Providing expert support, education and influence

Understanding cholesterol

HEART UK
THE CHOLESTEROL CHARITY

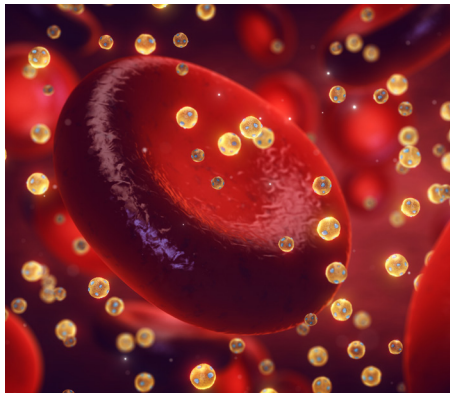
Lowering Cholesterol, Saving Lives

www.heartuk.org.uk

What is cholesterol?

Cholesterol is a blood fat which is vital for good health. It's needed to form cell membranes, to make Vitamin D and various hormones, and to make bile for digestion. We get some cholesterol from our diet but most is made in the liver.

Cholesterol and other blood fats, also known as lipids, are carried around the body in the blood. They can't travel loosely in the blood so they're packaged into tiny round parcels called lipoproteins – 'lipo' means fat and 'proteins' simply means proteins. There are two main lipoproteins:



Low density lipoprotein (LDL)

LDL carries cholesterol from the liver, where it's made, to cells around the body. It is the main carrier of cholesterol but when there is too much in the blood this can lead to a build-up of cholesterol in the artery walls, causing them to narrow. Over time, this can cause problems such as heart disease and stroke. This is why LDL cholesterol is sometimes called "bad cholesterol".

High density lipoprotein (HDL)

HDL cholesterol carries excess cholesterol away from the cells and artery walls back to the liver to be broken down and removed from the body or recycled. This is why it's often referred to as "good cholesterol" or the "protective particle".

What causes higher cholesterol?

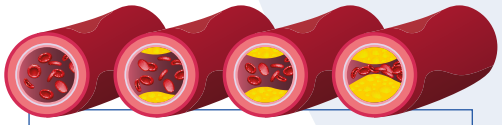
Anyone can have a higher cholesterol level, even if you are slim, eat well, and are physically active. Most people don't have any signs or symptoms of high cholesterol. A number of things can affect your cholesterol levels including your age, family history, your lifestyle, some medications and medical conditions, and your genes.

You are more likely to have unhealthy levels of cholesterol if:

- you have close family members with high cholesterol
- you have an unhealthy diet and lifestyle, including a diet high in saturated fat
- you drink more alcohol than recommended
- you smoke
- you are overweight or carry too much weight around your middle

Inherited (genetic) conditions such as familial hypercholesterolaemia (FH for short) can cause very high cholesterol, even if you have a healthy diet and lifestyle.

Medical conditions such as an underactive thyroid gland can raise cholesterol levels, but your cholesterol should return to your normal level within a few months of treatment.



cholesterol can build up causing arteries to narrow

Why should I lower my cholesterol?

Having too much cholesterol in your blood is known as a "risk factor" and it can raise your risk of diseases of the heart and blood vessels, known as cardiovascular disease (or CVD). These include:

Narrowing of the arteries – this is when arteries become furred up and may harden, usually over many years. As a result, less blood can flow through them. The medical name for this is atherosclerosis.

Coronary heart disease (CHD) – where the coronary arteries supplying the heart have become narrowed which may affect the blood flow. The most common type of heart disease.

Angina – chest pain caused by narrowed arteries which mean the heart can't get enough blood. This can be "stable" or "unstable".

Acute coronary syndrome – this includes unstable angina and heart attacks, which are both medical emergencies.

A heart attack – an artery supplying the heart becomes completely blocked, often by a blood clot, cutting off the blood supply.

A TIA or mini stroke – these are similar to a stroke but the effects usually wear off within 24 hours. They are a warning sign that you are at risk of a stroke.

A stroke – a medical emergency. When an artery in or leading to the brain becomes blocked, cutting off the blood supply.

Peripheral arterial disease (PAD) – when arteries leading to the legs and feet become blocked or narrowed, so not enough blood can reach them. This disease is closely associated with smoking.

