Cholesterol

Certain people should have a cholesterol blood test as part of a 'cardiovascular risk assessment'. These include: all people aged 40 or more, people at any age with a strong family history of early heart disease or stroke, and people at any age with a family history of a hereditary lipid (cholesterol) disorder. If you are found to have a high risk of developing heart disease or stroke then you will usually be advised to take a statin drug to lower your cholesterol level. As a rule, no matter what your cholesterol level is, then lowering the level reduces your risk. Lifestyle factors that also reduce the risk include: not smoking, choosing healthy foods, a low salt intake, regular physical activity, keeping your weight and waist size down, and drinking alcohol in moderation. Your blood pressure is also important.

What is cholesterol?

Cholesterol is a lipid (fat chemical) that is made in the liver from fatty foods that we eat. A certain amount of cholesterol is present in the bloodstream. You need some cholesterol to keep healthy. Cholesterol is carried in the blood as part of particles called lipoproteins. There are different types of lipoproteins, but the most relevant to cholesterol are:

- Low density lipoproteins carrying cholesterol - LDL cholesterol. This is often referred to as 'bad cholesterol' as it is the one mainly involved in forming atheroma. Atheroma is the main underlying cause of various cardiovascular diseases (see below). Usually, about 70% of cholesterol in the blood is LDL cholesterol, but the % can vary from person to person.
- High density lipoproteins carrying cholesterol - HDL cholesterol. This is often referred to as 'good cholesterol' as it may actually prevent atheroma formation.

## What are atheroma and cardiovascular diseases?

Patches of atheroma are like small fatty lumps that develop within the inside lining of arteries (blood vessels). Atheroma is also known as 'atherosclerosis' and 'hardening of the arteries'. Patches of atheroma are often called 'plaques' of atheroma.

Over months or years, patches of atheroma can become larger and thicker. So, in time, a patch of atheroma can make an artery narrower. This can reduce the blood flow through the artery. For example, narrowing of the coronary (heart) arteries with atheroma is the cause of angina.

Sometimes, a blood clot (thrombosis) forms over a patch of atheroma and completely blocks the blood flow. Depending on the artery affected, this can cause a heart attack, a stroke, or other serious problems.

Section of an artery

Cardiovascular diseases are diseases of the heart (cardiac muscle) or blood vessels (vasculature). However, in practice, when doctors use the term 'cardiovascular disease' they usually mean diseases of the heart or blood vessels that are caused by atheroma.

In summary, cardiovascular diseases that can be caused by atheroma include: angina, heart attack, stroke, transient ischaemic attack (TIA), and peripheral vascular disease. In the UK, cardiovascular diseases are a major cause of poor health, and the biggest cause of death.
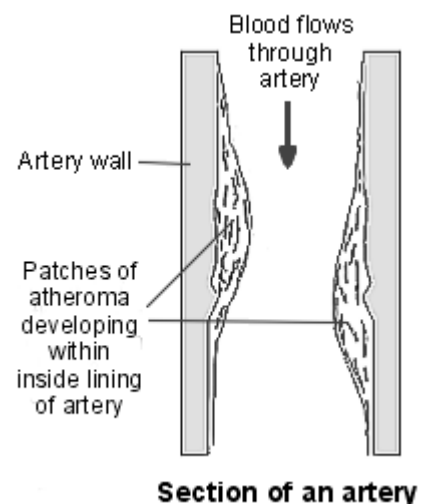
What factors affect the blood level of cholesterol?

In most people, your cholesterol level reflects the amount of fat that you eat. This is not the full story as different people who eat the same amount of fat can make different amounts of cholesterol. However, in general, if you eat less fat your cholesterol level is likely to go down.

In some people, a high cholesterol level is due to another condition. For example, an underactive thyroid gland, obesity, drinking a lot of alcohol, and some rare kidney and liver disorders can raise the cholesterol level.

In some people, a very high level of cholesterol runs in the family due to an inherited genetic problem with the way cholesterol is made. One example is called familial hypercholesterolaemia.

Risk factors

Everybody has some risk of developing atheroma which then may cause one or more cardiovascular diseases. However, certain 'risk factors' increase the risk. Risk factors include:

- Lifestyle risk factors that can be prevented or changed:

    o Smoking.
    o Lack of physical activity (a sedentary lifestyle).
    o Obesity.
    o An unhealthy diet - including eating too much salt.
    o Excess alcohol.

- Treatable or partly treatable risk factors:

    o Hypertension (high blood pressure).
    o High cholesterol blood level.
    o High trigliceride (fat) blood level.
    o Diabetes.
    o Kidney diseases that affect kidney function.

- Fixed risk factors - ones that you cannot alter:

    o A strong family history. This means if you have a father or brother who developed heart disease or a stroke before they were 55, or in a mother or sister before they were 65.
    o Being male.
    o An early menopause in women.
    o Age. The older you become, the more likely you are to develop atheroma.
    o Ethnic group. For example, people who live in the UK with ancestry from India, Pakistan, Bangladesh, or Sri Lanka have an increased risk.

    However, if you have a fixed risk factor, you may want to make extra effort to tackle any lifestyle risk factors that can be changed.

