

Patient information from the BMJ Group

High cholesterol

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High cholesterol

Too much bad cholesterol in your blood increases your risk of some serious health problems. If you have high cholesterol, you are more likely to have a heart attack or a stroke. But there are things you can do to reduce your cholesterol.

We've brought together the best research about high cholesterol and weighed up the evidence about how to treat it. You can use our information to talk to your doctor and decide which treatments are best for you.

What is high cholesterol?

The term high cholesterol is a bit misleading, because there are two types of cholesterol. If you've been told you have high cholesterol, it usually means you have more of the bad type and less of the good type. This may put you at higher risk of having a heart attack or a stroke.

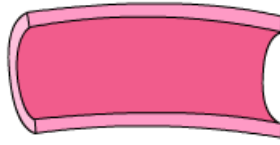
You won't notice if you have too much bad cholesterol, because you won't have any symptoms. The only way you can find out is to have a blood test.

Key points for people with high cholesterol

- There are two main kinds of cholesterol: good cholesterol (HDL cholesterol) and bad cholesterol (LDL cholesterol). Your doctor may also talk about total cholesterol and triglycerides.
- Eating lots of saturated fats and trans fats can increase the amount of bad cholesterol in your blood. Saturated fats are found in foods such as meat, butter, and cream. Trans fats are found in biscuits, cakes, pastries, and fast food.
- Too much bad cholesterol won't cause any symptoms, but it can increase your risk of having a heart attack or a stroke.
- You can lower your levels of bad cholesterol by changing what you eat, taking medicines, or both. This will lower your risk of having a heart attack or a stroke.
- If you smoke, stopping smoking can increase the amount of good cholesterol in your blood, which can lower your risk of having a heart attack or a stroke.

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What is cholesterol?



The blood flow becomes blocked as plaques build up in blood vessels.

Cholesterol is a fatty substance that is found in every cell in your body. Only a small amount of the cholesterol in your body comes directly from food. Most is made in your liver from saturated fats that you eat.

We've all started to think that fats are bad for us, but the body needs some fats to work properly. For example, fats in food are a source of energy and some vitamins.

Types of fat

There are several different types of fat in the food we eat.

Saturated fats are found in meat, pies, sausages, butter, and other dairy products. Your liver turns saturated fats into cholesterol. So, if you want to lower your cholesterol, you need to eat less saturated fat.

Unsaturated fats are divided into **polyunsaturated** and **monounsaturated**. They are found in vegetable oils such as sunflower oil, corn oil, and olive oil.

Omega-3 fatty acids are a type of polyunsaturated fat. These fats are found mainly in oily fish such as mackerel, salmon, sardines, herring, and fresh (but not tinned) tuna. They can help make your blood less sticky and reduce the chances of a clot forming. So they may protect against a heart attack. Other 'good' unsaturated fats are found in leafy green vegetables, vegetable oils, and margarine.

Trans fats are solid fats found in biscuits, cakes, pastries, and fast food. Scientists think that your body deals with these fats in the same way as saturated fats. So, if you want to lower your cholesterol you should eat fewer trans fats.

You don't need to remember all these names. All you need to remember is that saturated fats and trans fats may be harmful. Eating these tends to increase the amount of bad cholesterol in your blood.

To learn more, see [A guide to fats in food](#) .

Fats in the blood are called **lipids**. Cholesterol is a lipid. All the fats you eat are changed into a type of cholesterol or another group of lipids called **triglycerides**.

For more information, see [More about cholesterol and triglycerides](#) .

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How cholesterol is carried around the body

Cholesterol can't travel around the body by itself. It has to link up with other substances in the body called **proteins** to form particles called **lipoproteins**. There are several different types of lipoproteins in your blood. The two most important are called LDL and HDL.

- **Low-density lipoprotein (LDL):** This moves cholesterol from your liver through your blood to your body's cells. LDL cholesterol is also called bad cholesterol. This is because it can build up in your blood vessels and this increases your risk of getting heart disease. The more LDL cholesterol there is in your blood, the greater your risk of getting heart disease. When doctors say you have high cholesterol, they mean you have a lot of bad (LDL) cholesterol in your blood.
- **High-density lipoprotein (HDL):** This picks up any extra cholesterol from your body and takes it back to your liver. Because it clears cholesterol from your blood, it's often called good cholesterol. The more good (HDL) cholesterol you have in your blood, the lower your risk of heart disease.

What happens if cholesterol is high?

If you have high cholesterol it means that the level of cholesterol in your blood is outside of the normal range. For example, you may have too much bad (LDL) cholesterol and not enough good (HDL) cholesterol.

If you have too much bad cholesterol in your blood it builds up to form fatty deposits or **plaques** along the inside of the blood vessels. These plaques clog up your blood vessels, making them narrower. This condition is called **atherosclerosis**. It is harder for blood to flow through narrowed blood vessels and this puts you at increased risk of heart disease.

Sometimes the plaques make the walls of the blood vessels bumpy. This can lead to blood clots forming inside the vessels. When a blood clot forms on a plaque, it can block the flow of blood to your heart or brain, and this can cause a heart attack or a stroke.

To learn more, see [What is a stroke?](#)

What types of fats do I need to watch out for?

The types of fats that you have to worry about the most are saturated fats and trans fats. These are the solid fats found in meat and meat products (such as pies and sausages), and in dairy products (such as butter, hard cheese, milk, and cream). If you eat too much of this type of fat, the amount of bad (or LDL) cholesterol in your blood rises. ^[1]

High cholesterol: why me?

Some people are more likely to get high cholesterol than others. The things that increase your chances of getting a condition are called risk factors. You can control some of the

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risk factors for high cholesterol, such as your diet, but you can't control others, such as your family history.

These are some of the things that can affect your chances of getting high cholesterol:

- **What you eat:** Eating a lot of saturated fats and trans fats is likely to increase the amount of cholesterol in your blood.^[2] Researchers aren't sure how this happens.^[1] Trans fats are found in hard margarine and have the same effect on your body as saturated fats. For more information, see [A guide to fats in food](#) . There is some evidence that eating a low glycaemic index (low GI) diet can lower your cholesterol. With a low GI diet, you avoid foods that contain a lot of sugar or starch, such as white bread, biscuits, and potatoes.^[3]
- **Your genes:** Some people seem to be able to eat lots of fatty food without getting abnormal levels of lipids in their blood. But other people have to be very careful about what they eat. This difference may be caused by differences in their genes (the basic material in all cells that controls how cells grow and behave). Differences in genes may affect how much cholesterol your body makes and how it handles the fat in the food you eat.
- **Lack of exercise:** Not getting regular exercise can increase triglycerides and reduce good cholesterol. For more information, see [More about cholesterol and triglycerides](#) . Regular exercise can reduce the amount of bad (LDL) cholesterol in your blood and increase the amount of good (HDL) cholesterol.^[4]
- **Being overweight:** Putting on weight can have the same effect on cholesterol as not exercising.
- **Getting older:** Cholesterol tends to rise as we get older.
- **Your ethnic origin:** Men and women from Bangladesh and Pakistan often have low levels of good (HDL) cholesterol.^[5] This can increase the risk of heart disease. Black Caribbean men and women often have higher levels of good (HDL) cholesterol.^[5]
- **Drinking alcohol to excess:** Drinking a lot of alcohol on a regular basis can increase your cholesterol and triglycerides.
- **Severe lipid disorders:** Some lipid disorders are inherited, which means that faulty genes are inherited from one or both parents. People with one of these disorders have high levels of lipids and are more likely to have heart or circulation problems, even when they are quite young. These types of lipid disorders are rare. To learn more, see [Inherited lipid disorders](#) .

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Other risk factors for heart disease

When doctors talk about risk factors for heart disease, they are talking about the things that increase your chances of having a heart attack or a stroke. Having a high level of bad cholesterol is not the only risk factor for heart disease. Other things count too, especially your age, your blood pressure, whether or not you have diabetes, and whether or not you smoke. Your doctor will consider these before deciding whether you should have a cholesterol test and whether you need treatment.

For example, if your level of bad (LDL) cholesterol is slightly high, but you have no other risk factors for heart disease your doctor will probably not worry too much. Your doctor may give you some advice about your diet and check your cholesterol again after a few months. But you probably won't need drug treatment.

On the other hand, if you have low levels of good (HDL) cholesterol and high levels of bad (LDL) cholesterol, as well as **high blood pressure** and **diabetes**, then your doctor may consider drug treatment.

Many people who have too much bad cholesterol in their blood also have too much triglyceride in their blood. Triglycerides are another type of fat in the blood. High levels of triglycerides can be harmful. But it's not clear how triglycerides might cause heart disease.

Most doctors now agree that there is more and more evidence that having a lot of triglycerides in your blood raises your chance of getting narrowing of the arteries (atherosclerosis) and heart disease. ^{[6] [7] [8] [9] [10]}

What are the symptoms of high cholesterol and other lipid disorders?

If you have high cholesterol you usually won't know about it until you have a blood test. In most cases you won't have any symptoms: high cholesterol or high triglyceride levels are not something you can see or feel.

The only time you can see a lipid disorder (a disorder of fat in the blood) is if the amount of cholesterol in your blood is so high that it collects in small yellow bulges or lumps under your skin.

About three-quarters of people with **familial hypercholesterolaemia** (an inherited lipid disorder that gives you high levels of total cholesterol) get fatty bulges, called xanthomas, usually around their knuckles and ankles. ^[11] They may also appear on your elbows and buttocks. In many cases of familial hypercholesterolaemia these yellow lumps can develop on the eyelids or in clusters anywhere on your body (these are called xanthelasmas). Usually you only get these bulges if you have inherited a lipid disorder. They may not happen in younger people with the condition.

To learn more about familial hypercholesterolaemia, see [Inherited lipid disorders](#) .

You may wonder whether you should have a test to check your cholesterol. See [Should I have a cholesterol test?](#)

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How do doctors diagnose high cholesterol?

The only way to diagnose high cholesterol is to have a blood test. Doctors can't tell whether you have high cholesterol from asking about symptoms, or examining you.

You may be offered a cholesterol test as part of a general check on your health. Or you may be advised to have your cholesterol checked because you have other risk factors for heart disease, such as high blood pressure, and your GP wants to know what kind of treatment you need. All that's needed is a simple blood test.

When doctors take a blood sample to check your cholesterol level they don't just measure the total amount of cholesterol in your blood. They usually measure the different types of cholesterol in your blood and also the amount of triglycerides. This type of test is called a lipid profile. Lipids is the name for fats in your blood.

See [Should I have a cholesterol test?](#) and [More about cholesterol and triglycerides](#) .

Taking a lipid profile is only one of the things doctors do to work out your overall risk of heart disease. They also look at things like your age, your blood pressure, whether you smoke, and your family history. See [How doctors work out your risk of heart disease](#) to find out more.

How your doctor takes a lipid profile

You'll usually be asked not to eat for nine hours to 12 hours before you have a lipid profile so that all your food has had time to be digested and won't affect the test. This is because after a meal the level of triglycerides in your blood is higher than normal. This type of test is called a **fasting lipid (or lipoprotein) profile**. You'll usually have it done first thing in the morning, before you have breakfast.

All that's needed for a lipid profile is a blood sample. This can be taken from a vein either on the inside of your elbow or from the back of your hand. To take this sample, your doctor or nurse usually places a type of elastic band, called a tourniquet, around your upper arm to make it easier to collect the blood.

The doctor or nurse then inserts a needle into your vein and collects your blood in the syringe or in a small glass tube. You may feel a sharp scratch when the needle pierces your skin.

After your blood is taken, it is sent off to a laboratory where the lipids in it are measured.

The lipid profile gives you five readings, or numbers. Your doctor may call these your cholesterol numbers. The levels of lipids in your blood are measured in millimoles per litre of blood, or mmol/L for short. Cholesterol levels for the average person in the UK are relatively high. The average total cholesterol for men is about 5.5 mmol/L. For women it is about 5.6 mmol/L.

These numbers are levels of:

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- Total cholesterol (the amount of bad LDL cholesterol plus the good HDL cholesterol circulating in your blood)
- LDL cholesterol (the bad cholesterol that clogs up blood vessels)
- HDL cholesterol (the good cholesterol that picks up any extra cholesterol in your blood vessels)
- Triglycerides (bad lipids)
- Total cholesterol to HDL ratio (the proportion of your total cholesterol that is good HDL cholesterol).

Understanding your lipid profile results

If your total cholesterol is **more than 5**, your doctor may say it's too high. Generally speaking, the lower your cholesterol, the better. Your LDL (bad) cholesterol should be **below 3**.

Doctors also look at the last of these, the total cholesterol to HDL ratio, when they decide whether or not you need treatment. If your total cholesterol to HDL ratio is **6 or above**, you may need treatment. ^[14]

Blood lipids can vary from day to day so your doctor will want to do at least two test results before prescribing medicines for high cholesterol.