Vascular Dementia – where there is a reduced blood supply to the brain which can cause problems with memory, thinking and talking. It can also lead to strokes and mini strokes.

What can raise your risk of developing cardiovascular disease (CVD)?

A number of things can mean you're more likely to develop CVD as you get older. Along with raised cholesterol and triglycerides (see page 4), these are known as 'risk factors' and they can be described as modifiable (risk factors that can be changed) and non-modifiable (risk factors that cannot be changed).

Examples of modifiable risk factors – things that can be changed:

- smoking
- sedentary lifestyle/lack of exercise
- unhealthy diet
- being overweight or carrying fat around your middle
- high blood pressure

Examples of non-modifiable risk factors – things that can't be changed):

- age
- gender
- family history of early CVD
- ethnicity

Why am I being advised to lower my cholesterol?

Your healthcare professional may have advised you to lower your cholesterol because:

- Your risk of CVD over the next 10 years is moderate or high (above 10%), and/or your lifetime risk is high.
- A blood test has shown you have too much LDL cholesterol.
- You may have an inherited cholesterol condition, such as FH, and your risk of early heart disease or heart attack is high if left untreated. This is known as "premature" heart disease (below age 60).

What are triglycerides?

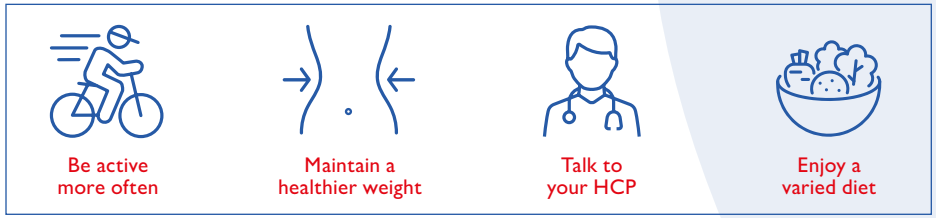
Triglycerides are another important blood fat that are essential for health and should be measured alongside cholesterol. We get some triglycerides from food but, like cholesterol, most are made by the liver.

After a meal, triglycerides are carried around the body by lipoproteins made in the small intestine, known as chylomicrons. The triglycerides are either used for energy or stored for later. When we are not eating, or we need more energy, the liver can make its own supply of triglycerides which are carried by another lipoprotein known as VLDL (very low-density lipoprotein). These carry a lot of triglycerides and a small amount of cholesterol.

There can be many reasons for a higher level of triglycerides which include:

- An unhealthy diet and lifestyle, such as with diets high in saturated fats and added sugars, alcohol, and lack of exercise.
- Medical conditions such as type 2 diabetes, kidney disease, and non-alcoholic fatty liver disease.
- Some medications.

Improve your cholesterol levels and triglyceride levels



Here are some things you could do:

- Enjoy a varied diet with plenty of plant foods such as fruits, vegetables, wholegrains and healthy sources of protein such as low fat dairy foods, beans, peas and fish.
- Swap foods high in saturated fats for those with more heart healthy fats (see the table on the next page).
- Replace refined carbohydrates such as white bread, pasta, rice, flour and breakfast cereals with their wholemeal or wholegrain equivalents.
- Choose heart-healthy foods such as oats and nuts.

Healthy swaps

Try swapping this...	...for this
Butter, ghee, lard, coconut oil and palm oil.	Oils made from vegetables and seeds such as olive, rapeseed, and sunflower oil, and fat spreads made from these.
White bread, pasta and rice.	Wholegrain breads, brown pasta and brown rice.
Cornflakes and sugar-coated cereals.	Bran flakes, malted wheats, porridge, oat-based cereals, wheat biscuits and unsweetened muesli.
Sweet and chocolate biscuits, cakes, buns and chocolate.	Oatcakes, rich tea, plain digestives, hot cross buns or currant buns.
Crisps.	Unsalted nuts, dried and fresh fruit, and plain unsalted/ unsweetened popcorn.
Pastry, sausage rolls and savoury pies.	Potato topped pies.
Sausages, burgers and fatty meat.	Beans, lentils, peas, nuts, soya, fish, chicken or turkey with skin removed or small quantities of lean meat.
Full fat dairy foods (cheese, milk, yogurts and cream), and coconut yogurts and drinks.	Reduced fat dairy foods and fortified plant-based dairy alternatives, including soya.

