

## Carbohydrates: Sugar

### Transcript

Hello and welcome back to our carbohydrate module. Today we're going to talk about sugar.

Sugar is an exciting topic to talk about because there is a lot of misunderstanding and it has a bad reputation, and people love it and we just want to see you take a look at the role of sugars in the body, and then the role of the sugars that we take from the outside.

So my name is Dr. Ritamarie Loscalzo, and I'm delighted to be here to present this to you.

Before we begin I do want to make sure that you are aware that the information that I'm presenting is not intended to replace a one on one relationship with a qualified healthcare professional, and it's certainly not intended as medical advice. It is intended as a sharing of knowledge and information from my research and my clinical experience. I encourage you to take it all in, learn as much as you can, and then make your own healthcare decisions based upon your research and in partnership with a qualified healthcare professional. Especially if you are on any medications or have been diagnosed with any kind of medical condition.

Let us take a look at what we're going to learn in this presentation, what I want you to walk away with at the end. We're going to review sugar on a molecular basis. The way that we looked at it in previous modules, and introducing the whole carbohydrate family. We're going to look at monosaccharides, disaccharides and oligosaccharides and review what those are. Then I'm going to talk to you about why you need sugar, where sugar comes from in the diet, the variety of sources, the good, better, best of that if you will, what effects the rate of absorption of sugar from your digestive track, and then the uptake of the sugar into the cells where they need to go in order to be able to be used. Then how sugar is converted into energy, what's needed for sugar to be efficiently utilized by the body so there's some nutrients and some conditions that are required. The negative effects of simple sugars, and then finally alternatives for sugar in satisfying your sweet-tooth.

When we talk about sugar and not eating refined sugar, which we'll get to, most people think it means a life of deprivation. But we're here to tell you that no, that doesn't have to be the case.

Let's take a look at the molecular level of what sugar looks like and we'll talk about the three different types of sugars starting with monosaccharides.

Monosaccharides meaning that there is one sugar molecule starting. There's three basic monosaccharides and they consist of one molecule each. They are the building blocks of all the rest of the sugars. What we have are glucose, fructose and galactose.

Glucose has a chemical structure that looks like this. It's a six carbon ring. Fructose is also a six carbon ring, but it has a slightly different look. It has more of a pentagon rather than a hexagon shape, and they're slightly different. We're showing them in two different ways. One with the carbons around the edge of the circle showing, and one without. Finally, we have galactose which is milk sugar. Fructose is often called fruit sugar because it's predominant in fruit. Galactose is called milk sugar because it is the sugar in milk. And again, it is a six carbon sugar, and there's just a subtle, subtle difference between it and glucose.

Life in your body is about subtle differences, making huge differences functionally, and this is the case galactose and glucose function differently with very little difference between them.

Another indication of that that you'll learn about is there's a very tiny, tiny, tiny difference between estrogen and testosterone. It's very interesting.

Then as a review, we have the disaccharides, sucrose, which is a combination of a glucose and a fructose and di meaning two, so two sugar molecules. Lactose which is a molecule of glucose and galactose, and maltose which is two sugars. Galactose of course is found in milk, dairy products and maltose is found in long chain starches. Then the third one we'll look at is oligosaccharides. That means short chains. Usually they're anywhere from three to nine sugars put together, and depending on which type you put together, gives you the different type of sugars. Fructooligosaccharides being one of the most popular ones, because it's used as a supplement and taken in supplemental form to help the body to feed the good organisms, the probiotic organisms in the gut. That's that with the molecular. That's about as geeky, sciencey as we're going to get. Now, we're going to go and talk more practically about some of the things like, why we need sugar.

Main thing is sugar is energy. In terms of your body creating energy, not only on an external level of, "Wow I have energy, I'm going to run and hike and jump," but energy for each and every cell in your body. In order to have optimal growth and repair, and detoxification, you have to have energy. The cell has to have that energy currency.

Gland and organ functions rely on having enough energy. Your brain, in terms of being able to be mentally clear, have attention and focus, needs energy in the form of glucose, which then gets converted into ATP, as we're going to see in a little bit. You need it for having steady moods. You of course need to have energy to have fun, meaningful relationships, and to achieve success in your chosen career.

Sugar is not the bad guy, but sugar in forms that we'll talk about in a bit, are definitely damaging to the body, whereas sugars in whole forms with lots of vitamins, minerals, and fiber are exactly what your body needs.