Your doctor uses your cholesterol numbers, along with your other possible risk factors, to work out your risk of getting heart disease. This helps your doctor choose the best treatment.

Your doctor will use statistical risk tables to see whether your risk of getting heart disease in the next 10 years is high (more than 20 percent), medium (10 percent to 20 percent), or low (less than 10 percent). ^[14]

If your risk is high, you have a more than 2 in 10 chance of having a heart attack or a stroke, or getting heart disease, during the next 10 years. Your doctor is likely to suggest you start taking a statin drug to lower your cholesterol. You are also likely to have advice about diet and exercise. ^[15]

If your risk is low or moderate, you should have it checked again in the next five years. Everyone's risk of heart disease goes up over time.

What treatments work for high cholesterol?

The aim of treating high cholesterol is to lower the amount of bad (LDL) cholesterol and triglycerides in your blood, and raise the amount of good (HDL) cholesterol. Adjusting the levels in this way reduces your risk of having a heart attack or a stroke.

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You'll have to have your blood lipids measured at least twice before any kind of treatment is started, to make sure the numbers are correct. And your doctor will also need to know whether there are any other things that increase your risk of heart disease, such as whether you have high blood pressure or whether other people in your family have heart disease. Things like these are called risk factors.

To learn whether or not you need treatment for high cholesterol, see [What will happen to me?](#)

To learn about what your test results should be when you are taking treatment for high cholesterol, see [Targets for treatment](#) .

Key points about treating high cholesterol

- All the treatments we cover here can help to bring down your cholesterol. But when researchers look at the effects of a treatment for high cholesterol they want to see if it reduces the risk of having a heart attack or a stroke. We have ranked treatments here according to how well they work to reduce your risk of having a heart attack or a stroke.
- Drugs called statins are the best way to reduce levels of bad cholesterol and reduce your risk of having a heart attack or a stroke.
- Drugs called fibrates can also help bring down your triglycerides, but they don't reduce your risk of heart disease as much as statins. They're not used much any more.
- Changing your diet, to one where you eat more fruit and vegetables and switch to healthier fats, can also help reduce bad (LDL) cholesterol and triglycerides.
- You may need a combination of approaches to bring down your cholesterol. For example, you may take a statin drug and make changes to your diet.
- People at greatest risk of heart disease benefit the most from reducing their levels of bad (LDL) cholesterol and triglycerides.

Which treatments work best?

We've carefully weighed up the research and divided the treatments into categories depending on how well they work. You can find out more about each treatment by clicking on the links below.

For help in deciding which treatment is best for you, see [How to use research to support your treatment decisions](#).

We've split them into treatments for people who already have heart disease, and treatments for people without heart disease.

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- [Treatments for people who already have heart disease](#) : This means you have high cholesterol and also a problem like angina or have had a heart attack.
- [Treatments for people without heart disease](#) : This means you have high cholesterol, but no signs that it has damaged your heart yet.

Treatment Group 1

Treatments for people who already have heart disease

Treatments that work

- [Statins](#) : These drugs lower levels of bad (LDL) cholesterol and raise levels of good (HDL) cholesterol. The commonly prescribed statins (and their brand names) are atorvastatin (Lipitor), fluvastatin (Lescol), pravastatin (Lipostat), rosuvastatin (Crestor), and simvastatin (Zocor). [More...](#)

Treatments that are likely to work

- [Fibrates](#) : These drugs lower levels of triglycerides in your blood. They're not used much any more. Some examples (with brand names) are fenofibrate (Lipantil, Supralip) and gemfibrozil (Lopid). [More...](#)
- [Mediterranean diet](#) : This diet includes plenty of vegetables and fruit, starchy carbohydrates (such as bread, pasta, and potatoes), and fish. Saturated and trans fats are replaced with olive oil or margarine made from rapeseed oil. [More...](#)
- [Eating more oily fish](#) : You can eat more oily fish or take fish oil supplements. Oily fish include mackerel and sardines. [More...](#)

Treatments that need further study

- [Low-fat diet](#) : On this diet you eat less bad fat by cutting down on butter, cream, cheese, and fatty meat. [More...](#)
- [Resins](#) : These drugs help lower bad (LDL) cholesterol levels in the blood by helping the body to use up more of it. Most of the research has been done on cholestyramine (brand names are Questran and Questran Light). These are also called bile-acid binding resins. [More...](#)
- [Niacin](#) : This is a vitamin treatment that can help to lower levels of bad (LDL) cholesterol and harmful triglycerides. Brand names include Olbetam. [More...](#)

High cholesterol

Other treatments

We haven't looked at the research on these treatments in as much detail as we've looked at the research on most of the treatments we cover. (To read more, see Our method.) But we've included some information because you may have heard of them or be interested in them.

- [Cholesterol absorption inhibitors](#) : These drugs lower bad (LDL) cholesterol levels in the blood by stopping the absorption of cholesterol in the gut. The only drug available at the moment is called ezetimibe (Ezetrol, Inegy). [More...](#)

Treatment Group 2

Treatments for people who don't have heart disease

Treatments that work

- [Statins](#) : These drugs lower levels of bad (LDL) cholesterol and raise levels of good (HDL) cholesterol. The commonly prescribed statins (and their brand names) are atorvastatin (Lipitor), fluvastatin (Lescol), pravastatin (Lipostat), rosuvastatin (Crestor), and simvastatin (Zocor). [More...](#)
- [Fibrates](#) : These drugs lower levels of triglycerides in your blood. They're not used much any more. Some examples (with brand names) are fenofibrate (Lipantil, Supralip) and gemfibrozil (Lopid). [More...](#)

Treatments that are likely to work

- [Resins](#) : These drugs help lower bad (LDL) cholesterol levels in the blood by helping the body to use up more of it. Most of the research has been done on cholestyramine (brand names are Questran and Questran Light). These are also called bile-acid binding resins. [More...](#)
- [Low-fat diet](#) : On this diet you eat less fats like butter, palm oil, cheese, and fatty meat. [More...](#)

Treatments that need further study

- [Eating more oily fish](#) : You can eat more oily fish or take fish oil supplements. Oily fish include mackerel and sardines. [More...](#)
- [Mediterranean diet](#) : This diet includes plenty of vegetables and fruit, starchy carbohydrates (such as bread, pasta, and potatoes), and fish. Saturated and trans fats are replaced with olive oil or rapeseed oil (or margarine made from these). [More...](#)

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- [Niacin](#) : This is a vitamin treatment that can help to lower levels of bad (LDL) cholesterol and harmful triglycerides. Brand names include Olbetam. [More...](#)

Other treatments

We haven't looked at the research on this treatment in as much detail as we've looked at the research on most of the treatments we cover. (To read more, see Our method.) But we've included some information because you may have heard of it or be interested in it.

- [Cholesterol absorption inhibitors](#) : These drugs lower bad (LDL) cholesterol levels in the blood by stopping the absorption of cholesterol in the gut. The only drug available at the moment is called ezetimibe (Ezetrol, Inegy). [More...](#)

What will happen to me?

There is good evidence that if you have high cholesterol or another lipid disorder you have a greater chance of getting heart disease. This is because your risk of getting atherosclerosis (where the arteries become narrow) is also increased.

If you have **atherosclerosis** , fatty deposits can build up inside your blood vessels, which increases your risk of having a heart attack or a **stroke** . The more bad cholesterol (LDL cholesterol) you have in your blood and the less good cholesterol (HDL cholesterol) you have, the higher your risk. ^[2] ^[16]

Many things besides the level of lipids in your blood affect whether or not you get heart disease. For example, having high blood pressure, smoking, being overweight, and not exercising can all increase your risk of getting heart disease. These are called [risk factors](#)

When your doctor decides whether you should be treated for high cholesterol, he or she also looks at what other risk factors you have. Only when all these things have been considered can he or she estimate whether your chances of having a heart attack or a stroke are raised and whether you need treatment.

If you have high cholesterol and already have heart disease

The people at the greatest risk of having a heart attack or a stroke are those who already have signs of heart disease. So if you have angina (a pain in your chest that you get when you exercise or do something strenuous) or if you've already had a heart attack or a stroke, your chances of having another are higher than average. You'll probably need treatment to reduce your cholesterol.

Doctors in the UK have been given guidelines on using drugs called statins to reduce cholesterol. ^[17] These guidelines say that if you already have heart disease (for example, you've had a heart attack or a stroke) then you should be treated with a drug called a statin. To learn more, see [Statins for people with heart disease](#) .

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If you have high cholesterol and don't have heart disease

If you don't already have heart disease, it's more complicated to work out whether or not you need treatment for high cholesterol. It depends on what other risk factors you have.

Here are the other risk factors that mean you have a higher chance of having a heart attack or a stroke: ^[14]

- Someone in your family had heart disease early. Early means that your father or uncle had a heart attack or died suddenly from heart disease before they were 55 or your mother or another female relative had a heart attack before they were 65
- You have **high blood pressure** (sometimes called hypertension)
- You have diabetes
- You smoke
- You are a man over 45
- You are a woman over 55
- You are a woman who had the menopause early
- Your total cholesterol to HDL ratio is 6 or more. (For more information, see [How doctors diagnose high cholesterol](#) .)
- You already have **atherosclerosis** (narrowing of the arteries).

Doctors can work out your risk of having a heart attack or a stroke in the next 10 years. They do this using the results of your cholesterol test and information about your other risk factors. Your doctor may say you have a low risk, medium risk, or high risk of heart disease. ^[18]

If you've inherited a lipid disorder

If you have **familial combined hyperlipidaemia** (the most common type of inherited lipid disorder) you are 70 percent more likely to have a heart attack than people with normal lipid levels. ^[13]

If you have **familial hypertriglyceridaemia** your risk of having a heart attack may be similar to people who have familial combined hyperlipidaemia. But in the big study that we looked at, there weren't enough families with this disorder to let us say for sure. ^[19]

You will usually be treated with drugs if you have one of these disorders.

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To learn more about the risks of heart disease in these conditions, see [Inherited lipid disorders](#) .

The good news

You can lower your risk of heart disease no matter what your age, your medical condition, or your sex, even if you have inherited a lipid disorder. You can do this by taking steps to lower the levels of harmful lipids (LDL cholesterol or triglycerides) in your blood and raise the level of good ones (HDL cholesterol).

For every 1 percent increase in good (HDL) cholesterol or 1 percent decrease in bad (LDL) cholesterol, your risk of having a heart attack or a stroke drops by 2 percent. ^[20] If your total cholesterol level lowers by 0.6 mmol/L, your risk of having a stroke is reduced by half. ^[21] This fall in cholesterol also lowers the risk of having a heart attack by one-fifth. ^[21]

See [More about cholesterol and triglycerides](#) .

Questions to ask your doctor

If you've been diagnosed with high cholesterol or a lipid disorder, you may want to talk to your doctor to find out more.

Here are some questions that you might want to ask:

- Do I need to have my cholesterol tested?
- Do I need to change my diet? If so, what should I eat? What should I avoid eating?
- Do I need to do anything else, such as exercising more?
- Do I need to lose weight?
- What's the best treatment for me?
- Do I need to take medication?
- What are the side effects of treatment?
- By how much will treatment lower my cholesterol?
- Do I need to take vitamins or any other supplements?
- What are my risk factors for heart disease?
- What treatment should I have for these risk factors?

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- What about my family? Are they at risk of having high cholesterol or another lipid disorder?
 - How can I find out if my lipid disorder is inherited?
 - If you give me medicine to lower my cholesterol, what is the target level you are aiming for?
 - Do I need to stop smoking?
-

Treatments:

Statins for people with heart disease

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[What are they?](#)

[How can they help?](#)

[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on statins for people with heart disease?](#)

This information is for people who have high cholesterol and heart disease. It tells you about statins, a treatment used to lower cholesterol. It is based on the best and most up-to-date research.

Do they work?

Yes. Taking a statin will reduce the amount of bad cholesterol in your blood. If you've had a heart attack or a stroke, a statin will reduce your chances of having another one and of dying from it. Statins seem to work better than any other drugs to treat high cholesterol.

What are they?

Statins are a group of drugs that can reduce your cholesterol level.

There are many different statins available. The main ones (with brand names) are:

- atorvastatin (Lipitor)
- fluvastatin (Lescol)
- pravastatin (Lipostat)
- rosuvastatin (Crestor)
- simvastatin (Zocor, Simzal).

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Most of these drugs need to be prescribed by a doctor. They are usually for people with a high risk of having a heart attack or a stroke.

To bring down your cholesterol, you might get moderate treatment or intensive treatment. The aim of intensive treatment is to get your bad (LDL) cholesterol level to between 1.6 to 2.2 millimoles per litre (mmol/L). The target level for moderate treatment is between 3.4 and 3.7 mmol/L.

