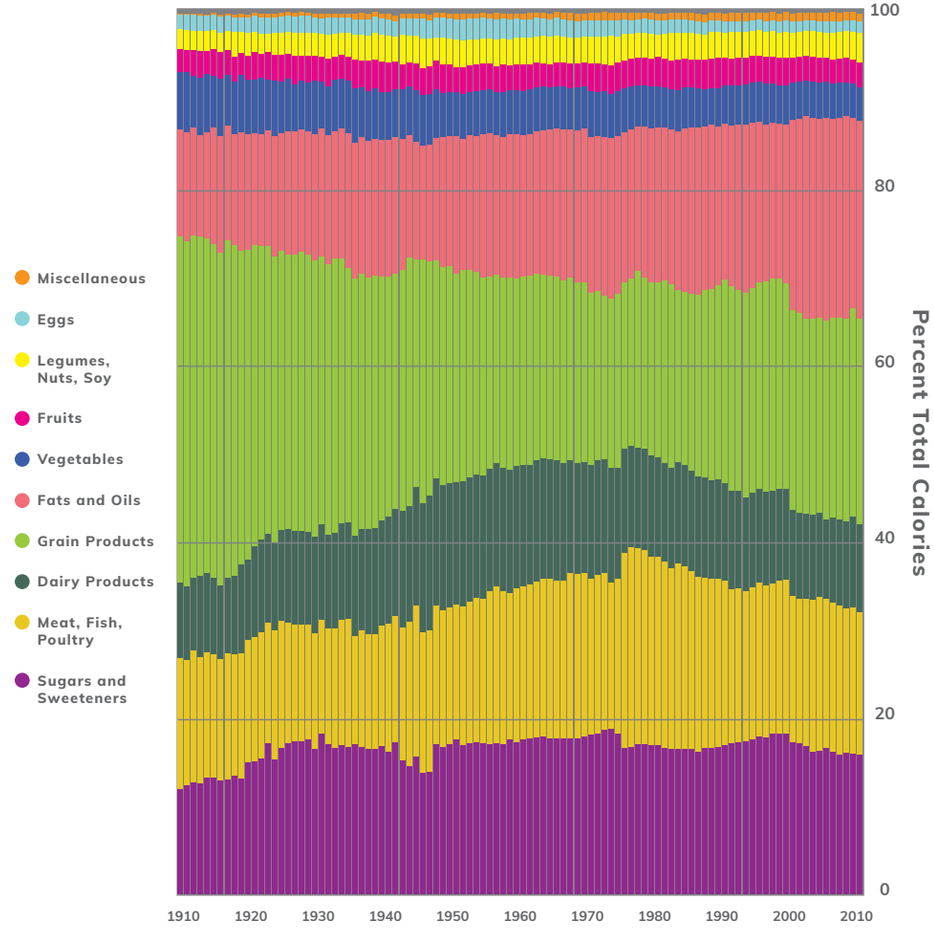
Going Way Back

The U.S. Department of Agriculture has been collecting food supply data for a long time! Looking back over 100 years, sugars and sweeteners made up 11.9% of all calories in the food supply in 1909.

Over the past century, there have been some ebbs and flows in this percentage, the highest being 18.2% in 1997–1999. However, since the turn of the 21st century, the percentage of calories from sugars and sweeteners has dropped steadily. It is important to note that total calorie intake has come up since 1909, but as a percentage of total calories, total sugars and sweeteners consumption is on the decline.[20] The most recent report was published in 2010, and sugars and sweeteners make up even less now.

The calories contributed by major food groups have also shifted over the years. Here's a look at the makeup of the total calories in our diet and the way they've changed since 1909.[20]

CALORIES CONTRIBUTED FROM MAJOR FOOD GROUPS TO THE U.S. FOOD SUPPLY, 1909–2010[20]



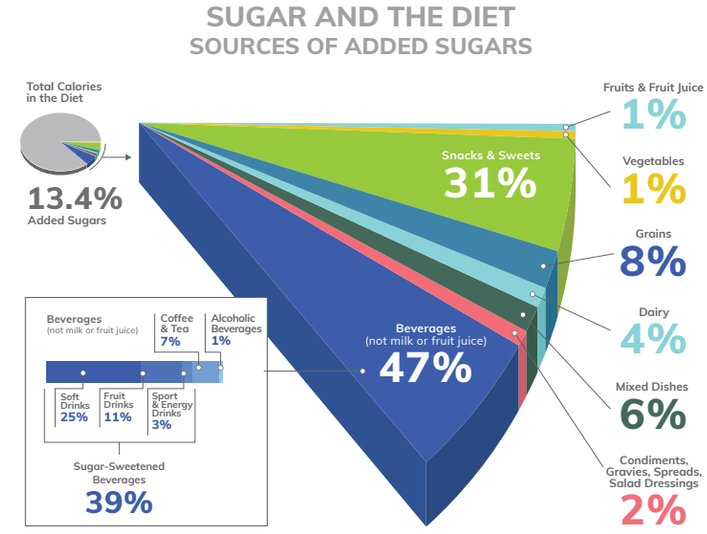
Sugar has benefits that go beyond sweetness or indulgence. Of course, it's a key ingredient in the treats we should enjoy in moderation, but it also has a specific functional role in other foods we might not immediately associate with sugar. It's added to nutritious foods to balance acidity and retain moisture, and it even helps bread rise.

Sources of Added Sugars in the Diet

Added sugars are found in a variety of foods and beverages for different reasons, many times for functions beyond sweetness. Calorically sweetened beverages such as soft drinks, tea and fruit drinks are the main source of added sugars in the diet across all age groups (older than 2 years), making up almost half of added sugars calories (47%). Snacks and sweets are the second main source of added sugars calories, making up close to one-third (31%).[11] Also among the top sources of added sugars in the diet are foods that contain important nutrients such as fibers, vitamins and minerals. These foods include ready-to-eat cereal, flavored milk and yogurt.[21] Sugars are added to these products for functional purposes, including making certain nutritious foods more enjoyable to eat. Because of this, sugar is a key partner in nutrient delivery.[22–29]

In a recent analysis of people with low and high intakes of added sugars, people on the lower end of added sugars intake chose similar types of foods with added sugars as those on the higher end.[21] The main differences were in the amounts of specific foods chosen. From this analysis, we can see that many people are enjoying the same types of foods that contain added sugars, but the portion sizes are different.

