Cholesterol
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Your Liver and Cholesterol: What ’s the Connection?

This organ plays a key role in making and regulating the waxy substance in your body. Learn how liver problems affect your cholesterol levels and vice versa.

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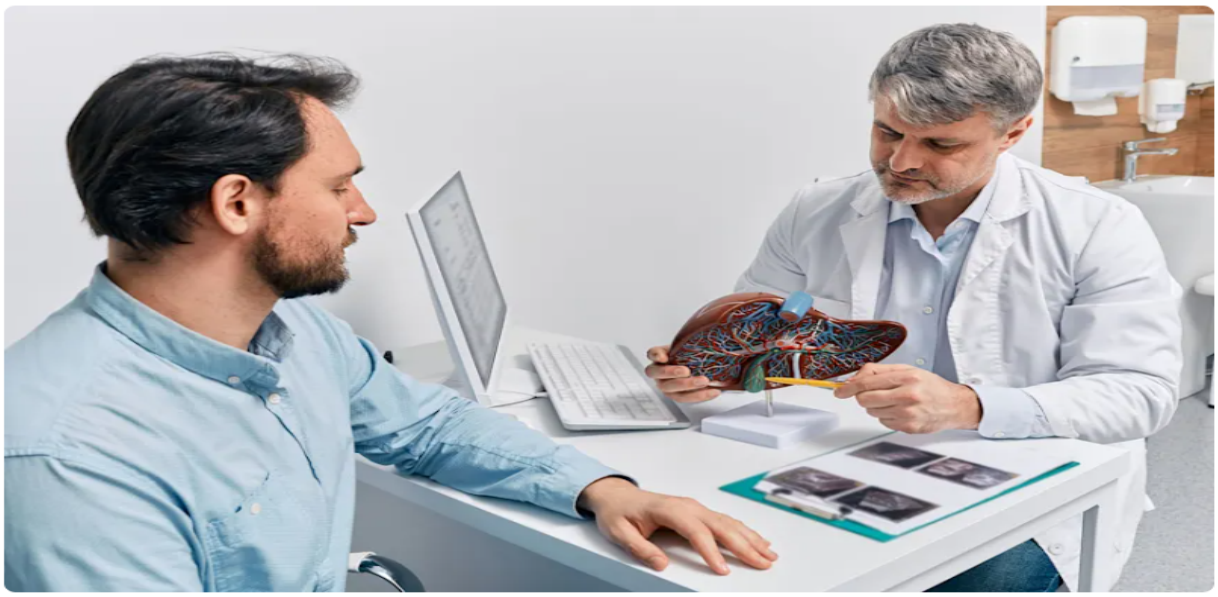

Chances are you know what cholesterol is, and you’re aware that eating too much of certain foods can raise it, leading to high cholesterol. But did you know that your body produces its own supply of cholesterol? In fact, you need cholesterol to survive: It performs several critical functions in your body, and it all starts in the liver, which makes cholesterol plus manages its level in your body.

As a result, problems with the liver can throw your cholesterol off balance, and vice versa. If your doctor has talked with you about high cholesterol (or you’re just curious about how it all works), here’s what you should know about the relationship between cholesterol and your liver.

What Is Cholesterol?

Cholesterol is a waxy, fat-like substance that circulates in your bloodstream. It helps to form protective layers, called cell membranes, around the cells in your body. It's also necessary to make vitamin D, certain hormones, and bile, which helps you digest foods. Your liver makes all the cholesterol you need.

So, cholesterol is a good thing. Too much cholesterol, however, boosts your risk of heart disease. That excess cholesterol mostly comes from your diet. If you eat too much saturated fat—the kind found in animal products like red meat and full-fat dairy—you run the risk of developing high cholesterol.

Types of Cholesterol in Your Body

There are two main types of cholesterol, and each has a different impact on your body.