Moderate treatment usually means taking a standard dose of a statin. For intensive treatment your doctor might prescribe a high dose of a statin on its own, or a statin together with another drug that reduces cholesterol.

You can buy a low dose (10 mg) of simvastatin over the counter at pharmacies. This type of simvastatin is for people with a moderate risk of having a heart attack or a stroke.

To find out your risk of having a heart attack or a stroke, the pharmacist will ask you to fill in a short questionnaire. If your risk is high, the pharmacist may suggest you see your doctor. This is because you may need a higher dose of statins than the over-the-counter dose.

There is also a tablet that contains simvastatin and another drug called ezetimibe. Its brand name is Inegy. Ezetimibe is a [cholesterol absorption inhibitor](#) .

How can they help?

If you already have heart disease, taking a statin can reduce your level of bad cholesterol. This can reduce your chance of having a heart attack or a stroke and of dying in the next five years by between one-quarter and one-half. ^[22] ^[23] ^[24] ^[25]

Both men and women benefit, whatever their age, and it doesn't matter what your cholesterol level is to begin with. Statins reduce the risk of heart attacks or a stroke in everyone. ^[22] But people who have already had a heart attack or stroke and who are at highest risk of having another one seem to benefit the most.

Some people may benefit from intensive treatment. This means taking a higher dose of statin, to bring your LDL cholesterol levels down to 2.2 millimoles per litre (mmol/L).

If you've had coronary artery bypass surgery (where surgeons replace a clogged artery with a healthy one, usually from inside your chest), you're less likely to need a repeat operation if you have intensive treatment. ^[26]

Intensive treatment is also likely to be better than moderate treatment to reduce your risk of having another heart attack or stroke, dying and needing hospital treatment for angina. ^[27]

How do they work?

Statins interfere with the liver's ability to make cholesterol. They also help your liver absorb more bad cholesterol from your blood.

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Statins stop the work of an enzyme that tells the liver to make more cholesterol. (An enzyme is a substance that assists a chemical reaction in the body.) Blocking this enzyme reduces the amount of bad (LDL) cholesterol that your liver makes.

Because your liver is making less cholesterol, the level of bad cholesterol in your blood starts to fall. When this happens, your liver thinks your body has a cholesterol shortage, so it absorbs more bad cholesterol from your blood. This means there is less bad cholesterol to clog up blood vessels.

The more bad cholesterol there is in your blood, the greater your risk of getting **atherosclerosis** (hardening of the arteries). If you get atherosclerosis, fatty deposits (known as plaques) build up in your blood vessels and disrupt the flow of the blood.

A heart attack happens when a blood vessel is completely blocked by a fatty deposit and blood can't get through to the heart.

Can they be harmful?

Yes, but harmful side effects are rare. And the chances of having a heart attack due to a raised blood cholesterol that is not treated or properly controlled are much greater than the risk of getting harmful side effects.

Atorvastatin and bleeding in your brain

One study has shown that, although atorvastatin protects against some types of stroke, it may increase your risk of others.^[28] Atorvastatin may be less suitable for people who are at risk of a stroke caused by bleeding in the brain (a **haemorrhagic stroke**). Make sure you tell your doctor if you've had a stroke before. Your doctor will be able to explain the risks and benefits of this treatment, and may recommend a different drug if atorvastatin isn't suitable.

Liver damage

Sometimes people taking statins get liver problems. The amount of an enzyme in the liver (called transaminase) goes up, which is a sign that the liver may not be working as well as it could. If the level rises too high (three times the normal level) then your doctor may take you off statins.

To check whether your liver is working properly your doctor may do a liver function test before you start treatment. This is a blood test. Your doctor will repeat the test in the first one month to three months of treatment and again every three months to six months after that for the first year of treatment.^[29]

Muscle pain and muscle damage

Some people who take statins get pain in their muscles, and a few actually get muscle damage, although this is rare. If you have new muscle pain after starting statins, you should tell your doctor.

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It's always hard to say who will get a side effect, and even how common it is. One research review looked at 30,000 people who took statins for more than five years. Of these, 50 people who were treated with statins and 40 who were given a placebo had high levels of the enzyme creatine kinase (a sign of muscle damage) in their blood.^[30]

Another review of nearly 20,000 people found that muscle pain was very rare.^[31] Less than 1 in 1,000 people had muscle pain. And the problem was just as likely to happen in people who took a placebo treatment as in those taking a statin.

One study from the United States has shown that Asian people who take rosuvastatin have twice as much drug in their blood as white people. This suggests that Asian people may not clear the drug from their body as quickly as other people. And they may not need such a big dose to get the same effect. In the US, doctors have been advised to start Asian people on a dose of 5 milligrams a day (5 mg/day).^[32] Asian people should not take more than 20 milligrams a day.^[29]

Muscle breakdown

Rarely, people taking statins get a serious kind of muscle damage, called rhabdomyolysis. If this happens, muscle tissue starts to break down. It breaks down into chemicals that enter your bloodstream. These chemicals are harmful to your kidneys, and can even cause your kidneys to stop working. If your kidneys stop working, your life may be in danger.

For more details see [Advice about rosuvastatin \(Crestor\)](#) .

There's also a higher risk of muscle breakdown if you take simvastatin together with another drug called amiodarone.^[33] Amiodarone is used to treat irregular heartbeats.

In the UK, there have been six suspected cases of muscle breakdown in people taking a high dose of rosuvastatin.^[34] There's no evidence that rosuvastatin is more likely to cause the problem than other statins, but doctors have been warned to be careful about giving people high doses of statins. A high dose is 40 milligrams a day or more. This dose is only recommended for people at a high risk of a heart attack or a stroke

Kidney damage

Some people who have taken statins have had kidney damage or kidney failure (when the kidneys stop working). But it's not clear whether the kidney problems are due to taking the statin or whether the people would have got kidney problems anyway.^[32] Many people who take statins are at increased risk of kidney damage because of other conditions they have, such as diabetes and high blood pressure .

If you get a fever, dark urine, vomit, or feel sick, you should see your doctor as soon as possible.^[35]

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Diabetes

Some people who take statins may be more likely to get diabetes. ^[36] This is most likely for:

- people taking high doses of atorvastatin or simvastatin
- people who are already at risk of getting diabetes.

The chance of getting diabetes from taking statins is small. Research suggests that, for every 255 people taking a statin for four years, one of them would get diabetes as a direct result of taking a statin.

Other side effects

These side effects have been reported among people taking statins, although they are not common:

- Sleep disturbances, such as insomnia and nightmares
- Short-term memory loss
- Sexual problems (such as being unable to get an erection)
- Depression
- Interstitial lung disease. This is when tissue in the lungs becomes inflamed, making it hard to breathe. If you have breathing problems while taking statins, see your doctor.

The Medicines and Healthcare Products Regulatory Agency, which monitors the safety of drugs in the UK, says patients should be warned about these possible side effects when taking any of the statins used in the UK. ^[37]

Other side effects sometimes mentioned include headaches, stomach upsets, and feeling tired. However, these symptoms are very common anyway, and we don't know for sure that they're caused by statins. ^[38]

Long-term side effects

We don't yet know if statins are harmful when taken for long periods of time. The studies done so far have lasted about six years. Since most people with high cholesterol will have to take these drugs for the rest of their lives, doctors are following people carefully to check the safety of the drugs and side effects after many years of using them.

How good is the research on statins for people with heart disease?

The evidence that statins work in people with heart disease is good. We found four summaries of the research (called [systematic reviews](#)) and one good-quality study that looked at the effects of statins in people who had heart disease. ^[40] ^[23] ^[24] ^[25] ^[41]

The summaries found that statins helped to reduce strokes and heart attacks and deaths from heart disease. ^[40] ^[23] ^[24] ^[25]

The study found that statins did not make a difference to what happened to people. ^[41] But this finding may have been due to the way the study was done. The study looked at two groups of people: some took the drug pravastatin while others had 'usual care'. But some people who were having 'usual care' may have been taking a different statin drug. So both groups may have had similar treatment.

Two good studies have compared the effects of intensive treatment involving a statin plus extra drugs if they're needed and standard treatment with statins. ^[42] ^[43] Both found that lowering cholesterol as much as possible with intensive treatment had more benefits than standard treatment.

We found one summary of the research (called a systematic review) and one good-quality study that looked at the effects of statins in different groups of people. ^[24] ^[44] The review found that statins worked well for both men and women. The study found that older people benefit more from statins than younger people, because they are more at risk of having a heart attack or a stroke.

Fibrates for people with heart disease

In this section

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[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on fibrates for people with heart disease?](#)

This information is for people who have heart disease. It tells you about fibrates, which are treatments used to lower cholesterol. It is based on the best and most up-to-date research.

Do they work?

Yes. If you have heart disease, there's a good chance that taking a fibrate drug will reduce your level of triglycerides and lower your risk of a heart attack.

But these drugs do not work as well as [statins](#). They're not used much any more.

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What are they?

Fibrates are a type of drug that mainly reduce the amount of triglycerides in your blood, but they also lower cholesterol. Besides cholesterol, triglycerides are the main group of fats (lipids) in your blood. They are formed from the fats you eat. Doctors now think that having high levels of triglycerides in your blood can increase your chance of getting heart disease.

Fibrates are now used only for people who just have very high levels of triglycerides, or for people who can't take another type of cholesterol-lowering drug, called a statin. Doctors sometimes prescribe a fibrate and a statin together. But this doesn't happen often, because you are more likely to get serious side effects if you take them together.

To find out more about triglycerides, see [What is high cholesterol?](#) and [More about cholesterol and triglycerides](#) .

If you want to know more about lipid disorders, see [Inherited lipid disorders](#) . (Fats in the blood are called lipids. Cholesterol and triglycerides are both lipids.)

The most common fibrates (and their brand names) are:

- bezafibrate (Bezalip)
- ciprofibrate (Modalim)
- fenofibrate (Lipantil, Supralip)
- gemfibrozil (Lopid).

When doctors think about treating people with high cholesterol they also look at other things that can increase a person's risk of having a heart attack or a stroke, such as their blood pressure, their age, and whether they have diabetes. So, whether you need treatment for high cholesterol will depend on several things, not just your cholesterol level. To learn more, see [What will happen to me?](#)

You shouldn't take a type of fibrate called gemfibrozil together with a statin. ^[45]

How can they help?

If you take a fibrate drug your chances of dying from a heart attack are slightly lower than if you don't take one, especially if your triglyceride level is high to begin with. ^[46] ^[47]

Taking a fibrate drug is likely to lead to: ^[46] ^[47]

- A rise in your good (HDL) cholesterol level
- A fall in your triglyceride level.

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How do they work?

Fibrates are thought to work by making an enzyme, called **lipoprotein lipase**, work harder. An enzyme is a substance that assists a chemical reaction in your body.

Lipoprotein lipase breaks down triglycerides in your blood, allowing some of them to be used for energy by your muscles, and others to be stored in the tissues under your skin for use later. If you take a fibrate drug, more of the triglycerides in your blood will be moved to other parts of your body.

If your triglyceride levels fall, your chances of having a heart attack or a stroke should fall too.

Can they be harmful?

Fibrates can cause muscle pain and damage to your muscles (known as **myopathy**), particularly if you take them with statins (another group of drugs used to treat high cholesterol). In rare cases, the breakdown of the muscle tissue can damage your kidneys as well.

- If you are taking fibrates, your doctor may perform regular checks on your blood for a substance called **creatin kinase**. Creatine kinase is found in your blood when muscles break down.
- However, muscle damage and kidney problems aren't common. In one study, only five people out of more than 3,000 had this problem. Four of these people were treated with fibrates, and the other was treated with a dummy treatment (a placebo).^[48]

You may feel mildly nauseous, have diarrhoea, or put on weight if you take a fibrate drug.

How good is the research on fibrates for people with heart disease?

There is some good evidence that fibrates can reduce your risk of dying from heart disease or having a heart attack if you already have heart disease.

We found six studies that looked at the effects of a fibrate drug in people with heart disease. Four of the studies found that fibrates reduce the risk of having a heart attack or dying from heart disease.^[47] ^[46] But two studies found that this treatment did not protect against death or heart attacks.^[47] ^[49]

We also found a large review of studies of the effects of fibrates in more than 25,000 people with high cholesterol. Large reviews like this one (called **systematic reviews**) can often give a good overview or 'big picture' of the research in a way that smaller studies can't. But this review included studies of people without heart disease and of people with diabetes, so we can't say how the results apply only to people with heart

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disease. It found that fibrates slightly reduced people's chance of having a heart attack.
[50]

Mediterranean diet for people with heart disease

In this section

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[How good is the research on a Mediterranean diet for people with heart disease?](#)

This information is for people with heart disease. It tells you about eating a healthy diet, a treatment used to lower cholesterol. It is based on the best and most up-to-date research.

