10 Types of Saturated Fat Reviewed

By Dr. Atli Arnarson |

The health effects of saturated fats are a controversial topic.

In the past, saturated fat was widely believed to be a major cause of heart disease. Today, scientists are not so sure.

However, one thing is clear: saturated fat is not a single nutrient. It is a group of different fatty acids with varying effects on health and metabolism.

This article takes a detailed look at the most common saturated fatty acids, their health effects and dietary sources.

What Is Saturated Fat?

Saturated fat is one of the two main classes of fat, the other being unsaturated fat.

These groups differ slightly in their chemical structure and properties. For instance, saturated fat is generally solid at room temperature, while unsaturated fat is liquid.

The main dietary sources of saturated fat are fatty meat, lard, tallow, cheese, butter, cream, coconut oil, palm oil and cocoa butter.

All fats are composed of molecules called fatty acids, which are chains of carbon atoms. The different types of saturated fatty acids can be distinguished by the length of their carbon chains.

Here are the most common saturated fatty acids in the human diet:

- **Stearic acid:** 18 carbon atoms long
- **Palmitic acid:** 16 carbon atoms long

- **Myristic acid:** 14 carbon atoms long
- **Lauric acid:** 12 carbon atoms long
- **Capric acid:** 10 carbon atoms long
- **Caprylic acid:** 8 carbon atoms long
- **Caproic acid:** 6 carbon atoms long

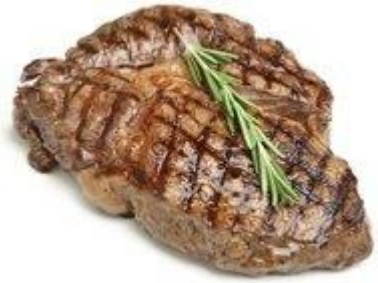
It's rare to find saturated fatty acids other than these in the diet.

Saturated fatty acids that are less than six carbon atoms long are collectively known as short-chain fatty acids.

These are produced when gut bacteria ferment fiber. They are created in your gut from the fiber you eat and can also be found in trace amounts in some fermented food products.

Bottom Line: Saturated fatty acids are one of the two major categories of fat. Common dietary saturated fatty acids include stearic acid, palmitic acid, myristic acid and lauric acid.

How Does Saturated Fat Affect Health?



Most scientists now accept that saturated fats are not as unhealthy as previously assumed.

Evidence suggests they do not cause heart disease, although their exact role is still being debated and investigated (1, 2).

However, replacing saturated fat with unsaturated fats, such as omega-3s, may reduce the risk of heart attacks (3, 4).

This doesn't necessarily mean that saturated fats are unhealthy. It simply suggests that certain unsaturated fats are protective, while saturated fats are neutral.

In comparison, replacing saturated fat with carbs doesn't provide any health benefits and even impairs the blood lipid profile. This is a measurement of the levels of lipids in your blood, such as cholesterol and triglycerides (5).

Although it is clear that some saturated fats may raise the "bad" low-density lipoprotein (LDL) cholesterol, the association between cholesterol levels and heart disease is a bit more complex than that.

For instance, saturated fats raise the levels of large LDL cholesterol particles, which are not as strongly associated with heart disease as those that are smaller and denser (6, 7).

For more information on the issue, read this article.

Bottom Line: Saturated fats are not as harmful as previously believed. Growing evidence suggests there are no strong links between saturated fat and heart disease.

