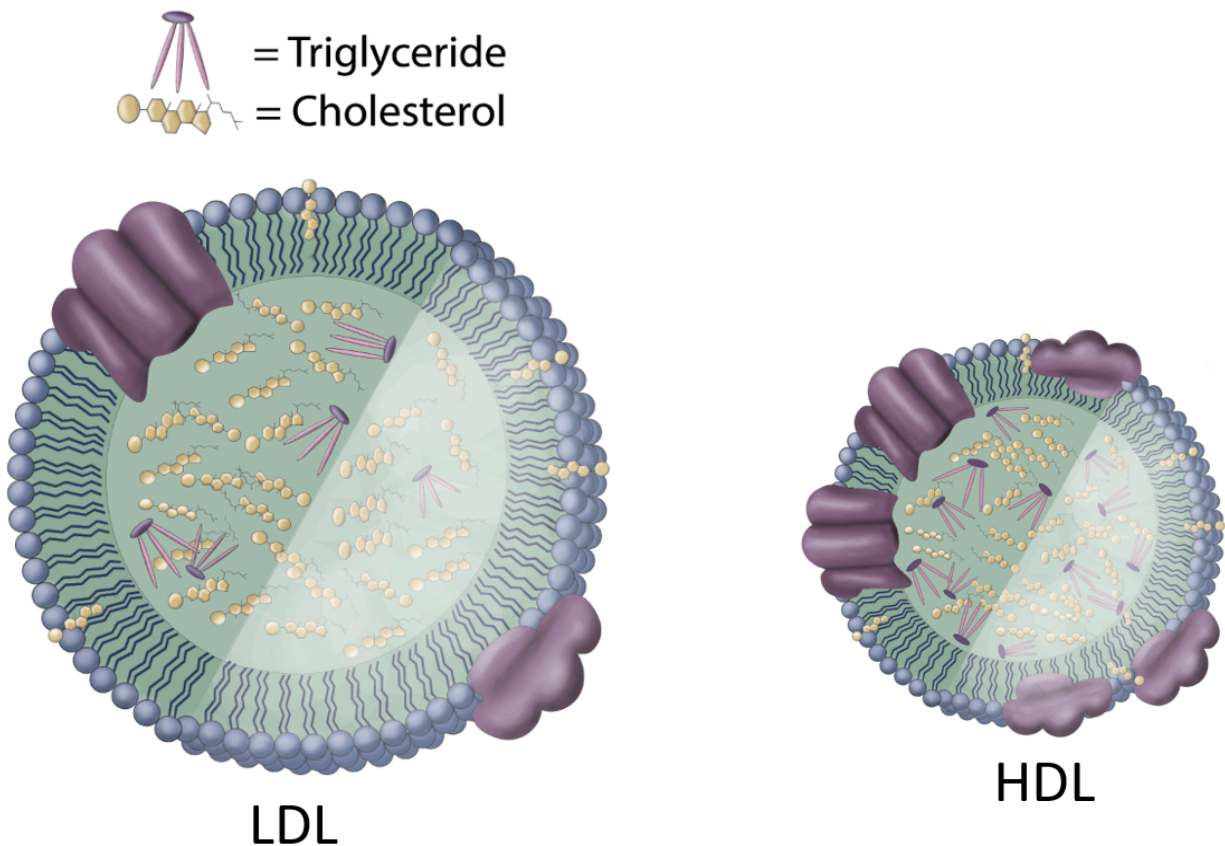


### 3.2.4

## Lipoproteins

The transport of lipids (triglycerides and cholesterol) throughout the body is important to provide energy and building blocks to cells. However, because lipids are hydrophobic, these molecules do not easily dissolve in blood. To transport lipids through the blood, the body uses micelle-like structures called **lipoproteins**. As discussed in the previous section on phospholipids, a micelle is a sphere consisting of a single layer of phospholipids. A lipoprotein is essentially a micelle with certain proteins embedded within the phospholipid monolayer. As the phospholipid hydrophobic tails orient toward the inside of the sphere, this hollow structure becomes a useful tool as it transports lipids within its hydrophobic lumen. Cholesterol and triglycerides travel inside of these spheres and are shielded from the water (see figure below). This lipoprotein particle will dissolve in the water portion of blood plasma and be carried easily through the circulation. Lipids will not form droplets or plug up any vessels because they are safely tucked away in the lipoprotein assembly. Cells throughout the body have the ability to bind these lipoproteins and move lipids in and out of them. There are several different types of lipoproteins, and each one has a specific role. Some will focus on picking up lipids from the digestive tract, while others will specialize in the transport of lipids between the liver and body tissues.



**Low-Density Lipoprotein and High-Density Lipoprotein.** Image created by Dessa Selch BYU-Idaho, 2013.

Above is a schematic representation of two types of lipoproteins, with the phospholipid molecules shown in blue and the apoprotein molecules shown in orange. LDL stands for Low-Density Lipoprotein and HDL is an acronym for High-Density Lipoprotein. As has been mentioned above, lipoproteins are an assembly of phospholipids and proteins that carry triglycerides and cholesterol in the blood. Low-Density Lipoprotein (LDL) is lower in protein and higher in lipid content, and High-Density Lipoprotein (HDL) has more apoproteins which increases this particle's overall density. The more protein that a lipoprotein assembly contains, the heavier it is (see image above).

You may have heard of these terms **HDL** and **LDL** before. These are two common lipoproteins that have gained a lot of attention as they appear to correlate with the risk of atherosclerosis development. Many brochures and websites refer to HDL as "Good Cholesterol" and LDL as "Bad Cholesterol."

In reality, there is no such thing as "good cholesterol" or "bad cholesterol." Cholesterol is simply a type of lipid that is necessary for life. It does not come as "bad" or "good." The idea of "good" and "bad" refer to the lipoproteins. LDL particles tend to accumulate in the walls of arteries. It is the overabundance of this LDL deposition that contributes to atherosclerosis, hence why it receives the term "bad." HDL or High-Density Lipoprotein is often called the "good cholesterol" because HDL particles help prevent atherosclerosis by extracting cholesterol from artery walls and disposing of it through biochemical reactions in the liver. Research has shown that lowering LDL cholesterol reduces the risk of heart attacks, strokes, and atherosclerosis.

## LIPID SUMMARY

The lipids include a large and diverse group of naturally occurring compounds. Triglycerides, phospholipids and cholesterol are three important lipids in biology. The large stores of fat in our bodies are mostly triglycerides, which also comprise the bulk of fats and oils that we consume. Triglycerides contain saturated and unsaturated fatty acids that lend physical and chemical properties such as solidity, texture and flavor to food. Fatty acids also affect health. Saturated fatty acids appear to contribute to heart and vascular disease when consumed in high quantities. Unsaturated fatty acids may actually lower some health risks like inflammation and heart disease.

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