Does it work?

Yes. If you have heart disease and you eat a healthy diet there's a good chance that your blood cholesterol will fall.

You are also likely to reduce your risk of having a heart attack or a stroke.

What is it?

There are lots of different things you can do to make your diet more healthy. One of the diets we know works to lower cholesterol is called the Mediterranean diet.

The Mediterranean diet is traditionally eaten by people who live around the Mediterranean in countries like Greece, Italy, and Spain. It is rich in olive oil, grains, fruits, nuts, vegetables, and fish. It is low in meat (especially red and processed meat), dairy products, and alcohol, although some red wine is usually consumed with meals.

Other things you can do to make your diet more healthy include [cutting down on fat](#) , especially saturated fats, and [eating more oily fish](#) such as mackerel and salmon. To learn more about which fats are more or less healthy, see [A guide to fats in food](#) .

How can it help?

In one good-quality study, people with heart disease who switched to the Mediterranean diet were less likely to have another heart attack or stroke, and less likely to die from heart disease. [51] The risk of having a heart attack fell by 70 percent among people who spent just more than two years on the diet.

There's less evidence about the benefits of a low-fat diet or eating more oily fish. But the research does suggest a low-fat diet can lower your cholesterol. [52] Eating more oily fish, if you've already had a heart attack, may help you live longer. But the research is unclear.

[53] [54] Read more about [oily fish for people with heart disease](#) .

How does it work?

Scientists aren't exactly sure why a Mediterranean-style diet is healthy. It may be because the main fats in this diet come from olive oil rather than from animal fats. Olive oil is healthier than the saturated fats and trans fats that are found in meat and meat products, butter, lard, cakes, biscuits, coconut oil, and palm oil. Saturated fats and trans fats can increase the amount of LDL cholesterol in the blood, which can clog the arteries and lead to high blood pressure and heart disease. So replacing saturated fats and trans fats with olive oil could help to keep the blood healthy.

Oily fish contain omega-3 fatty acids, which may help make the blood less sticky and reduce the chances of a clot forming. Nuts and seeds are also high in monounsaturated fats and polyunsaturated fats, both of which may have health benefits. Some scientists think that it's not one element of the Mediterranean diet that makes it healthy, but a combination of the foods together.

In the study we found, people used a margarine that was especially high in alpha-linolenic acid.^[51] This fat is part of the family of polyunsaturated fatty acids known as omega-3 fatty acids. It's found in walnuts, walnut oil, pumpkin seeds, canola oil, linseed oil, salmon, mackerel, and a green vegetable called purslane. In your body, alpha-linolenic acid is turned into the fats that are found in oily fish. These fats may protect you against heart disease. It is thought that they make your blood less sticky so that it is less likely to form blood clots that can block blood vessels and eventually lead to a heart attack or a stroke.

Read more about [oily fish for people with heart disease](#) .

The researchers suggest that alpha-linolenic acid may help keep your blood from forming dangerous clots. Alpha-linolenic acid may also stop the heart from beating irregularly (doctors call this an **arrhythmia**). Irregular heartbeats can sometimes cause someone to die suddenly from a heart attack.

Can it be harmful?

There is no evidence that eating a Mediterranean diet is harmful. Some people don't like the taste of fish oils, and some people get an upset stomach from fish oil capsules. But they are unlikely to be harmful.

How good is the research on a Mediterranean diet for people with heart disease?

We found one good study on the effects of a Mediterranean diet in people with heart disease.^[51] This study had to be stopped after 27 months because of the big differences between the people who ate a Mediterranean diet and those who did not. During this time, only eight people in the group who were eating the Mediterranean diet died compared with 20 people in the other group. There were 605 people in the study altogether.

Two summaries of the research into fish oils showed people with heart disease who ate more oily fish or took fish oil capsules were likely to live longer, and less likely to have a

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fatal heart attack. ^[53] ^[54] But some of the studies included in the research were not very good, so we can't rely on these summaries completely.

Low-fat diet for people with heart disease

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[How does it work?](#)

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[How good is the research on a low-fat diet for people with heart disease?](#)

This information is for people with heart disease. It tells you about eating a low-fat diet, a treatment used to lower cholesterol. It is based on the best and most up-to-date research.

Does it work?

We're not sure. Eating less fat can lower your bad cholesterol. But we don't know whether eating less fat lowers your risk of having a heart attack or a stroke . More research is needed.

What is it?

If you have high cholesterol your doctor may advise you to go on a low-fat diet. Following a low-fat diet means eating less saturated fat and less trans fat. Instead, you should eat monounsaturated or polyunsaturated fats.

To learn more about these fats and which foods you get them from, see [A guide to fats in your diet](#) .

Saturated and trans fats are found in butter, hard cheese, cream, ice cream, meat fat (lard), meat, coconut oil, and palm oil.

To eat less saturated fats and trans fats you should: ^[55]

- Eat lots of fruit and vegetables, and whole-grain and high-fibre foods
- Try to keep your overall fat intake down. Try to make sure the fats you do eat come from healthier sources, such as fish, nuts, seeds, and vegetable oils
- Limit the amount of saturated fat you eat. Saturated fat is found mostly in foods from animals, such as beef, lamb, pork, butter, cream, and cheese. All of these foods also contain dietary cholesterol
- Eat less food that contains trans fats such as hard margarine, full-fat margarine, fast food and other baked goods (doughnuts, pastries, biscuits)

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- Look for processed foods made with unhydrogenated oil, rather than partially hydrogenated or hydrogenated vegetable oils or saturated fat
- Avoid fried fast food.

How can it help?

Eating a low-fat diet can reduce your cholesterol.^[52] But we don't know whether it will reduce your risk of having a heart attack or a stroke if you already have heart disease.^[56]

However, there is research to show that a [Mediterranean-style diet](#) may help prevent a heart attack or a stroke in people with heart disease. That means eating olive or vegetable oils instead of animal fat, plenty of fruit and vegetables, and less meat.

How does it work?

Research shows that if your level of bad (LDL) cholesterol falls by 1 percent, your chance of having a heart attack or a stroke falls by 2 percent.^[20] If you eat less saturated fat, trans fat, and cholesterol, you may be able to reduce the amount of bad cholesterol that builds up in your blood.

Eating a diet that is low in saturated fats should help reduce the amount of fatty deposits that build up in your blood vessels and reduce your chance of having a heart attack or a stroke. But the research isn't clear on whether a low-fat diet actually works in this way.

A Mediterranean diet may be better.

Can it be harmful?

There's no evidence that eating a diet low in saturated fats and trans fats is harmful.

How good is the research on a low-fat diet for people with heart disease?

We didn't find any evidence that eating less fat can help reduce the risk of a heart attack or a stroke for people who already have heart disease. Most of the studies we looked at found that a low-fat diet reduced cholesterol a little bit, but didn't make it less likely that people would die from heart disease.^[52] ^[56]

Eating more oily fish for people with heart disease

In this section

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[How good is the research on eating more oily fish for people with heart disease?](#)

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This information is for people with heart disease. It tells you about eating more oily fish, which is a treatment sometimes used to reduce bad cholesterol. It's based on the best and most up-to-date research.

Does it work?

Probably. There's some evidence that eating more oily fish (or taking supplements that contain omega-3 fatty acids) can reduce your risk of dying from a heart attack. But we need more research on oily fish for people with heart disease to be sure.

What are they?

Oily fish, such as anchovies, herring, mackerel, sardines, salmon, pilchards, and trout, are rich in omega-3 polyunsaturated fatty acids. (Omega-3 fatty acids are also called n-3 fatty acids.)

There are a couple of ways to get more omega-3 fatty acids in your diet.

- One way is to eat oily fish. People who were included in studies of oily fish ate about two or three portions a week. ^[56]
- You can also get fish oils in capsules. You don't need a prescription to get these, but you should talk to your doctor if you decide to take them. In studies people took about 1 gram of fish oil in capsules each day. ^[56] You can also get a high-strength fish oil capsule on prescription. The brand name for this is Omacor. In a large study, this type of fish oil capsule reduced the chances of suddenly dying after a heart attack, even in people already taking [statins](#). ^[57] It can also be used alongside statins to lower both cholesterol and triglycerides.

Advice from the UK Foods Standards Agency, an independent government department, says adults should eat at least two portions of fish a week. One of these portions should be oily fish. ^[58]

If you're pregnant, you shouldn't eat more than two portions of oily fish a week. Also, don't eat more than two tuna steaks a week or four cans of tuna a week. This is because of the amount of mercury in tuna, which can be harmful to your baby. ^[59]

How can it help?

Eating more oily fish or taking fish oil supplements may reduce your chances of dying from a heart attack. But the studies that look at this question have had mixed results. Not all have shown a benefit. So we can't be completely sure that this works. ^[53] ^[54]

We need more studies that look at this treatment and follow patients for a long time.

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How does it work?

Oily fish contains omega-3 polyunsaturated fatty acids, and these fatty acids help in a number of different ways: ^[60]

- If you already have **atherosclerosis**, they may stop it getting worse. (Atherosclerosis is sometimes called narrowing of the arteries.)
- They make **platelets** (the cells that help blood to clot) less sticky so that you are less likely to get blood clots blocking your blood vessels
- They lower **blood pressure**
- They reduce levels of triglycerides (a type of fat in your blood that can be harmful).
- They raise the levels of good cholesterol (also called HDL cholesterol) in your blood.

Can it be harmful?

Very high doses of fish oils may increase the time it takes for you to stop bleeding if you've been cut (doctors call this bleeding time). But the studies we looked at did not find this was a problem.

There are concerns that fish oils may contain pollutants (such as mercury, dioxins, and polychlorinated biphenyls), which can be harmful. Studies in animals and people who have been exposed to large amounts of these chemicals (mainly in accidents in chemical plants) have found that they can increase the risk of cancer, nerve damage, and heart attack.

It is thought that any harm from these pollutants would only happen after many years of eating extra portions of oily fish or taking supplements. ^[61] A very large review of lots of studies found that fish oils did not increase the risk of cancer. ^[61]

The Food Standards Agency in the UK tested 100 fish oil supplements for mercury in 2004 and 2005. It found that only nine samples contained any mercury. It says that an adult would have to take 500 of these supplements a day to consume the amount of mercury that is said to be unsafe. ^[62]

How good is the research on eating more oily fish for people with heart disease?

There are three summaries of the evidence looking at this (**systematic reviews**). But these contradict each other. One review found that more oily fish cut people's chances of dying from a heart attack. ^[54] But the other summaries found no benefit. ^[53] ^[63] We need to see more good-quality, long-term studies, to be sure.

Resins for people with heart disease

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[Do they work?](#)

[What are they?](#)

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[How good is the research about resins for people with heart disease?](#)

This information is for people with heart disease. It tells you about resins, a type of treatment used to lower cholesterol. It's based on the best and most up-to-date research.

Do they work?

We're not sure. Resins have only been tested in people who don't have heart disease. In these people, they can reduce cholesterol and the risks of heart attacks and strokes. But we need more research in people who have heart disease (such as [angina](#)) or who have had a heart attack or a stroke.

But even though studies haven't yet been done in people with heart disease, many doctors think that lowering your cholesterol any way you can is good for you.

What are they?

Resins are a group of drugs that are used to treat high cholesterol and similar lipid disorders (abnormal levels of lipids in the blood). There are three resin drugs available in the UK:

- cholestyramine (brand names Questran and Questran Light)
- colesevelam (Cholestagel)
- colestipol (Colestid).

Resins come as powders or tablets that you take with a drink. You might be given a resin as well as another treatment to reduce your cholesterol.

How do they help?

Research that included people who have high cholesterol but don't have any signs of heart disease showed that one of these drugs (cholestyramine) reduces the risk of having a heart attack and of dying from a heart attack by a small amount.^[64] But this treatment has not been well studied in patients who already have heart disease.

How do they work?

Your body makes bile acids to help digest food in your bowels. Resins work by sticking to these acids. This stops your body recycling the acids to use again. You get rid of both the drug and the bile acid in your stools when you go to the toilet. Your body then has

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to make more bile acid. Cholesterol is one of the chemicals your body uses to make these acids. So, making more of these acids helps to use up the cholesterol in your body, which lowers the amount of cholesterol in your blood.

Can they be harmful?

Resins pass straight through your stomach and intestines without being absorbed by your body. This reduces the risk of side effects. However, they can cause an upset stomach or constipation. In studies looking at colesevelam, about 1 in 10 people became constipated. ^[65]

Resins can stop your body absorbing some vitamins properly. If you take a resin for a long time, your doctor may recommend a supplement containing vitamins A, D, and K. ^[29]

How good is the research about resins for people with heart disease?

