In this lesson we are going to discuss the structure and function of carbohydrates, as well as the role of carbohydrates in our body. So before we begin, I'm going to explain what an organic compound is, because carbohydrates are actually organic compounds.

An organic compound is a compound that contains carbon and at least one hydrogen atom. So generally, when we think of organic compounds, we think of carbohydrates, lipids, proteins, and nucleic acids. Those are the four types of organic compounds.

So carbohydrates being an organic compound, we'll talk a little bit more in depth about what exactly are the characteristics of a carbohydrate. So carbohydrates are molecules that contain carbon, hydrogen, and oxygen in a 1:2:1 ratio. And carbohydrates are used in our body. They're broken down into sugars that our bodies and our cells use for energy.

And there are three main categories of carbohydrates, so they're listed here, monosaccharides, oligosaccharides, and polysaccharides. So we're going to discuss what each of these different types of carbohydrates are.

So a monosaccharide is the most simple type of carbohydrate that you can have. And it's made of just one sugar unit. So the prefix mono- means one. So that'll help you remember that monosaccharides are simple. And they're just made up of one sugar unit.

And monosaccharides are the building blocks for larger molecules. So other larger molecules, larger carbohydrates, are built off of these monosaccharides. So a common example of a monosaccharide is glucose. That's one that you're probably fairly familiar with. Our body and our cells use glucose for energy. So for cellular respiration, glucose is necessary for that process to happen.

So we have a diagram here of what glucose looks like. And glucose is a six-carbon sugar, so one, two, three, four, five, six. So it has a carbon backbone. So when we're talking about carbohydrates and their structure, they have a carbon backbone that have hydroxide ions coming off of them. And they have to have at least one hydroxide attached to that carbon backbone.

So you'll notice this one has multiple hydroxide ions. But it's a six-carbon sugar. So this is just the structure of what glucose looks like. So again, glucose is a monosaccharide and is a simple sugar.

We'll take a look at oligosaccharides next. So these are a little bit more complex than monosaccharides. They are when two or more monomers are joined by dehydration synthesis, so two or more. When there is exactly two joined together, we call that a disaccharide. So two is called a disaccharide. So it came be two or more, we call it

oligosaccharide.

So we're going to take a look at an example here of a disaccharide that you might also be familiar with. So you should notice this molecule here is glucose. And the molecule next to it is fructose.

Now, both individually are monosaccharides. But when they're joined together by dehydration synthesis, it forms a disaccharide. So we have two monosaccharides forming this disaccharide. And this disaccharide here is called sucrose. So sucrose is a type of sugar. It's a disaccharide.

And when we talk about dehydration synthesis, that's how these monosaccharides are bonded together. So generally what would happen is here we would have a hydroxide ion here. And coming off here we would have a hydroxide ion. So I'm going to highlight this a little bit better so you can see it.

So you'll notice we have two hydroxide ions together. And if you take out one, two of the hydrogens and one of the oxygen, it forms water. So we could get rid of this one, this one, and this one. So what we have left is the O in between them, like you see on the diagram here. And then water is formed as a byproduct. So that's what happens in dehydration synthesis when two monosaccharides are joined together.

And our third type of sugar is polysaccharides. The prefix poly- means many. So we have many sugar units joined together. And this is what forms complex carbohydrates, such as starches and cellulose.

So we can have up to thousands of monomers connected by dehydration synthesis. So again, that's when they're linked together and water is formed as a byproduct. And the reason that these are complex carbohydrates, they have a lot more energy.

So if you think of the complex carbohydrates, like starches that you would actually eat, you get a little bit more energy from them because of the many bonds that form between them. And those bonds store energy so that stored energy can be used to produce more energy later on. So starch is a common example of a polysaccharide.

Cellulose is another example of a polysaccharide. And cellulose is a plant-derived polysaccharide. So it's actually how glucose is stored in plants. And generally, we cannot digest cellulose. Our digestive system doesn't have the enzymes to break cellulose down. But we benefit from eating cellulose from those plant-derived-- from eating plants, because we can benefit from it as fiber in our diet.

So this was an overview of the structure, function, and roles of carbohydrates in our body, as well as an overview of what the three different types of carbohydrates are.