What else can I do to reduce my risk?

- take regular physical activity – at least 150 minutes of moderate activity each week. Brisk walking is ideal.
- stop smoking, visit nhs.net/quitsmoking for support.
- have your blood pressure checked regularly.
- if you have diabetes, keep it under good control.
- make your GP aware of any family history of early heart disease.
- keep alcohol to the recommended limits.
- aim for a healthy BMI.

If you are carrying excess weight, losing just 10% of your body weight can help you to improve your blood fats and lower your blood pressure and your risk of diabetes. Being active, keeping an eye on your portion sizes, and cutting down on foods high in sugar and saturated fats can all help.

Aim for a healthy BMI

You can work out your BMI using your weight and height to give you an idea of whether you are a healthy weight.

The BMI ranges are: underweight, healthy weight, overweight, obese and severely obese. The healthy range is between 18.5 and 24.9 for most adults.

Some ethnic groups have a higher risk of illness at a lower weight and need to use a lower BMI range, including people from an Asian, Chinese, Middle Eastern, Black African or African-Caribbean family background.

To work out your BMI, visit **www.nhs.uk/health-assessment-tools/calculate-your-body-mass-index/**

Aim for a healthy waist measurement:

Current guidelines now recommend using the waist to height ratio to find out how much fat is stored around your belly. To work out your waist to height ratio visit **https://www.nhs.uk/health-assessment-tools/calculate-your-waist-to-height-ratio**

Your cholesterol and triglyceride blood test

Your healthcare professional can check the amount of cholesterol and triglycerides in your blood with a blood test. This will involve taking a sample of blood from your arm and sending it to a laboratory or taking a small amount of blood from your finger and checking this with a desk analyser.

You don't need to fast for a routine test, but in some cases your healthcare professional might ask you to fast for 12-14 hours beforehand.

Your results should include:

- **Total cholesterol** this is your overall level of cholesterol (HDL added to non-HDL cholesterol)
- **HDL cholesterol.**
- **Non-HDL cholesterol** (total cholesterol minus HDL cholesterol). This is the sum of all the "bad" cholesterol
- **LDL cholesterol** this makes up most of the non-HDL cholesterol. It's not directly measured but is calculated by the laboratory.
- **Triglycerides.**
- **The total cholesterol: HDL cholesterol ratio** this is only needed in risk assessment tools to calculate someone's risk of CVD (see page 8)

What should my levels be ?

In the UK, cholesterol and triglycerides are measured in millimoles per litre (mmol/L). Use these recommendations as a guide only, for adults who don't have existing CVD, and who are seen as very low risk of developing CVD.

Cholesterol levels – healthy adults should aim for:

- Total cholesterol below 5mmol/L
- Non-HDL cholesterol below 4mmol/L
- LDL cholesterol below 3mmol/L
- HDL cholesterol above 1mmol/L for men or above 1.2mmol/L for women

Triglyceride levels – healthy adults should aim for:

- Fasting triglyceride level below 1.7mmol/L
- Non-fasting triglyceride below 2.0mmol/L

Cardiovascular risk assessment

Cholesterol and triglycerides are not the only risk factors which contribute to developing CVD. If you have other risk factors, your healthcare professional might advise you to reduce your levels further to lower your overall risk.

If you don't have CVD or health conditions that mean you're at high risk of developing it, you should have a cardiovascular risk assessment. This uses a risk assessment tool called QRISK which works out your risk of developing CVD over the next 10 years, based on all your risk factors (both modifiable and non-modifiable).

Healthcare professionals can also carry out a lifetime risk assessment which works out your risk of CVD over a longer time. Your healthcare professional should explain what the results mean to you.

If you have CVD (such as heart disease or stroke) or you are seen at higher risk, your healthcare professional will talk to you about a target cholesterol level that's individual to you, based on national guidelines.

Record your results here

Date of test		
Fasting test	◯ Yes ◯ No	
Total cholesterol		mmol/L
HDL cholesterol		mmol/L
Non-HDL cholesterol		mmol/L
TC:HDL-C ratio		
Triglyceride		mmol/L
LDL cholesterol		mmol/L

What about those at higher risk?