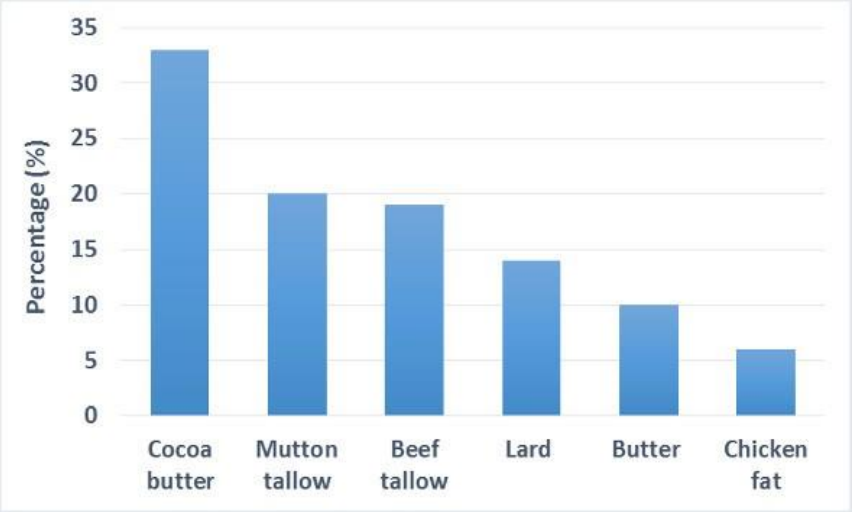
1. Stearic Acid

Stearic acid, which consists of 18 carbon atoms, is the second most common saturated fat in the American diet (8).

Compared with carbs or other saturated fats, stearic acid lowers the "bad" LDL cholesterol slightly or has neutral effects. This suggests it may be healthier than many other saturated fats (9, 10, 11).

Research shows that stearic acid is partly converted to oleic acid, a healthy unsaturated fat, within the body. However, according to some estimates, the conversion rate is only 14% and may not have much relevance to health (12, 13).

The main dietary source of stearic acid is animal fat. The levels of stearic acid are usually low in plant fat, with the exception of coconut oil, cocoa butter and palm kernel oil.



Stearic acid is considered a healthy saturated fat.

It does not appear to raise the risk of heart disease. This seemed to be true even in a study of people whose stearic acid intake constituted up to 11% of their total calorie intake for 40 days (9).

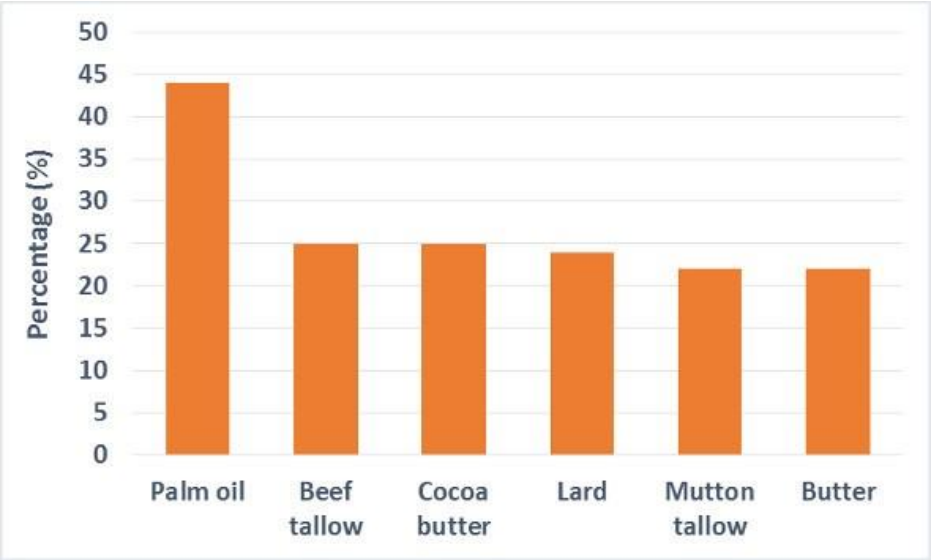
Bottom Line: Stearic acid is the second most common saturated fat in the American diet. It appears to have neutral effects on the blood lipid profile.

2. Palmitic Acid

Palmitic acid is the most common saturated fat in plants and animals. It is 16 carbon atoms long.

In 1999, palmitic acid made up an estimated 56.3% of the total saturated fat intake in the US (8).