The 2015–2020 Dietary Guidelines for Americans reported that in 2014 added sugars made up 13.4% of total calories in the diet.[5,11] Below is the breakdown of where those calories come from.



The 2015–2020 Dietary Guidelines for Americans recommend that we limit our added sugars consumption to 10% of total calories,[5] making the current average consumption slightly higher than recommended. However, it is important to note that a healthy diet includes up to 10% of calories from added sugars, allowing room for sugars in nutritious foods and occasional sweets and treats. Sugar-containing foods and drinks that don't contribute significant nutritional value should be considered treats and consumed in moderation within caloric needs.

"Choose a healthy eating pattern at an appropriate calorie level to help achieve and maintain a healthy body weight, support nutrient adequacy, and reduce the risk of chronic disease... To meet nutrient needs within calorie limits, choose a variety of nutrient-dense foods across and within all foods groups in recommended amounts.

DIETARY GUIDELINES FOR AMERICANS, 2015–2020[5]

SUGAR AND HEALTH

The Basics

Sugar, or sucrose, is a carbohydrate. Carbohydrates are the primary source of energy for the human body. In fact, glucose (a product of carbohydrate digestion) is essential to the function of the central nervous system. The essential role of carbohydrates, including sugar, as an important source of fuel for the body is nothing new. Sugar (sucrose), whether intact in fruits and vegetables or in the popular extracted and crystalized form, has been incorporated in the diets of humans throughout all of time. Like many other foods and ingredients, sugars have been the subject of numerous scientific studies, which help deepen the understanding of the impact food choices have on health. And while emerging research will always reveal new information, the scientific evidence consistently shows that a healthy lifestyle based on moderation, a variety of food choices and physical activity tends to lead to the best outcomes when compared to simply focusing on cutting out or adding one ingredient or another.[30–34] Here we review a few health outcomes and what we know about the role of sugar. It is important to point out that scientific evidence does not support adverse outcomes of sugar intake when sugar is consumed in moderation and as part of a diet where calories are not eaten in excess.

carbohydrate noun
car·bo·hy·drate
a macronutrient that includes starches, sugar and other sugars

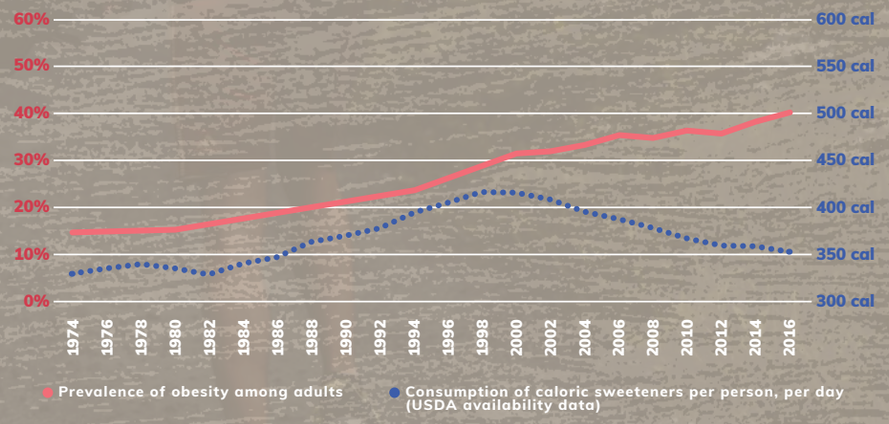
There has been extensive research focus on soda or other caloric beverages and their role in health outcomes. While these studies provide data on the role that caloric beverages may have in health, these beverages are not a proxy for all the ways that sugar is consumed in the diet and these studies should not be extrapolated to represent the role of sugar in health.

Obesity

The cause of obesity is a complex issue and there are many factors that contribute to obesity, including excess caloric intake, genetics and low physical activity levels, along with other factors. Just like protein, starch, fat, alcohol and other carbohydrates, sugar is a source of calories in the diet. Excess calories from any source, including sugar, can lead to weight gain, increasing the risk of obesity and other chronic diseases. A recent systematic review of the evidence concluded that "if there are any adverse effects of sugar, they are entirely due to the calories it provides."[35] Additionally, three authoritative scientific organizations, including the U.S. Institute of Medicine, European Food Safety Authority, and the U.K. Scientific Advisory Committee on Nutrition, each conducted extensive scientific reviews of "added sugars" and obesity and found no unique role for added sugars in the development of obesity.[36–38]

Data from the past 40 years show that obesity trends do not mirror trends in sugars consumption. Obesity has gone up as sugars intake has gone down. However, total calorie consumption has paralleled the rise in obesity rates.[13,16–18,39–41]

CONSUMPTION OF ADDED SUGARS AND PREVALENCE OF OBESITY IN THE UNITED STATES, 1974–2016[16–18,39–41]



Type 2 Diabetes

Over 30 million Americans have diabetes, a condition that causes poor regulation of blood glucose.[42] Being overweight increases the risk for developing type 2 diabetes, and a diet high in calories from any source contributes to weight gain, according to the American Diabetes Association. While sugar does provide calories and, when eaten in excess of calorie needs can contribute to weight gain, experts agree that "Type 2 diabetes is not caused by sugar, but by genetics and lifestyle factors."[43] A major review of studies examining risk factors for type 2 diabetes demonstrated no effects of increasing sugars intake on diabetes risk. However, this review and others have identified an association between sugar-sweetened beverages (SSB) and higher risk for type 2 diabetes.[36,44]

Blood glucose is often referred to as "blood sugar". This can be confusing because sugar isn't actually traveling through your blood, just glucose is.

