# Cholesterol

## What is it AND how should I monitor it?

These days, cholesterol is almost a household word. You see ads on TV and in magazines for the latest cholesterol-lowering treatments, hear about foods and diets that will keep your cholesterol in check, and hear people discuss their ratio of good to bad cholesterol like a change in the weather. But in many ways, cholesterol is more confusing than ever.

*By Jacqueline Jacques, ND*

My grandparents were the first people I ever remember talking about cholesterol. When I was a little girl, they suddenly adopted a radical dietary change – going almost overnight from steak, eggs and potatoes to a near vegetarian diet enhanced by fish and occasional chicken.

And the reason? Cholesterol. My grandpa's, so I was told, was too high, and these changes were intended to help him get it under control (which he did and lived a long and healthy life to the age of 93).

Back when my grandpa found out his was high, there was really just one number: total cholesterol. Now we have HDL, LDL, VLDL, Lp(a) and ratios to compare them. And when it comes to what controls cholesterol - we now know it is not just cholesterol in diet and genetics, but also in some fats, other nutrients, lifestyle factors and more.

### What is Cholesterol?

Cholesterol is a waxy, fat-like substance that is both made by humans and found in fat-containing animal products in varying amounts. As humans, we need cholesterol, which is why it is not all "bad." Cholesterol is important to the structure of all cells and is the precursor to the creation of steroid hormones like estrogen and testosterone. We also use it to make vitamin D.

### Where Does Cholesterol Come from?

Most of the cholesterol in your body is made by you in your liver, and often the amount of cholesterol a person makes (as well as the type) is greatly influenced by genetics.

All sources of dietary cholesterol are from animal products such as eggs, shellfish, dairy products, beef and poultry. Daily cholesterol intake in excess of 300mg/day from dietary sources can raise blood cholesterol levels and contribute to heart disease.

## Types of Cholesterol

Total Cholesterol ◆ LDL ◆ HDL ◆ VLDL

When you have your blood tested for cholesterol, you may see a whole group of different numbers. Cholesterol can be broken down into subtypes including LDL, HDL, VLDL, and lipoprotein a [Lp(a)]. Your doctor may look at these "cholesterol fractions" and their ratios to determine your risk for cardiovascular disease. These are the most common values you will see:

- **Total Cholesterol** – Total cholesterol is still on most lab panels, and is really an outdated test. This value combines the total of your HDL ("good" cholesterol) and LDL ("bad" cholesterol) with a percentage of your triglycerides (another "bad" fat). Because the good and the bad are tossed together in this number, it really doesn't help us understand much about cardiovascular risk.

- **Low-Density Lipoprotein (LDL Cholesterol)** – Since cholesterol is a fatty substance, and fats do not dissolve in water, it has to be carried around in your body by something else. Cholesterol in our bodies is carried by protein – which we then call "lipoproteins." LDL carries cholesterol out of your liver, where it is made, to other parts of your body where it is used to make hormones and other things. Excess is taken back to the liver, excreted into bile and eliminated through your digestive system.

  However, if there is too much, it can also be deposited as plaques on the wall of your arteries – this is what we call

atherosclerosis. For this reason, LDL is called "bad" cholesterol and is most associated with poor cardiovascular health. Ranges for LDL are as follows:

- Less than 100 mg/dL (2.59 mmol/L) - Optimal
- 100-129 mg/dL (2.59-3.34 mmol/L) - Near optimal, above optimal
- 130-159 mg/dL (3.37-4.12 mmol/L) - Borderline high
- 160-189 mg/dL (4.15-4.90 mmol/L) - High
- Greater than 189 mg/dL (4.90 mmol/L) - Very high

- **High-Density Lipoprotein (HDL Cholesterol)** – High-density lipoproteins carry much less cholesterol than LDL. They are made both in the liver and in the intestines. We call them "good" cholesterol, because they help to remove cholesterol deposits from artery walls.

  Ranges for HDL are usually different for men and women:

  - Less than 40 mg/dL for men, less than 50 mg/dL for women - Increased risk for heart disease
  - 40 to 50 mg/dL in men, 50 to 60 mg/dL in women - Average
  - Above 60 in men or women - Lowered risk for heart disease

- **Very Low-Density Lipoprotein (VLDL Cholesterol)-** VLDL is another type of "bad" cholesterol. It carries some cholesterol, but primarily transports another fat – triglyceride. After VLDL drops off the triglyceride it is carrying, it is then simply a protein and cholesterol "remnant." Like LDL, these can lead to arterial plaque formation.

