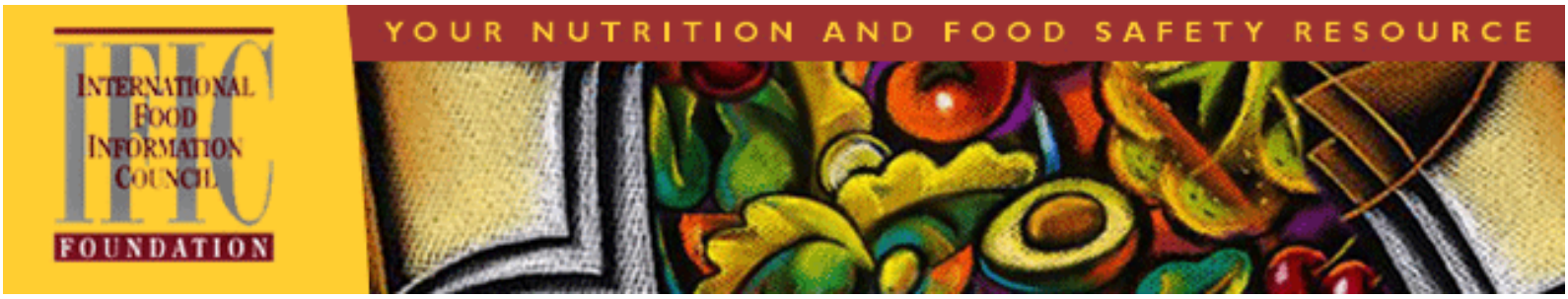

Frequently Asked Questions About Sugars and Carbohydrates

April 2005

The recently released 2005 Dietary Guidelines for Americans recommend that Americans wisely choose carbohydrate-containing foods to ensure adequate nutrient intake and still keep their weight within healthful limits. Consumers now have numerous questions about carbohydrates and sugars. This document will attempt to answer those questions.

CARBOHYDRATES AND SUGARS 101

What are carbohydrates?
Carbohydrates are one of the three main classes of food and a source of energy. Sugars, starches, and fiber are all types of carbohydrates. Technically, carbohydrates are any compound containing carbon, hydrogen, and oxygen, with twice as many hydrogens as oxygens. Carbohydrates are the main energy source for the body and the only direct energy source for the brain. Carbohydrates can be found in varying amounts in fruits, vegetables, grain foods, and many dairy products. Carbohydrates are also found in ingredients in many other foods prepared at home, eaten at a restaurant, or purchased at grocery stores.

Sugars come in several forms. The simplest sugars are called monosaccharides. Examples of these simple sugars are glucose, fructose, and galactose. When two of these sugars join together they are called disaccharides. The most common disaccharide is sucrose or table sugar. Table sugar is made up of equal amounts of glucose and fructose that are joined together by chemical bonds. Starches and fiber are typically made up of many simple sugars joined together and are referred to as polysaccharides.

Some common terms:

- **Corn Syrup:** Syrup made from maize (corn), composed mainly of glucose. Its liquid form keeps food moist and prevents them from spoiling quickly.
- **Fructose:** A simple sugar found in fruits, honey, and root vegetables.
- **Galactose:** A simple sugar found in milk products.

- **Glucose:** The main source of energy for the body and the sugar produced when you digest carbohydrates. Glucose is sometimes referred to as dextrose.
- **High-Fructose Corn Syrup:** A mixture of glucose and fructose produced from corn syrup. The most common form of high fructose corn syrup (HFCS) has 55 percent fructose and 45 percent glucose. It is used to improve taste and help keep many foods and beverages fresh longer.
- **Lactose:** The natural sugar found in milk, it is composed of one galactose unit and one glucose unit; sometimes called milk sugar.
- **Maltose:** A disaccharide composed of two glucose units. It is found in molasses and is also used for fermentation.
- **Sucrose:** Composed of one glucose unit and one fructose unit bonded together. It is commonly referred to as table sugar.

What are sugars?
When people hear the word “sugar” they often think of sugar in a bowl on the breakfast table. That sugar is scientifically known as sucrose and is the most familiar to home cooks. But there are many types of sugars, which scientists classify according to their chemical structure. Sometimes called “caloric sweeteners,” sugars are carbohydrates naturally present in or added to foods. Sugars usually have between 3 and 4 calories per gram (simple sugars have 4 calories per gram; some polyols and polysaccharides can have lower caloric content).

