

High Cholesterol (Dyslipidemia)

What is high cholesterol?

Blood transports necessary nutrients, fuel and oxygen to your body. Cholesterol is a type of fat in the blood. Some cholesterol is important for your body's function. High levels of cholesterol in the blood (high blood cholesterol) can be serious. It can cause fatty deposits, called plaque, to build up in arteries, making blood flow more difficult. High blood cholesterol can be secondary to many diseases. It can also contribute to many forms of disease, most notably cardiovascular disease, or heart disease.

There are often no signs or symptoms of high blood cholesterol. Many people don't know that their cholesterol level is too high until they have a heart attack or stroke, unless they have their cholesterol levels checked regularly.

Everyone age 20 and older should have their cholesterol levels checked at least once every 5 years. You and your doctor can discuss how often you should be tested.



Why does the cholesterol become high?

A high level of cholesterol in the blood is due to abnormal levels of lipoproteins. These are the particles that carry cholesterol in the bloodstream. This may be related to:

- Diet
- Weight
- Lack of physical activity or sedentary lifestyle
- Genetic factors
- Presence of other diseases (diabetes, underactive thyroid, etc.).

What are these cholesterol particles and types?

The types of cholesterol and lipoproteins include:

- **Low-Density Lipoprotein (LDL) or Bad Cholesterol - Plaque Builder** When too much LDL circulates in the blood, it can slowly build up in the inner walls of the arteries that feed blood to the body. Together with other substances, it can form plaque (or atheroma). Plaque is a thick, hard deposit that can narrow the arteries, make them less flexible and limit the amount of blood they can deliver. This condition is known as atherosclerosis. As the artery narrows and hardens, less blood can get through, causing ischemia, or a lack of necessary nutrients. If a clot or blockage forms in a narrowed artery to the heart or the brain, a heart attack or stroke can result.
- **High-Density Lipoprotein (HDL) or Good Cholesterol - The Bad Cholesterol Eater** About one-fourth to one-third of blood cholesterol is carried by HDL. HDL cholesterol is known as "good" cholesterol, because high levels of HDL seem to protect against heart attack. Low levels of HDL (less than 40 mg/dL) also increase the risk of heart disease. HDL tends to carry cholesterol away from the arteries and back to the liver, where it's passed from the body—in a way it "eats" up the bad cholesterol. Some experts believe that HDL removes excess cholesterol from arterial plaque, slowing its buildup.
- **Triglycerides - Blood Fats** - Triglyceride is a form of fat made in the body. Elevated triglycerides can be due to overweight or obese, physical inactivity, cigarette smoking, excess alcohol consumption and a diet very high in carbohydrates (60 percent of total calories or more). Many times, people with diabetes have high triglycerides when their blood sugar is not well controlled. People with high triglycerides often have a high total cholesterol level, including a high LDL (bad) level and a low HDL (good) level. Many people with heart disease and/or diabetes also have high triglyceride levels.
- **Lp(a) Cholesterol** - Lp(a) is a genetic variation of LDL (bad) cholesterol. A high level of Lp(a) is a significant risk factor for the premature development of fatty deposits in arteries. Lp(a) isn't fully understood, but it may interact with substances found in artery walls and contribute to the buildup of fatty deposits.

How is high cholesterol diagnosed?

Since there are usually no signs and symptoms of high blood cholesterol, a blood test is important to diagnose high blood cholesterol. The blood test is called a lipoprotein profile or lipid panel. This test requires you to fast. You cannot eat or drink anything for 10 to 12 hours or more before taking the test. Often people fast after dinner, until blood is drawn in the morning. The lipoprotein profile provides information about:

- Total cholesterol
- Low-density lipoprotein (LDL) or bad cholesterol level
- High-density lipoprotein (HDL) or good cholesterol level
- Triglycerides

If it is not possible to get a lipoprotein profile done, knowing your total cholesterol and HDL cholesterol can give you a general idea about your cholesterol levels.

What are treatment goals?

Treatment is tailored to your individual risk of developing heart disease. Some people need to have an LDL less than 100 or even 70 mg/dL, but you and your doctor can work on these plans together.

Below is just one example of some treatment goals. As always, consult your doctor for complete information on your individual needs.