  The liver also makes excess VLDL into LDL cholesterol. A normal level for VLDL is between 5 and 40 mg/dL. This is usually calculated as a percentage of your triglyceride level. If your triglycerides are over 400, this number is not accurate and may not be calculated.

## Other Tests You May See

- **Lp(a)** – Lipoprotein a, or Lp(a) for short, is a genetic variation of LDL cholesterol. Studies have shown that higher levels of Lp(a) can lead to earlier, and perhaps more aggressive, development of arterial plaques.

- **Triglycerides** – Triglycerides are not cholesterol, but usually appear in the "lipid (fat) panel" that your doctor orders. Triglycerides are the primary storage form of fat in the body. Normally, we have low levels of circulating triglycerides in the blood, and when levels are elevated, it is a risk factor for heart disease just like elevated cholesterol. It is also a risk for fatty liver disease, pancreatitis (inflamed pancreas) and xanthoma formation (fatty growths under the skin). The normal ranges for triglycerides are:

  - Less than 150 mg/dL - Normal
  - 150-199 mg/dL - Borderline-high
  - 200-499 mg/dL - High
  - 500 mg/dL or above - Very High

- **Total Cholesterol/HDL ratio** – This ratio, which is calculated by dividing your total cholesterol by your HDL level, will sometimes appear on your lab results. It has been studied as a predictive number for developing heart disease, although in recent years, some doctors have come to feel it is not very useful. If your doctor is looking at this ratio, they will want you to keep it below 5:1.

- **HDL/LDL ratio** – This is another calculated number that compares your levels of "good" to "bad" cholesterol. It is best for this ration to be above 0.3 – even better if it is above 0.4.

## Things that Influence Cholesterol Levels

There are many factors, from genetics to diet to lifestyle, which raise and lower our cholesterol levels – both good and bad. Sometimes, your doctor will use medications to keep cholesterol levels lower, but there are also things you can do on your own that can help.

## Good Foods to Help Control Cholesterol

There are other things you can do through diet to help lower cholesterol. Increasing the soluble fiber-containing foods in your diet has been shown to be beneficial. Good sources of soluble fiber include oats, peas, beans, apples, pears, citrus fruit, broccoli and carrots. Overall, most fruits and vegetables have soluble fiber.

Soybeans have been shown to be very helpful in lowering cholesterol. This can be tofu, tempeh, soy protein or other soy foods. For helping to lower cholesterol, the recommended amount of soy protein is 25 grams per day.

Another great dietary strategy is to include sources of beneficial essential fatty acids – especially sources of Omega-3 fatty acids. This includes salmon, tuna, sardines, walnuts, flax seeds, fish oil or flax oil products, or foods such as eggs, milk or yogurt fortified with Omega-3 fatty acids. Other good things to include in your diet to help keep cholesterol in check include foods like margarines that say they are made with sterols or stanols, olive oil, and the herbs garlic and cinnamon.

## Foods to Avoid

On the side of things to avoid, the most important are saturated fats, trans fats and very high-cholesterol foods. Saturated fats are those that are solids when they are at room temperature and turn to an oil when heated.

All fats are made up of carbon, hydrogen and oxygen. In a saturated fat, all the carbon bonds are occupied by (or *saturated* with) hydrogen molecules. These fats are mostly found in meat, poultry, egg yolk and full-fat dairy foods. They are also found in a few non-animal products such as coconut, cocoa butter and palm oil. Saturated fats are known to contribute to elevated cholesterol and are associated with heart disease risk when consumed in excess.

Trans fats, or trans fatty acids, are created when a fat is partially hydrogenated. Technically, the "trans" refers to the fact that the hydrogens are attached on opposite sides of the carbon molecules (versus on the same side, which would be "cis").

Trans fats have received a lot of attention lately in relation to their role in cardiovascular disease. It is believed that they act in the body more like saturated fats than unsaturated fats, and studies have shown that they both increase LDL (bad) and lower HDL (good) cholesterol. In 2003, the United States Food and Drug Administration (FDA) passed legislation making it mandatory to label the trans fatty acid content of foods. Since 2006, this should appear on all food labels, making trans fats easy to spot.

