

# Cholesterol

## What is cholesterol?

Cholesterol is a waxy, fat-like substance that your body needs for good health, but in the right amounts.

[Lipoproteins](#) are small, round particles made of [lipids](#) (fats) and [proteins](#). These particles carry cholesterol in your blood and throughout your body. Two types of lipoproteins include:

- **Low-density lipoprotein (LDL)**, sometimes called “bad” cholesterol
- **High-density lipoprotein (HDL)**, sometimes called “good” cholesterol

High levels of “bad” LDL cholesterol may create a buildup of [plaque](#) (fatty deposits) in your [arteries](#). This buildup can lead to a heart attack, stroke, or other health problems. High levels of “good” HDL cholesterol may lower your risk for health problems. HDL cholesterol carries cholesterol and plaque to the liver to be flushed out of the body.

The [genes](#) you [inherit](#) and your lifestyle habits play a major role in your cholesterol levels.

Routine blood tests can show whether your cholesterol levels are healthy or unhealthy. To help get your cholesterol levels into the healthy range, you may need heart-healthy [lifestyle changes or medicines](#).

## Symptoms of Cholesterol

High levels of low-density [lipoprotein](#) (LDL) cholesterol usually do not cause [symptoms](#). Most people do not know they have high blood cholesterol until they have a [blood test](#) during a routine healthcare visit.

If your levels are very high, you may notice the following [signs](#):

- **Fatty bumps ([xanthomas](#)) on your skin**, especially on the elbows, joints, knees, hands, ankles, or buttocks
- **Grayish-white rings ([corneal arcus](#))** that appear around the cornea in your eye

These signs develop mostly in people who have very high cholesterol that runs in families ([familial hypercholesterolemia](#)).

Undiagnosed or untreated high blood cholesterol can lead to serious problems, such as [heart attack](#) and [stroke](#). Talk to your healthcare provider about [your risk](#) and steps you can take to keep your cholesterol levels in a healthy range.

## Causes and Risk Factors

An unhealthy lifestyle is the most common cause of high “bad” LDL cholesterol or low “good” HDL cholesterol. However, [genes](#) that you [inherit](#) from your parents, other medical conditions, and some medicines may also raise LDL cholesterol levels or lower “good” HDL cholesterol levels.

What raises the risk for unhealthy blood cholesterol levels?

Unhealthy lifestyle habits

- **Eating a lot of foods high in saturated fats** raises “bad” LDL cholesterol levels. Saturated fats are found in fatty cuts of red meat and dairy products. No more than 10% of your daily calories should come from saturated fats.
- **Lack of physical activity** is linked to a higher risk of having unhealthy blood cholesterol levels.
- **Smoking** lowers HDL cholesterol, particularly in women, and raises LDL cholesterol.
- **Stress** may raise levels of certain [hormones](#), such as [corticosteroids](#). These can cause your body to make more cholesterol.
- **Drinking too much alcohol** (more than two drinks a day for men or one drink a day for women) can raise your total cholesterol level.
- **Getting little or low-quality sleep** has been linked to lower cardiovascular health.

Learn about [heart-healthy lifestyle changes](#) you can make to lower your risk for high blood cholesterol.

Family history

Family members usually have similar cholesterol levels. This suggests that your genes can raise your risk of having unhealthy cholesterol levels.

[Mutations](#), or changes, in your genes can be passed from parent to child. These changes in genes that control cholesterol levels can cause [familial hypercholesterolemia](#). If you have a family history of high blood cholesterol, it may be more difficult for your body to remove LDL cholesterol from your blood or break it down in the liver.

Other medical conditions

Many health problems that raise your risk of high blood cholesterol are caused by unhealthy lifestyle habits. For example, a lack of physical activity and poor eating habits

can lead to overweight and obesity, which are linked to diabetes and sleep apnea. For people with conditions such as lupus and HIV, the condition itself and the medicine used to treat it may lead to unhealthy cholesterol levels.

Talk to your healthcare provider about your risk of high cholesterol if you have any of the following:

- [Chronic kidney disease](#)
- [Diabetes](#)
- [HIV/AIDS](#)
- [Hypothyroidism](#)
- [Lupus erythematosus](#)
- [Overweight and obesity](#)
- [Polycystic ovary syndrome \(PCOS\)](#)
- [Sleep apnea](#)

#### Medicines

Some medicines that you take for other health problems can raise your level of “bad” LDL cholesterol or lower your level of “good” HDL cholesterol, including:

- **[Arrhythmia medicines](#)**, such as amiodarone
- **Beta-blockers** for relieving [angina](#) chest pain or treating [high blood pressure](#)
- **Chemotherapy medicines** used to treat [cancer](#)
- **Diuretics**, such as thiazide, to treat high [blood pressure](#)
- **Immunosuppressive medicines**, such as cyclosporine, to treat [inflammatory](#) diseases or to prevent rejection after organ transplant
- **Retinoids** to treat acne
- **Steroids**, such as prednisone, to treat inflammatory diseases such as lupus, rheumatoid arthritis, and psoriasis

#### Age

Unhealthy levels of cholesterol can affect people of all ages, even young children. However, high cholesterol is most commonly diagnosed in people between ages 40 and 59. As you get older, your body’s [metabolism](#) changes. Your liver does not remove “bad” LDL cholesterol as well as it did when you were young. These normal changes may increase your risk for developing high blood cholesterol as you age.

