

## Sugar

**Main objectives:** To explain what sugar is and in what foods it can be found. To help students understand the benefits of sugar as well as the negative health aspects. To demonstrate how to find added sugar on nutrition labels.

### Essential Discussion Topics:

- *What is sugar?* Start off with a discussion about what foods the class thinks contain sugar. Direct the conversation to reveal that the sweetness in all foods, even healthy ones like fruit, come from sugar. There are many different types of sugar. Common table sugar is sucrose – made up of glucose and fructose. Sucrose is extracted from cane or beets (which are plants) and then refined to produce the white crystalline grains that we know. Fruit and honey contain fructose. Milk has lactose. Glucose is the type of sugar that circulates in our blood – often referred to as blood sugar.
- *Why is sugar important?* Ask the class what sugar does for our bodies. Sugar is the body's main source of energy. When you consume a large amount of sugar, it is responsible for making you feel energetic (as in a sugar rush). It is also responsible for the crash that may occur afterwards, leaving you feeling lethargic and tired. If you consume too much sugar, the unused sugar is converted into fat to store the energy for later. Thus, we should eat foods with sugar because they give us energy and taste good, but we should also be cautious not to eat too much because of the negative effects they can have on your body.
- *What is meant by the term added sugar?* Fruit (fructose) and milk (lactose) are obvious examples of foods with naturally occurring sugar. Added sugars are those we add ourselves at the table or those that are added in the processing and preparation of foods by manufacturers. Common foods with added sugars include: soda, candy, cakes, cookies, pies, fruit drinks, dairy products (such as yogurt), and breakfast cereals. According to the AHF, added sugars “contribute zero nutrients, but many added calories.” Ask the students to think about sources of added sugar in their daily lives. Ask them to think about one easy change they could make to eliminate some of the added sugar in their diets.
- *Why is too much sugar bad?* As discussed above, a spike in blood sugar can cause you to crash later. This is a short-term side effect of consuming a lot of sugar once. There are also many long-term negative health effects of consuming too much sugar. It can increase your risk for developing dental cavities, becoming overweight, and developing diabetes.

### Supplemental Discussion Topics:

- *Simple vs. Complex Carbohydrates*
  - Simple carbohydrates are sugars (i.e. table sugar, brown sugar, honey, maple syrup, candy). They are made of just one or two sugar molecules. They are the quickest source of energy because they can be digested very rapidly.
  - Complex carbohydrates are also made of sugar molecules, but they consist of longer strings or branches of molecules. They are often rich in

fiber, and thus keep you fuller longer (remind students of whole grains lecture). Complex carbohydrates are commonly found in whole plant foods and, therefore, are often high in vitamins and minerals (remind students of fruits and veggies lecture). Good sources of complex carbohydrates include: green vegetables, whole grain breads, oatmeal, starchy vegetables (potatoes, sweet potatoes, corn), beans, and lentils.

- *What is diabetes?* The CDC defines diabetes mellitus as a group of disease characterized by high levels of blood glucose resulting from defects in insulin production, insulin action, or both. Most of the carbohydrates we eat are broken down into glucose (a monosaccharide), which is a major source of energy. After a meal, blood glucose levels rise. In healthy people, this stimulates the pancreas (the beta cells, specifically) to release insulin. Insulin is a hormone that facilitates the uptake of glucose into liver, muscle and fat cells. People with diabetes either do not make enough insulin or are resistant to the insulin that they make. As a result, glucose builds up in their blood because their body can't use it effectively. Chronic high blood sugar can cause heart disease, blindness, kidney disease and lower extremity amputations.
- *Artificial Sweeteners.* Much debate exists regarding the relative health benefits vs. risks of artificial sweeteners. Artificial sweeteners are synthetic sugar substitutes, but may be derived from naturally occurring substances. Artificial sweeteners are many times sweeter than regular table sugar. Some examples include: aspartame (Equal), saccharin (Sweet'N Low), sucralose (Splenda). These sweeteners are increasingly found in foods, especially beverages. They are attractive because they provide a similar taste to many of the sweet things we love, without all of the calories. One concern, however, is that artificial sweeteners affect the body's ability to gauge how many calories are being consumed – by providing a sweet taste without any calories, these sweeteners cause us to crave more sweet foods and drinks, which can end up leading to excess calories.