Cardiovascular Disease

Heart disease, the single largest cause of mortality in the United States and worldwide, has many underlying risk factors, including dyslipidemia, high blood pressure, inactive lifestyle, obesity, diabetes and cigarette smoking. Nutritional patterns may play a role in several of these risk factors; however, evidence for a specific role of carbohydrates or sugars in cardiovascular disease (CVD) has been heavily debated and not fully settled by scientists. If there is any role of carbohydrates and sugars in CVD progression, it is likely dependent on whether they are consumed as part of calorically abundant diet and eaten in excess of normal ranges.[36,45] Recent reviews have found that when calories are matched, fructose-containing sugars (like sucrose) do not appear to cause weight gain compared to other forms of macronutrients (other carbohydrates, fats and protein) or impact blood pressure; however, when sugars provide excess calories, this can lead to weight gain and increases in cardiometabolic risk factors.[31,46]

Dental Caries

Frequent consumption of foods and drinks that contain fermentable carbohydrates (including sugars, both naturally occurring and added) can increase the risk of tooth decay. Fermentable carbohydrates can be broken down by bacteria in your mouth to produce acid that can lead to tooth decay without proper dental hygiene. While there are many studies on the relationship between amount of sugar consumed, frequency of intake and dental caries, recent reviews[36,38,47–51] and recommendations[5,37,52] are mixed on whether there is sufficient evidence to set an upper level of intake of added sugars to reduce risk of dental caries. The best way to protect your teeth is to brush them with fluoride toothpaste twice a day and reduce the amount of time your teeth are exposed to these carbohydrates by consuming sugary foods and drinks at mealtimes.[53]

New research will always be underway related to the health effects of food choices and it is important to consider the level of evidence each study provides when documenting the relationship between food choices and the development of certain disease states. Separating the contributions of specific foods from related dietary and lifestyle factors is difficult and a constant challenge for researchers. The majority of research suggesting an adverse effect of sugar has involved excessive caloric intake, coupled with very high intakes of added sugars.[54]

To simplify the science: by practicing moderation and portion control, there is room to include an appropriate amount of sugar in a healthful lifestyle.

SUGAR MYTHS

Reduced sugar doesn't mean reduced calories. When sugar is removed from a food, other ingredients need to take its place. Compare product labels to see what the entire nutrient package of a product is when making purchasing decisions.

Raw sugar is not healthier than table sugar. Raw sugars, brown sugars and any white sugars are all processed the same in the body. Darker colors are due to varying but small amounts of molasses left on the sugar crystals. The nutrients that are contained in this amount of molasses are so small that they offer no real nutritional value.

Added sugars intake has not increased dramatically over the last several decades. You might be surprised to learn it's on the decline. See page 14 for the specifics.

There is no single ingredient that can replace sugar's flavor and function. Sugar is a natural ingredient that has been in our diets for centuries. Sugar alternatives offer sweetness but can't replicate all of the other important functions that sugar provides such as texture, preservation and so forth. When sugar is replaced, often several ingredients are added.

Sugars aren't hidden in foods. While sugars may be added for functional purposes to foods you may not expect, sugars aren't hidden in foods. The food labels on the back (or side) of the pack always show the list of ingredients (in descending order of weight) and soon all products will also include both the total sugars and added sugars content on the Nutrition Facts Label to help you know the amount of sugars you're consuming in a single serving.

Added sugars aren't simply empty calories that displace intakes of essential nutrients. Adding a limited amount of sugars to foods that provide important nutrients—such as whole-grain cereal, flavored milk or yogurt—to improve their taste, especially for children, makes sugar a key partner in nutrient delivery. For example, the sweetness and thickness that sugar adds to fat-free chocolate milk increases its palatability for kids, which provides important shortfall nutrients such as calcium, potassium and vitamin D.[6,55]

Sugars aren't added to foods to make everything taste sweet. Added sugars provide functions beyond sweetness in many foods. See page 12 for specific examples.

Added sugars are not the cause of obesity, diabetes or cardiovascular disease. Scientific evidence suggests that sugar does not directly cause conditions such as obesity or diabetes. See page 16 for more info on sugar and health.

Avoiding added sugars won't prevent cavities. Sugar, whether naturally occurring or added, and any other fermentable carbohydrate can increase the risk of cavities. Other risk factors include poor dental hygiene and lack of fluoridated water or dental products. The most effective way to reduce cavities is to reduce the amount of time sugars and starches are in contact with the teeth, drink fluoridated water and brush and floss teeth regularly. See page 16 for more info.

Sugar is not addictive. Scientific evidence does not support the idea that sugar (or any other foodstuff) can be addictive.[56–58] There are many factors involved in choosing foods and choosing to eat–with psychological and behavioral components not to be overlooked. Certain foods and drinks of course can be pleasurable to consume, but it's important not to confuse this with clinical addiction.

Sugar doesn't make cancer cells grow faster. While there is still a lot about cancer we don't know, according to the Mayo Clinic, "All cells, including cancer cells, depend on blood sugar (glucose) for energy, but giving more sugar to cancer cells does not speed their growth. Likewise, depriving cancer cells of sugar doesn't slow their growth."[59] Glucose is found in most carbohydrates but is not synonymous with sugar.

Sugar is not a high glycemic food. Sugar has a moderate glycemic index (GI), similar to that of wheat bread. Sugar's GI is 58, just 3 points above the low GI range (55 or less). High glycemic foods have a GI of 70 or more.[60]

NAVIGATING SUGARS AND SWEETENERS IN FOODS AND BEVERAGES

According to the 2015–2020 Dietary Guidelines for Americans,[5] a healthy diet includes up to 10% of calories from added sugars, allowing room for sugars in nutritious foods and occasional sweets and treats. It is important to remember that sugar-containing foods and drinks that don't contribute significant nutritional value should be considered treats and consumed in moderation within caloric needs.

