Middle and High School Curriculum

# NUTRITION 101

LESSON FOUR

**A SPOONFUL OF SUGAR**

by Dr. Heather Manley, N.D.

# NUTRITION 101

## LESSON 4
## A Spoonful of Sugar

### INSTRUCTIONAL OBJECTIVES

Students may use the Cornell Note Taking as you present the following information regarding "A Spoonful of Sugar."

### STUDENT-FRIENDLY OBJECTIVES

I will examine sugar, its different types, and its effects on my body.

### HANDOUTS

Optional: **Cornell Note Taking** and **Student Notes** Handouts

### MATERIALS

**iBrainstorm**: Free ipad app
Suggested videos
http://www.sophia.org/carbohydrates-tutorial
http://www.slideshare.net/guest486771/sugar-the-bitter-truth

### OVERVIEW OF CONTENT

- Carbohydrates and Sugar
- Body
- Glucose
- Pancreas
- Insulin

Review, Q&A, conclusion

### DIRECT INSTRUCTIONS

Students may use either the Cornell Note Taking format or the Student Notes as you present the following information regarding "A Spoonful of Sugar."

**Discuss Edison quote:**

*"The doctor of the future will no longer treat the human frame with drugs, but rather will cure and prevent disease with nutrition."* Thomas Edison

Who is Thomas Edison? What does this quote mean to you?

# Introductory Information

1. Carbohydrates are saccarides which are commonly referred to as sugars.
2. Glucose is the most common carbohydrate.
3. The primary function of carbohydrates ( complex)  is to provide energy for the body.
4. The key is to eat the right type of carbohydrate which will be discussed later.

# Carbohydrates

- Simple carbohydrates are broken down quickly. Some simple carbohydrates - like fruits, milks - have beneficial nutrients in them; however, others like processed and refined sugars - store bought baked goods, candy, table sugar, syrups, and soft drinks -  are void of any nutrients (vitamins, minerals and fiber) and create more work for the body to digest it.

**A sugar fact:** In general, the sweeter a sugar, the simpler it is.

- Complex carbohydrates are chains of 3 or more single sugar molecules therefore are long chains of sugar molecules (also referred to as starches). They are storage forms of energy and nutrients for plants which aid us, when these plants are eaten.  Cellulose, another type of complex carbohydrate, is the main component of fiber ( fiber slows the digestion and absorption of sugar). Foods: Think color and whole grain: broccoli, legumes, whole wheat, leafy greens.

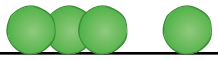
EFFECTS OF SUGAR IN THE BODY

1. Nutrient depletion
    - Processing of sugar destroys most to all nutrients.
    - No nutrients means no nutrition for the body.
    - Sugar actually robs the body of nutrients in order for it to be processed in the body.

2. Immune System Suppressant
    - Bacteria, viruses, germs and tumors (think cancer) thrive on sugar; this makes them strong, reproduce easily and very powerful.

3. Inflammation
    - One of the reasons inflammation occurs is due to a rapid rise in blood sugar, which causes biochemical changes in the cell = inflammation.

4. Hypoglycemia
    - Hypoglycemia occurs when there is an abrupt drop in blood sugar levels.
    - Hyperglycemia occurs after a high sugar, high processed meal is ingested; people may feel a “sugar high” but then blood sugar will lead to a drop, creating a low blood sugar state - hypoglycemia. Once this occurs, one will crave more sugar to achieve that “sugar high” again (vicious cycle).
    - This may give symptoms of fatigue, dizziness and even seizures.



# Pancreas, Insulin and Glucose

- The pancreas, the organ situated on that left side of the body by the stomach, senses glucose in the bloodstream and will release the chemical enzyme, insulin.
- Insulin will attach to the glucose and acts as a key to release glucose into your body's cells, to be used for energy.
- Glucose cannot get into the body's cells with out the help of insulin. Once glucose and insulin meet and bind, the pancreas will sense a decrease in blood sugar and will not release any more insulin - great communicative feedback loop.
- If this system is in a healthy balance (just enough insulin to meet glucose levels) everything is great.