Let's talk about where sugar comes from in foods. Of course when we think about it, we think about, "Well sugar comes from fruit. Sugar comes from dessert. Sugar comes from ice cream." But we're going to look a little bit more details about that, and some surprising sources of sugar. On the less desirable side, on the right hand side of your chart, we're going to list some of the sugars that are not going to be desirable.

Table sugar which is sucrose, comes in little white crystals sitting in the bowl on a lot of people's tables, is composed of a glucose and a fructose molecule. The problem is that it doesn't have any fiber which means that it's rapidly absorbed into the system. Rapidly absorbed, it's very quick. In addition to it not having the fiber, it also doesn't have any nutrients. It doesn't have vitamins and minerals. You'll see when we look at the Krebs Cycle, which is how energy is actually produced from the sugar, what you're going to find there as we look at the Krebs Cycle is that there's a bunch of B vitamins and amino acids that are required to actually convert the sugar into energy. If you just take in the simple sugars without the rest of it, energy is going to be produced much less efficiently, and you're going to deplete rapidly any storage you might have of those nutrients.

Fructose, less desirable as a separate supplement. Fructose as part of whole fresh fruit is okay, although in some cases, people who are insulin resistant or diabetic do need to watch their intake of whole fresh fruits because of the high fructose content. Fructose taken in as a supplement is either taken in as crystalline fructose, I see that a lot, or more commonly is high fructose corn syrup. The problem with fructose is, while it does not require insulin in order to get into the cells, it is metabolized through the liver. When there's too much of it, it causes a buildup and some sluggishness and a fatty liver.

Glucose syrup is sometimes seen ... it's more used in Europe than in the United States, but it's seen, and again, it's just the glucose without the fiber. So same as fructose and sucrose, not really the best things to be taking in. Then there's the high fructose corn syrup.

Maple syrup is often a surprise to folks, because we think, "Wow, that's a whole fresh sugar. It come right from a tree." Yes indeed in comparison to taking some of the other refined foods, it is much better, because it does still have some B vitamins and other minerals in it, however, it still can be rapidly taken up into the blood stream through the intestinal track and create problems with blood sugar swings.

Agave nectar, that was very popular for a while, and now it's lost in the favor because it's found that there is a very high percentage of fructose in there, which can be problematic, as we said before, in terms of folks with liver congestion. Again, it's very quickly absorbed. There was a whole thing about it being low glycemic, and the reason it's labeled low glycemic is because it has fructose, not glucose, but indeed a lot of people had their blood sugars go up.

Coconut nectar, kind of the new kid on the block. Over the last few years, we have companies that have discovered that they can actually sap out the coconut nectar from the coconut trees. Similar to the way that we extract that from the maple trees for maple syrup. In my opinion, my humble opinion and my experience, I've found that people do best to go off of all of these and not do the moderation at least at the beginning while you're trying to restore balance. And then palm sugar, similar to coconut nectar.

Honey is often touted as a really healthy alternative to table sugar, and indeed, it is much healthier. Especially if you get organic raw honey, there are some immunologically stimulating and balancing properties in there helpful with allergies. Used as a medicine, honey can be quite effective, but used as a food, I think it just needs to be considered as little as possible.

Finally, we look at refined grains, which I think nobody should eat. That would be your white flour, your white rice, and things like that. Again, because of the lack of fiber and the grain's germ, bran, and all the nutrients have been removed, you're really just getting starch, and you're getting it without all the nutrients that it needs to actually have the sugars convert and be turned into energy.

The best sources, green leafy vegetables. Bet you didn't know they had sugars in them. Yesm they do. They have long chain sugars in the form of starch. Varying ones have different amounts of it, but indeed they have sugar in them. The sugar in there is not going to be damaging into your system because the sugars are going to be tempered in terms of their absorption and the uptake and then the glucose levels aren't going to fluctuate so much.

What I do find is that when people juice green leafy vegetables and then drink it quickly, because you're drinking it without all the fiber, the sugar can be a rush.

We have rainbow colored vegetables. They actually do have sugars. They have a sweetness and it's a non-sweet sweet, if you will. I've listed root vegetables and tubers. Now, you got to be cautious with these again, if you're diabetic or pre-diabetic/insulin resistant, but root vegetables like your carrots and beets and sweet potatoes and the like.

Fruit certainly is a good source of sugars and it's usually because it comes in a package. It comes with all the fiber and the other nutrients intact, that's the way you're going to be getting the best advantage.

Whole grains but non-gluten grains, so we're talking here about millet, quinoa, things like that. Next, we have legumes, and legumes are the bean family. They have sugars in them. In fact, some of the sugars in the legumes that your body does not properly process, that leads to the traditionally mentioned tooting after eating your legumes. It actually gives you lots of gas.

