

# Lipids

by Sophia



## WHAT'S COVERED

In this lesson, you're going to learn about the different types of lipids and their structure and function in your body. Specifically, this lesson will cover:

## 1. Lipid Characteristics Overview

**Lipids** are molecules that are nonpolar. They contain hydrogen, carbon, and oxygen. They are an organic molecule. They also don't dissolve in water, which goes along with them being **nonpolar**.



### TERMS TO KNOW

#### Lipid

An organic molecule made up of fatty acids, which is nonpolar, and does not dissolve easily in water.

#### Nonpolar

Does not dissolve easily in water.

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## 2. Fats

**Fats** are a type of lipid that have at least one fatty acid tail attached to a glycerol molecule.

A glycerol molecule can have up to three side chains. If it has at least one fatty acid for a side chain, the molecule is a fat.

There are two main categories of fats: Saturated fats and unsaturated fats.



### TERM TO KNOW

#### Fat

A lipid made of a glycerol molecule and at least one fatty acid side chain.

### 2a. Saturated Fats

**Saturated fats** are a type of fat that only contain single covalent bonds in the fatty acid tail.

Often saturated fats are animal fats. Because there are no double bonds, the fatty acid side chains are fairly

**Saturated Fats**

## TERM TO KNOW

A type of fat which does not have double bonds in its side chain.

**Unsaturated fats** are a type of fat that has one or more double covalent bonds between carbons, which are the backbone of the fatty acid.

**Unsaturated Fats**

The diagram illustrates the structure of unsaturated fats. It shows a Glycerol molecule (HO-CH<sub>2</sub>-CH(OH)-CH<sub>2</sub>-OH) esterified with three fatty acid chains. One chain is saturated (CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-), and two are unsaturated (CH<sub>3</sub>-CH=CH-CH<sub>2</sub>-). The diagram is zoomed out to show the full structure and then zoomed in to show the liquid state of the fat.

Another type of unsaturated fat is something called polyunsaturated fat. The prefix "poly" means many; this type of unsaturated fat could have multiple double bonds.

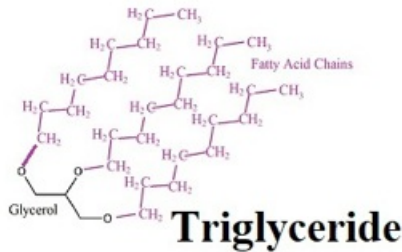
## TERMS TO KNOW

A type of fat which has double bonds in its side chain.

A type of unsaturated fat which may lead to health problems.

### 3. Triglycerides

**Triglycerides** look similar in structure to fats, but the prefix "tri" means three, so rather than just having one fatty acid tail, they have three. Triglycerides are the most common lipid in your body and contain lots of energy. An example of a triglyceride might be butter, lard, or oils.



#### TERM TO KNOW

#### Triglyceride

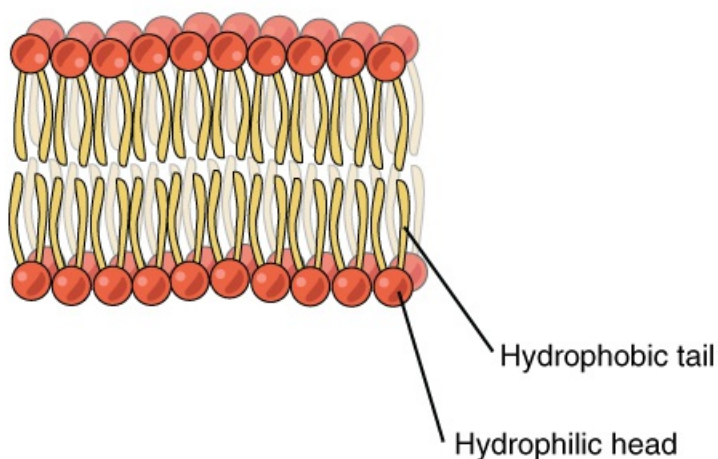
A type of lipid which is made up of a glycerol molecule and three fatty acid side chains.

### 4. Phospholipids

**Phospholipids** are a type of lipid found in the cell membrane of your body's cells. Phospholipids are made up of a hydrophilic (polar, water-attracting) head and two hydrophobic (non-polar, water-repelling) tails.

Something that is hydrophilic is attracted to water, whereas something that is hydrophobic is repelled by water. So in the structure of your cell membranes, the phospholipids are arranged in a bilayer.

See the image of a phospholipid below.



The head faces out and all of the tails face in. The heads are hydrophilic, meaning they're attracted to water. So those heads are pointed to the outside, or to the inside of the cell, where there's water. The hydrophobic tails are pointed inward, away from water.



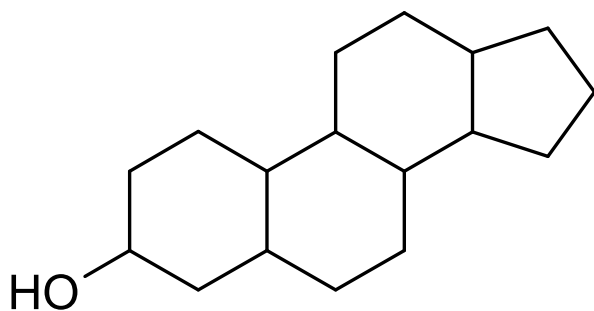
#### TERM TO KNOW

### Phospholipid

A type of lipid made up of a hydrophilic head and hydrophobic tail and is found in cell membranes.

## 5. Sterols

**Sterols** are lipids that don't have glycerol so their structure is a little bit different. The fatty acids, instead of being side chains, often form into multiple rings. Instead of 1 to 3 "chain ropes," the fatty acids look more like "chain mail."



➔ **EXAMPLE** One common example of sterols would be cholesterol in your body. Steroid hormones, like estrogen and testosterone, are also examples of sterols.



#### TERM TO KNOW

### Sterol

A type of lipid containing only fatty acids.



#### MAKE THE CONNECTION

If you're taking the Human Biology Lab course simultaneously with this lecture, it's a good time to try the Cell Membrane and Transport: How Transporters Keep Cells Healthy Activity in Unit 2 of the Lab course. Good luck!



#### SUMMARY

This lesson has been an **overview of the different types of lipids**, and the structure and function of them in your body. In this lesson, you learned that lipids are nonpolar, and don't dissolve in water. They are organic molecules containing hydrogen, carbon, and oxygen. You also went more in-depth about **fats, triglycerides, phospholipids, and sterols**.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND



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## TERMS TO KNOW

### **Fat**

A lipid made of a glycerol molecule and at least one fatty acid side chain.

### **Lipid**

An organic molecule made up of fatty acids, which is nonpolar, and does not dissolve easily in water.

### **Nonpolar**

Does not dissolve easily in water.

### **Phospholipid**

A type of lipid made up of a hydrophilic head and two fatty acids (hydrophobic tail) and is found in cell membranes.

### **Saturated Fat**

A type of fat which does not have double bonds in its side chain.

### **Sterol**

A type of lipid containing only fatty acids.

### **Trans Fat**

A type of unsaturated fat which may lead to health problems.

### **Triglyceride**

A type of lipid which is made up of a glycerol molecule and three fatty acid side chains.

### **Unsaturated Fat**

A type of fat which has double bonds in its side chain.