Adult treatment panel III classification of LDL, total, and HDL cholesterol

LDL cholesterol, mg/dL (mmol/L)	
<100 (2.58)	Optimal
100 to 129 (2.58 to 3.33)	Near or above optimal
130 to 159 (3.36 to 4.11)	Borderline high
160 to 189 (4.13 to 4.88)	High
≥190 (4.91)	Very high
Total cholesterol, mg/dL (mmol/L)	
<200 (5.17)	Desirable
200 to 239 (5.17 to 6.18)	Borderline High
≥240 (6.20)	High
HDL cholesterol, mg/dL (mmol/L)	
<40 (1.03)	Low
≥60 (1.55)	High

Adapted from Adult Treatment Panel III at <http://www.nhlbi.nih.gov/>.

How is high cholesterol treated?

High cholesterol levels are treated with diets low in cholesterol and saturated fats, lifestyle modifications and medications. There is also increased emphasis on other risk factors for cardiovascular disease, such as high blood pressure.

Lifestyle changes are the most common treatment and include:

- increasing exercise
- avoiding excess carbohydrates and fatty foods
- decreasing animal products in the diet.

Medications to keep a healthy heart

If these lifestyle changes don't produce the necessary result, oftentimes doctors will use medications. Medications such as statins (HMG-CoA reductase inhibitors) help to reduce LDL and boost HDL cholesterol. The statin medications are one of the most effective medications for lowering the LDL or bad cholesterol. The statin medications have additional effects that can further lower the chances of a heart attack or stroke. There are also many other drugs and supplements to help with cholesterol.

It is important to note that a healthy lifestyle with moderate physical activity 30 minutes a day combined with a mostly plant-based diet is probably the best, low-cost and most highly effective option as a first step toward improved cholesterol levels.

Medication treatment controls, but does not "cure" high blood cholesterol. Therefore, you must continue taking your medicine to keep your cholesterol level in the recommended range.

Six major types of cholesterol-lowering medicines are:

- **Statins** - Lowers LDL cholesterol
- **PCSK9 Inhibitors** - Lowers LDL cholesterol
- **Bile Acid Sequestrants** - Lowers LDL cholesterol
- **Nicotinic Acid** - Lowers LDL cholesterol and triglycerides and raises HDL and cholesterol

- **Fibrates** - Lowers triglycerides and may increase HDL and cholesterol
- **Ezetimibe** - Lowers LDL cholesterol

Lifestyle modifications to keep a healthy heart

Cholesterol is largely derived from foods that contain fats and animal products — such as dairy (including cheese), fish and shellfish, meats of any kind, eggs and poultry.

Cholesterol, as we refer to it, is composed of three different groups that make up your lipid profile:

- LDL (low-density lipoproteins or "bad" cholesterol)
- HDL (high-density lipoproteins or "good" cholesterol)
- Triglycerides

High LDL, low HDL and elevated triglyceride levels are all associated with plaque development in the arteries, which can lead to heart attack and stroke. Certain cholesterol-lowering medications are generally safe and effective. However, a heart-healthy lifestyle, including a healthy diet and exercise can significantly reduce your cholesterol levels, in some cases in place of medication.

Top 10 Tips to Improve Heart Health:

1. Avoid Bad Fats.

Saturated, polyunsaturated and trans fats all raise LDL ("bad" cholesterol) levels. Saturated fats are found mainly in animal products and tropical oils. Trans fats are typically found in margarines, baked goods or anything containing "partially hydrogenated vegetable oil." One often overlooked source of trans fats is many "nondairy" products. Because the amount of trans fats are below the officially reportable amount, the package usually lists "0," which may not be true. Surprisingly, dietary fat intake may have a greater impact on blood cholesterol levels than cholesterol itself. Did you know that two slices of bacon have 17 grams of saturated fat?

Reduce or avoid bad fats:

- Red meat
- Whole milk, butter and cheese
- Tropical oils (coconut, palm and other tropical oils)
- Trans fats or partially hydrogenated vegetable oil
- "Nondairy" products

Watch the fat calories you eat every day:

- Fats — less than 25 to 35 percent of total caloric intake (American Heart Association [AHA] recommendation)
- Saturated fat — less than 7 percent (AHA recommendation) to 10 percent (2016 U.S. Dietary Guidelines)
- Trans fats — less than 1 percent (AHA recommendation)

2. Increase Good Fats.

There are positive benefits of eating "good fats" that are best demonstrated by the Mediterranean diet, which is low in saturated fats. Mono- and polyunsaturated fats, such as those found in olive oil, canola oil and nuts, can be particularly beneficial to your lipid profile.