#### Activities:

- *Finding sugar in foods.*
  - Hand out empty boxes of food to the class. Have the class look through the ingredient list to find different types of sugar. Have the class make a list and see how many different types of sugar they can find. Essentially, the key words to look for are 'syrup' and anything ending in '-ose.' (See list of types of sugar at the end).
  - Finding the amount of added sugar in foods can be challenging. By law, The Nutrition Facts Label must list the grams of sugar in each product. But this does not differentiate between natural sugars and those that are added. The AHA suggests an added sugar limit of no more than 24 grams of sugar (about 6 teaspoons, 100 calories per day) for women and 36 grams (about 9 teaspoons, 150 calories) for men.

#### Food Activities:

- *Seeing the sugar.*

- Bring in table sugar and actually measure out the sugar content of some of the foods that they found (in nutrition label exercise above) and place them in clear containers. Four grams of sugar = 1 teaspoon. A more visual representation of how much sugar can be hidden in different foods and how important it is to pay attention to. There is an entire lesson on drinks, so try to focus on other sources of added sugar – like cereals.
- *How much sugar does the average American consume?*
  - Have the students guess how much added sugar the average American consumes per day. Answer: 22 teaspoons, which amounts to an extra 350 calories. Like above, measure out this amount into a clear container to show just how much sugar that is. It is estimated that the average American eats more than 150lbs of sugar and sweeteners per person per year!

#### Snack Ideas:

- *Frozen grapes.* Take grapes off the stem and place in a freezer bag. Freeze at least overnight and enjoy!
- *Low fat Greek yogurt with honey and fruit.* The point of the taste test is to have the class thinking about the different types of sweeteners and how they change the way food tastes. With this taste test, give each student a bowl of yogurt. Have them try it alone, then add sliced fruit (i.e. strawberries, peaches, mango) and tell them to think about the slightly sweeter flavor. Then add a small amount of honey to demonstrate the change in sweetness.
- *Banana Ice Cream.* Make this one ingredient banana ice cream from scratch in front of the students. In advance, start with ripe bananas – peel them and cut into coins (slice the banana). Place in freezer bag and freeze for at least 2 hours, but ideally overnight. Then, place bananas into food processor (usually more powerful than a blender) and pulse the frozen banana pieces. Keep blending – the banana will first look crumbly, then gooey, then smooth but chunky, but it will eventually smooth out completely. Scrape down the food processor a few times throughout the process. Depending on the size of the food processor, can do several bananas at a time or also do in smaller batches. If processor is less powerful, can add a few tablespoons of milk (or soymilk, almond milk, etc.) and the end result may be a little looser. In the end, the product will be relatively soft but will still taste great. (In an ideal world you would pop it back into the freezer for a bit).

#### Supplemental Materials:

##### Types of sugar

- **Sucrose:** Table sugar, made up of glucose and fructose. Derived from plants, commonly sugar cane in the US, but also from beets in other countries. This also includes brown sugar, which is made by adding a varying amount of molasses back to white sugar.

- Fructose: A monosaccharide, commonly found in fruit. The taste is actually sweeter than sucrose.
- Glucose: Another monosaccharide, generally used as a syrup. Also described as dextrose on packaging.
- Lactose: This is the sugar found in milk, and thus all milk products. Some people don't produce the enzyme necessary to break down lactose, leading to GI distress if consumed. It is a disaccharide of glucose and galactose.
- Other 'natural' sounding types of sugar
  - Honey: Also made up of fructose and glucose. Made by bees, which basically process the sugar from plants.
  - Molasses: This is essentially the same as table sugar, only it is unrefined and a syrup. It is darker in color and has a more distinct flavor from the minerals and 'impurities' present
  - Maple Syrup: Made by boiling down the sap from maple trees into a concentrated syrup. It takes 20-50 liters of sap to make a single liter of syrup, depending on the temperature. Processing the syrup more, maple sugar can be made as well.
  - Agave nectar: This is made by extracting the sugar from the agave plant. It started to gain popularity because it was said to be a lower-glycemic index sugar, meaning it doesn't raise blood sugar as quickly as other forms of sugar. Most people probably don't deal with this sugar much, but it is also added to some 'healthy' and organic products, mainly because it isn't called corn syrup.
  - Corn syrup/high fructose corn syrup: Corn syrup is made by processing the starch in corn into a sugar syrup. High fructose corn syrup is refined further to increase the ratio of fructose to glucose, which makes it taste sweeter.
  - Brown rice syrup: Used in many ways like agave nectar, since it sounds a somewhat healthier.
  - Malt syrup: Generally made from grains, like barley. Used to make bagels sweet.
  - Fruit syrup: Syrup made out of different types of fruit. It is often used in products because they sound less offensive than corn syrup.