Cholesterol is found in the diet in all animal products (meat, poultry, eggs, dairy, fish), and in baked goods that contain ingredients like milk, lard, egg yolk, butter or cheese. Daily cholesterol intake in excess of 300mg/day can contribute to heart disease. The TLC diet, mentioned in the below box, recommends keeping daily intake below 200mg.

### Things that Raise HDL

Raising your HDL is usually as important as lowering your LDL. Lifestyle factors that can help with raising HDL include weight-loss, moderate exercise and quitting smoking (or never starting). The American Heart Association recommends a target body mass index below 25 for optimal HDL.

Studies have generally shown that aerobic exercise, done for 30 minutes 3 times a week up to daily, raises HDL. Modest alcohol consumption may also help to raise HDL, but carries its own risks. Finally, the vitamin niacin (B3) is known to be effective for raising HDL levels. Niacin is also sold as drug Niaspan® for the treatment of elevated cholesterol. Proper use of niacin may raise HDL levels by as much as 35 percent.

If you are purchasing niacin on your own, it is important to know that there are two forms – crystalline niacin or nicotinic acid, which impacts cholesterol, and niacinamide or nicotinamide, which does nothing to cholesterol at all. Also, at the doses typically used for this purpose, the uncomfortable side effect of flushing is extremely common. Niacin may also cause liver toxicity, stomach irritation, diarrhea and changes in blood sugar levels. For these reasons, it is a good idea for anyone who wishes to take niacin for cholesterol to consult with a qualified healthcare professional first.

### Can Cholesterol be Too Low?

With all this talk about lowering cholesterol, we also know that we need some. Cholesterol, as we said earlier, is important for making hormones and as a structural component of cells. There is some evidence that very low cholesterol is associated with increased cancer rates, and perhaps with depression. But we don't really know what too low would be.

Many people think that having LDL levels between 60 and 70 would be optimal, and it is generally suggested to keep total cholesterol below 200. Perhaps in the future, research will really tell us what is optimal to create a balance where we have enough cholesterol in the body to keep us healthy while not contributing to heart disease.

***About the Author:***

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***Resources:***

1. *American Heart Association:* ***www.americanheart.org***
2. *National Heart, Lung and Blood Institute:* ***www.nhlbi.nih.gov***
3. *National Library of Medicine Cholesterol Resources:* ***www.nlm.nih.gov/medlineplus/cholesterol.html***
4. *Mayo Clinic Cholesterol Center:* ***www.mayoclinic.com/health/cholesterol/CL99999***
5. *Health Central Cholesterol Information:* ***www.healthcentral.com/cholesterol***

## Things that Lower LDL

There are many things you can do on your own to help lower your LDL cholesterol. A good place to start is with the Therapeutic Lifestyle Change (TLC) program advocated by the National Heart, Lung and Blood Institute. The primary components of TLC include:

1. The TLC Diet – this is a very low saturated fat and low cholesterol diet with moderate calorie restriction. The diet also has programs that increase fiber and dietary sterols and stanols, which can further lower cholesterol.
2. Weight-loss – The TLC program advocated weight-loss for those who are overweight as part of an overall cholesterol-lowering program.
3. Exercise – They recommend 30 minutes or more on most or all days of the week.

OAC
Obesity Action Coalition

# ABOUT THE **OBESITY ACTION COALITION (OAC)**

The Obesity Action Coalition (OAC) is a National non-profit organization dedicated to giving a voice to individuals affected by obesity and helping them along their journey toward better health. Our core focuses are to elevate the conversation of weight and its impact on health, improve access to obesity care, provide science-based education on obesity and its treatments, and fight to eliminate weight bias and discrimination.

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# LEARN, CONNECT, ENGAGE

The OAC knows that the journey with weight can be challenging but we also know that great things happen when we learn, connect and engage. That is why the OAC Community exists. Our Community is designed to provide quality education, ongoing support programs, an opportunity to connect, and a place to take action on important issues.

## Through the OAC Community, you can get access to:

Weight & Health Education • Community Blogs • Community Discussion Forum • Ongoing Support • Meaningful Connections

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