

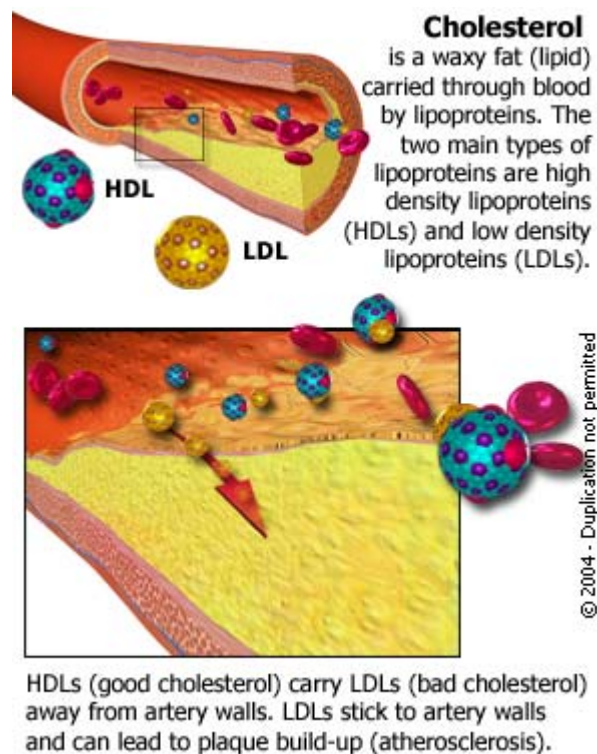
TRIGLYCERIDES & YOUR HEALTH

Summary

Like **cholesterol**, triglycerides are common types of fats (**lipids**) that are essential for good health when present in normal amounts. They account for about 95 percent of the body's fatty tissue. Triglycerides are both present in food and manufactured by the body.

Abnormally high triglyceride levels are associated with a number of diseases and conditions, such as *cirrhosis* (a disease of the liver), underactive thyroid (**hypothyroidism**), poorly controlled **diabetes**, and *pancreatitis* (inflammation of the pancreas).

High triglyceride levels are also associated with known **risk factors** for **heart disease**, such as low levels of **HDL** ("good") cholesterol, high levels of **LDL** ("bad") cholesterol and **obesity**. Triglycerides may also contribute to a type of thickening of artery walls – a physical change believed to be a predictor of hardening of the arteries (**atherosclerosis**). Researchers are continuing to investigate exactly how triglycerides affect cardiovascular health.



At the very least, high triglyceride levels are a warning sign that a patient's heart health may be at risk. In response, physicians may be more likely to stress the importance of losing weight, getting enough **exercise**, **quitting smoking**, controlling **diabetes** and other strategies that patients can use to protect their own cardiovascular health.

According to the **National Heart, Lung and Blood Institute**, the most current classifications for triglyceride levels are as follows (in milligrams per deciliter [mg/dL]):

Triglyceride Level	Classification
Less than 150 mg/dL	Normal
150 to 199 mg/dL	Borderline high

200 to 499 mg/dL	High
500 mg/dL and higher	Very high

About triglycerides

Triglycerides are common types of fats (**lipids**) essential for good health when present in normal amounts. Like **cholesterol**, triglycerides are both consumed through food and manufactured in the liver. They are transported through the bloodstream by the proteins present in various types of **lipoproteins**.

Cholesterol is mostly transported through the bloodstream by **high-density lipoproteins** (HDLs) and **low-density lipoproteins** (LDLs). In contrast, triglycerides are a main component of – and transported by – lipoproteins known as **chylomicrons**, as well as **very low-density lipoproteins** (VLDLs). Chylomicrons are only a temporary storage unit for triglycerides. They disappear shortly after appearing in the bloodstream.

Triglycerides are the body's major energy storage form. Their presence in the blood is closely related to eating. Triglyceride levels rise dramatically after eating, especially after consuming simple **carbohydrates** like refined sugar or alcohol. This is because any sugars that aren't used immediately as energy are converted to triglycerides, in which form they will be stored as body fat. The release of stored triglycerides is regulated by hormones, depending on the body's energy needs. Fasting will stimulate the release of stored triglycerides.

Together with cholesterol, triglycerides form the blood lipids, or blood fat. By measuring the level of fasting triglycerides, physicians can evaluate how much fat is circulating in a patient's blood. This measure has proven valuable when it comes to diagnosing and predicting **cardiovascular disease**. High triglyceride levels may contribute to cardiovascular disease by increasing blood's "stickiness" (viscosity).

Causes of high triglyceride levels

The number of triglycerides in the human body can rise to abnormally high levels when someone eats a **diet** high in carbohydrates (starches and sugars) and/or **saturated fats** – especially when that person is **obese** and/or rarely **exercises**.