There's no research about using resins to lower cholesterol for people who've already had a heart attack or stroke. One study in people at high risk of heart attack and stroke shows resins may help. ^[64]

Niacin for people with heart disease

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[How good is the research on niacin in people with heart disease?](#)

This information is for people with heart disease. It tells you about niacin, a treatment used to lower cholesterol. It's based on the best and most up-to-date research.

Does it work?

We don't know. There have been no good studies of niacin in people with heart disease.

What is it?

Niacin is a vitamin. You get vitamins from food and you need them to stay healthy. Niacin is one of the B vitamins, and we normally get it from liver, lean meat, fortified cereals, bread, and potatoes. Niacin is also called nicotinic acid.

Niacin is one of the oldest treatments for high cholesterol. But it's not used as much as it used to be because it can cause a lot of side effects, especially itching, flushing (red face), and diarrhoea.

Newer treatments for reducing cholesterol, such as [fibrates](#) and [statins](#), tend to be used instead. However, if your cholesterol is still high with one of these treatments, your

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doctor might suggest taking niacin as well. As a treatment for high cholesterol, niacin comes as pills.

Common brand names include Niacor. You can buy niacin from health food stores. But to lower cholesterol you need a much higher dose than you get in most vitamin supplements. So you should ask your doctor's advice before taking it.

How can it help?

There are no studies that show that taking niacin can help people with heart disease.

How does it work?

Niacin lowers both cholesterol and triglycerides by interfering with their production in the body. It also increases the levels of good (HDL) cholesterol. But we don't know if it works to help people with heart disease avoid heart attacks or strokes.

Can it be harmful?

Niacin can cause an abnormal heartbeat in some people who already have heart disease. ^[66] For this reason researchers advise that niacin should be used with care in people who have heart disease. Ask your doctor or pharmacist how to avoid side effects with this treatment.

How good is the research on niacin in people with heart disease?

There's no evidence that niacin helps people with heart disease.

Statins for people who don't have heart disease

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[How good is the research on statins for people who don't have heart disease?](#)

This information is for people at risk of getting heart disease. It tells you about statins, drugs that are used to lower cholesterol and reduce the risk of having a heart attack or a stroke. It is based on the best and most up-to-date research.

Do they work?

Yes. If you're at risk of getting heart disease, taking a statin will reduce your risk of having a heart attack or a stroke. But the reduction might be small. Statins make a bigger difference in people who have already had a heart attack or a stroke.

What are they?

Statins are a group of drugs that can reduce your cholesterol level.

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There are many different statins available. The main ones (with brand names) are:

- atorvastatin (Lipitor)
- fluvastatin (Lescol)
- pravastatin (Lipostat)
- rosuvastatin (Crestor)
- simvastatin (Zocor, Simzal).

When doctors think about treating people with high cholesterol, they look at all the things that can increase a person's risk of having a heart attack or a stroke, such as their blood pressure, their age, and whether they have diabetes. So whether you need treatment for high cholesterol will depend on several things, not just your cholesterol level. To learn more, see [What will happen to me?](#)

Most statins need to be prescribed by a doctor. They are usually for people with a high risk of having a [heart attack](#) or a [stroke](#).

You can buy a low dose (10 mg) of simvastatin over the counter at pharmacies. This type of simvastatin is for people with only a moderate risk of having a heart attack or a stroke.

To find out your risk of having a heart attack, the pharmacist will ask you to fill in a short questionnaire. If your risk is high, the pharmacist may suggest you see your doctor. This is because you may need a higher dose of statins than the over-the-counter dose.

If your risk of having a heart attack is moderate, the pharmacist may suggest some ways of lowering your risk, such as changing your diet, exercising, and giving up smoking. The pharmacist may also offer you over-the-counter simvastatin.

There is also a tablet that contains simvastatin and another drug called ezetimibe. Its brand name is Inegy. Ezetimibe is a [cholesterol absorption inhibitor](#).

How can they help?

Studies disagree about how helpful statins are for people who don't have heart disease or who are not at high risk of heart disease.

Statins are likely to have most benefit in people who have a moderate or high risk of heart disease.^[67] This risk depends on several things, not just your cholesterol level. To read more, see [Should I have a cholesterol test?](#)

One large summary of research that included more than 65,000 people found that statins offered little or no short-term benefit for people without heart disease.^[68] On the other hand, other equally big studies have found that statins can reduce your chances of having

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a heart attack or stroke even if you are at low risk of heart disease. But these studies found that the benefits are small, and they don't happen straight away. For example, for every 100 people taking statins for five years, one or two people would avoid a heart attack or stroke. ^[69] ^[70]

Most large studies have not found that taking statins will help people who don't already have heart disease to live longer. ^[70]

Metabolic syndrome

People who have a condition called metabolic syndrome are more likely to get heart disease than other people. Metabolic syndrome is not a disease. It is a range of risk factors, such as excess fat around your abdomen, high cholesterol, high blood pressure, and too much sugar in your blood. People who have metabolic syndrome and who take statins are less likely to have a heart attack or a stroke. ^[71]

How do they work?

Statins interfere with the liver's ability to make cholesterol. They also help your liver absorb more bad cholesterol from your blood.

Statins stop the work of an enzyme that tells the liver to make more cholesterol. (An enzyme is a substance that assists a chemical reaction in the body.) Blocking this enzyme reduces the amount of bad (LDL) cholesterol that your liver makes.

Because your liver is making less cholesterol, the level of bad cholesterol in your blood starts to fall. When this happens, your liver thinks your body has a cholesterol shortage, so it absorbs more bad cholesterol from your blood. This means there is less bad cholesterol to clog up blood vessels.

The more bad cholesterol there is in your blood, the greater your risk of getting **atherosclerosis** (hardening of the arteries). If you get atherosclerosis, fatty deposits (known as plaques) build up in your blood vessels and disrupt the flow of the blood.

If there is less bad (LDL) cholesterol in your blood, the chance that fatty plaques will build up in your blood vessels falls and so does your risk of having a heart attack. (A heart attack happens when a blood vessel is completely blocked by a fatty deposit and blood can't get through to the heart.)

Statins also lower levels of triglycerides, the other main fat (lipid) circulating in the blood. High levels of triglycerides can be harmful.

Can they be harmful?

Yes, but side effects are rare.

Atorvastatin and bleeding in your brain

One study has shown that, although atorvastatin protects against some types of stroke, it may increase your risk of others. ^[28] Atorvastatin may be less suitable for people who

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are at risk of a stroke caused by bleeding in the brain (a **haemorrhagic stroke**). Make sure you tell your doctor if you've had a stroke before. Your doctor will be able to explain the risks and benefits of this treatment, and may recommend a different drug if atorvastatin isn't suitable.

Liver damage

Sometimes people taking statins get liver problems. The amount of an enzyme in the liver (called transaminase) goes up, which is a sign that the liver may not be working as well as it could. If the level rises too high (three times the normal level) then your doctor may take you off statins.

The main job of the liver is to remove harmful chemicals (toxins) from the body. If it can't do this job very well, then harmful chemicals build up in the body and can lead to liver failure.

It's not clear whether raised enzyme levels are more common in people taking statins than in people not taking them. Studies compared people given a statin with people given an inactive treatment (a placebo). Similar numbers of people from both groups got this problem.^[30] ^[31] This suggests that the liver problem may not be related to statins.

To check whether your liver is working properly your doctor may do a liver function test before you start treatment. This is a blood test. Your doctor will repeat the test within the first three months of treatment and again every three months six months after that for the first year of treatment.^[29]

Muscle pain and muscle damage

These side effects aren't common. Some people who take statins get pain in their muscles, and a few actually get muscle damage, although this is rare. If you have new muscle pain after starting statins, you should tell your doctor.

One research review looked at 30,000 people who took statins for more than five years. Of these, 50 people who were treated with statins had signs of muscle damage (they had high levels of a chemical called creatine kinase in their blood).^[30] This compared with 40 people who were given a placebo.

Another review of nearly 20,000 people found that muscle pain was very rare.^[31] Less than 1 in 1,000 people had muscle pain. And the problem was just as likely to happen in people who took a pretend treatment as in those taking a statin.

One study from the United States has shown that Asian people who take rosuvastatin have twice as much drug in their blood as white people. This suggests that Asian people may not clear the drug from their body as quickly as other people. And they may not need such a big dose to get the same effect. In the US, doctors have been advised to start Asian people on a dose of 5 milligrams a day.^[32] And Asian people should not take more than 20 milligrams a day.^[29]

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Muscle breakdown

Rarely, people taking statins get a serious kind of muscle damage, called **rhabdomyolysis**. If this happens, muscle tissue starts to break down. It breaks down into chemicals that enter your bloodstream. These chemicals are harmful to your kidneys, and can even cause your kidneys to stop working. If your kidneys stop working, your life may be in danger.

In the UK, there have been six suspected cases of muscle breakdown in people taking a high dose of rosuvastatin. ^[34] There's no evidence that rosuvastatin is more likely to cause the problem than other statins, but doctors have been warned to be careful about giving people high doses. A high dose is 40 milligrams a day or more. This dose is only recommended for people at a high risk of a heart attack or a stroke. For more details see [Advice about rosuvastatin \(Crestor\)](#) .

There's also a higher risk of muscle breakdown if you take simvastatin together with another drug called amiodarone. ^[32] Amiodarone is used to treat irregular heartbeats.

Kidney damage

Some people who have taken statins have had kidney damage or kidney failure (when the kidneys stop working). But it's not clear whether these problems are caused by statins. ^[32] Many people who take statins are at increased risk of kidney damage because of other conditions they have, such as **diabetes** and **high blood pressure** . The FDA is keeping a close watch to see what happens to people who take statins.

If you get a fever or dark urine, vomit, or feel sick, you should see your doctor as soon as possible. ^[35]

Diabetes

Some people who take statins may be more likely to get diabetes. ^[36] This is most likely for:

- people taking high doses of atorvastatin or simvastatin
- people who are already at risk of getting diabetes.

The chance of getting diabetes from taking statins is small. Research suggests that, for every 255 people taking a statin for four years, one of them would get diabetes as a direct result of taking a statin.

Other side effects

These side effects have been reported among people taking statins, although they are not common:

- Sleep disturbances, such as insomnia and nightmares

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- Short-term memory loss
- Sexual problems (such as being unable to get an erection)
- Depression
- Interstitial lung disease. This is when tissue in the lungs becomes inflamed, making it hard to breathe. If you have breathing problems while taking statins, see your doctor.

The Medicines and Healthcare Products Regulatory Agency, which monitors the safety of drugs in the UK, says patients should be warned about these possible side effects when taking any of the statins used in the UK. ^[37]

Other side effects sometimes mentioned include headaches, stomach upsets, and feeling tired. However, these symptoms are very common anyway, and we don't know for sure that they're caused by statins. ^[38]

Long-term side effects

We don't yet know if statins are harmful when taken for long periods of time. The studies done so far have lasted about six years. Since most people with high cholesterol and other harmful lipids in their blood will have to take these drugs for the rest of their lives, doctors are following them carefully to check the safety of the drugs and side effects after many years of using them.

One group of researchers looked at five studies and found that statins may do more harm than good in people with a very low risk of heart disease. ^[67]

How good is the research on statins for people who don't have heart disease?

There has been a lot of good research into how well statins work for people who are at risk of getting heart disease but who haven't had a heart attack or a stroke. ^[68] ^[70] The fact that much of this research hasn't provided clear answers about how well statins work suggests that statins don't reduce people's chances of heart attacks and strokes by much, and that people need to take these drugs for several years for there to be any benefit. Other good-quality research into whether statins might help some people who are not at risk of heart disease found similar results. ^[69]

In one other good-quality study, researchers looked at whether statins could prevent heart attacks and strokes in more than 400 people who had a very high risk of heart disease. ^[72] These people all had albumin in their urine. Doctors call this **microalbuminuria**. it means that your kidneys are not working properly. If you have microalbuminuria, then you are more likely to get heart disease. The study found that

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statins worked no better than a dummy treatment (a [placebo](#)) to prevent heart attacks and strokes.

However, another good-quality study that looked at the results from this study found that statins did help people with a condition called **metabolic syndrome**.^[73] People with metabolic syndrome are more likely to get heart disease. These people have a range of risk factors such as excess fat around their abdomens, high cholesterol, high blood pressure, and too much sugar in their blood. The people in the study who had metabolic syndrome and who took statins were less likely to have a heart attack or a stroke.

Fibrates for people who don't have heart disease

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[Can they be harmful?](#)

[How good is the research on fibrates for people who don't have heart disease?](#)

This information is for people who are at risk of getting heart disease. It tells you about fibrate drugs, a treatment used to lower cholesterol. It is based on the best and most up-to-date research.

Do they work?

Yes. Taking a fibrate drug can reduce your chances of having a heart attack or a stroke. The only research that has been done involved people who have a moderate risk of heart disease.