The richest dietary source is palm oil, but palmitic acid also makes up approximately a quarter of the fat in red meat and dairy, as shown in the chart below.



Compared to carbs and unsaturated fats, palmitic acid raises the levels of total cholesterol and LDL cholesterol without affecting the levels of "good" high-density lipoprotein (HDL) cholesterol (9, 11, 14).

High levels of LDL cholesterol are a well-known risk marker of heart disease.

However, not all LDL cholesterol is created equal. More accurate markers of heart disease are the presence of a large number of LDL particles and of small, dense LDL particles (15, 16, 17).

Although palmitic acid raises the levels of total LDL cholesterol, this is mainly due to an increase in large LDL particles. Many researchers consider high levels of large LDL particles to be less of a concern, but some people disagree (6, 16, 18).

Additionally, when other fatty acids, such as linoleic acid, are eaten at the same time, they can offset some of palmitic acid's effects on cholesterol (19).

Palmitic acid may also affect other aspects of metabolism. Studies in both mice and humans indicate that a high-palmitic-acid diet may adversely affect mood and reduce physical activity (20, 21).

Several human studies suggest that eating higher amounts of palmitic acid reduces the amounts of calories burned, compared to eating more unsaturated fats, such as oleic acid (22, 23, 24).

These aspects of palmitic acid need to be studied further before clear conclusions can be reached.

Bottom Line: Palmitic acid is the most common saturated fatty acid, making up over half of all the saturated fat eaten in the US. It raises LDL cholesterol levels without changing HDL cholesterol.

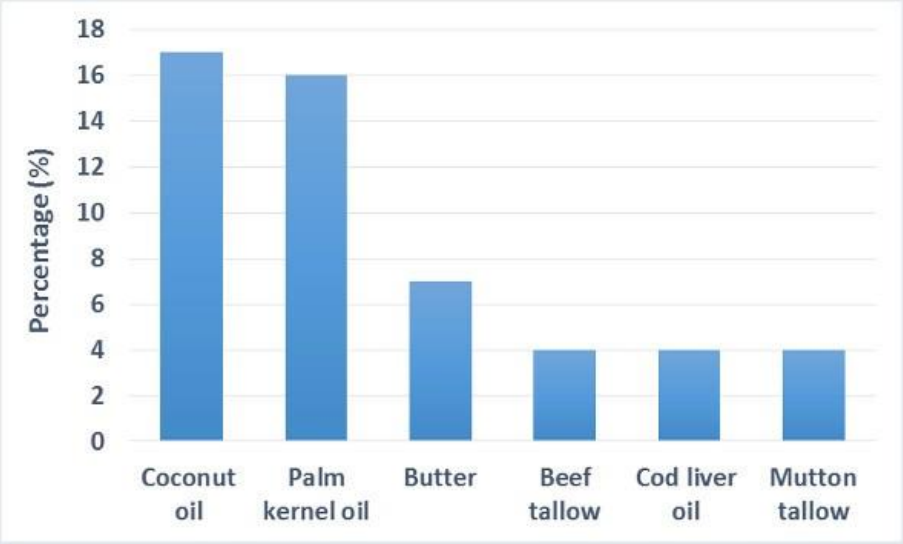
3. Myristic Acid

Myristic acid consists of 14 carbon atoms.

Consuming myristic acid causes a significant increase in total cholesterol and LDL cholesterol compared to consuming palmitic acid or carbs. However, it doesn't appear to affect levels of HDL cholesterol (11, 25).

These effects are much stronger than those of palmitic acid. Yet similar to palmitic acid, myristic acid appears to increase the levels of large LDL particles, which many scientists consider to be less of a concern (6).

Myristic acid is a relatively rare fatty acid, not found in high amounts in most foods. Yet certain oils and fats do contain decent amounts, as shown in the chart below.