Note: some risk factors are more 'risky' than others. For example, smoking and a high cholesterol level probably cause a greater risk to health than obesity. Also, risk factors interact. So, if you have two or more risk factors, your health risk is much more increased than if you just have one. For example, a middle aged male smoker who has high blood pressure and a high cholesterol level has a high risk of developing a cardiovascular disease such as a heart attack before the age of 60.

What is a 'high' cholesterol level?

The following levels are generally regarded as desirable:

- Total cholesterol (TC) - 5.0 mmol/l or less. However, about 2 in 3 adults in the UK have a total cholesterol level of 5.0 mmol/l or above.
- Low-density lipoprotein (LDL) cholesterol after an overnight fast: 3.0 mmol/l or less.
- High-density lipoprotein (HDL) cholesterol: 1.2 mmol/l or more.
- TC/HDL ratio: 4.5 or less. That is, your total cholesterol divided by your HDL cholesterol. This reflects the fact that for any given total cholesterol level, the more HDL, the better.

As a rule, the higher the cholesterol level, the greater the risk to health.

However, your level of cholesterol has to be viewed as part of your overall cardiovascular health risk. The cardiovascular health risk from any given level of cholesterol can vary, depending on the level of your HDL cholesterol, and on other health risk factors that you may have.

Assessing (calculating) your cardiovascular health risk

A 'risk factor calculator' is commonly used by doctors and nurses. This can assess your cardiovascular health risk. A score is calculated which takes into account all your risk factors such as age, sex, smoking status, blood pressure, cholesterol level, etc.

The calculator has been devised after a lot of research that monitored thousands of people over a number of years. The score gives a fairly accurate indication of your risk of developing a cardiovascular disease over the next 10 years. If you want to know your 'score', see your practice nurse or GP.

Who should have their cardiovascular health risk assessed?
Current UK guidelines advise that the following people should be assessed to find their cardiovascular health risk:

- All adults aged 40 or more.
- Adults of any age who have:
  - A strong family history of early cardiovascular disease. This means if you have a father or brother who developed heart disease or a stroke before they were 55, or in a mother or sister before they were 65.
  - A first degree relative (parent, brother, sister, child) with a serious hereditary lipid disorder. For example, familial hypercholesterolaemia or familial combined hyperlipidaemia. These diseases are uncommon.

If you already have a cardiovascular disease or diabetes then your risk does not need to be assessed. This is because you are already known to be in the high risk group.

What does the assessment involve?
A doctor or nurse will:

- Do a blood test to check your cholesterol and glucose (sugar) level.
- Measure your blood pressure and your weight.
- Ask you if you smoke.
- Ask if there is a history of cardiovascular diseases in your family (your blood relations). If so, at what age the diseases started in the affected family members.

A score is calculated based on these factors plus your age and your sex. An adjustment to the score is made for certain other factors such as strong family history and ethnic origin.

What does the assessment score mean?
You are given a score as a % chance. So, for example, if your score is 30% this means that you have a 30% chance of developing a cardiovascular disease within the next 10 years. This is the same as saying a 30 in 100 chance (or a 3 in 10 chance). In other words, in this example, 3 in 10 people with the same score that you have will develop a cardiovascular disease within the next 10 years. Note: the score cannot say if you will be one of the three. It cannot predict what will happen to each individual person. It just gives you the odds.

You are said to have a:

- High risk - if your score is 20% or more. That is, a 2 in 10 chance or more of developing a cardiovascular disease within the next 10 years.
- Moderate risk - if your score is 10-20%. That is, between a 1 in 10 and 2 in 10 chance.
- Low risk - if your score is less than 10%. That is, less than a 1 in 10 chance.

Who should be treated to reduce their cardiovascular health risk?

Treatment to reduce the risk of developing a cardiovascular disease is usually offered to people with a high risk. That is:

- People with a risk assessment score of 20% or more. That is, if you have a 2 in 10 chance or more of developing a cardiovascular disease within the next 10 years.
- People with an existing cardiovascular disease (to lower the chance of it getting worse, or of developing a further disease).
- People with diabetes. If you have diabetes, the time that treatment is started to reduce cardiovascular risk depends on factors such as: your age, how long you have had diabetes, your blood pressure and if you have any complications of diabetes.
- People with certain kidney disorders.

The following people should also have drug treatment to lower their cholesterol level, *regardless* of any calculated risk. The risk calculator may not necessarily take these people into account who have a high risk of developing atheroma.

- People with a total cholesterol to high density lipoprotein ratio of 6 or more (TC/HDL = 6 or more).
- People with familial (hereditary) lipid disorders.

What treatments are available to reduce the risk?

If you are at high risk of developing a cardiovascular disease then drug treatment is usually advised along with advice to tackle any lifestyle issues. This usually means:

- Drug treatment to lower your cholesterol level, usually with a statin drug. No matter what your current cholesterol level, drug treatment is advised. There are several brands of statin drug. They work by blocking an enzyme (chemical) which is needed to make cholesterol in the liver. See leaflet called '*Statins*' for details. The aim is:
  - to reduce total cholesterol to less than 4.0 mmol/l *and* LDL cholesterol to less than 2.0 mmol/l, OR
  - a 25% reduction in total cholesterol *and* a 30% reduction in LDL cholesterol.