To learn more about how doctors work out your risk, see [Should I have a cholesterol test?](#)

Fibrates are not used much now, because they don't work as well as [statins](#).

What are they?

Fibrates are a type of drug that mainly reduces the amount of [triglycerides](#) in your blood, but they also lower cholesterol. Triglycerides are the other main group of fats (lipids) in your blood, besides cholesterol. Doctors now think that having too much of these lipids in your blood can increase your chance of getting heart disease.

Fibrates are now used only for people who just have very high levels of triglycerides, or for people who can't take another cholesterol-lowering drug called a statin. Doctors sometimes prescribe a fibrate and a statin together. But this doesn't happen often, because you are more likely to get serious side effects if you take them together.

To find out more about triglycerides, see [More about cholesterol and triglycerides](#).

If you want to know more about lipid disorders, see [Inherited lipid disorders](#).

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The names of some of the main fibrates (and brand names) are given below:

- bezafibrate (Bezalip)
- ciprofibrate (Modalim)
- fenofibrate (Lipantil, Supralip)
- gemfibrozil (Lopid).

When doctors think about treating people with high cholesterol they also look at all the things that can increase a person's risk of having a heart attack or a stroke, such as their blood pressure, their age, and whether they have diabetes. So, whether you need treatment for high cholesterol will depend on several things, not just your cholesterol level. To learn more, see [What will happen to me?](#)

You shouldn't take a type of fibrate called gemfibrozil together with a statin. ^[45]

How can they help?

One study in people who didn't have heart disease but who were at moderate risk of having a heart attack or a stroke found that taking a fibrate drug reduced the risk of having a heart attack or a stroke. ^[74] A moderate risk of a heart attack or a stroke means there's between a 1 in 10 and 2 in 10 chance of these things happening in the next 10 years.

This study found that: ^[74]

- Nearly 3 in 100 people who took the drug gemfibrozil had a heart attack or a stroke in the next five years
- Nearly 4 in 100 people who took a dummy treatment (a placebo) had a heart attack or a stroke in the next five years.

We don't know how this group of drugs might help people at higher risk of heart attack or stroke, as no studies have been done.

How do they work?

Fibrates are thought to work by making an enzyme, called lipoprotein lipase, work harder. An enzyme is a substance that assists a chemical reaction in the body.

Lipoprotein lipase breaks down triglycerides in your blood. This means that some of them can be used to give muscles energy and some can be stored in the tissues under your skin, so they can be used later. So if you take a fibrate drug, more of the triglycerides in your blood will be moved to other parts of your body.

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The role of triglycerides in heart disease is not as clear as that of cholesterol. But there is more and more evidence that having a high level of triglycerides, even if your cholesterol levels are normal, can raise your risk of getting heart disease. ^[6] ^[7] ^[8] ^[9]

If your triglyceride levels fall, your chances of having a heart attack or a stroke should fall too.

Can they be harmful?

Fibrates can cause muscle pain and damage to your muscles, particularly when they are taken along with statins. You may hear muscle pain called **myopathy**. In rare cases, the breakdown of muscle tissue can damage your kidneys as well.

- If you are taking fibrates, your doctor may perform regular checks on your blood for a substance called **creatin kinase**. Creatin kinase is made when muscles break down.
- However, muscle damage and kidney problems aren't common. In one study, only five people out of more than 3,000 had this problem. ^[75] Four of these people were treated with a fibrate and one was treated with a dummy treatment (placebo).

You may have some symptoms of indigestion when you first start taking a fibrate drug. ^[74]

How good is the research on fibrates for people who don't have heart disease?

The evidence that fibrates reduce your risk of having a heart attack is quite good, but it is not as good as the evidence for statins .

We found one study that looked at the effects of the drug gemfibrozil over five years in more than 4,000 men who had a moderate risk of having a heart attack. ^[74] It found that fewer men who took the drug had a heart attack or a stroke compared with those who took a dummy drug (a placebo). But just as many men died in each group. Because the study involved just men we can't be certain that the drug has the same effects in women.

We also found a large review of studies of the effects of fibrates in more than 25,000 people with high cholesterol. Large reviews like this one (called systematic reviews) can often give a good overview or 'big picture' of the research in a way that smaller studies can't. But this review included studies of people with heart disease and people with diabetes, so we can't say how the results apply only to people who don't have heart disease. It found that fibrates slightly reduced people's chance of having a heart attack. ^[50]

Resins for people who don't have heart disease

High cholesterol

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[How good is the research on resins for people who don't have heart disease?](#)

This information is for people at risk of getting heart disease. It tells you about resins, a type of treatment that's used for lowering cholesterol. It's based on the best and most up-to-date research.

Do they work?

Yes, there's a good chance that taking a resin will lower your cholesterol level and your risk of having a heart attack.

These drugs are also called bile-acid binding resins.

But resins do not work as well as [statins](#) .

What are they?

Resins are a group of drugs that are used to treat high cholesterol and similar lipid disorders (abnormal levels of lipids in the blood). There are three resin drugs available in the UK:

- cholestyramine (brand names Questran and Questran Light)
- colestevlam (Cholestagel)
- colestipol (Colestid).

Resins come as powders or tablets that you take with a drink.

When doctors think about treating people with high cholesterol they also look at other things that can increase a person's risk of having a heart attack or a stroke, such as their blood pressure, their age, and whether they have diabetes. So, whether you need treatment for high cholesterol will depend on several things, not just your cholesterol level. To learn more, see [What will happen to me?](#)

How do they help?

Research that included people who have high cholesterol but don't have any signs of heart disease shows that one of these drugs (cholestyramine) reduces the risk of having a heart attack and of dying from a heart attack by a small amount.^[76]

How do they work?

Your body makes bile acids to help digest food in your bowels. Resins work by sticking to these acids. This stops your body recycling the acids to use again. You get rid of both

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the drug and the bile acid in your stools when you go to the toilet. Your body then has to make more bile acid. Cholesterol is one of the chemicals your body uses to make these acids. So, making more of these acids helps to use up the cholesterol in your body, which lowers the amount of cholesterol in your blood.

Can they be harmful?

Resins pass straight through your stomach and intestines without being absorbed by your body. This reduces the risk of side effects. However, they can cause an upset stomach or constipation. In studies looking at colestevlam, about 1 in 10 people became constipated. ^[65]

Resins can stop your body absorbing some vitamins properly. If you take a resin for a long time, your doctor may recommend a supplement containing vitamins A, D, and K. ^[29]

How good is the research on resins for people who don't have heart disease?

The evidence that a resin called cholestyramine reduces the risk of having a heart attack is quite good.

We found one study that looked at the effects of cholestyramine or a dummy pill (placebo) in nearly 4,000 men who did not have heart disease. ^[77] After seven years, more men (nearly 10 in 100) who did not take the drug treatment had a heart attack or died from heart disease compared with those who took cholestyramine (8 in 100).

Low-fat diet for people who don't have heart disease

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[How good is the research on a low-fat diet for people who don't have heart disease?](#)

This information is for people at risk of getting heart disease. It tells you about eating a healthy diet, to lower your cholesterol. It is based on the best and most up-to-date research.

Does it work?

Probably. Eating a diet low in fat , including oily fish and with plenty of fruit and vegetables, may help to reduce your cholesterol level and your chances of having a heart attack or a stroke.

High cholesterol

What is it?

If you have high cholesterol you may want to follow a low-fat diet to try to bring it down. In a low-fat diet you eat less saturated fat and less trans fat. Instead, you eat monounsaturated or polyunsaturated fats.

Saturated and trans fats are found in butter, hard cheese, cream, ice cream, meat fat (lard), meat, coconut oil, and palm oil.

To eat less saturated fats and trans fats you should: ^[55]

- Eat lots of fruit and vegetables, and whole-grain and high-fibre foods
- Try to keep your overall fat intake down. Try to make sure the fats you do eat come from healthier sources, such as fish, nuts, seeds, and vegetable oils
- Use fat-free or low-fat dairy products
- Limit the amount of saturated fat you eat. Saturated fat is found mostly in foods from animals, such as beef, lamb, pork, butter, cream, and cheese. All of these foods also contain dietary cholesterol
- Eat less food that contains trans fats such as hard margarine, full-fat margarine, fast food, and other baked goods (doughnuts, pastries, biscuits)
- Look for processed foods made with unhydrogenated oil, rather than partially-hydrogenated or hydrogenated vegetable oils or saturated fat
- Avoid fried fast food.

You can also eat more fish oil, either by eating oily fish such as mackerel, sardines, and salmon, or by taking fish oil capsules. Fish oil may help lower bad cholesterol. See [Eating more oily fish to learn more](#) .

The Mediterranean diet is also thought to be healthy for people at risk of heart attacks or strokes. This includes eating plenty of vegetables and fruit, starchy carbohydrates (such as bread, pasta, and potatoes), and fish, but little meat. Saturated and trans fats are replaced with olive oil or rapeseed oil (or margarine made from these). See [Mediterranean diet](#) to learn more.

How can it help?

Eating a low-fat diet may help to reduce your risk of having a heart attack or a stroke. ^[78] It doesn't matter what your risk of heart disease is to start with. A low-fat diet seems to offer the same protection against heart disease for everyone. But you need to follow this diet for at least two years get the benefit.

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In one study, one group of men went on a low-fat diet for five years, and another group of men did not change what they ate.^[79] After about 20 years, about 2 in 10 of the men who were on a low-fat diet had died. About 4 in 10 of the men who had not changed what they ate had died.

One big study found that people eating a Mediterranean diet seem to live longer, and be less likely to die of a heart attack.^[80] But in this study, we don't know whether people had high cholesterol to start with. So it's hard to know whether we can rely on these results. To learn more, see [Mediterranean diet](#) .

There hasn't been any research done on how fish oils affect your cholesterol if you don't already have heart disease. But we do know they help people who do have heart disease, by bringing down blood pressure and increasing their levels of good cholesterol. To learn more, see [Eating more oily fish](#) .

How does it work?

Scientists and doctors have been looking at what people eat to try to explain why heart disease is more of a problem in certain parts of the world than it is in others. For example, in Japan and Crete (Greece), heart disease is not as big a problem as it is in many other countries. This has led doctors to advise people to eat more oily fish or a more Mediterranean diet in hopes of reducing the chance that they will get heart disease.

Research shows that if your level of bad (LDL) cholesterol falls by 1 percent your chance of having a heart attack or a stroke falls by 2 percent.^[20] By reducing how much saturated fat, trans fat, and cholesterol you eat, you can reduce the amount of harmful cholesterol that builds up in your blood. This will lower your risk of having a heart attack or a stroke.

When cholesterol builds up in your blood vessels a disease called **atherosclerosis** starts to develop. (Atherosclerosis is sometimes called 'narrowing of the arteries'.) In this disease, fatty deposits build up in the blood vessels, making them harder, less flexible, and narrower. All this makes it more difficult for blood to flow through them.

Clots can develop when **platelets** (a type of cell found in your blood) become trapped in the fatty deposits. If a clot blocks a blood vessel in the heart, this results in a heart attack. If a clot blocks a blood vessel in the brain, this results in a stroke. (To find out more about strokes, see [What is a stroke?](#))

Eating a low-saturated-fat diet should help reduce the amount of fatty deposits that build up in your blood vessels. It should also reduce your chance of having a heart attack or a stroke.

Can it be harmful?

There's no evidence that eating a healthy diet low in saturated fats and trans fats is harmful. Some people get problems with bleeding if they take very high doses of fish oil supplements.

How good is the research on a low-fat diet for people who don't have heart disease?

There's some evidence that eating a low-fat diet can reduce your risk of having a heart attack or a stroke if you don't already have heart disease. ^[81]

We found a summary of the research (called a **systematic review**) that looked at the results of 27 studies. These included people at low and high risk of heart disease. Overall, it found that people who followed a low-fat diet were 20 percent less likely to have a heart attack or a stroke than people who didn't follow the diet. But it takes two years of sticking to the diet to get this benefit.

Some research suggests that you could live longer if you eat a low-fat diet. ^[82] But not all the research agrees on this. ^[81]

In one study, a low-fat diet didn't reduce the chances of getting heart disease. ^[83] The study included about 50,000 women aged over 50. One group of women followed a low-fat diet. The other group didn't change what they ate. After eight years, the women who did not change what they ate were no more likely to have heart disease.

Eating more oily fish for people who don't have heart disease

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[How good is the research on eating more oily fish for people who don't have heart disease?](#)

This information is for people at risk of heart disease. It tells you about eating more oily fish, a treatment sometimes used for people with high cholesterol. It's based on the best and most up-to-date research.

Does it work?

We don't know whether eating oily fish or taking supplements that contain omega-3 fatty acids (also called n-3 fatty acids) helps people who don't have heart disease because no studies have been done in this group of people.

