In this lesson, we're going to discuss the structure, function, and roles of lipids in our body. So we're first going to start by discussing some characteristics of lipids.

So lipids are molecules that are nonpolar. They contain hydrogen, carbon, and oxygen. They are an organic molecule, and they don't dissolve in water, which ties with them being nonpolar. So these are some basic characteristics of lipids. They're nonpolar, don't dissolve in water. They're organic molecules containing hydrogen, carbon, and oxygen.

So fats are a type of lipid that have a fatty acid tail attached to a glycerol molecule. And in a few moments here we're going to get into what the structure of a fat might look like a little bit more in depth. Each of those fatty acid tails contains up to 36 carbons as the backbone of the fatty acid, and also contains a carboxyl group at one end. And most of the bonding space that's available in the fatty acid tail is occupied by hydrogens.

So there are two main categories of fats. We have saturated fats and unsaturated fats. So saturated fats are a type of fats that only contain single covalent bonds in the fatty acid tail.

And we'll get into examples of this in just a moment. So an example of a saturated fat would be lard. And oftentimes saturated fats are animal fats. And they're generally solid at room temperature, because they're more tightly packed together.

And unsaturated fat is a type of fat that has one or more double covalent bonds between carbon. So it contains double bonds between the carbons, which are the backbone of the fatty acid. So an example of an unsaturated fat might be vegetable oil or olive oil.

Generally-- not always, but generally-- unsaturated fats are more plant-based, where saturated fats are more animal-based. So they're less tightly packed, and they're usually liquid at room temperature. So think of olive oil as an example. We know that's liquid at room temperature, because they're less tightly packed.

Some saturated fats, however, such as trans fats-- I'll write that down here-- are an unhealthy saturated fat. So margarine or shortening would be an example. So generally unsaturated fats are a little bit healthier than saturated fats, but there are some unsaturated fats, such as trans fats, that are more unhealthy. And again, margarine or shortening could be a good example of that.

So we're going to take a look here at what saturated fats versus unsaturated fats might look like. So I just have some outlines here and we're going fill these in so you can see that example. So we have the glycerol molecule here. So we discussed that the fatty acid tail is attached to a glycerol molecule. So we have our glycerol molecule on the top, and then our fatty acid tail connected to that.

So like I said, the fatty acid tail is made of a carbon backbone, and it can have up to 36 of those. It's going to vary depending on the type of fat that it is. So we have the carbon backbone, and then again, like I said, most of the bonding space is going to be occupied by hydrogens. So we have the carbon bonded to hydrogens.

And you'll notice that they are all single covalent bonds. We don't have any double bonds between our hydrogens in this example. So I'm going to zoom in here so you can see this a little bit better. There we go. OK?

So you'll notice they're all single bonds between the carbons, and then most of the bonding space here is occupied by hydrogens. So that would be an example of a saturated fat. So our glycerol molecule, and our fatty acid tail.

Let's take a look at an unsaturated fat. So we said unsaturated fats have one or more double covalent bonds between the carbons. So we could have-- again, we have our glycerol molecule in all three of these right here. We have our carbon backbone. But in an unsaturated fat, we might have a double bond. So you'll notice the double bond right here between the carbons would make this an unsaturated fat.

And unsaturated fats, because of the double bonds, the fatty acid tail is usually kinked, which, again, allows them to be packed less tightly, making them generally liquid at room temperature. And again, we would have our hydrogens filled in here in all the bonding spots. I won't fill them all in, but you get the general idea, I think.

And then another type of unsaturated fat-- so this would be an unsaturated fat-- we could have something called a polyunsaturated fat. So the prefix "poly" means many. So it means that it's going to have not just one double bond, but it could have many double bonds.

So again, glycerol molecule on the top, carbon backbone, and then we have a double bond there, and then maybe we even have another double bond. So you'll see in this example, we have two double bonds, rather than just one. So that would be our polyunsaturated fat.

Let's take a look at something called a triglyceride. So you'll notice a triglyceride looks like it has a similar structure to these fats over here, but rather than having just one fatty acid tail, it's going to have three fatty acid tails. So triglycerides are the most common lipid in our body, and they contain lots of energy. An example of a triglyceride might be butter, or lard, oils.

So it has those three fatty acid tails. So the prefix "tri" means three, so rather than just having one fatty acid tail, it has three. One, two, three. So that would be what the structure of a triglyceride would look like. And I'm going to scooch this over here just a little bit.

We're going to take a look at something called a phospholipid. So if you're familiar with the structure of a cell membrane, you might be familiar with phospholipids. Phospholipids are a type of lipid that are found in the cell membrane of the cells in our body. So phospholipids are made up of a hydrophilic head, and they're made up of two hydrophobic tails. So we have one tail here, and one tail here.

And those tails, like I said, are hydrophobic. And what this means, something that is hydrophilic-- whoops. There we go. Something that is hydrophilic is attracted to water, whereas something that is hydrophobic is repelled by water. So in the structure of our cell membranes, the phospholipids are arranged in a bilayer.

So I'm just going to draw a quick example here. So we have all of the heads facing out, and all of the tails facing in. So like we said, the heads are hydrophilic, meaning they're attracted to water. So this area in here would be like the inside of the cell, and this would be like outside of the cell, which are going to be exposed to water.

So those heads are pointed to the outside-- or to the inside of the cell-- where there's water, whereas the hydrophobic tails are pointed inward, away from water. So this would be what the structure of our cell membranes would look like composed of these phospholipids. So let me zoom out.

The last thing we're going to discuss is something called a sterols. So sterols are lipids that don't have a fatty acid tail. They don't have a fatty acid tail. So think back to what we looked at down here, when we looked at our different unsaturated and saturated fats. They all had at least one fatty acid tail. Sterols are types of lipids that do not have a fatty acid tail. So their structure is a little bit different.

Some common examples of sterols would be cholesterol in your body. So cholesterol is a sterol. It's a lipid that doesn't have a fatty acid tail. And steroid hormones-- if you think of estrogen and testosterone, they come from sterols. So they're also an important type of lipid in our body.

So this lesson has been an overview of the different types of lipids, the structure and function of them in our body.