How does your sugar get into your cells? Well, it's our good ol' friend insulin. Insulin, yay! Insulin is a hormone that floats around in your blood stream, and it basically allows the sugar to pass from the blood stream into the cell. It has an effect on the receptors. There's insulin receptors on every cell. It's job is to escort, if you will, glucose across the cell membrane so it gets into the cell. In addition to having insulin, producing enough insulin, your body has to have healthy insulin receptors. What we see a lot in our society is people who don't have healthy insulin receptors because they've been bombarded year after year after year with high doses of sugars and refined carbohydrates. So they've had to work overtime and basically they get tired. They get worn. They can also get damaged. They get damaged by a number of things, including like I said, excess sugars, but other things can damage them like, tobacco, inflammation of any kind.

Finally, we need a variety of nutrients to help the insulin to shuttle the glucose across the cell membrane. There's things like chromium and DHA and magnesium and a host of other nutrients that are really important in order to have correct assimilation of the sugars into the cells.

Once the sugar gets into the cells, what's needed?

Well, you have to have good oxygen supply to convert the sugar into what's called ATP. Don't let this picture scare you, it's just to show that it is a complex process that takes sugar and converts it into energy for your body. It's one that is not to be taken lightly. So many people are suffering from fatigue and it doesn't have to be that way.

This is a picture taken from one of our practitioner modules, and I showed it to you so that you just get a sense and an understanding of where things are. You basically take your sugar in and there's some pre-processing that happens before the Krebs Cycle, and then the Krebs Cycle happens and it basically shuttles the carbons down through this and attaches them to various chemicals for various purposes.

Things that are important in here ... NAD is nicotinic acid, which is vitamin B3, Niacin. I don't want to get into too many details about the Krebs Cycle, just suffice it to say, it's complex.

It requires some amino acids. It requires good functioning. It requires oxygen. It requires B vitamins. CoQ10 is a good one too.

Let's take a look at the negative effects of simple sugars. Simple sugars deplete B vitamins and other nutrients that are required for energy production. Why? Because the sugar alone doesn't have the B vitamins, and as it goes through the Krebs Cycle and requires B vitamins, your body has to take them from somewhere. Unless you're completely out, and then you're flat on your back. Also, sugars can cause intestinal distress. Some people don't breakdown simple sugars, the disaccharides and monosaccharides, and they get gas from them. Candida and other overgrowth. Other organisms like candida and candida grow rapidly in the presence of sugar. It can lead to mood swings, addictions, and many more.

What else is a negative effect of simple sugars? Well, blood sugar imbalances. There's this constant influx of sugar into the bloodstream, constant influx of insulin in there and after a while it can lead to insulin resistance and diabetes.

Dental cavities, very common. We all associate too much sugar with getting cavities. It actually feeds the bacteria that live on the teeth and in the mouth and causes them to decay the teeth.

Decreases immunity. It's been studied and shown that after the intake of refined sugar, the macrophage counts go down. Macrophages are a type of white blood cells that fight infection. Think about this, every time you eat sugar for a period of time, that depends on the amount of sugar you ate and how quickly you ate it, your immune system is low. If you're around people who are coughing or sneezing or have some sort of immune issues and infectious issues, you're much more likely to have that affect you.

Accelerated cancer cell growth. This is interesting too. It's been shown that cancer cells contain about 10 times more insulin receptors than non-cancer cells. When you eat sugar, you're actually feeding the cancer cells before you feed yourself, and that's not good. We don't want to do that. It's actually been linked to premature aging, effects on collagen and collagen bonds in the skin.

The intake of simple sugars has been associated with mental decline. Especially Alzheimer's. Alzheimer's is now being called insulin resistance of the brain. It's such a great discovery because we know that then we can control it, that it's not some weird mysterious thing. Now, it's not in everyone, but in a lot of folks, their brain gets resistant to insulin.

Let's take a quick look at how you can assess your tolerance to various sugars. You can do some home testing and check your blood sugar using a very simple at-home blood sugar meter for several hours after eating a variety of different foods. You can get your own sense of what your own glycemic index is so that you know what carbohydrates, what sugars you can get away with eating. If you want to do lab testing, the most important ones are: Fasting glucose, hemoglobin A1C, fructosamine, and insulin.