- **Low density lipoprotein cholesterol (LDL)**. This is frequently referred to as bad cholesterol. Having too much LDL contributes to plaque buildups in your arteries, a process called atherosclerosis. Such buildups can cause block the flow of blood and trigger heart attack and stroke.
- **High density lipoprotein cholesterol (HDL)**. This is good cholesterol. It helps carry LDL to your liver, where it then gets flushed out of your body. But you have to have enough HDL to do that job. If your HDL is too low, LDL will continue to circulate in your bloodstream and potentially lead to heart disease.

How Does Your Liver Regulate Cholesterol?

Your liver sits in the upper-right portion of your abdomen, above the stomach, and weighs about 3 pounds, making it one of the body's larger organs. It has a big job to do, too: Not only does your liver produce cholesterol, it also helps keep it in check.

"The liver plays a crucial role in regulating cholesterol levels in the body," says Mehrdad Ghahramani, M.D., a cardiologist at University of Miami Health System in Miami, FL. "When cholesterol levels in the blood are too high, the liver responds by reducing its own production of cholesterol and increasing the production of bile acids, which help to break down and eliminate excess cholesterol from the body."

If you have more cholesterol in your bloodstream than the bile acids can break down, your liver must work overtime to process it. That's bad. "When there's too much cholesterol passing through the liver, that contributes to the accumulation of fat in the liver," says Eric Ascher, D.O., a family medicine physician at Lenox Hill Hospital in New York City. "This is when you are at risk for liver disease."

Fatty liver disease can cause inflammation in your liver, which eventually can lead to chronic liver disease.

What’s a Normal Cholesterol Level and What’s Considered High?

A blood test called a lipid panel will tell your doctor whether you have high cholesterol. This test reports your cholesterol as several numbers: your total cholesterol level, LDL level, and HDL level, plus a measurement of your triglycerides, another type of fat that circulates in your bloodstream. At high levels, triglycerides increase your odds of heart disease. Your total cholesterol number is the sum of your LDL and HDL plus a percentage of your triglycerides. The ranges for each component of the lipid panel are:

Total Cholesterol

- High: 240 milligrams per deciliter (mg/dL) or higher
- Borderline high: 200 mg/dL to 239 mg/dL
- Normal: Below 200 mg/dL

LDL

- Very high: 190 mg/dL or higher
- High: 160 mg/dL to 189 mg/dL
- Borderline high: 130 mg/dL to 159 mg/dL
- Near optimal: 100 mg/dL to 129 mg/dL
- Normal: below 100 mg/dL
- Optimal for people with heart disease, history of heart attack, and certain heart surgeries: below 70 mg/dL

HDL

- Poor: below 40 mg/dL for men and below 50 mg/dL for women
- Better: 40 mg/dL to 59 mg/dL for men and 50 mg/dL to 59 mg/dL for women
- Best: 60 mg/dL or higher for both men and women

Triglycerides

- Very high: 500 mg/dL and above
- High: 200 mg/dL to 499 mg/dL
- Borderline high: 150 mg/dL to 199 mg/dL
- Desirable: below 150 mg/dL

How Liver Function Complications Affect Cholesterol

Just as excess cholesterol in your blood can damage the liver, so too can issues with your liver affect your cholesterol level. “Liver problems can have significant effects on cholesterol metabolism in the body, leading to the development of high cholesterol levels,” says Dr. Ghahramani. “This can increase the risk of cardiovascular disease.” These liver problems include:

Fatty Liver Disease (Steatosis)

This is a condition characterized by the accumulation of excess fat in the liver cells. While it’s normal for your liver to contain a small amount of fat, if that fat accounts for 5% to 10% of your liver’s total weight, you have fatty liver disease. There are two main types of fatty liver disease:

- **Alcohol-induced fatty liver disease**, which is caused by heavy drinking and is generally reversible if you cut out alcohol.
- **Non-alcoholic fatty liver disease (NAFLD)**, which occurs in people who don’t drink alcohol or who drink in moderation. Experts are not sure what causes it, but Dr. Ghahramani says that people with NAFLD often have higher levels of LDL cholesterol and lower levels of HDL cholesterol than people without the condition. Non-alcoholic steatohepatitis (NASH) is a more severe form of NAFLD in which inflammation and scarring (fibrosis) develops in the fatty liver.