History of Nutrition Labeling

The first Nutrition Facts Label was introduced in 1994 following the Nutrition Labeling and Education Act of 1990, which made including nutrition facts on packaged food law. Prior to this, the only mandatory information on these foods was the food's name, quantity, ingredients and the name and address of the manufacturer. Nutrition information was only required on products making a nutrition claim or if they were fortified with vitamins, minerals or protein.

The goal of the Food and Drug Administration's (FDA) Nutrition Facts Label is to "ensure consumers have access to the information they need to make informed decisions about the foods they eat."[61] However, understanding and knowing how to use the information on the Nutrition Facts Label is an essential part of dietary success. While the label is found on almost all products, it is important to look at how each food and beverage fits into an entire day's intake and not just focus on what is in one product. It's also helpful to examine the entire nutrient package of a product and consider how it fits in your total daily diet instead of focusing on one nutrient. History shows us that focusing on a single nutrient, like fat or sugar, is not helpful to achieving a balanced diet or improving nutrient intakes or health.[62]

> *"Rather than trying to isolate a single dietary culprit, we should focus on the whole picture.*
>
> ALICE H. LICHENSTEIN, DSc,
> TUFTS UNIVERSITY HEALTH AND NUTRITION LETTER, 2015[63]

Here is some quick info to help avoid any added confusion when using the label:

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount Per Serving

Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholestrol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	**10%**
Calcium 260mg	**20%**
Iron 8mcg	**45%**
Potassium 235mg	**6%**

*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

+ ***Total sugars*** This number includes the total of both naturally occurring sugars and added sugars. For example, in strawberry yogurt the naturally occurring sugars come from both the milk and the strawberries, and the added sugars come from the sugars added to balance and enhance flavors.

+ ***Added sugars*** Added sugars, as defined on page 41, are listed to help you know how much you are consuming. The 2015–2020 Dietary Guidelines for Americans recommend you consume less than 10% of calories per day from added sugars. That is because it is difficult to get the nutrients you need for good health while staying within calorie limits if you consume more than 10% of your total daily calories from added sugars.[64]

+ ***Percent daily value*** Shown as a general rule, the percent daily value tells you how much a nutrient in a serving of food contributes to a daily diet, based on a target of 2000 calories per day.

+ ***Ingredient list*** While not technically a part of the Nutrition Facts Label, ingredients are listed in descending order by weight on the back (or side) panel of packaged foods.

"The FDA recognizes that added sugars can be a part of a healthy dietary pattern. But if they are consumed in excess, it becomes more difficult to also eat foods with enough dietary fiber and essential vitamins and minerals and still stay within calorie limits." Having access to added sugars information on the Nutrition Facts Label increases consumer awareness of the quantity of added sugars in foods. "Consumers may or may not decide to reduce the consumption of certain foods with added sugars, based on their individual needs or preferences."[61]

Sugars? Sugar? Added Sugars?

Understanding exactly what the differences are can be confusing and even a little bit frustrating, especially when there are a lot of inconsistencies in how these terms are used. To clarify, let's take a look at some quick definitions and links to what they actually mean.

Sugars

Sugars is a term referring to a broad category of all mono- and disaccharides: the simplest carbohydrates. Monosaccharides include glucose, galactose and fructose, and disaccharides include sucrose, lactose, maltose and trehalose.[1] Sugars can be naturally occurring (e.g., found in fruits, vegetables, dairy products and nuts); they can be extracted from plants and dairy and added to foods; or they can be made using various plant or dairy ingredients as a starting point.

Sugar

Sugar refers only to sucrose, a disaccharide, made up of two sugars (glucose and fructose) bound together, that is naturally made and found in all green plants. Sugar found in the food supply is harvested from sugar beets and sugar cane.

SUGAR CANE AND SUGAR BEETS PROVIDE THE SUGAR IN THE FOOD SUPPLY

Added Sugars

Added sugars refers to a category that includes a variety of caloric sweeteners, including sugar and many others sweeteners that are classified as sugars. Added sugars do not include non- and low-calorie sweeteners.

The term "added sugars" was defined by the FDA[4] in 2016 as sugars that are:

- added during the processing of foods, or are packaged as such;
- free, mono- and disaccharides;
- sugars from syrups and honey; and
- sugars from concentrated fruit or vegetable juices that are in excess of what would be expected from the same volume of 100% fruit or vegetable juice of the same type.

The FDA definition of added sugars does not include:

- fruit or vegetable juice concentrated from 100% fruit juice that is sold to consumers; and
- the fruit component of fruit spreads.

While many whole foods contain naturally occurring sugars (e.g., sucrose, glucose or fructose in fruit and lactose in milk), these are not considered added sugars when found in whole foods. Other sweeteners such as sugar alcohols, low-calorie sweeteners and no-calorie natural sweeteners are also not considered added sugars. Next you'll find more information about and examples of others sweeteners.

Other Sweeteners

On the ingredient list you'll often find other sweeteners, sometimes in combination with sugar for both flavor and functional reasons. These other sweeteners can be caloric (included in "added sugars" on the Nutrition Facts Label), low-caloric or non-caloric. Some examples are included in the chart below. The sweetness and functionality of other sweeteners varies from product to product, so when it comes to ingredient substitution or product reformulation, sugar can't simply be replaced by another single ingredient.

OTHER SWEETENERS

CALORIC	LOW-CALORIC	NON-CALORIC
Brown Rice Syrup	Isomalt	Acesulfame K
Coconut Sugar	Mannitol	Aspartame
Corn Syrup	Monk Fruit	Neotame
Dextrose	Sorbitol	Saccharin
High-fructose Corn Syrup	Sugar Alcohols	Stevia
Honey	Xylitol	Sucralose
Maltodextrin		
Maple Syrup		

There is no substitute for sugar. As a functional ingredient, sugar can't simply be replaced by another single ingredient. Its versatility is unmatched.