## BELOW ARE A FEW PROBLEMS THAT OCCUR WHEN THERE IS AN IMBALANCE

### Type 1 Diabetes

- This is an autoimmune response in which the pancreas will begin destroying pancreatic cells that secret insulin. People, who have type 1 diabetes, need daily injections of insulin to allow their glucose to be balanced.
- This type of diabetes is discovered in childhood or early adolescence and is mostly due to genetics versus lifestyle.

### Type 2 Diabetes

- Type 2 diabetes is mostly due to diet and lifestyle: overindulgence in a high sugar diet and sedentary lifestyle. Once known as adult onset diabetes, it now affects all people, including children.
- The pancreas does not release enough insulin; therefore, glucose cannot get into the cells.
- The cells become insulin resistant in which they will not respond to the insulin; therefore, no glucose into the cells.

### Insulin Resistance

- This is often referred to as pre-diabetic state. It is ideal to have a fasting blood sugar level between 85 and 100 mg per deciliters.
- The cells become insulin resistant in which they will not respond to the insulin; therefore, no glucose into the cells. The pancreas will release insulin into the blood but the cells will not allow the glucose insulin complex into the cells.

### Where will excess sugar go?

This is the detrimental problem. The glucose may settle anywhere (the eyes = cataracts) but it will predominately end up in fat cells and stored as fat.

## Glycemic Index and Load

- The glycemic index is the ranking of foods according to how quickly the food – glucose – will be absorbed into the bloodstream. It is defined during a 2-hour blood glucose response after ingesting approximately 50 grams of a carbohydrate. The number obtained from this curve – from 10 human subjects (referred to as the AUC) – is then divided using the standard of either glucose or white bread and multiplied by 100.

The glycemic index is not a very good indicator as some foods may have a high glycemic index but have many other quality aspects – packed with nutrients and fiber- that benefit the body.

- The newer version of measurement is the glycemic load. The glycemic load is a ranking system for carbohydrate content in food portions.

It is a perfect predictor of blood sugar values in different types of foods as it puts emphasis on both the quality (key) and quantity (also key) of the food. Review the below formula.

Glycemic Load (GL) = ( glycemic index x the amount of available carbohydrate) divided by 100.

**Carrot** (fiber and nutrient rich):
Notice the GI is 47 and this is considered high yet the GL is low due to the nutrients and fiber found in the carrot.
GL = (47 x 7.5) divided by 100
GL = 3.5

**White bread** (no fiber, no nutrients):
GL = ( 95 x 50) divided by 100
GL = 48

The key to remember here is the more fiber and nutrients the food has to offer, the more beneficial it is in the body and thus will have the desired lower GL.

**Fact**
Foods that have higher fiber, protein or fat content tend to slow down the absorption of sugar therefore creating a filling of fullness sooner as well as providing nutrients.

**A few food thoughts:**
If you plan to eat a sugary treat do it...
1. After a meal
2. With a meal ( apples with cheese, nuts or nut butter)

## Summary activity

- Lesson 5 presents: Acid/Alkaline Balance
- Present the following quotation to students at the conclusion of Lesson 4. There are to consider its meaning and prepare to make comments in a classroom discussion before beginning Lesson 5.

QUOTATION

"If you can't pronounce it, don't eat it." Common Sense

Why is this quotation just good common sense?

## Homework Options:

1. Research the history of sugar and learn about how it is processed.
2. Learn about different types (with options below*) of sugar alternatives available (saccharin, xlitol, aspartame etc), learn how they are processed and effect the body.

* Technological (iPad App) Activity: Using a free technological app such as iBrainstorm and the information below about sugar, students will brainstorm all of the "sweet" tasting foods that they currently eat in their lives. They will then research this food and why it tastes "sweet." They will label each brainstorm post it note with the type of sweetener that the food contains. Is it good or bad? See list below.

## Supplemental Information

Sugar Side Notes

Teacher's note

This is added information concerning good and bad sugars.

