>> Hi there. This is chapter four on carbohydrates. A lot of information in this chapter. Again, the videos will be in 15 minute increments so you can watch parts of it at a time. And let's get started with the carbohydrates. So, as we discussed in chapter one, carbs provide energy for the body, and every gram of carbs, one gram, provides four calories. Okay? So again you can look on a food label. If something has 10 grams of carbs, that's going to be 10 times 4 is 40 calories in that item from carbs. Compare that to fats. Fats have nine calories for every gram. So carbs technically have less calories per gram, but we'll talk more about that later. Like I said, carbs are the main source of fuel for your body, especially for your brain and nervous system. Your brain and nervous system needs a lot of sugar, a lot of glucose, to function, to transmit impulses for your memory for you to even think. Okay? It's really the brain – The brain's only source of fuel really is from glucose from carbohydrates. So that's why it's really not good to skip meals, particularly breakfast. Because you wake up in the morning and your brain is not getting the fuel it needs. Muscles also need carbs for fuel, but muscles can get energy from fats. And we'll get more in to that in a little bit. So carbs break down in to glucose. We do store some of that glucose as glycogen, and we'll talk about that. But because it is such an important main source of fuel, particularly for the brain, you've got to make sure you're taking in carbs on a regular basis. You know, each meal. Three meals a day at least. But the healthy carbs, and we'll get in to which is healthy and which are the ones you need to stay away from. So let's first talk about simple carbs. We have simple carbs and complex carbs. Simple carbs are also called simple sugars, and these are mainly carbs that are made up of just one single sugar unit. One glucose unit. And because there's only one, they also call them monosaccharides. So we have mono means one. Also disaccharides which is made up of two sugar units is also considered a simple carb. Complex carbs are also known as starches, and fibers. That's a carbohydrate made up of three or more sugar units. So simple sugars are either mono or disaccharides, one or two sugar units. Complex carbs are three or more. So let's start with monosaccharides. Again, these are carbohydrates that contain single sugar units. Glucose, fructose, and galactose are the three monosaccharides. Glucose is the main sugar in your body. Fructose is also known as fruit sugar. When you eat an apple or some other fruit, the main type of sugar in that fruit is fructose. And galactose is in dairy. And that's what it looks like. You can see the different ones. They're all single sugar units. They're just one glucose or fructose or galactose unit. And then you'll see up top here on the right disaccharide. Two or more sugar – Two sugar units. I'm sorry. And here you are one, two. There's the monosaccharide, polysaccharide, or three or more. Now glucose, and you should know this for the quiz, but also you should know it, is the major monosaccharide in the body. It's the main sugar that you'll find in your bloodstream, and in what cells need. All carbohydrates, no matter what type you eat, has to break down to glucose because that's the type of energy that your cells need, the type of sugar that your cells need. And again, no matter what you eat. Let's say you eat a complex carb, also known as a polysaccharide, it's broken down in to disaccharides, and monosaccharides,

and in this case eventually in to glucose. Again, glucose is the type of sugar your cells need. Fructose, also known as fruit sugar, like I said, is in fruit, and also honey. Honey contains fructose. And nowadays manufacturers are making high fructose corn syrup from fructose. This is not healthy at all. Years ago if you bought soda or candy, the sugar was called sucrose. This is table sugar. Now they're making high fructose corn syrup. The problem is it's got a lot of fructose in it, and not as much glucose, and it raises your sugar levels higher and faster than regular sucrose or table sugar. It also is made from corn. You can see that in the name. And most corn in the United States is GMO. Okay? So now you've got a GMO product that raises your sugar, your blood sugar, levels faster and higher than regular sugar. And this has contributed to both obesity and diabetes in the United States since they've been – food manufacturers have been using it. And keep in mind the liver does have to convert fructose to glucose because again that's the main sugar form your body needs. The disaccharides are again two sugar units. Sucrose. Lactose. Maltose. So let's go through those. Here again is sucrose. Two sugar units. And you can see up here on the left these two sugar units are made up of, in the case of sucrose, which is table sugar that you buy in the supermarket – is made up of a glucose and a fructose. Lactose, which is from dairy, is made up of glucose and galactose. And maltose, which is used as a sweetener, are two glucose units. You don't need to know that for the quiz, but just so you can understand what you're buying and what you're eating. So table sugar is sucrose. When you go to the supermarket and you buy sugar, it's sucrose. Again, it's made up of glucose and fructose. And it is made from or milled from sugar cane plants, sugar beets, honey, and maple sugar. They're all processed to make either brown or white sugar. Now a lot of people think brown sugar is healthier. Unless it's raw, sugar – Brown sugar is just white sugar that has – They've added molasses to make it brown. And the process of making sugar from, let's say, a sugar cane plant is a lot of processing. So besides raising your sugar levels, there's just been a lot of processing going on. Also they bleach it to make it white. And again, in the case of brown sugar, they bleach it first, and then they add molasses to make it brown. These are sugar cane and sugar beet plants that again are processed to make table sugar. And you can see it here. That's raw sugar. It should be like a tan color. Lactose is the sugar found in dairy products. Some people have a problem with dairy. It gives them intestinal issues, and the reason being is that you are missing the enzyme that breaks apart these two molecules of sugar. And we'll talk more about it I believe in chapter three, but basically if you're lactose intolerant, you're missing the enzyme, a digestive enzyme, that breaks down that sugar. And because it doesn't get broken down, it ends up in your intestine – in your large intestine, and creates a lot of problems. Maltose. If you read ingredients on different processed items, in particular desserts, it's a break down product of starches, and they do use it to – as a sweetener in certain products. It's also used in making beer. So again, to summarize, the simple sugars are the mono and disaccharides. These are single – either one sugar unit or two sugar units. The main thing you want to know, again, is that glucose is your main source of fuel. It is the main monosaccharide in the body. Poly