BEYOND FOODS: NON-FOOD USES FOR SUGAR

Sugar is a versatile and irreplaceable functional ingredient in food. In addition to providing sweetness, sugar is also used to balance acidity, add bulk or prevent spoilage, among other functional properties. But did you know that sugar is also used in the production of medication, to make bioplastics for planes and can extend the life of your fresh cut flowers? Explore the many uses of sugar that go beyond sweetness and beyond food.

Health

Medicine: Sugar is used to for coating, adding volume or texture and flavoring medicine. It can also act as a preservative and antioxidant.

Soothe a sore throat: Sucking on a lozenge or hard candy increases salvia production, helping keep your throat moist and lubricating the irritation.

Heal wounds: Many of the same properties that make sugar an excellent preservative also make sugar effective in would healing. When sugar is applied to an open wound, it absorbs the wound's moisture, which prevents the growth of bacteria. While there are records that date back to 1700 BCE, recent research has also been conducted in this area.[65]

Beauty

Sugar is used in cosmetics for its exfoliating and moisturizing properties. Sugar cane extracts are also used in moisturizers and face masks.

Try a sugar body scrub: Sugar scrubs are great for exfoliating. Make your own simple body scrub by mixing sugar with oil (coconut, almond, jojoba or olive all work well) to create a loose paste. Gently rub the paste on your skin and then rinse it off in the shower.

Make lipstick last longer: Sprinkle a little bit of sugar on your lips after applying lipstick, wait a minute, then lick it off. The sugar draws moisture from the lipstick and will extend the color.

Home and Garden

Clean your hands: Do you have greasy or dirty hands from cooking, gardening or working on your car? Put about a teaspoon of sugar into the palm of your hand before washing with soap as usual. The sugar helps cut the grease and acts as an abrasive to scrub the mess away.

Keep cut flowers fresher, longer: Add 3 teaspoons of sugar and 2 tablespoons of vinegar per quart of warm water, then add fresh-cut flowers. The sugar feeds the stems and the vinegar restricts the growth of bacteria. Replace the water every other day.

Keep baked goods fresh: Add a few sugar cubes to the airtight container holding your baked goods. The sugar will absorb the moisture and keep your bread, cakes, cookies, and biscuits fresher, longer.

Combat garden pests: To naturally combat garden pests like nematodes, sprinkle plants and the soil around them with handfuls of sugar. The sugar will feed microorganisms, which will increase the organic matter in the soil while making it a hostile environment for nematodes.

Industrial and Agricultural

Electricity: Sugar cane bagasse is often used to make electricity for the sugar cane mills and refineries. Some factories even supply electricity to nearby towns.

Bioplastics: Sugar cane is used to make bioplastics used in a wide range of rigid and flexible materials, including food and drink packaging, acoustical paneling and airplane parts. A few recent innovations are included below.

- Legos: Lego started using sugar cane-based polyethylene in its botanical elements such as trees, bushes and leaves at the Billund, Denmark, production plant in 2018.
- Electric car panels: The honeycomb structured core from sugar cane (PLA) is one of the sustainable materials being used in the body panels of circular electric cars being developed in the Netherlands.

Biofuels: Sugar is used in the production of biofuels like ethanol, an additive in automotive gasoline.

Beer, wine and distilled spirits: Sugar is involved in the fermentation process that produces ethanol in alcoholic beverages.

Ingredients for foods and medicines: Sugar molasses is used in the production of ingredients for foods and medicines.

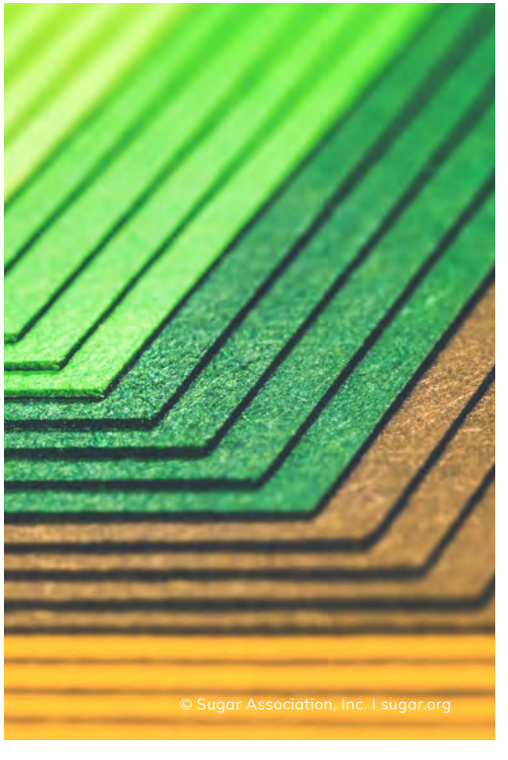
- Lysine: an essential amino acid used to make medicine. Lysine is used for preventing and treating cold sores and is also found in supplements.
- Lactic acid: used in prepared foods for preservation and flavor, and also as a curing agent.
- Citric acid: used in prepared foods for preservation and flavor (sour).
- Yeast: used in baking and brewing industries.

Paper products: Sugar cane bagasse is used to make:

- Office products: copy paper, envelopes, cardstock and more
- Take-out containers: eco-friendly solution to Styrofoam

Cement and glue: Sugar slows the setting of cement and glue.

Livestock feed: Sugar production byproducts and molasses are used as feed supplements for livestock.



FUN FACTS

Sugar is naturally white. It is simply removed from sugar beet or sugar cane plants and washed to remove the naturally present molasses and other plant materials.