#### Race or ethnicity

Your race or ethnicity may affect your risk of high blood cholesterol:

- Overall, **non-Hispanic White people** are more likely than other groups to have high levels of total cholesterol.
- **Asian Americans**, including those of Indian, Filipino, Japanese, and Vietnamese descent, are more likely to have high levels of “bad” LDL cholesterol than other groups.

- **Hispanic Americans** are more likely to have lower levels of “good” HDL cholesterol than other groups.
- **African Americans** are more likely than other groups to have high levels of “good” HDL cholesterol.

A study found that [higher levels of HDL may not be as beneficial](#) in some Black and White adults as was once believed. Having other risk factors, such as [high blood pressure, obesity](#), or diabetes may outweigh the health benefits of higher HDL levels.

## Sex

Between ages 20 and 39, men have a greater risk for high total cholesterol than women.

A woman’s risk goes up after menopause. Menopause lowers levels of female hormones that may protect against high blood cholesterol. After menopause, women’s levels of total and “bad” LDL cholesterol usually go up, while their levels of “good” HDL cholesterol go down.

## Diagnosis

### Medical history and physical exam

Your healthcare provider will ask about your eating habits, physical activity, family history, medicines you are taking, and other [risk factors](#) for heart or blood vessel diseases.

During your physical exam, your provider will check for [signs](#) of very high blood cholesterol, such as [xanthomas](#), or signs of other health conditions that can cause high blood cholesterol.

### Screening for high cholesterol

Your healthcare provider may order a blood test called a [lipid](#) panel to screen for unhealthy cholesterol levels.

Your healthcare provider may ask you to fast for 8 to 12 hours before a [lipoprotein](#) panel.

### Lipoprotein (lipid) panel

A lipoprotein panel, also called a lipid panel or lipid profile, measures the levels of LDL and HDL cholesterol and [triglycerides](#) in your blood. Cholesterol and triglyceride levels that are higher than normal may be signs of higher risk of coronary heart disease.

A lipoprotein panel gives the following types of information:

- **Total cholesterol**
- **LDL (“bad”) cholesterol**, which is the main source of cholesterol buildup and blockages in the [arteries](#)
- **HDL (“good”) cholesterol**, which helps decrease cholesterol blockages in the arteries
- **Triglycerides**, which are another type of fat in your blood

Your lipoprotein panel may also provide other potentially useful numbers, such as your non-HDL cholesterol (total cholesterol minus HDL cholesterol) and remnant LDL (total cholesterol minus LDL and HDL cholesterol).

The goal for a healthy lipid profile is to have non-HDL levels below 130 milligrams (mg) per deciliter (dL) with an HDL of at least 40 mg/dL for men and 50 mg/dL for women. Check with your provider on the lipid levels that are best for you.

	<b>Metric: Non-HDL cholesterol (mg/dL)</b>	<b>Metric: Non-HDL cholesterol (mg/dL), starting no later than age 9-11 y and earlier per clinical discretion</b>
	Scoring:	Scoring:
Measurement: Plasma total and HDL cholesterol with calculation of non-HDL	<b>Points</b>	<b>Level</b>
Blood cholesterol	100	<130
lipids	60	130-159
Example tools for measurement: Fasting or nonfasting blood sample	40	160-189
	20	190-219
	≥220	20
		0
	If drug-treated level, subtract 20 points	If drug-treated level, subtract 20 points

For healthy persons, how often you get a lipid panel done depends on your age, risk factors, and family history of high blood cholesterol or cardiovascular diseases, such as [atherosclerosis](#), [heart attack](#), or [stroke](#).

Here is a general guide:

- **Ages 19 or younger:** Screening begins at ages 9 to 11 and should be repeated every 5 years. Screening may be performed as early as age 2 if there is a family history of high blood cholesterol, heart attack, or stroke.
- **Ages 20 to 65:** Younger adults should be screened every 5 years. Men ages 45 to 65 and women ages 55 to 65 should be screened every 1 to 2 years.
- **Older than 65:** Older adults should be screened every year.