High Fructose Corn Syrup (HFCS or corn sugar)

HFCS is a processed mixture of 55% fructose and 45% glucose. It is very important to note that the fructose is derived from highly processed corn that is most likely genetically modified. It is found in almost every package food and drink - ketchup, energy drinks, cereals, cookies, crackers, breads, ice creams, soda pop and more.

Why? It is not from a natural source; it is not bound with nutrients or fiber, which cause the body to process it faster and leaving you unsatisfied. Leaving one unsatisfied leads to extra calories, weight gain and long term health problems as high blood pressure and diabetes (vicious cycle).

*Side note*

*A Princeton University study gave rats either a diet of HFCS or table sugar. The rats consuming HFCS showed a significant amount of abdominal fat deposits and circulating triglycerides (i.e.: obesity, heart disease and cancer) in comparison to the table sugar.*

*A sugar side note*

*Food and beverage manufacturers began switching their sweeteners from table sugar/sucrose to corn syrup in the 1970s. Two reasons: they discovered that HFCS was not only far cheaper to make and it is about 20 percent sweeter than table sugar. This could lead to a great discussion.*

## ASPERTAME

Aspertame is an artificial sweetener. It is also referred to as Nutra Sweet, Equal, Spoonful and Equal-Measure.

**Why?** Aspertame is made of 40% aspartic acid. Aspartic acid is an amino acid and when taken in its free form (nothing attached to it) will raise blood levels of aspartate and glutamate.

Aspartate or glutamate act as neurotransmitters in the brain allowing for communication in the cells. When there are too much of these in the blood (from ingesting aspartame), neuron damage, and free radicals may result.

Usually the blood brain barrier (BBB) protects itself from too much of these substances but the BBB is not developed fully in children, and sometimes does not protect all areas of the brain (due to illnesses).

Some symptoms may include: migraines, nausea, abdominal pains, fatigue (may block glucose into the brain), depression, asthma.

## SUCRALOSE/ SPLENDA

Splenda is NOT a sugar, despite its sugar-like name and deceptive marketing slogan, "made from sugar." It's a chlorinated artificial sweetener - chlorocarbon. The molecule structure of sugar have been manipulated by removing the hydrogen and oxygen and replacing them with chlorine atoms.

**Why?** Chlorocarbons have long been known to cause organ damage.

## SACCHARINE OR SWEET N' LOW

It has been around for over a hundred years and is approximately 300 times sweeter than sugar. It was banned in the early 1900s but then brought back on the market during WW1.

**Why?** Numerous studies have connected saccharin use with cancer - mostly bladder. Before 2000, there was an actual warning on the packet, which was removed by the US congress due to diligent lobbying by the saccharin industry. Here is the warning:

*"Use of this product may be hazardous to your health. This product contains saccharin, which has been determined to cause cancer in laboratory animals."*

# Sugar Alternatives

All of the below are packed with nutrients and fiber, which slow down digestion and do not rob the body of vitamin and mineral reserves.

### RAW HONEY

**Why?** It is sweet so a little bit adds enough sweetness to herbal teas or baked goods. Completely natural in its raw form and has many health benefits when used in moderation, due to its antioxidants.

It is also anti-microbial. Raw honey contains propolis also referred to as bee glues which acts as a barrier against bacteria in the beehive. This substance will also help boost and protect our immune systems.

### DARK ORGANIC MAPLE SYRUP

**Why?** Its earthy rich flavor is full of the trace mineral manganese. Manganese is a special mineral that has a big job in fighting free radicals. Maple syrup also has a good amount of zinc, which supports the immune system and plays a key role in the health of your heart (slows down progression of atheroscerlosis).

### DATE OR COCONUT SUGAR

**Why?** These sugars are packed with potassium, which will help reduce hypertension, regulate blood sugar levels (due to fiber) and vitamin c. Similar in taste to brown sugar.

### STEVIA

Stevia is a highly sweet herb derived from the leaf of the South American stevia plant.

**Why?** Stevia will help reduce sugar cravings, inhibits any oral bacteria growth, and does not affect blood sugar levels. It can be purchased as a liquid or in a powder form. Perfect for tea or coffee.