- Sugar doesn't spoil.
- Sugar (sucrose) is the standard for the measurement of sweetness and has a relative sweetness score of 100.[66]
- Sugar has just 15 calories per teaspoon.
- Sugar is used to mask the bitter taste of medicines. It was one of the first pharmaceutical ingredients used for this purpose and still is today.
- Ever wonder why even low-fat chocolate milk tastes like whole milk? Sugar serves the dual purpose of increasing the thickness of the milk and enhancing the sweetness of the cocoa.
- Sugar has healing powers. Many of the same properties that make sugar an excellent preservative also make sugar effective in wound healing. When sugar is applied to an open wound, it absorbs the wound's moisture, which prevents the growth of bacteria. While there are records that date back to 1700 BCE, recent research has also been conducted in this area.
- Sugar is grown and/or refined in 17 states across the United States
- All sugar products in the marketplace differ only in crystal size or molasses content. Molasses adds color, flavor and moisture. The darker the brown sugar, the more molasses it has.

COOKING AND BAKING FAQS

How can I soften hard white sugar?

Sugar hardens when it is exposed to moisture, like high humidity, and then the surface dries. Break the hardened sugar into manageable pieces with a meat tenderizer or heavy mixing spoon. Toss the pieces into a food processor or blender, and blend until smooth. It's best to keep your sugar in a sealed container.

How can brown sugar be stored to prevent hardening?

Brown sugar hardens when its moisture evaporates. Storing brown sugar in a way that allows the product to retain its natural moisture–in its original plastic bag (closed tightly) or in an airtight container–helps brown sugar stay moist.

If brown sugar hardens, let it stand overnight in a sealed jar with a damp paper towel or apple slice. For a quick fix, heat the needed amount in a 250° F oven for a few minutes, or in a microwave oven on low for 1–2 minutes per cup. The softened brown sugar should be used immediately.

Can I substitute brown sugar for white granulated sugar in recipes?

Yes. While white sugar can be substituted with an equal amount of brown sugar, brown sugar will add a slight molasses flavor to your recipe.

Can I make my own brown sugar?

Yes! Combine 1 tablespoon of molasses with 1 cup of white granulated sugar. Mix well.

Can confectioners (powdered) sugar be substituted for granulated sugar in a recipe?

These products usually are not interchangeable. Confectioners sugar is made up of much finer particles than granulated sugar, and it contains a small amount of cornstarch to prevent caking.

Can I make powdered sugar at home?

Yes! Blend 1 cup of white sugar and 1 tablespoon of cornstarch to get 1 cup of powdered sugar.

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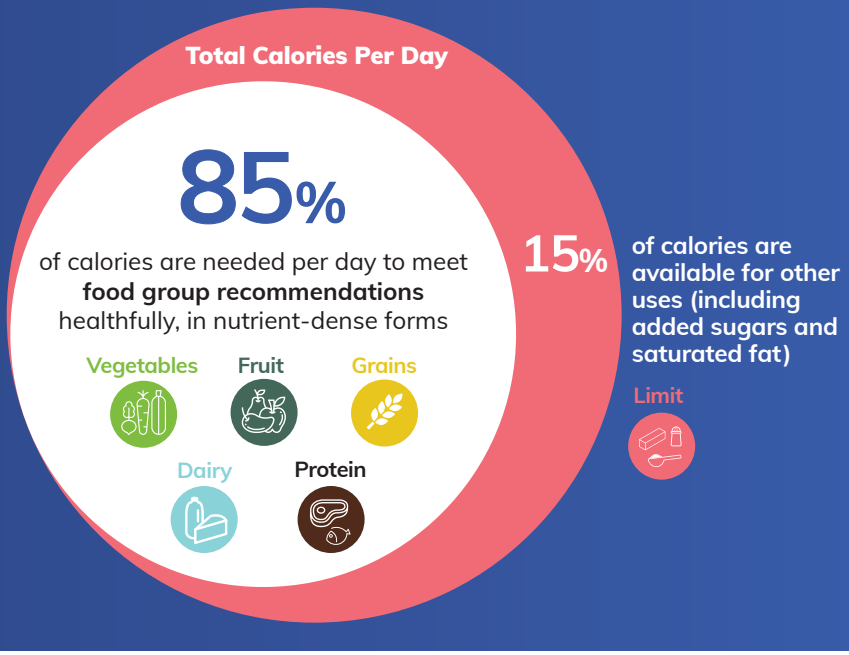
2020-2025 Dietary Guidelines for Americans & Sugar

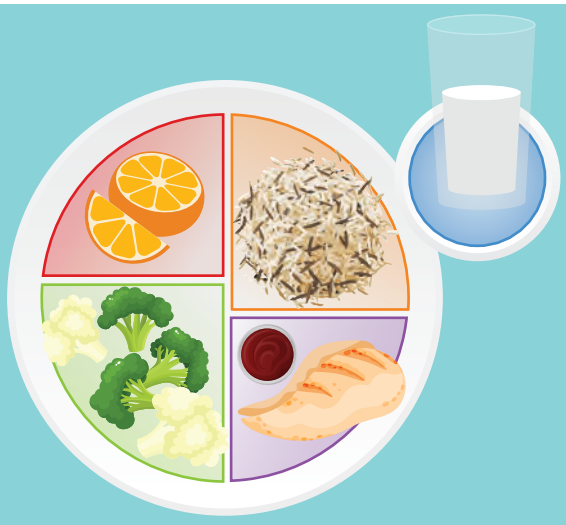
The New 2020-2025 Dietary Guidelines suggest we "make every bite count" by following these guidelines:

1. Follow a healthy dietary pattern at every life stage.
2. Customize and enjoy food and beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations.
3. Focus on meeting food group needs with nutrient dense foods and beverages and stay within calorie limits.
4. Limit foods and beverages higher in added sugars, saturated fats, and sodium, and limit alcoholic beverages.



What do they say about added sugars?

- Limit added sugars to **less than 10 percent of calories per day** starting at age 2.
  - When added sugars in foods and beverages exceed 10 percent of calories, a healthy dietary pattern within calorie limits is difficult to achieve.
- Avoid foods and beverages with added sugars for those younger than age 2.