means many so polysaccharides in this case is three or more sugar units. So this is a carbohydrate made up of three sugar units also known as starches. Also fiber is a complex carb. We'll talk about that in a minute. And basically all grains, vegetables, and fruits are also polysaccharides. Don't worry about that. So what does a starch – A lot of people are confused about starches, and they hear starch and they think it's a bad thing. But let's go through this. A starch by definition is a polysaccharide which means three or more sugar units. But in the case of starches, this is a carbohydrate that has hundreds of sugar units. So you can imagine why it gets a bad name because these hundreds of sugar units have to be broken down in to single sugar units. So you have a piece of bread, and it will raise your sugar levels in your blood really high. Well, especially if you're eating it by itself without something else, and we'll talk about that later. But starches are grains. So if you eat wheats, any kind of wheat, whole wheat bread, white bread, rice, whether it's brown rice or white rice, barley, oats, oatmeal, they're all starches. They're made up of hundreds of sugar units. Pastas. Breads. Muffins. Anything made from those products, wheat products, and most vegetables are also starches. Some are starchier than others, like corn and potatoes. It just means that they're made up of even more sugar units. Okay? But don't think that whole wheat pasta is – I mean in certain ways it's healthier, but it's still going to raise your blood sugar levels as much as a piece of white bread versus whole wheat bread or whole wheat pasta [inaudible] pasta. They're all made up of hundreds of sugar units. They're all going to raise your sugar levels a lot. The key is to eat something with it that will slow down the release of the sugar, and we'll get in to that. Fiber is also made up of hundreds of sugar units, but the bonds between the sugar units is at an angle, and because of that angle, the enzymes in your digestive tract have a hard time breaking down these bonds. And because of that, some fibers aren't broken down at all, and some of them are broken down, but it just takes a long time. So these – Fibers don't raise your sugar levels. And, in fact, they help slow down the release of sugar after you eat a meal. And these are different. You can see here this is glucose, this is – And this is not showing it, but it would be made up of hundreds of sugar units. Okay? And then you can see glycogen. Now glycogen is how we store glucose in your body, and we store glycogen in both the liver and muscles. And it's more compact, but you can see all the hundreds of sugar units here. Okay? And this is the fiber. So you can see the different angles of these sugar units, and it's a little harder to break this down than this starch. Okay. So fiber typically is not digested very well. They pass in to our intestines, in to our stool. We'll get in to the health benefits of that. Fiber is only found in plant products. You will not have any fiber in animal products. It's part of the cell wall of the plant. It makes – That's why like you chew vegetables. That's why they're chewy. That's the fiber. So there are two main types of fiber: soluble fiber and insoluble fiber. You need to know these slides. You need to know this for your health, but you might see these names on food labels. Pectin, gums, mucilage, guar gum, these are soluble fibers. They are pretty digestible. They dissolve in water. They – Food manufacturers will put this in salad dressings or jams and jellies or other items to thicken the product

up. So that's why you'll see it in the product. What you want to know for yourself, and for the quiz, is foods with soluble fiber help lower your cholesterol level because it binds to the cholesterol in the food, and basically brings it to the small – the large intestine. So you poop it out. So you should also know which foods have soluble fiber, and that would be citrus fruits, oatmeal, and beans. So, you know, adding beans to all of your salads, this is how you can get it on a daily basis. That's when it has the most effect. Oatmeal. If you look at the claim, health claim, on oatmeal, it says lowers cholesterol, helps lower cholesterol. It's because of the soluble fiber. Now insoluble fiber is a little different. This is part of the cell wall of a vegetable. So, for instance, broccoli, that stem of the broccoli's very chewy. It – This type definitely do not digest. It's very chewy. So that's why if you eat a piece of whole grain bread or brown rice, they take longer to cook, and they're much chewier than, say, white rice or white bread. So insoluble fiber is not digestible. It's found in whole grains, brown rice, wheat, whole wheat, and vegetables. The main thing, and why you want to get a lot of insoluble fiber, it helps decrease your risk of colon cancer because we don't digest it. It gets in to the large intestine and just kind of sweeps all the garbage out, basically. And helps lower your risk of colon cancer because those harmful items aren't sitting there in the colon irritating the colon wall. Okay? So please know the difference between soluble fiber and insoluble fiber, and know which one has which health effect. Okay. I'm going to end this particular podcast now, and you can continue on with part two.