What are they?

Oily fish, such as anchovies, herring, mackerel, sardines, salmon, pilchards, and trout, are rich in omega-3 polyunsaturated fatty acids. (Omega-3 fatty acids are also called n-3 fatty acids.)

There are a couple of ways to get more omega-3 fatty acids in your diet. Firstly, you can eat oily fish. People who were included in studies of oily fish ate about two or three portions a week. ^[84]

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You can also take fish oils in capsules. You don't need a prescription to get these, but you should talk to your doctor if you decide to take them. In studies, people took about 1 gram of fish oil in capsules each day.^[84] You can also get a high-strength fish oil capsule on prescription. The brand name for this is Omacor. In a large study, this type of fish oil capsule reduced the chances of suddenly dying after a heart attack.^[44]

If you're pregnant, you shouldn't eat any shark, swordfish, or marlin. Also, don't eat more than two portions of oily fish a week. Also, don't eat more than two tuna steaks a week or four cans of tuna a week. This is because of the amount of mercury in tuna, which can be harmful to your baby.^[85]

Advice from the UK Foods Standards Agency, an independent government department, says adults should eat at least two portions of fish a week. One of these portions should be oily fish.^[86]

How can it help?

We don't know if eating oily fish or taking omega-3 fatty acids can help people who have high cholesterol but who don't have heart disease. No studies have been done in this group of people.

How does it work?

Oily fish contains omega-3 polyunsaturated fatty acids. These fatty acids may help in a number of different ways:^[44]

- If you already have **atherosclerosis**, they may keep it from getting worse. (Atherosclerosis is sometimes called 'narrowing of the arteries'.)
- They make platelets (the cells that help blood to clot) less sticky so that you are less likely to get blood clots blocking your blood vessels
- They lower **blood pressure**
- They reduce levels of triglycerides (bad lipids) in your blood
- They raise the levels of good cholesterol (also called HDL cholesterol) in your blood.

But we don't know for sure that eating oily fish helps people with high cholesterol and no heart disease, because there hasn't been enough research.

To learn more about cholesterol and triglycerides and how they affect your risk of having a heart attack or a stroke, see [What is high cholesterol?](#) and [More about cholesterol and triglycerides](#) .

Can they be harmful?

Very high doses of fish oils may increase the time it takes for you to stop bleeding if you've been cut (doctors call this bleeding time). But the studies we looked at did not find this was a problem.

There are concerns that fish oils may contain pollutants (such as mercury, dioxins, and polychlorinated biphenyls), which can be harmful. Studies in animals and people who have been exposed to large amounts of these chemicals (mainly in accidents in chemical plants) have found that they can increase the risk of cancer, nerve damage, and heart attack.

It is thought that any harm from these pollutants would only happen after many years of eating extra portions of oily fish or taking supplements.^[87] A very large review of lots of studies found that fish oils did not increase the risk of cancer.^[87]

The Food Standards Agency in the UK tested 100 fish oil supplements for mercury in 2004 and 2005. It found that only nine samples contained any mercury. It says that an adult would have to take 500 of these supplements a day to consume the amount of mercury that is said to be unsafe.^[88]

How good is the research on eating more oily fish for people who don't have heart disease?

There is no research that tells us whether eating more oily fish or omega-3 fatty acids (also called n-3 fatty acids) can help people who have high cholesterol but don't already have heart disease. No studies have been done that included this group of people.

Mediterranean diet for people who don't have heart disease

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[How good is the research on eating a Mediterranean diet if you don't have heart disease?](#)

This information is for people at risk of heart disease. It tells you about the Mediterranean diet, which is sometimes used to treat high cholesterol. It is based on the best and most up-to-date research.

Does it work?

We're not sure. A big study found that people who closely followed the Mediterranean diet were less likely to die prematurely (earlier than expected) from heart disease. But we don't know how many of the people in this study had high cholesterol.

High cholesterol

What is it?

The Mediterranean diet is traditionally eaten by people who live around the Mediterranean in countries like Greece, Italy, and Spain. People eat lots of olive oil, grains, fruits, nuts, vegetables, and fish. They eat less meat (especially red and processed meat), dairy products, and alcohol, although some red wine is usually consumed with meals.

Using olive oil instead of animal fats, such as butter, is a big part of the Mediterranean diet. But some people don't like the taste of olive oil and find this difficult. In one study that tested the benefits of a Mediterranean diet in people with heart disease, patients were given margarine made with rapeseed oil to use instead of butter. ^[51]

How can it help?

Studies have found that the Mediterranean diet can help people to avoid heart disease and live longer, compared with not following the diet at all, or with just adopting one or two elements of the diet into their daily eating habits. ^[80] ^[89] In one study, people who followed the Mediterranean diet closely had a reduced risk of dying from heart disease as well as some other conditions, including cancer. ^[80]

However, the studies didn't specifically look at the effects of the Mediterranean diet on people with high cholesterol. We don't know how many people in the studies had high cholesterol.

How does it work?

Scientists aren't exactly sure why a Mediterranean-style diet is healthy. Some people think it's because the main fats in this diet come from olive oil rather than from animal fats, as is the case in many western diets. Olive oil is high in monounsaturated fats. These fats are healthier than the saturated fats and trans fats that are found in meat and meat products, butter, lard, cakes, biscuits, coconut oil, and palm oil. Saturated fats and trans fats can increase the amount of LDL cholesterol in the blood, which can clog the arteries and lead to high blood pressure and heart disease. So replacing saturated fats and trans fats with olive oil could help to keep the blood healthy.

But there may be other things about the Mediterranean diet that have health benefits. Oily fish contain omega-3 fatty acids, which may help make your blood less sticky and reduce the chances of a clot forming. Nuts and seeds are also high in monounsaturated fats and polyunsaturated fats, both of which may have health benefits. Some scientists think that it's not one element of the Mediterranean diet that makes it healthy, but a combination of the foods together.

In a study of the effects of the Mediterranean diet on people who already had heart disease, researchers gave people a margarine based on rapeseed oil. ^[51] Rapeseed oil is similar to olive oil but is higher in alpha-linolenic acid. This fat is part of the family of polyunsaturated fatty acids known as omega-3 fatty acids. It's found in walnuts, walnut oil, pumpkin seeds, canola oil, linseed oil, salmon, mackerel, and a green vegetable called purslane. In your body, alpha-linolenic acid is turned into the fats that are found

High cholesterol

in oily fish (called eicosapentaenoic acid and docosahexaenoic acid). These fats may protect you against heart disease. They are thought to make do this by making your blood less sticky so that it is less likely to form blood clots that can block blood vessels and eventually lead to a heart attack or a stroke.

To find out more about oily fish and high cholesterol, see [Eating more oily fish for people who don't have heart disease](#) .

Can it be harmful?

There's no evidence that eating a Mediterranean diet is harmful.

How good is the research on eating a Mediterranean diet if you don't have heart disease?

There's some evidence from one big study that sticking to the Mediterranean-style diet can help reduce the risk of dying from heart disease.^[80] Another large study found that sticking closely to the Mediterranean diet can help reduce things that can cause heart disease (risk factors).^[89] But the research did not look specifically at people with high cholesterol, so we can't say for sure how this diet can help people with high cholesterol.

Both of the studies we found were a type of study called a **meta-analysis** , which combines the results from other studies. One of them looked at the results from 12 other large studies and included more than 1.5 million people.^[80] The dietary habits and health of the people in the studies were followed for up to 18 years. It found that people who stuck closely to the Mediterranean diet were less likely to die from heart disease than those who didn't follow this diet very much. Following the Mediterranean diet closely also reduced the risk of getting or dying from cancer, getting Alzheimer's disease, and getting Parkinson's disease.

Niacin for people who don't have heart disease

In this section

[Does it work?](#)

[What is it?](#)

[How can it help?](#)

[How does it work?](#)

[Can it be harmful?](#)

[How good is the research on niacin in people who don't have heart disease?](#)

This information is for people at risk of getting heart disease. It tells you about niacin, a treatment sometimes used for people with high cholesterol. It's based on the best and most up-to-date research.

Does it work?

We don't know. There haven't been any good studies of niacin in people who don't have heart disease.

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What is it?

Niacin is a vitamin. You get vitamins from food and you need them to stay healthy. Niacin is one of the B vitamins, and we normally get it from liver, lean meat, fortified cereals, bread, and potatoes. Niacin is also called nicotinic acid.

Niacin is one of the oldest treatments for high cholesterol. But it's not used as much as it used to be because it can cause a lot of side effects, especially itching, flushing (red face), and diarrhoea. Newer treatments for reducing cholesterol, such as [fibrates](#) and [statins](#), tend to be used instead.

Doctors sometimes suggest niacin if your cholesterol is still high after using other treatments. However, the Scottish Medicines Consortium, which decides which treatments should be used by the NHS in Scotland, doesn't recommend niacin as a treatment for high cholesterol.

Niacin comes as tablets. Common brand names include Niacor. You can buy niacin from health food stores. But to lower cholesterol you need a much higher dose than you get in most vitamin supplements. So you should ask your doctor's advice before taking it. Niacin can have side effects and your doctor may be able to give you some advice on how to avoid these.

How can it help?

There haven't been any studies that show that taking niacin can help people who don't have heart disease.

How does it work?

Niacin lowers both cholesterol and triglycerides by interfering with their production in the body. It also increases the levels of good (HDL) cholesterol.

Can it be harmful?

Niacin can cause an abnormal heartbeat in some people who already have heart disease. ^[66] For this reason researchers advise that niacin should be used with care in people who have heart disease.

How good is the research on niacin in people who don't have heart disease?

There's no evidence that niacin helps people who don't have heart disease.

Cholesterol absorption inhibitors for people with heart disease

In this section

[What are they?](#)

[How can they help?](#)

[Can they be harmful?](#)

High cholesterol

This information is for people with heart disease. It tells you about cholesterol absorption inhibitors, a treatment used to lower cholesterol.

We haven't looked at the research on cholesterol absorption inhibitors in as much detail as we've looked at the research on most of the treatments we cover. (To read more, see Our method.) But we've included some information because you may have heard of this treatment or be interested in it.

What are they?

Cholesterol absorption inhibitors are a new group of drugs used to lower cholesterol. They work by stopping your body from absorbing cholesterol from food through your gut, which stops it going into your bloodstream.

The cholesterol absorption inhibitor available in the UK is called ezetimibe. The brand name is Ezetrol. It comes as a tablet you take once a day.

There's also a tablet that contains ezetimibe and simvastatin, one of the statin drugs. The brand name of this combination is Inegy. Statins are another type of drug used to lower cholesterol.

How can they help?

Early results from one study showed that taking ezetimibe with a statin helped to lower bad cholesterol levels. However, it didn't stop fatty deposits building up in people's blood vessels. ^[91]

Other studies have also found that adding ezetimibe to a statin helps to lower bad cholesterol levels. ^[92] However, there haven't been any long-term trials to tell us whether the drug cuts your risk of having a heart attack or a stroke.

Can they be harmful?

Ezetimibe doesn't seem to cause too many side effects. ^[93] Some people get an upset stomach, a headache or muscle pain, or feel tired. ^[94]

Cholesterol absorption inhibitors for people without heart disease

In this section

[What are they?](#)

[How can they help?](#)

[Can they be harmful?](#)

This information is for people who are at risk of heart disease. It tells you about cholesterol absorption inhibitors, a treatment used to lower cholesterol.

We haven't looked at the research on cholesterol absorption inhibitors in as much detail as we've looked at the research on most of the treatments we cover. (To read more, see

High cholesterol

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Can they be harmful?

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Further informations:

A guide to fats in food

We all need to eat some fat. Fat gives us energy and helps to transport vitamins around the body. But some types of fat are harmful. They can raise the level of bad cholesterol in your blood.

For more about diets and whether they work to help control bad cholesterol or increase good cholesterol, see [Treating high cholesterol](#).

Here's a quick guide to different types of fats, what foods you can find them in, and what effect they have on cholesterol and triglycerides in your blood.

Type of fat	Where it comes from	Effect on levels of lipids in your blood
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Saturated fats	Butter, hard cheese, cream, ice cream, meat fat (lard), coconut oil, and palm oil	Raises level of bad cholesterol (low-density lipoprotein cholesterol, also called LDL) if eaten too much
Trans unsaturated fats (also known as trans-fatty acids)	Hard margarine and full-fat margarine, fast food, pastries, and other baked goods (doughnuts, pastries, biscuits) especially ones that contain hydrogenated fats	Raises level of bad cholesterol (low-density lipoprotein cholesterol, also called LDL) if eaten too much
Polyunsaturated fats	Sunflower oil, safflower oil, corn (maize) oil, and fish oils	Can lower level of bad cholesterol (LDL)
Monounsaturated fats	Olive oil, walnut oil, rapeseed oil, groundnut (peanut) oil, and avocados	Can lower level of bad cholesterol (LDL) and triglycerides (bad lipids), and slightly raises level of good cholesterol (known as high-density lipoprotein cholesterol, also called HDL)
Omega-3 fats	Oily fish (herring, mackerel, sardines, salmon, fresh tuna, trout, pilchards)	Lowers level of triglycerides (bad lipids)

More about cholesterol and triglycerides

Cholesterol and triglycerides are fatty substances in your body. Fats in your body are called lipids.