High triglyceride levels can also be caused by a number of different medical conditions, such as the following:

- **Diabetes**
- **Obesity**
- **Hypothyroidism**, or a lack of thyroid hormone
- **Kidney** disease
- Certain medications, including *tamoxifen* (used in cancer treatment) and **estrogen** replacement therapy
- *Familial hyperlipoproteinemias*. Rare genetic conditions that involve high levels of **cholesterol** and/or triglycerides. Some studies have associated genetically elevated levels of triglycerides with an increased risk of **heart disease**, and others have not.

- *Familial hypertriglyceridemia* (also known as *Type IV hyperlipoproteinemia*). Genetic condition in which triglyceride levels are abnormally high. It is often accompanied by **insulin resistance**, obesity, **overactive thyroid** and **high blood pressure**.
- *Familial dysbetalipoproteinemia* (also known as *familial combined hyperlipoproteinemia*). Genetic condition in which levels of both triglycerides and cholesterol are abnormally high.
- *Familial lipoprotein lipase deficiency* or *Apo-C-II deficiency*. Genetic condition in which people lack one of the **enzymes** necessary to properly break down **chylomicrons**. As a result, the person may be diagnosed with a high chylomicron level (also known as *hyperchylomicronemia* or *chylomicronemia syndrome* or *Type I hyperlipoproteinemia*).
- *Type III hyperlipoproteinemia*, a combination of high triglycerides and high levels of **very low-density lipoproteins** (VLDL).
- *Type V hyperlipoproteinemia*, the inability to use and rid the body of triglycerides, leading to high levels of triglycerides in the plasma.

Heart impact of high triglycerides

A number of studies have found a link between triglycerides and **heart disease**. These studies have found the following:

- High levels of triglycerides contribute to “stickiness” (*viscosity*) of red blood cells – a predictor of **cardiovascular disease**.
- The ratio between triglycerides and **HDL** (“good”) **cholesterol** may be an even better predictor of **heart attack** than the ratio between good and bad (**LDL**) cholesterol.
- High triglyceride levels tend to be associated with **angina** – chest pain due to **cardiac ischemia**.
- High levels of triglycerides are associated with an increased death rate among patients with confirmed **coronary artery disease**. Likewise, the survival rate after **coronary artery bypass graft** surgery is worse among patients with elevated triglycerides.
- There is an increased risk of death from heart disease among families with elevated triglyceride levels as a result of either *familial combined hyperlipidemia* or *familial hypertriglyceridemia* – two common, inherited blood lipid disorders.

Other studies have found a clear link between high triglyceride levels and **risk factors** for heart disease (e.g., low HDL cholesterol, **obesity**, abnormal **glucose** metabolism) but no direct link between triglyceride levels and heart disease. Additional research is hoped to clarify the role of triglycerides in cardiovascular disease.

Normal triglyceride test results

Triglyceride levels are measured by a particular **blood test** called a complete **lipid profile**. The results of the blood test will tell you what your triglyceride level is. To figure

out if your level is within the normal range, use the following chart (in milligrams per deciliter [mg/dL]):

Triglyceride Level	Classification
Less than 150 mg/dL	Normal
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High triglyceride levels can impact the accuracy of the formula used to calculate LDL levels. Unlike HDL and triglycerides, LDL is not measured directly in most blood tests because it is difficult and expensive to do so. Instead, physicians subtract HDL and 1/5 of triglycerides from the total cholesterol to calculate the LDL.

In other words, say a person has a total cholesterol level of 270. The HDL level, which is measured directly, is 30. The triglyceride level is 250, but this result is divided by 5 to get a score of 50. LDL (270) is calculated by subtracting HDL (30) and triglyceride (50). The LDL level is 190, which is high.

This method becomes unreliable when triglyceride levels are above 400, which means LDL must be measured directly.

Tips for lowering triglycerides

Research has not demonstrated that lowering triglyceride levels will necessary lead to improved heart health. However, the strategies recommended for lowering triglyceride levels are all heart-healthy, and many result in an improved **cholesterol** ratio. These strategies include the following:

- Decrease the amount of **saturated fat** in your **diet**.
- Eat a balanced, **heart-healthy diet** in which **carbohydrates** are eaten in proportion to **proteins, vitamins and minerals**, essential fatty acids and **fiber**.
- Take steps to raise your **HDL** level.
- Favor complex carbohydrates over simple carbohydrates. Simple carbohydrates, such as sugar, are absorbed quickly and can cause a sudden rise in insulin production (which in turn can increase triglycerides).
- Limit **alcohol** use. Even small amounts of alcohol can lead to large changes in triglyceride levels.
- Start a regular **exercise** program.
- Achieve and maintain and **healthy weight**.
- Control **diabetes**.
- Control **high blood pressure**.

If these strategies are unsuccessful, a physician might prescribe **cholesterol-reducing drugs**, such as certain **fibrates** (e.g., *fenofibrate*) or niacin (**nicotinic acid**).