As well as following a healthy diet and lifestyle, your healthcare professional may advise you to take medication to help reduce your cholesterol and triglyceride levels.

If you have problems taking medications or you need further help to lower your cholesterol or triglycerides, you may be referred to a lipid clinic to see a specialist in treating people with raised blood fats.

Medicines for lowering cholesterol

Various medicines can be used to lower cholesterol, and different treatments will be suitable for different people.

Statins – the first choice of medication to help lower cholesterol and triglycerides, and CVD risk. They slow down cholesterol production in the liver by blocking the action of an enzyme. The liver then removes more LDL cholesterol from the blood, and cholesterol levels fall. The most commonly used statins are atorvastatin and rosuvastatin. Statins are generally safe and well tolerated.

Ezetimibe – a cholesterol absorption inhibitor which partially blocks the absorption of cholesterol in the small intestine. It can be given alongside a statin if you need to lower your cholesterol further, or on its own if you have problems taking statins.

Bempedoic acid – works in a similar way to a statin but on a different pathway in the liver. It is usually given alongside ezetimibe for those who may have problems taking statins.

PCSK9 inhibitors – an injection that's given once or twice a month to block a protein called PCSK9. It can lower LDL cholesterol by around 50% or more. These medications are available for people with FH and CVD depending on their LDL cholesterol level.

Inclisiran – an injection which blocks the production of the PCSK9 protein. After the first two doses, it's only needed once every 6 months. It can be prescribed for those who have CVD (England) and those who have CVD/FH (Scotland and Wales).

Icosapent ethyl – a pure fish oil (EPA) which can be prescribed for those who have CVD and a higher level of triglycerides.

Find out more at
www.heartuk.org.uk/getting-treatment

Your stories

HEART UK - The Cholesterol Charity - is the only UK charity providing expert support, education and influence for people with raised cholesterol and other blood fats. Here are some of the people and families we have helped:

Gurcharan's story

The impact of a blocked artery

"A CT scan revealed I had a 99% blockage in my left artery. A stent saved my life. I was so scared having a heart condition and Covid made it ten times worse. HEART UK's helpline and information have been a lifeline, helping me understand my condition and rethink my lifestyle."

Susie's story

The impact of lifestyle-induced high cholesterol

"A routine blood test for my kidneys picked up that I had high cholesterol. I was terrified I was heading for a heart attack or stroke. I was determined to lower my cholesterol via lifestyle changes. HEART UK's information and resources are my bible as they have helped me to change my life."

Rebecca's story

The impact of familial hypercholesterolaemia (FH)

"My son Harrison was diagnosed with FH at 18 months through a heel prick test. Two of our 3 children have inherited our faulty gene and are now on statins to manage their cholesterol. Had we not tested, they could have been at unknown risk of an early cardiac event. Our family's story is sadly too unique to identifying FH in young children. HEART UK's advocacy for child-parent screening is literally lifesaving".

Help us to help others...

If you would like to make a donation towards our work please see how to donate overleaf.

HEART UK – actively supported by gifts in wills and donations

Where can I find out more?

Our range of materials include our Healthy Eating Guide, Blood Fats Explained and Familial Hypercholesterolaemia booklets. There are web pages on a range of topics on our website including foods that help lower cholesterol, healthy oils and fats and handy tips for eating out.

General enquiries

hello@heartuk.org.uk

Literature orders

literature@heartuk.org.uk

Email or call our Cholesterol Helpline

ask@heartuk.org.uk
0345 450 5988

Will you help the next person needing support?

HEART UK relies on donations and gifts in wills to provide the information you are reading today.

Please help the next person in need of support by making a donation today via www.heartuk.org.uk

Raise funds

There are many ways you can raise funds for HEART UK. Visit our website for more information.

National Cholesterol Month

October is National Cholesterol Month - a whole month devoted to raising awareness and funds for HEART UK.

Visit our website

You can find out more on our website at www.heartuk.org.uk

Check out our frequently asked questions, recipe ideas, what your cholesterol and triglyceride numbers mean and sign up to our free monthly e-newsletter for more facts and tips to help you.

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Lowering Cholesterol, Saving Lives

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