With either of these diseases, your liver’s ability to function properly is compromised. That, in turn, has an impact on your cholesterol level.“If your liver is unable to function optimally because it is fatty, your cholesterol levels will continue to increase because fats from the foods you eat cannot be broken down appropriately,” says Dr. Ascher.

Cirrhosis

This is late-stage liver disease, in which liver tissue gets replaced by scar tissue. Long-term alcohol abuse can lead to cirrhosis, which also affects how your liver metabolizes cholesterol. “People with cirrhosis may have low levels of HDL cholesterol, high levels of LDL cholesterol, and increased levels of triglycerides,” says Dr. Ghahramani.

Viral Hepatitis

Viral hepatitis refers to hepatitis, or inflammation of the liver, that is caused by a viral infection. There are three types of viral hepatitis: Hepatitis A, B, and C. Damage to the liver from viral hepatitis can lead to a rise in LDL in the blood, Dr. Ghahramani says. A damaged liver produces less HDL (which helps clear LDL) and might not be able to make enough bile, which breaks down LDL.

Primary Biliary Cholangitis and Primary Sclerosing Cholangitis

These chronic inflammatory diseases affect the bile ducts, says Dr. Ghahramani, resulting in abnormal bile flow. Bile is a digestive fluid made by your liver that plays a critical role in the breakdown of cholesterol in your body. It flows through ducts that connect digestive organs such as the liver, gallbladder, and small intestine. Bile ducts also connect to the pancreas, which produces digestive enzymes. “This can lead to changes in cholesterol metabolism and the development of high cholesterol levels,” he says.

What Are the Symptoms of Liver Damage?

Blood tests and other liver tests can tell your doctor if your liver is not functioning normally, but often there are no signs to indicate a liver problem, especially in the early stages. Symptoms that may occur from liver damage in more advanced stages include:

- Dark urine and pale stool (poop)
- Easy bruising
- Fatigue
- Itching that can be severe and prolonged
- Jaundice, or yellowing of the skin and eyes
- Loss of appetite
- Nausea or vomiting
- Pain or discomfort in your abdomen, particularly on the right side, where your liver is located
- Swelling in the arms and legs

How to Manage Your Cholesterol (and Help Your Liver, Too)

If you need to bring down your cholesterol, especially your LDL, there are lifestyle changes that your doctor likely will recommend. Bonus: These changes also can help protect your liver. These include:

- **Exercise Regularly**. Regular exercise helps boost HDL, the good cholesterol that helps rid your body of LDL, the bad cholesterol. Aim for 150 minutes a week, per the Centers for Disease Control and Prevention. You can break that into 30 minutes on five days in a week. Walk, bike, swim, play sports: whatever you enjoy that gets you moving.
- **Follow a Healthy Diet**. Eat less red meat and full-fat dairy, which contain saturated fats that raise your cholesterol. Eat foods that have plenty of fiber, which helps reduce the cholesterol in your bloodstream. Think whole grains (like oatmeal), beans, and fruits and vegetables.
- **Watch Your Weight**. Excess weight contributes to high cholesterol, so aim to lose those extra pounds. Your diet and exercise plan will help you accomplish that.

In addition, if your doctor decides that you need a cholesterol-lowering drug, such as a statin, take it as prescribed. Your heart will be healthier for it.

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Sources

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Matt McMillen is a health reporter. He covers breaking medical news and the latest medical studies, profiles celebrities, and crafts easy to digest overviews of medical conditions. His work has appeared, both online and in print, in *The Washington Post*, *WebMD Magazine*, *Diabetes Forecast*, *AARP*, and elsewhere.

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