Eat these good fats:

- Olive and canola oils
- Walnuts and almonds — high in calories, but a handful can help lower bad cholesterol

3. Eat Omega-3 Fatty Acids.

Omega-3 fatty acids can lower triglycerides by 25 to 30 percent, while modestly elevating HDL (good cholesterol). High doses of omega-3s can also increase LDL (bad cholesterol).

Since omega-3 fatty acids are not produced by the body, we are dependent on marine sources (salmon, herring and fish oil supplements), plant sources (soy, canola and flaxseed oils) and food sources (walnuts and flaxseeds), which are rich in the most healthy omega-3s, EPA and DHA.

- Eat two servings of fatty fish per week (salmon, mackerel, herring, lake trout, sardines and albacore tuna; some fish are quite high in cholesterol). Avoid fish with high levels of heavy metals (such as mercury) and pesticide residues (recommendation from AHA).
- Flaxseeds and walnuts may be the easiest way to regularly add omega-3s into your diet.
- Use soy, canola and flaxseed oil.
- Plant sources of omega-3s are preferred over fish oil capsules.

4. Increase Your Fiber Intake.

Soluble fiber lowers the absorption of cholesterol in the intestines. It's not just eating more fruits and vegetables, but rather replacing the high fat, high cholesterol food items with those that are low fat and low cholesterol. A cheeseburger with bacon piled high with veggies is still not a healthy choice. Consuming more fruits and vegetables is not only associated with lower cardiovascular disease risk, but can also reduce risks of certain cancers and can even affect energy levels, performance and bone density.

- Eat at least 25 to 30 grams of soluble fiber a day.
- Oatmeal: A cup and half of cooked oatmeal contains six grams of fibers.
- Soluble fiber sources include bran, bananas, kidney beans and vegetables.

5. Exercise Every Day.

Exercise can raise HDL approximately 5 percent within two months of starting a program, while lowering triglycerides. Increasing your HDL can in turn lower your LDL. Moderate-intensity, aerobic activity is best. Remember to consult your doctor before initiating an exercise program.

Aim for:

- 30 minutes/day, five days/week
- Strength training at least two days/week to maintain muscular endurance

6. Lose Excess Weight.

Excess weight lowers HDL and raises triglycerides; weight loss tends to raise HDL and lower triglycerides.

7. Quit Smoking.

We all know that smoking is bad for your heart. What you may not know is that smoking lowers HDL, which in turn can increase the risk for heart attack and stroke.

8. Use Margarine with Plant Sterols/Stanol.

It was not that long ago that margarine was loaded with trans fats. Trans fats are felt to be so unhealthy that New York City now outlaws their use in restaurants. Many margarines are now not only trans fat-free but also contain heart healthy plant stanols and sterols. Plant sterols and stanols (essential components of plant membranes) are structurally similar to cholesterol, thereby reducing intestinal absorption of cholesterol.

- Two grams a day, or roughly two tablespoons/day of a sterol/stanol-enriched butter-substitute can lower LDL by 5 percent to 15 percent.

9. Watch the Alcohol.

The information surrounding alcohol and heart disease can be confusing for patients and doctors alike. On the one hand, alcohol (in moderation) can raise HDL while reducing the risk of heart attack and stroke. However, significant alcohol intake can fuel high triglycerides (and even be linked to high blood pressure) and cause liver problems, particularly if you take cholesterol-lowering medications. If you have high triglycerides, it's best to minimize, if not avoid alcohol altogether.

10. Take Cholesterol Medication, If Prescribed.

Cholesterol medications are not just for high cholesterol patients. In fact, patients with normal cholesterol may still benefit from cholesterol medication. Plaque development in the arteries is an inflammatory disease. Certain cholesterol medications may lower the risk or development of this disease process.

The latest guidelines for treating high cholesterol focus now on one's overall cardiovascular risk rather than specific numbers.

The best way to lower your risk is to exercise; eat more plant-based foods; reduce stress; maintain a healthy weight and blood pressure; and avoid smoking.

Visit our website for more information about support groups, clinical trials and lifestyle information.

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