### Lipoprotein-a

A lipoprotein-a, or Lp(a), test is not usually part of a routine lipid panel. High levels of Lp(a) may mean you are at higher risk of heart or blood vessel diseases, even if your

other cholesterol levels are healthy. The [genes](#) you [inherit](#) from your parents determine how much Lp(a) you have. Your Lp(a) level is unlikely to change much from childhood to old age.

Your healthcare provider may order an Lp(a) test if you have a [family history](#) of stroke, early heart disease, such as a heart attack, or do not know your family medical history. If you have a high Lp(a) level, your provider may prescribe [statins](#), a medicine to help lower your heart disease risk, even if your other cholesterol levels are in the healthy range.

## Treatment

### Healthy lifestyle changes

To help you lower your LDL cholesterol level, your healthcare provider may talk to you about adopting a healthy lifestyle:

- **[Choose heart-healthy foods](#).** The [Therapeutic Lifestyle Changes](#) and [DASH](#) eating plans can help you lower your “bad” LDL cholesterol. These plans encourage:
  - Limiting saturated fats found in fatty cuts of meats, dairy products, and desserts
  - Eating whole grains, fruits, and vegetables rather than refined carbohydrates such as sweets and other high-sugar foods
  - Eating a variety of nuts
  - Preparing foods with little or no salt
- **[Get regular physical activity](#).** Studies have shown that physical activity can lower LDL cholesterol and triglycerides and raise your “good” HDL cholesterol. For example, resistance training among postmenopausal women may decrease total cholesterol, LDL cholesterol, and triglycerides. Before starting any exercise program, ask your provider what level of physical activity is right for you.
- **[Aim for a healthy weight](#).** Research has shown that adults with overweight and obesity can lower “bad” LDL cholesterol and raise “good” HDL cholesterol by losing only 3% to 5% of their weight.
- **[Manage stress](#).** Research has shown that chronic stress can sometimes increase LDL cholesterol levels and decrease HDL cholesterol levels.
- **[Quit smoking](#).** Visit [Smoking and Your Heart](#) and the NHLBI’s [Your Guide to a Healthy Heart](#). Although these resources focus on heart health, they include basic information about how to quit smoking. For free help and support to quit smoking, you may call the National Cancer Institute’s Smoking Quitline at 1-877-44U-QUIT (1-877-448-7848).
- **[Get enough good quality sleep](#).** Getting 7 to 9 hours of sleep a day lowers your risk for high “bad” cholesterol (LDL) and total cholesterol.
- **[Limit alcohol](#).** Visit the National Institute on Alcohol Abuse and Alcoholism for [resources on support and treatment](#) to stop drinking.

## Medicines

Your healthcare provider may prescribe one of these medicines to help lower high blood cholesterol:

- **Statins** are the most common medicine used to treat high blood cholesterol. They reduce the amount of cholesterol made in the liver. Studies have shown that statins lower the risk of heart attack and stroke in people with high LDL cholesterol. Statins usually don't cause side effects, but they may raise the risk of diabetes. However, this mainly happens in people already at high risk of diabetes, such as those who have [prediabetes](#), [overweight or obesity](#), or [metabolic syndrome](#). Statins may also cause abnormal results on liver [enzymes](#) tests, but actual liver damage is extremely rare. Other rare side effects include muscle damage and cognitive impairment. [Learn more about how you can stay safe while taking statins](#).
- **Medicine to treat familial hypercholesterolemia**, which includes mipomersen, ezetimibe, bempedoic acid, and lomitapide. Ezetimibe or bempedoic acid may be used if statins cause side effects, or if statin treatment and lifestyle changes do not lower your "bad" LDL level enough. Ezetimibe works by blocking how cholesterol is absorbed into the body. In rare cases, these medicines can cause liver injury. Your provider will check your liver enzymes regularly and may recommend that you take vitamin E.
- **Bile acid sequestrants** may be prescribed if you cannot take statins or if statins alone are not lowering your cholesterol enough. Bile acid sequestrants help lower LDL cholesterol. They keep bile acids, which digest fats and oils, from being absorbed into the body. These medicines may cause diarrhea, make some other medicines less effective, or raise your blood triglyceride level.
- **PCSK9 inhibitors** are a type of medicine that you inject under your skin. The liver makes the protein, PCSK9. PCSK9 destroys parts of cells in the liver that allow LDL cholesterol to be absorbed. By stopping the PCSK9 protein, these inhibitors can reduce LDL cholesterol levels. Your provider may prescribe a PCSK9 inhibitor and a statin if you are at high risk of complications like heart attack or stroke, or if you have familial hypercholesterolemia. In 2021, the United States Food and Drug Administration [approved the PCSK9 inhibitor, inclisiran](#)[external link](#), joining the already approved alirocumab, for patients with familial hypercholesterolemia. The most common side effects are itching, pain, or swelling at the place where you injected it.