"The nutrient-dense choices included in the Healthy U.S.-Style Dietary Pattern are based on availability in the U.S. food supply and include 17-50 calories from added sugars, or 1.5-2 percent of total calories."

U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. Available at DietaryGuidelines.gov.

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What are Added Sugars?

Sugars are found naturally in all plant and dairy foods and beverages and are also added to foods and beverages for taste, texture, and preservation.

The FDA defines ADDED SUGARS as those sugars that are added to foods during processing or sugars packaged for consumers to add to foods and beverages on their own (like table sugar, brown sugar, honey, syrup on pancakes, etc.).

Added sugars do not include naturally occurring sugars that are found in milk, fruits, and vegetables or low- and no-calorie sweeteners.

"A healthy dietary pattern limits added sugars to less than 10 percent of calories per day.

Added sugars can help with preservation; contribute to functional attributes such as viscosity, texture, body, color, and browning capability, and/or help improve the palatability of some nutrient-dense foods."

—Dietary Guidelines for Americans, 2020-2025

Real sugar comes from sugar beets and sugar cane plants.

For more resources, visit sugar.org

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March 2021

SWEETENERS you might find in your food

There are many different sweeteners in our food supply today that might be used as an alternative to table sugar. Here is some basic information about some of the most popular caloric, low- and non-caloric sweeteners, including real sugar as a comparison.

CALORIC

Sugar	Agave	Brown Rice Syrup	Coconut Sugar	Date Sugar	Dextrose	Fruit Juice Concentrate	High Fructose Corn Syrup (HFCS)	Honey	Maltodextrin
SOURCE: Sugar beet and sugar cane plants	**SOURCE:** Agave Plant	**SOURCE:** Rice	**SOURCE:** Flower of the coconut plant	**SOURCE:** Dates	**SOURCE:** Corn or Wheat	**SOURCE:** Fruit varieties	**SOURCE:** Corn	**SOURCE:** Nectar collected by bees	**SOURCE:** Corn or Wheat
									
SUGARS: Sucrose	**SUGARS:** Fructose (55-90%), glucose	**SUGARS:** Glucose, maltose, maltotriose	**SUGARS:** Sucrose, glucose, fructose	**SUGARS:** Glucose, fructose, sucrose	**SUGARS:** Glucose	**SUGARS:** Sucrose, glucose, fructose	**SUGARS:** Fructose (55% or 42%), glucose (45% or 58%)	**SUGARS:** Fructose, glucose	**SUGARS:** Glucose
Calories per teaspoon: 15	Calories per teaspoon: 21	Calories per teaspoon: 16	Calories per teaspoon: 15	Calories per teaspoon: 11	Calories per teaspoon: 16	Calories per teaspoon: ~16	Calories per teaspoon: 17	Calories per teaspoon: 20	Calories per teaspoon: 15
GI: moderate	**GI: low**	**GI: high**	**GI: low**	**GI: low**	**GI: high**	**GI: unknown**	**GI: moderate**	**GI: low ↔ high**	**GI: high**

SWEETNESS COMPARED TO SUGAR

Standard for sweetness	30-40% sweeter	30% less sweet	Equal sweetness	Less sweet	25% less sweet	Less sweet	120-160 times sweeter	variable	10% as sweet
PRODUCTION After sugar beet and sugar cane plants are harvested, sugar is removed from the plant through crushing, cutting and boiling. It is then filtered, washed and crystallized to produce the sugar we find in our pantries. **NOTES** While all green plants make sucrose through photosynthesis, sugar beet and cane plants make the greatest quantities of sugar.	**PRODUCTION** The leaves of the plant are cut and crushed to extract the sap. The sap is filtered, heated and treated enzymatically to convert the fructans (not very sweet) to fructose and glucose. **NOTES** Takes about seven years for the sugar content of the plant to reach a reasonable level for harvesting.	**PRODUCTION** Rice dextrin is produced by removing the hemicellulose, protein and lipid fractions from the brown rice. The rice dextrin then goes through further steps to convert polysaccharides to predominantly monosaccharides. **NOTES** A mild-flavored sweetener, also known as a maltose-based sweetener or rice malt syrup.	**PRODUCTION** Made from sap of the coconut blossom. Sap is collected and boiled down to a thick syrup, cooled into blocks and broken into granulated sugar. **NOTES** Considered a partially refined sugar and is similar in color, flavor and sweetness as brown sugar. May retain a small amount of micronutrients.	**PRODUCTION** Made from powdering dried dates. Commercial varieties may have a flowing agent added (like oat flour) to help reduce clumping. **NOTES** Looks a lot like brown sugar but cannot simply replace brown sugar in recipes as it does not dissolve in water or melt, and therefore does not incorporate well into mixtures.	**PRODUCTION** Dextrose is most commonly produced from cornstarch, though starch can come from any kind of plant. The process involved enzymatic breakdown of the starch polymers to single glucose unites, which is similar to how our bodies breakdown starch. **NOTES** Most commonly used in beer making.	**PRODUCTION** Made by evaporating most of the water from the fruit puree, concentrating the natural sugar content. **NOTES** Can contain traces of vitamins and minerals.	**PRODUCTION** Corn syrup is made from cornstarch. The cornstarch is processed enzymatically by glucose isomerase to convert some of the glucose into fructose. To develop HFCS, this process is taken further to convert more glucose. **NOTES** The higher fructose variety is often used in soft drinks and the lower fructose version is used more in cakes.	**PRODUCTION** Produced by bees, honey is harvested by bee keepers and the filtered/ processed commercially. Taste, color and flavor all depend on the types of flowers the bees have collected nectar from. Basic commercial honey tends to be a mix of different nectars to help ensure consistency and flavor. **NOTES** GI ranges are dependent on where the honey has been collected. Commercial honey blends tend to be high (GI>70).	**PRODUCTION** Produced by processing starch (most commonly corn), using acids or enzymes to break it down. **NOTES** Commonly added to processed foods to provide bulk and texture and help blend ingredients together.

