

## Cholesterol

### Overview

Cholesterol is a type of fat (lipid) made mainly by the liver that is essential for the body's health and an important part of metabolism. However, having too much cholesterol in the body can damage the arteries (blood circulation system) leading to diseases including stroke, heart attack, and high blood pressure.

In some cases, high blood cholesterol levels are the result of genes that are passed down from one generation to the next, but in most cases the excess comes from diets that are high in cholesterol and saturated fats, like those found in meat and dairy products.

Unlike body fat, which is stored under the skin, cholesterol is normally transported around the body through blood circulation and 'recycled' by the liver.

There are two types of cholesterol in the bloodstream - the 'good' and the 'bad'. 'Good' cholesterol is called high density lipoprotein (HDL) and the 'bad' cholesterol is known as low density lipoprotein (LDL).

LDL cholesterol build-up causes hardening and narrowing of the arteries (atherosclerosis). This is associated with an increased risk of heart attack and stroke.

HDL cholesterol on the other hand is thought to be protective against the damage caused by LDL cholesterol.

### Causes

There are many reasons for someone to have a high cholesterol level. When people speak of high cholesterol levels, it is in fact an imbalance of 'good' versus 'bad' cholesterol.

Sometimes high cholesterol may run in families (an inherited trait) but in most cases it is the result of poor eating habits.

Some people may have high cholesterol from diseases of the thyroid, kidneys or liver.

Eating a lot of animal fats (red meat, cheese, yoghurt, cream etc), which contain large amounts of cholesterol and saturated fats, leads to an imbalance of 'good' and 'bad' cholesterol because they are high in the bad or LDL cholesterol.

Low levels of 'good' HDL cholesterol can also be caused by being overweight, obesity, diabetes, lack of physical exercise and cigarette smoking.

### Symptoms

Most people with high LDL 'bad' cholesterol levels have no signs or symptoms until

enough damage to the arteries has occurred to cause chest pain, heart attack or stroke. It is therefore almost impossible to judge cholesterol levels based on physical symptoms. The best way to know is to have a blood test.

A blood test for cholesterol levels can pick up abnormalities years before problems surface, and treatment with drugs to reduce LDL cholesterol can significantly improve life expectancy and reduce the risk of heart attack and stroke.

Some people with very high levels of LDL, may have yellow, flat, painless bumps on the eyelids called xanthelasma. These people may also have cholesterol deposits in their tendons, which appear as firm, painless lumps. These lumps usually present at back of the knuckles and in the Achilles' tendons.

### Diagnosis

Cholesterol levels are measured by a blood test which includes 'total cholesterol', HDL and LDL. The higher the levels of 'total' and LDL cholesterol and the lower the level of HDL, the greater the risk of artery damage.

Your doctor may measure another type of lipid called triglycerides that have been shown to also be associated with an increased risk of heart attack and stroke. In most people, as triglyceride levels go up, HDL cholesterol levels go down.

A diet high in carbohydrates may lead to increased triglyceride and lower HDL cholesterol levels. Conditions such as obesity and diabetes can also increase triglyceride levels.

#### Lipids in the blood are measured in millimols per litre (mmol/L).

The normal ranges are about:  
 Total cholesterol: <4.0 mmol/L  
 Triglycerides fasting 0.3 - 1.7 mmol/L  
 HDL 0.9 - 2.2 mmol/L  
 LDL 0.5 - 3.5 mmol/L

### Treatment

The best way to get LDL cholesterol down is to reduce the amount of animal fats in the diet and reduce weight to the ideal level.

Medications can also be prescribed, but lifestyle changes should always be considered as a first line treatment.

In the last two decades, the introduction of a group of drugs called statins has been a remarkable step forward in reducing LDL cholesterol levels. Statins can also repair

some of the damage already done to blood vessels by high cholesterol.

### Medicines

#### ▶ Statins

By far the most effective drugs in reducing elevated LDL 'bad' cholesterol levels are statins, which reduce the amount of cholesterol made by the liver and increase the rate of LDL removal from the blood.

Since their introduction more than two decades ago, a significant reduction in cardiovascular disease, including heart attack and stroke has been observed.

Statins are relatively free of side effects, but can affect the liver and the muscles of the body in some people. Monitoring of liver function tests along with cholesterol levels is recommended and people are advised to report unusual muscle aches and pains as soon as possible.

Atorvastatin, simvastatin, fluvastatin, pravastatin and rosuvastatin are drugs in this class.

#### ▶ Ezetimibe

This is usually taken in combination with a statin. It is added when the target levels of LDL cholesterol have not been reached after the maximum tolerated dose of a statin has been tried. Ezetimibe inhibits absorption of cholesterol in the intestine and as a result reduces the amount of LDL cholesterol in the blood. It is usually well tolerated and safe in long term use. By itself it can reduce LDL cholesterol by up to 20% and with statins, by up to 70%.

#### ▶ Secondary drugs

Drugs called 'fibrates' and nicotinic acid are also used to treat high cholesterol as a second line treatment. These are usually prescribed when other drugs cannot be tolerated or may clash with other medications.

### Lifestyle and diet

Reducing animal fat in the diet reduces LDL cholesterol levels. All meat should be lean (without visible fat) and portions should not be large. An appropriate portion should be no bigger than the palm of your hand and about 12- 15 mm thick, weighing about 100 grams.

Eating fish twice a week is also beneficial as it is low in cholesterol and saturated fat. Also, it has the added benefits of omega-3 (fish oil) levels.

Some foods high in animal fat like

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commercial pastries, sausages and salami should be avoided. Reduced fat milk (skim or semiskimmed) and low-fat cream should replace their full-fat relatives. Butter should give way to polyunsaturated or monounsaturated spreads/ margarine.

Additionally, there are now spreads made from plant sterols that may help reduce cholesterol absorption if eaten in sufficient amounts.

Egg yolks should be restricted as one egg yolk alone contains the near-maximum daily allowance. Egg whites contain no cholesterol and are a good source of protein; they can safely be eaten as required.

Increasing fruit and vegetables in the diet, along with fibre and legumes (beans) is a good idea, and a handful of nuts each day can also contribute to a healthier cholesterol level. However, go easy on the nuts because they are relatively high in calories and too many will not be good for the weight.

**There are two main things you can do to help lower your cholesterol in addition to reducing fat in your diet.**

- Stop smoking. Smoking lowers the 'good' HDL cholesterol levels.
- Take up some form of moderate exercise. This provides the dual benefits of aerobic fitness as well as aiding weight reduction. The ideal is 30 minutes of physical activity every day, at the level where you can just carry on a conversation. Lower levels of exercise such as walking can also be of benefit.

### Support and resources

- For additional resources visit Heart Foundation [www.heartfoundation.org.au](http://www.heartfoundation.org.au).