Two other terms are often associated with sugars: “added” and “naturally occurring” sugars. Both types of sugars are digested and metabolized in the same way in the body and can be part of a balanced diet that includes a variety of foods.

- “Naturally occurring sugars” is a term that refers to the sugars in food or beverages coming from the ingredients themselves. Such ingredients inherently containing sugars are fruit, vegetables, and milk.
- “Added sugars” refer to sugars added to foods in manufacturing, cooking, or at the table. Examples of added sugars include sucrose, corn syrup, high-fructose corn syrup, honey, and molasses.

Speaking of carbohydrates and sugars:

- **Whole grains:** A whole grain is the entire edible part of any grain such as wheat, rice, corn, or oats. The Food and Drug Administration (FDA) defines whole grain foods as foods that contain 51 percent or more whole grain ingredients by weight. Whole grains can be foods such as popcorn or brown rice; whole grains can also be ingredients such as whole wheat flour and oats. Whole grain products can be identified by examining the ingredient list printed on the label.
- **Refined carbohydrates and sugars:** Refined grains are the product of grain processing where the bran and the germ are removed. This is done to produce foods with a certain desired texture or to extend freshness. Grain products with the bran and germ removed can be made into other foods (e.g., bread, macaroni, breakfast cereal) or they can be enjoyed themselves (e.g., white rice). Most refined grains, such as flour, are enriched before being added to foods. In the case of sugar, the refining process refers to filtering sugar cane or beets until the desired material—the sugar crystal—is obtained.
- **Enrichment/fortification:** With modern milling techniques, the bran and germ are often separated from the whole grain resulting in a softer textured product. However, these processes also result in some of the nutrients contained in the whole grain being lost. The

resulting refined grains are often enriched by the addition of vitamins and minerals and sometimes fiber. Grains in breads and cereals may be fortified with B vitamins and iron, and sometimes folic acid, thus improving the nutrient content of the diet.

CARBOHYDRATES AND SUGARS IN THE DIET

Are the caloric sweeteners used in food safe?

The FDA has examined numerous sugars including glucose, dextrose, fructose, sucrose, high fructose corn syrup, lactose, and maltose and determined that they are 'generally recognized as safe' (GRAS). According to the FDA, sugars for use in foods have a proven track record of safety based either on a history of use or on published scientific evidence, and need not be further approved by the FDA prior to being used in food products.

How are carbohydrates and sugars used by the body?

Once ingested, most carbohydrates and complex sugars are broken down into the simple sugar glucose. Glucose is the primary fuel utilized by the brain and working muscles. To protect the brain from a potential fuel shortage, the body tries to maintain a constant glucose level in the blood. Excess dietary glucose can be stored in the liver and muscle cells in units called glycogen. When the level of glucose in the blood starts to drop, glycogen can be converted to glucose to maintain blood glucose levels.

Do carbohydrates and sugars cause weight gain?

Carbohydrates are a source of energy or calories. If you consume more calories than you expend by metabolism and exercise you will gain weight no matter what the source of those calories. For good health, the *Dietary Guidelines for Americans* state that you should choose carbohydrates wisely; choosing plenty of foods like fruits, vegetables, grains, and dairy products, while not exceeding calorie needs. Additionally, consumers should carefully choose foods and beverages with added sugars because they may provide calories without many other essential nutrients. Carbohydrates and sugars themselves do not cause weight gain. In order to avoid weight gain it is necessary to pay attention to all calories not just those from added sugars. Excess calories may come from any macronutrient whether proteins, fats, alcohol, or carbohydrates. A person will not gain weight if the calories they eat are equaled by the calories they expend either in maintaining body processes or in activities of daily life and exercise.

What about sugar and diabetes?

There are two types of diabetes: type 1 and type 2. In type 1 diabetes, the pancreas fails to produce the hormone insulin. Insulin is required by the body for energy utilization both by muscles and other cells. Type 2 diabetes results when the body is unable to respond properly to the insulin produced by the pancreas. Type 2 diabetes is the most common. Individuals who are overweight or obese may be more at risk for developing type 2 diabetes. Consumption of sugars and carbohydrates does not cause either type of diabetes. People with diabetes need to be especially careful about the carbohydrates that they consume, usually by counting grams of carbohydrate, but sugars are not "off limits" even for people with diabetes. Regular exercise improves insulin sensitivity for people with diabetes and everyone else.

SUGARS IN YOUR FOOD

Why are sugars added to foods?