Cholesterol

Cholesterol is a soft, waxy substance. Your body needs cholesterol to help build cells, to keep your nerves healthy, and to make some hormones and other substances. There is some cholesterol in every cell in your body.

Most of the cholesterol in your body doesn't come from food. It's made by your liver. Your liver is a large organ that sits just below your ribs on the right side of your body. It checks the amount of glucose, proteins, vitamins, fats, and other substances in your blood. And it stores some of these substances if you have too much. Your liver makes cholesterol from the fats you eat, particularly from [saturated fats](#) and [trans fats](#). Your liver produces all the cholesterol that your body needs.

But you can also get some cholesterol from some foods, such as egg yolks, dairy products, liver, kidney, and shellfish.

You may have heard about good cholesterol and bad cholesterol.

- **Bad cholesterol** is the type that can build up in your arteries, making it difficult for the blood to flow through them. This type is called LDL cholesterol. LDL stands for low-density lipoprotein.
- **Good cholesterol** helps get rid of the bad cholesterol. It's called HDL (high-density lipoprotein) cholesterol.

High cholesterol

So it's not just the amount of cholesterol in your blood that counts: it's how much there is of each type that's really important.

The balance between how much cholesterol the body makes and how much it removes decides the level of cholesterol in the blood.

Triglycerides

You may not have heard of triglycerides. If you eat more calories than you can use straight away, your body stores the extra calories as triglycerides. They are made from fats and other foods such as carbohydrates. Triglycerides are carried to fat cells, where they are stored until your body needs them for energy.

If you eat more than you need, the fat cells build up and you put on weight. When you haven't eaten recently, these stores of fat act as a reserve and help to keep your body running. People who exercise regularly have lower levels of triglycerides in their blood.

Inherited lipid disorders

There are three main lipid disorders that you can inherit from one or both of your parents.

Familial hypercholesterolaemia

This is the most serious lipid disorder you can inherit. It means that very high cholesterol runs in your family. You only need to inherit one gene from one of your parents to get the disorder. So if one parent has the disorder, there's a 1 in 2 chance that the condition will be passed to a child.

About 1 in 500 people have this disorder.^[11] The faulty gene means that your liver isn't able to pick up as much bad (LDL) cholesterol as it should. This increases the level of LDL cholesterol in your blood and leads to narrowing of the arteries (atherosclerosis).

People with familial hypercholesterolaemia often have twice as much cholesterol as the level that doctors normally think of as high.^[11] So they often get heart disease at an early age (men get it in their 30s and 40s, and women get it in their 40s and 50s).

If you inherit familial hypercholesterolaemia from both parents, you will have a more severe form of the illness. About 1 in a million people have this.^[11] It causes heart disease in childhood.

Familial hypertriglyceridaemia

About 1 in 500 people get this disorder. If you have it your risk of getting heart disease is raised, but not as high as if you have familial hypercholesterolaemia.^[11] This disorder also runs in families, and it shows up as raised levels of triglycerides in your blood. The way it's passed on means you only need to inherit one gene from one of your parents to get the disorder. People with this disorder have very high levels of triglycerides.

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Familial combined hyperlipidaemia

This is the most common inherited lipid disorder. About 1 or 2 people in every 100 have this condition.^[12] It means you have high levels of cholesterol, triglycerides, or both.

If you have this disorder you're 70 percent more likely to get heart disease than someone who doesn't have it.^[13]

Should I have a cholesterol test?

You may wonder whether you need to have a cholesterol test. Having too much bad cholesterol in your blood can increase your risk of having a heart attack or a stroke . And there are things you can do to bring your bad cholesterol down and reduce your risk of heart disease.

Who needs a cholesterol test?

Anyone can have a cholesterol test. But it's more important for people at higher risk of heart disease. If you're under 40 and healthy and don't have any other risk factors for heart disease then you may not need to have your cholesterol measured. You will need to have a cholesterol test before the age of 40 if people in your family have died of heart disease at a young age (under 55), or if you have diabetes.^[14]

Guidelines for doctors say that they should think about the risk of heart disease for all adults aged 40 or over. They should check people's records and offer cholesterol tests to people thought to be at high risk.^[15]

Risk factors for heart disease include:

- Being male
- Being middle aged or older
- Being overweight
- Having high blood pressure
- Having high cholesterol
- Having diabetes
- Smoking
- Not getting enough exercise

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- Your father or son died from heart disease under the age of 55
- Your mother died from heart disease under the age of 65

If you have a cholesterol test, the results will help doctors work out your overall risk of heart disease.

Home testing kits

You can buy kits for measuring cholesterol at pharmacies and other shops. But some may not be very accurate. If you do one of these tests at home you will have to go back to your pharmacist so that he or she can work out your risk of getting heart disease. You can then discuss whether you need drug treatment.

How doctors work out your risk of heart disease

If you are 40 or over, and want to have your overall heart disease risk checked, your doctor should consider all these things: ^[14]

- Your ethnic background
- Your age and sex
- Whether you smoke, or have smoked in the past
- Whether anyone in your family had or has heart disease
- Your weight
- Your waist measurement
- Your cholesterol test results
- Your blood pressure
- Your blood glucose reading.

From these results, your doctor can use statistical risk tables to work out your overall risk of getting heart disease during the next 10 years. Your risk will be described as high (more than 20 percent), medium (10 percent to 20 percent) or low (less than 10 percent).

^[14]

These results help your doctor decide whether you need treatment for high cholesterol.

High cholesterol

If your risk is high, you have a more than 2 in 10 chance of having a heart attack or a stroke, or getting heart disease, during the next 10 years. Your doctor is likely to suggest you start taking a statin drug to lower your cholesterol. ^[15]

If your risk is low or moderate, you should have it checked again in the next five years. Everyone's risk of heart disease goes up over time

Targets for treatment

When you are being treated for high cholesterol because you have heart disease, you'll have regular blood tests to see if the treatment is working. You may have tests quite often at first. Once your cholesterol level is steady, you may only need tests once a year.

Cholesterol in your blood is measured in millimoles per litre of blood (mmol/L). These are the targets your doctor will be looking for: ^[14]

- Your total cholesterol should be less than 5 mmol/L. Ideally it should be below 4 mmol/L.
- Your LDL (bad) cholesterol should be below 3 mmol/L. Ideally it should be below 2 mmol/L.

Generally speaking, the lower your cholesterol, the better. Your doctor may be especially keen to get your cholesterol low if you have other health problems like diabetes.

If you are being treated for high cholesterol, but you don't have heart disease, you may not need regular cholesterol tests. ^[15]

Advice about rosuvastatin (Crestor)

The Committee on Safety of Medicines has published this advice to doctors about prescribing rosuvastatin (Crestor). ^[39]

- Anyone taking rosuvastatin (including people who have taken another statin before) should start with a dose of 5 milligrams (mg) to 10 mg a day.
- The dose should only be increased to 20 mg a day if necessary, and only after taking the 10 mg dose for four weeks.
- Only people with very high cholesterol levels and a very high risk of heart disease should take 40 mg a day.

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- People who are prescribed 40 mg a day should be under the care of a specialist doctor, such as a cardiologist.
- People of Asian origin should start with a dose of 5 mg and the dose should be increased only to 20 mg.
- People who are already taking 40 mg a day should see their doctor, who will either lower the dose or refer them to a specialist.

The Committee on Safety of Medicine also says that if you are taking 10 mg or 20 mg of rosuvastatin daily you should continue your treatment as normal.

If you have any unexpected pain or muscle problems, you should stop taking rosuvastatin and see your doctor as soon as possible. ^[39]

The National Institute for Health and Care Excellence (NICE), the government body that decides which treatments should be available on the NHS, says ezetimibe can be prescribed to lower cholesterol: ^[90]

- On its own, if statins are not suitable or cause side effects
- Along with a statin, if statins alone don't reduce cholesterol enough.

But you'll probably try a statin drug first.

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But you'll probably try a statin drug first.

Glossary:

stroke

You have a stroke when the blood supply to a part of your brain is cut off. This damages your brain and can cause symptoms like weakness or numbness on one side of your body. You may also find it hard to speak if you've had a stroke.

liver

High cholesterol

Your liver is on the right side of your body, just below your ribcage. Your liver does several things in your body, including processing and storing nutrients from food, and breaking down chemicals, such as alcohol.

proteins

A lot of your body's tissues are made out of proteins. Proteins can be made in your cells. Proteins are also part of the food you eat, particularly meat and dairy products. Your body breaks down the protein you eat into amino acids. Your cells then use these amino acids to build new proteins, which make up muscles, joints, hair and other parts of your body.

atherosclerosis

Atherosclerosis is also called 'hardening of the arteries'. It happens when fatty material sticks to the inner wall of your arteries. Over time, cholesterol, fats and other things in your blood stick to the same area and the artery wall becomes thick and narrow, making it progressively more difficult for blood to flow through the affected vessels.

hormones

Hormones are chemicals that are made in certain parts of the body. They travel through the bloodstream and have an effect on other parts of the body. For example, the female sex hormone oestrogen is made in a woman's ovaries. Oestrogen has many different effects on a woman's body. It makes the breasts grow at puberty and helps control periods. It is also needed to get pregnant.

high blood pressure

Your blood pressure is considered to be high when it is above the accepted normal range. The usual limit for normal blood pressure is 140/90. If either the first (systolic) number is above 140 or the lower (diastolic) number is above 90, a person is considered to have high blood pressure. Doctors sometimes call high blood pressure 'hypertension'.

diabetes

Diabetes is a condition that causes too much sugar (glucose) to circulate in the blood. It happens when the body stops making a hormone called insulin (type 1 diabetes) or when insulin stops working (type 2 diabetes).

triglycerides

Triglycerides are the form in which fat is stored in your body. Triglycerides are made from the fat found in food. They can be used by your body for energy.

placebo

A placebo is a 'pretend' or dummy treatment that contains no active substances. A placebo is often given to half the people taking part in medical research trials, for comparison with the 'real' treatment. It is made to look and taste identical to the drug treatment being tested, so that people in the studies do not know if they are getting the placebo or the 'real' treatment. Researchers often talk about the 'placebo effect'. This is where patients feel better after having a placebo treatment because they expect to feel better. Tests may indicate that they actually are better. In the same way, people can also get side effects after having a placebo treatment. Drug treatments can also have a 'placebo effect'. This is why, to get a true picture of how well a drug works, it is important to compare it against a placebo treatment.

systematic reviews

A systematic review is a thorough look through published research on a particular topic. Only studies that have been carried out to a high standard are included. A systematic review may or may not include a meta-analysis, which is when the results from individual studies are put together.

platelets

Platelets are small disc-shaped particles found in your blood (along with red blood cells and white blood cells). Platelets form the clots that stop the bleeding when you've been cut. People who don't have enough platelets have problems with bleeding too much.

blood pressure

Blood pressure is the amount of force that's exerted by your blood on to your blood vessels. You can think of it like the water pressure in your home: the more pressure you have, the faster and more forcefully the water flows out of the shower. Blood pressure is measured in millimetres of mercury (written as mm Hg). When your blood pressure is taken, the measurement is given as two numbers, for example 120/80 mm Hg. The first, higher, number is called the systolic pressure, and the second, lower, number is the diastolic pressure. The systolic number is the highest pressure that occurs while your heart is pushing blood into your arteries. The diastolic number is the lowest pressure that happens when your heart is relaxing and is not pushing your blood.

angina

Angina is the name that doctors use for a pain in your chest that you get when your heart muscle isn't getting enough oxygen.

diarrhoea

Diarrhoea is when you have loose, watery stools and you need to go to the toilet far more often than usual. Doctors say you have diarrhoea if you need to go to the toilet more than three times a day.

heart attack

Doctors call a heart attack an acute myocardial infarction (or acute MI). This is the name for the damage that occurs to the heart muscle if it isn't getting enough blood and oxygen because a branch of the coronary arteries is blocked. During a heart attack, you may have pain or heaviness over your chest, and pain, numbness or tingling in your jaw and left arm.

meta-analysis

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A meta-analysis puts together the results of a number of studies. A meta-analysis is used if individual studies are too small for any definite conclusions to be drawn about a treatment. Pooling together results from a number of studies may help say for sure what the effects of the treatment are.

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