SWEETENERS
you might find in your food

Calorie free? In order for tabletop sweeteners to be used like regular table sugar, they are often mixed with a bulking agent such as maltodextrin or erythritol. These bulking agents add just a few calories when you use these non-caloric sweeteners. One packet of Equal or Splenda contains 4 calories and the sweetness of two teaspoons of sugar.

Source: Barclay A, Sandall P, Schwede-Slavin C. The Ultimate Guide to Sugars and Sweeteners: discover the taste, use, nutrition, science and lore of everything from agave nectar to xylitol. New York, NY: The Experiment, LLC; 2014.

CALORIC		LOW-CALORIC		NON-CALORIC						
Maple Syrup	Molasses	Allulose	Sugar Alcohols	Acesulfame K	Aspartame	Monk Fruit	Neotame	Saccharin	Stevia	Sucralose
SOURCE: Sap of the maple tree	SOURCE: Sugar cane plant	SOURCE: Corn	SOURCE: Corn	SOURCE: N/A	SOURCE: N/A	SOURCE: Monk fruit (a small melon)	SOURCE: N/A	SOURCE: N/A	SOURCE: Stevia plant	SOURCE: N/A
SUGARS: Sucrose, glucose, fructose	SUGARS: Sucrose, glucose, fructose	SUGARS: Allulose	SUGARS: Glucose	SUGARS: Glucose	SUGARS: N/A	SUGARS: Mogrosides	SUGARS: N/A	SUGARS: N/A	SUGARS: N/A	SUGARS: N/A
Calories per teaspoon: 17	Calories per teaspoon: 19	Calories per teaspoon: 1.6	Calories per teaspoon: 0.6-8	Calories per teaspoon: 0	Calories per teaspoon: 0	Calories per teaspoon: 0	Calories per teaspoon: 0	Calories per teaspoon: 0	Calories per teaspoon: 0	Calories per teaspoon: 0
GI: low	GI: moderate	GI: N/A	GI: varies	GI: N/A	GI: N/A	GI: N/A	GI: N/A	GI: N/A	GI: N/A	GI: N/A
SWEETNESS COMPARED TO SUGAR										
Slightly less sweet	25-50% less sweet	70% as sweet	30-100% as sweet	200 times sweeter	150-250 times sweeter	200-400 times sweeter	8,000 times sweeter	300-500 times sweeter	200 times sweeter	400-600 times sweeter
PRODUCTION The maple tree is tapped so the sap can be collected in buckets that hang on the tree. The sap is then boiled to reduce the water content, concentrating the sugars.	**PRODUCTION** Molasses is a co-product of sugar refining. It is spun off the raw sugar in a centrifuge. The first spin produces light molasses, while later spins produce darker molasses.	**PRODUCTION** Allulose is a "rare sugar" naturally present in wheat, figs and raisins. However, it is manufactured from corn through enzymatic reactions.	**PRODUCTION** While sugar alcohols can occur naturally, most are produced industrially from sugars (pentoses and hexoses). Sorbitol and xylitol are hydrogenated with a nickel catalyst. Erythritol is made through fermentation of glucose and sucrose.	**PRODUCTION** Acesulfame K, or aceK, is a potassium salt. It is made by combining acetoacetic acid and potassium.	**PRODUCTION** Aspartame is a methyl ester of aspartic acid/ phenylalanine dipeptide. Typically aspartame is made through chemical synthesis.	**PRODUCTION** Monk fruit naturally contains sucrose, glucose and the high-intensity sweetener mogroside. Extracting the mogrosides involves crushing the fruit, adding water, filtering and spray drying.	**PRODUCTION** Neotame is a derivative of the amino acids phenylalanine and aspartic acid.	**PRODUCTION** Saccharin is a sodium salt, made through the oxidation of o-toluensulfaonamide and or/phthalic anhydride.	**PRODUCTION** The leaves are boiled, then the liquid is passed through a resin and washed in alcohol to release the sweet glycosides. These are then re-crystallized to produce the commercial product. Seven glycosides have been extracted, the two most commonly used are stevioside and rebaudioside A (Reb A).	**PRODUCTION** Manufactured through chlorination of sucrose in a multistep synthesis.
NOTES Contains traces of organic acids, vitamins and some minerals, however not a significant level.	**NOTES** May contain trace amounts of iron, calcium and phosphorus. Sugar beets also naturally contain molasses but it is not used in the food supply.	**NOTES** Allulose has the same chemical formula as fructose but is arranged differently. It isn't metabolized by the body and may cause GI distress similar to sugar alcohols.	**NOTES** Sugar alcohols are considered tooth friendly. Excess consumption of sugar alcohols can cause diarrhea. This is because the body ferments them in the gut.	**NOTES** As a tabletop sweetener, it is always mixed with at least one other ingredient to reduce the sweetness to compare to table sugar. Brand name Sweet One or Sunett.	**NOTES** Breaks down in the body to aspartic acid, phenylalanine and a small amount of methanol. Brand names are NutraSweet or Equal.	**NOTES** It is challenging stevia as the next "natural" high-intensity sweetener as it is heat stable, acid stable and soluble in water. Also called Lou Han Guo.	**NOTES** It is heat stable, so it can be used in baking. Brand name is Newtame.	**NOTES** It can provide a bitter or metallic aftertaste. Saccharin crosses the placenta and is secreted in breastmilk. It is not metabolized in the body and excreted in the urine. Brand name SweetN' Low or Sweet and Low.	**NOTES** Stevia can leave a bitter aftertaste. Stevia consumer products are often mixed with erythritol or sugar.	**NOTES** When combined with maltodextrins (used as bulking agents) there is a small contribution to energy. It is also stable in heat, so can be used in baking. Brand name Splenda.

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