Some functions that sugars have in foods include that they:

- Act as a sweetener
- Act as a tenderizer in baking
- Caramelize under heat
- Enhance the growth of yeast for breads and baked goods
- Control the gelling process when making fruit preserves
- Function as a preservative to prevent spoilage
- Add to the smoothness of ice creams and frozen desserts

The sweetening ability of sugar can encourage people to eat nutrient-rich foods that would otherwise probably not be consumed. Some examples are a sprinkle of sugar added to oatmeal or grapefruit or adding sugar to cranberries in the juice making process.

LABEL LINGO

How can labels be helpful when choosing foods?

When consumers read a food label they will see sugars listed by several names (see “Some Common Terms” above). The use of these names in the ingredient section is required to accurately identify which sugars are present in the product. To help clarify how different foods can fit into the diet, it is helpful to read the Nutrition Facts panel. In addition to checking for carbohydrates and sugars information, it is helpful to check the following as you make food choices:

- Calories (be sure to note the serving size and compare it to the amount you typically eat)
- Fats (including saturated fat, trans fat, and cholesterol)
- Fiber, Vitamins, and Minerals (try to choose foods each day that are sources)

CONSUMPTION GUIDELINES

What are carbohydrate and sugar consumption recommendations?

The Institute of Medicine recommends that adults and children consume at least 130 grams of total carbohydrate per day based on the average minimum amount of glucose utilized by the brain. The Dietary Reference Intakes (DRI) for carbohydrates and sugars recommends a maximum intake level of 25 percent or less of energy from added sugars. The new Dietary Guidelines for Americans emphasize that it is necessary to include nutrient dense foods within an individual’s caloric needs. After all basic nutrition needs are met with these nutrient dense foods any calories “left over” for the day are considered “discretionary.” These so-called discretionary calories may be used in any way an individual chooses. This might be to add more butter or oil for cooking or to add some sugars to their foods. Depending upon your activity level and basic metabolic needs you will have different amounts of discretionary calories available to you while still maintaining a healthy body weight. The new dietary guidelines suggest that consumers choose and prepare foods and beverages with only those added sugars or caloric sweeteners that fit into the individual’s discretionary calorie allowance.

WHAT’S THE BOTTOM LINE FOR CONSUMERS?

Eating a well-balanced diet and incorporating adequate physical activity is the ultimate goal when it comes to staying healthy. Carbohydrates and sugars can easily be enjoyed in moderation as part of a healthful eating plan.

Here are some tips:

- Enjoy whole grain breads, cereals, and grains to enhance the nutrient quality of your diet.
- Include these whole grains in your diet for the benefits of fiber, vitamins, and minerals.
- Include enriched/fortified grain foods, which are an excellent source of folic acid
- Food choices are endless when it comes to level of sweetness and types of sweetener used. For example, choose the whole grain cereal with the level of sweetness that appeals to you most, or combine a sweeter cereal with a less sweet cereal for a 'personalized' breakfast.
- Sugar-free or lower-sugar food options are now widely available for many food choices; you can check the Nutrition
- Facts panel to see the calorie levels and types of any non-calorie sweeteners used.
- Both sweetened and unsweetened beverages contribute to hydration. Choose sweetened beverages in moderation to quench your thirst. Research on both children and adults during exercise has shown that people drink more water when it is flavored versus unflavored.

References:

U.S. Department of Health and Human Services, U.S. Department of Agriculture. **Dietary Guidelines for Americans**, 2005. Online: www.healthierus.gov/dietaryguidelines.

GRAS: Time-Tested, and Trusted, Food Ingredients. **FDA Consumer Magazine**. March-April 2004: United States Food and Drug Administration. Online: www.fda.gov/fdac/204_toc.html.

FDA/Center for Food Safety and Applied Nutrition. *Everything added to food in the United States*. **EAFUS: A Food Additive Database**. Online: www.cfsan.fda.gov/~dms/eafus.html. Accessed 17 February 2005.

Institute of Medicine of the National Academies. **Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids**. Washington, D.C.: The National Academy of Sciences, 2002.

Institute of Medicine of the National Academies. **Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate**. Washington, D.C.: The National Academy of Sciences, 2004.

International Food Information Council Foundation. *What do we know about Fructose and Obesity?* **Food Insight**. July/August 2004. IFIC Foundation.

Dietary Guidelines Alliance. **It's All about You**. USA: Online: http://www.ific.org/publications/other/allaboutyouom.cfm. 1999.