  Whichever is the biggest reduction.
- Drug treatment to lower blood pressure if it is high. This is even if your blood pressure is just mildly high. See leaflet called '*High Blood Pressure*' for details.
- A daily low dose of aspirin - depending on your age and other factors. Aspirin helps to prevent blood clots from forming on patches of atheroma. See leaflet called '*Aspirin to Prevent Blood Clots*' for details.
- Where relevant, to encourage you even more to tackle lifestyle risk factors. This

means to:

- stop smoking if you smoke
- eat a healthy diet
- keep your salt intake to under 6 g a day
- keep your weight and waist in check
- take regular physical activity
- cut back if you drink a lot of alcohol.

If available, and if required, you may be offered a referral to a specialist service. For example, to a dietician to help you to lose weight and eat a healthy diet, to a specialist 'stop smoking clinic', or to a supervised exercise programme.

Can diet lower my cholesterol level?

Changing from an unhealthy diet to a healthy diet can reduce a cholesterol level. However, dietary changes alone rarely lower a cholesterol level enough to change a person's risk of cardiovascular disease from a high risk category to a lower risk. However, any extra reduction in cholesterol due to diet will help. A healthy diet has other benefits too apart from reducing the level of cholesterol.

Briefly, a healthy diet means:

- AT LEAST five portions, and ideally 7-9 portions, of *a variety of* fruit and vegetables per day.
- THE BULK OF MOST MEALS should be starch-based foods (such as cereals, wholegrain bread, potatoes, rice, pasta), plus fruit and vegetables.
- NOT MUCH fatty food such as fatty meats, cheeses, full-cream milk, fried food, butter, etc. Use low fat, mono-, or poly-unsaturated spreads.
- INCLUDE 2-3 portions of fish per week. At least one of which should be 'oily'.
- LIMIT SALT to no more than 6 g a day (and less for children).
- If you eat meat it is best to eat lean meat, or poultry such as chicken.
- If you do fry, choose a vegetable oil such as sunflower, rapeseed or olive oil.

In addition, foods that contain plant sterols or stanols can reduce blood cholesterol level. For example, a daily dose of about 2 g of plant sterols or stanols can reduce LDL cholesterol by about 10%. Plant sterols and stanols are available in margarine spreads, yoghurts, milk drinks and other foods sold in stores. Food products containing plant sterols and stanols are generally designed to provide about one third of the recommended daily dose per meal. However, always read the labels and follow the manufacturer's advice about portion sizes. Recommendations from the Food Standards Agency include the following:

- You should not not eat more than 3 g per day of plant sterols and stanols.
- Pregnant women, breast-feeding women, and children under the age of five years should not eat foods with added plant sterols or stanols.
- Foods with added plant sterols or stanols should be eaten as part of a balanced diet.

How much benefit do I get if my cholesterol level is reduced?

If you have an increased risk of developing an atheroma related disease, your risk can be reduced by up to 30% if your cholesterol level is lowered to a target level.

If you already have an atheroma related disease, lowering the cholesterol level reduces your risk of further problems.

For details on exactly how much risk is reduced by lowering and treating risk factors, see the Guidance produced by the Clincal Knowledge Services called '*Cardiovascular Risk*' - www.cks.library.nhs.uk/cardiovascular_risk.

What if I am at moderate or low risk?
If you are not in the high risk category, it does not mean you have no risk - just a lesser risk. Drug treatment is not usually prescribed. However, you may be able to reduce whatever risk you do have even further by any relevant changes in lifestyle (as described above).

Some people with a moderate risk buy a low dose statin drug from a pharmacy to lower their cholesterol level. (Statin drugs are available on prescription and funded by the NHS if your risk is high. However, you need to buy them if your risk is not in the high category. But, if you do buy a statin and take it regularly, it is best to let you doctor know so that it can be put on your medical record.)

Further help and information

Heart UK
7 North Road, Maidenhead, Berkshire, SL6 1PE
Helpline: 0845 450 5988 Web: www.heartuk.org.uk
Provides information on heart disease and its management by lifestyle and drugs. Aims to help anyone at high risk of heart disease especially families with inherited high cholesterol.

British Heart Foundation
14 Fitzhardinge Street, London, W1H 6DH
Tel (Heart Information Line): 08450 70 80 70 Web: www.bhf.org.uk

British Nutrition Foundation
Web: www.nutrition.org.uk
Their website provides healthy eating information

References

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- Coronary heart disease risk - assessment and management, Clinical Knowledge Summaries (October 2006)
- Cardiovascular disease - statins, NICE (January 2006)
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- No authors listed; Lifestyle measures to tackle atherosclerotic disease.; *Drug Ther Bull.* 2001 Mar;39(3):21-4. [abstract]
- No authors listed; Statin therapy--what now? Drug Ther Bull. 2001 Mar;39(3):17-21. [abstract]

Comprehensive patient resources are available at www.patient.co.uk