Although coconut oil and palm kernel oil do contain relatively high amounts of myristic acid, they also contain other types of fats, which may offset the effects of myristic acid on the blood lipid profile (26).

Bottom Line: Myristic acid is a long-chain, saturated fatty acid. It raises LDL cholesterol more than other fatty acids.

4. Lauric Acid

Lauric acid is 12 carbon atoms long, making it the longest of the medium-chain fatty acids.

It raises the levels of total cholesterol more than most other fatty acids. However, this increase is largely due to an increase in the "good" HDL cholesterol.

In other words, lauric acid reduces the amounts of total cholesterol relative to HDL cholesterol. These changes are associated with a reduced risk of heart disease (27).

In fact, lauric acid appears to have more beneficial effects on HDL cholesterol levels than any other saturated fatty acid (11).

Lauric acid makes up approximately 47% of palm kernel oil and 42% of coconut oil. In comparison, other commonly eaten oils or fats contain only trace amounts of it.

Bottom Line: Lauric acid is the longest medium-chain fatty acid. Although it raises total cholesterol significantly, this is largely due to an increase in HDL cholesterol, which is beneficial for health.

5–7. Caproic, Caprylic and Capric Acid

Caproic, caprylic and capric acid are medium-chain fatty acids (MCFAs). They range from 6–10 carbon atoms in length.

Their names are derived from the Latin "capra," which means "female goat." They are sometimes referred to as capra fatty acids, due to their abundance in goat's milk.

MCFAs are metabolized differently than long-chain fatty acids. They are more easily absorbed and transported straight to the liver where they are rapidly metabolized.

Evidence suggests that MCFAs may have the following benefits:

- **Weight loss:** Several studies indicate that they may slightly increase the number of calories burned and promote weight loss, especially when compared with long-chain fatty acids (28, 29, 30, 31, 32).
- **Increased insulin sensitivity:** There is also some evidence that MCFAs increase insulin sensitivity, compared to long-chain fatty acids (33).
- **Anti-seizure effects:** MCFAs, especially capric acid, may have anti-seizure effects, especially when combined with a ketogenic diet (34, 35, 36).

Because of their potential health benefits, MCFAs are sold as supplements, known as MCT oils. These oils usually consist primarily of capric acid and caprylic acid.

Capric acid is the most common of these. It constitutes around 5% of palm kernel oil and 4% of coconut oil. Smaller amounts are found in animal fat. Otherwise, it is rare in foods.

Bottom Line: Capric, caprylic and caproic acid are medium-chain fatty acids with unique properties. They may promote weight loss, increase insulin sensitivity and reduce the risk of seizures in certain epileptic patients.

8–10. Short-Chain Fatty Acids

Saturated fatty acids that contain fewer than six carbon atoms in their chains are known as short-chain fatty acids (SCFAs).

The most important SCFAs are:

- **Butyric acid:** 4 carbon atoms long
- **Propionic acid:** 3 carbon atoms long
- **Acetic acid:** 2 carbon atoms long

SCFAs are formed when beneficial gut bacteria ferment fiber in the colon.

Their dietary intake is minimal compared to the amounts of SCFAs produced in the colon. They are uncommon in food and only found in small amounts in dairy fat and certain fermented food products.

SCFAs are responsible for many of the health benefits associated with fiber intake. For instance, butyric acid is an important source of nutrition for the cells lining the colon (37).

Types of fiber that promote the formation of short-chain fatty acids are known as prebiotics. They include resistant starch, pectin, inulin and arabinoxylan (38, 39).

For more information on the potential health benefits of SCFAs, read this article.

Bottom Line: The smallest saturated fatty acids are known as short-chain fatty acids (SCFAs), which are formed when friendly bacteria ferment fiber in the colon. They have many potential health benefits.

Take Home Message

Not all saturated fat is the same. Its health effects vary depending on the type.

Although certain types of long-chain saturated fat may raise your levels of “bad” LDL cholesterol, no strong evidence proves any of them cause heart disease.