As just a quick review of how to read a label, total carbohydrate count 15 grams. Dietary fiber is 4 grams. Sugars are 4 grams. Sugar alcohols, that's like the erythritol, etc. That's 3. That'll give you the total. When I look at these, I will always look for a product that has 1 or less grams of sugar for every 50 to 100 calories.

I'm not just the bearer of bad news about how sugar effects the body, but what can you do if you want to satisfy a sweet-tooth and you're just not in the mood for a salad to satisfy you. You have that craving for something sweet, which by the way can be imbalanced nutrients related to blood sugar balance. People do well with combating their sugar cravings by consuming nutrients like, Chromium, DHA, Magnesium and others. Let's take a look at what we have.

We have stevia. Stevia is an awesome replacement for sugar. Fresh is best, and then followed by the green powder, then followed by sweet leaf concentrate. What I mean by fresh is, you can actually grow it and it looks kind of like mint. You can see a picture of it on this page. That's one thing, the objection people have with stevia is it has a slightly bitter after taste if you use a lot. What I found that a lot of people really benefit from doing is combining stevia with something like erythritol or lohan, or something along those lines, and we'll talk about what those are in a bit.

Another low glycemic alternative sweetener is a Chinese herb called lotan. Which is traditionally used as a longevity remedy and for respiratory ailments, but it's been found to have a very sweet taste and can be used to sweeten various tings.

The next in order of my priority preference for satisfying that sweet-tooth would be erythritol. It's a sugar alcohol, and we talked in way more detail about the structure and what all that means in the main carbohydrate, so I don't want to go into that in that much detail. Certainly erythritol as a sugar alcohol that gets absorbed most fully in the small intestine and doesn't cause lower GI gas, as to things like sorbitol and to some extent xylitol.

Let's take a look at a couple of others that you may not have heard of. Chicory root, Chicory root inulin. Remember inulin is a string of fructooligosaccharides, which is like a starch version of a fructoligosaccharide, so when it gets broken down it's fructooligosaccharides which are food for your intestinal bacteria, but not for you. Everybody is going to be different on this one, and I would highly recommend if you want a new source of sweetener that you get it and that you test your blood sugars.

Finally, yacon which a root that's similar to a sweet potato, and you'll see a picture of it on the screen. Again, similar to the chicory root, you just need to pay attention and see what it does to your blood sugars.

Here are some products that are excellent alternative to sugars, and there are more. You've got Zero, which is organic erythritol. You've got lakanto, which is a combination of lohan and erythritol and then something new on the market, a proprietary brand, called Just Like Sugar, which is the chicory root inulin I just spoke to you about.

Just as a review, your sugar alcohols are also called polyols. Kind of sounds like a little kids game or something, like, "Let's play polyol." They don't contain ethanol even though they say alcohol in the name. Their sweetness is very similar to sucrose. You can almost do a 1 to 1 swap in a ratio that's calling for sugar. They're naturally occurring and they can be chemically derived. They can be naturally occurring in various plants and they can also be chemically derived in a factory from glucose. They don't tend to raise the blood sugar.

Here's a chart that's just giving you a summary. It's a repeat of a chart we've showed you before. Of the various sugar alcohols and how sweet they are relative to sucrose, what kind of energy they provide, and then sweetness per food energy relative to sucrose, which basically means that if sucrose is considered a 1, erythritol has 15 times the amount of sweetness per calorie. That's pretty huge. Mannitol: 1.2, Sorbitol: .93, and xylitol, which is better than the others, except for erythritol, is 1.6.

Finally, I'm just ending with a quick review of erythritol that we covered in the carbohydrate part of the module. It's absorbed in the small intestine and excreted unchanged in the urine and feces. So you have to take enormous quantities of this to cause a problem. Enormous.

Free of side effects and regular use. The dose that's been found to cause nausea and stomach rumbling is about 50 grams, which is way more than any person would eat in a day. Unless you sit there and eat it out of the bag, which you may want to do, it taste pretty darn good.

It's much more difficult for the intestinal bacteria to digest than other sugar alcohol, so that's why it causes less gas and bloating than the others. It naturally occurs in nature and foods that you might already be eating like pears, melons, grapes, mushrooms, wine, soy sauce, and cheese.

This concludes the sugar aspect of our carbohydrate module. I hope you enjoyed it and really found some good information and have some things that you can take away. What I would suggest that you do as a result of listening here, is that you really look at your sugar consumption habits, look at the various aspects you take in, the refined stuff, the not refined stuff and get a glucose meter and start testing to see what sugars work best for your body. Thank you for being here, this is Dr. Ritamarie Loscalzo, and we'll see you again soon.