

# CHOLESTEROL

## What is Cholesterol?

Cholesterol is a fatty substance (lipid), which is essential to healthy life.

It is found in the brain, nervous tissue, skin and adrenal glands.

It has three main functions within the body.

- It is used in the structure of all cell membranes.
- It is used to manufacture steroid hormones and vitamin D within the body.
- It is used to produce bile acids which aid the digestion and absorption of fats in the diet.

Cholesterol is manufactured mainly in the liver but it is also present in saturated fats found in meat and dairy products and many processed foods. Excess saturated fat in the diet increases blood cholesterol.

## How is cholesterol transported and removed?

Lipoproteins are used to transport cholesterol from the liver around the body to where it is needed. Cholesterol is removed by the body in the form of waste bile salts and is excreted in bowel movements.

## Triglycerides

Triglycerides are another fatty substance in the body that lipoproteins have a part to play in. They make up about 90% of fat in the body and are designed to store energy.

## Lipoproteins

There are four main groups of lipoproteins; each has a different function in the transport and storage of cholesterol and triglycerides.

Measuring the amounts of these lipoproteins can give an indicator of how much fat is being carried in the blood stream that may be harmful. LDL cholesterol carries the most cholesterol and is considered 'bad cholesterol' when levels are high. HDL is the 'good cholesterol' because it carries surplus cholesterol away.

In this factsheet we are looking at cholesterol in terms of risk of heart disease and stroke.

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Lipoprotein	Function	Recommended level
Chylomicrons	Transport triglycerides from the intestine to tissues.	Triglyceride level should be less than 1.5
VLDL (very low density lipoproteins)	Transport triglycerides from the liver to fat and muscle.	
LDL (low density lipoproteins) 'Bad cholesterol'	Transport cholesterol from the liver to tissues.	LDL level should be below 3.0mmol/l
HDL (high density lipoproteins) 'Good cholesterol'	Transport surplus cholesterol from tissues back to the liver to be recycled or excreted.	Your HDL level should be above 1.0mmol/l

### Why is too much cholesterol harmful?

If there is too much cholesterol in the blood stream it can build up in the walls of your blood vessels like lime-scale furring up a water pipe narrowing the flow. It can also interfere with clotting mechanisms and allow a clot to develop within the blood vessels.

However all risk factors have to be looked at together and not in isolation. When there are other risk factors such as smoking, obesity and age, then a high LDL cholesterol level will multiply the overall risk not just add to it. Most doctors now use risk assessment charts to help identify your risk in terms of how likely you are to develop heart or stroke problems in the future.

### Who needs to have their cholesterol checked?

As well as the other risk factors mentioned, your doctor may also need to know your cholesterol:

- If you have evidence of heart disease or stroke
- If you have a family history of high cholesterol
- If you are a diabetic
- If you have high blood pressure
- If you have a family history of heart disease

In such cases it is recommended that Total cholesterol should be below 4.0 and LDL less than 2.0

### Cholesterol test

An initial blood test will give a 'total cholesterol' level. This will tell your doctor whether s/he needs to know about your cholesterol levels in more detail. As mentioned before this will depend on what if any other risk factors you may have. The table below gives an idea of risk in relation to total cholesterol level results.

Total Cholesterol Level	Risk of heart disease (Without other risk factors)
3.4 - 4.9 mmol/l	Acceptable /Low Risk
5.0 - 5.9 mmol/l	Some Risk
6.0 - 6.9 mmol/l	Moderate Risk
above 7 mmol/l	High Risk

### What is a lipid profile?

Your doctor may decide that you need a further blood test called a lipid profile, if for example you are in the moderate to high risk range.. A ‘fasting’ blood sample is taken after an overnight fast of 12 hours or so. This is because any recent intake of food or drink can have an effect on the results. A lipid profile provides a detailed breakdown of the different lipoproteins in your blood. These results have to be compared against each other to provide a more accurate picture of what is going on and to assess each individual’s risk.

### What is a Total cholesterol/HDL ratio?

A good HDL level or a bad LDL level is not usually enough information on its own. A comparison of total cholesterol and HDL can give a more accurate indicator of risk. This is called the Total cholesterol / HDL Ratio. Generally a figure greater than 4.5 indicates increasing risk. See examples below to illustrate how this works.

Total cholesterol/HDL ratio	> 4.5 indicates increasing risk
A high risk total cholesterol of 8.3 divided by a poor HDL of 0.9	$8.3 \div 0.9 = 9.2$
A high risk total cholesterol of 8.3 divided by a good HDL cholesterol of 1.3	$8.3 \div 1.3 = 6.38$
A lower risk total cholesterol of 5 divided by a poor HDL of 0.9	$5 \div 0.9 = 5.56$
A lower risk total cholesterol of 5 divided by a good HDL cholesterol of 1.3	$5 \div 1.3 = 3.85$

### What can I do to help myself?

Many people are initially advised to try and get their cholesterol down themselves over a period of time.

- Reduce your total fat – this means limiting the number of calories you take in that come from any fat.
- Replace saturated fat with poly and mono unsaturated fat – this means replacing fat from animals in meat and dairy products with oils and fish.
- Increase your fruit and vegetables to five portions a day – this increases your intake of fibre as well as A, C, and E vitamins.

- Increase your carbohydrates i.e. pasta, cereals, rice, bread – this will give you the energy you need that used to come from fat.
- If necessary, reduce your weight to the recommended level for your sex and height.
- Increase your physical activity and exercise – ideally exercising for 30 minutes 3-5 times a week.
- Limit your alcohol to recommended levels – no more than 2-3 units a day for women and no more than 3-4 units a day for men (one unit of alcohol is around half a pint of beer or lager, one pub measure of spirits, or one small glass of wine).

### **What treatment will I get?**

If after three months your cholesterol levels remain too high, your doctor may prescribe drugs called statins to lower the amount of cholesterol your body manufactures. Usually these have to be taken for life, as the body reverts back to overproducing cholesterol when they are stopped. Your doctor will monitor long term treatment with statins with blood tests and discuss possible side effects and any possible interactions such as avoiding grapefruit when taking Simvastatin. Patient UK has a very useful factsheet on Statins -see below.

### **High risk groups**

For people who already have heart disease, have had a stroke or have diabetes, lowering the cholesterol **even when it is not high** with diet and drugs can help to prevent further problems. In some cases it is recommended that along with lifestyle changes and blood pressure control, the total cholesterol should be reduced to below 4.

### **Genetic influence**

Some people have a consistently very high concentration of cholesterol in their blood stream because the cholesterol is not cleared properly from the blood stream. As this problem has a tendency to run in families it is sometimes called familial hyperlipidaemia or familial hypercholesterolaemia, however it is quite rare in the general population. Further support and advice is available from Heart UK, the result of a merger between The Family Heart Association and the British Hyperlipidaemia Association.

#### **Useful contact details:**

Heart UK  
7 North Road, Maidenhead  
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Tel; 01628 628 638  
Fax: 01628 628 698  
Email: ask@heartuk.org.uk  
Website: www.heartuk.org.uk

Patient UK  
For more information about taking  
statins see their factsheet  
'Statins (cholesterol lowering  
medicine)' on their website.  
www.patient.co.uk

If you would like to speak to one of our nurses in confidence,  
please call the Chest, Heart and Stroke Scotland Advice Line  
*Monday - Friday 9.30am - 12.30 and 1.30pm - 4.00pm*

**0845 077 6000**