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## **AN OVERVIEW OF CHOLESTEROL - a patient's guide**

Dr Guy Armstrong - Cardiologist

### **What is Cholesterol?**

#### Normal

Cholesterol is a type of fat (or lipid) present in certain foods and made by your liver. A certain amount is essential for the formation of cell membranes (the basic building blocks of life).

#### Abnormal

Too much "bad" (LDL = low density lipoprotein) cholesterol causes damage (atherosclerosis) to your artery walls. This build up of cholesterol results in narrowing of the arteries (which transport blood pumped from heart around the body). This process happens slowly over many years in most people in Western countries.

Lack of blood supply due to narrowed arteries can affect the heart (causing angina), the legs (causing claudication) and brain (causing transient ischaemic attacks, "TIAs"). If the artery blocks off completely it can cause a heart attack or stroke.

Some of the adverse affects of LDL cholesterol are reduced by "good" (HDL) cholesterol, which removes LDL cholesterol from the artery walls.

### **What are the causes?**

There are genetic (inherited) causes of high cholesterol. However, cholesterol levels are also related to the type and amount of fat eaten, and your body weight.

Levels of good cholesterol are increased by exercise and low to moderate alcohol consumption.

### **What symptoms may I expect?**

There are no symptoms directly related to high cholesterol levels. With time, the elevated cholesterol cause damage to your arteries that may result in angina, heart attack, TIA, stroke or claudication.

### **What will the doctor look for?**

The doctor may examine the back of your ankle (Achilles tendon) and the skin just below your eyebrow, adjacent to your nose. These may be sites of cholesterol deposits in people with 'familial hypercholesterolemia (a genetic condition).'

### **What investigations will the doctor consider?**

Your doctor will order a blood test to measure your blood lipid levels. This will measure levels of total cholesterol, LDL cholesterol, HDL cholesterol and calculate the ratio of total to HDL cholesterol.

This test may need repeating to obtain a more accurate estimate, because there is natural variation in lipid levels from day to day.

### **What treatment options are available?**

#### Natural history

Most people can reduce their cholesterol levels 10-20 percent by careful eating. However, this may not be enough in many cases to reduce risk and medication may be required. Increasingly, well conducted research is showing benefits from drug treatment in high risk groups.

#### Lifestyle

##### Dietary changes:

Reducing your cholesterol by 0.6 mmol/l long-term will reduce your risk of a heart attack by one third. This means reducing the amount of saturated fat eaten (mainly found in red meat and dairy products). Plant foods such as fruits, vegetables, grains, rice and potatoes contain no cholesterol or saturated fat, which leads to increased cholesterol levels.

The actual cholesterol in food is not as harmful as saturated fat in the diet. Most cholesterol in the body is made in your own liver using saturated fat from the diet.

Saturated fats are found mainly in animal foods such as meat and full fat dairy products. Two vegetable oils, coconut and palm oil are also high in saturated fat. They are used in commercially baked cakes and biscuits. Saturated fats are bad because they increase LDL cholesterol and lower HDL cholesterol.

Polyunsaturated fats are good because they lower LDL cholesterol (although they may also reduce HDL cholesterol). Polyunsaturated fats are in sunflower, safflower, corn, soybean, nuts and fish. Omega-3 polyunsaturated oils, found in some fish and building blocks are found in some foods (See Table). Omega-3's are particularly effective in preventing heart disease, even though they do not alter cholesterol levels much.

#### Fish high in Omega-3 oil

Dory, Eel, Kahawai, Kingfish, Salmon, Sardines, Trevally, Trout, Tuna, Warehou

(moderate amounts found in Squid, Mussels & Oysters)

High in Omega-3 building block (alpha-linolenic acid)

Canola oil, Soya bean oil, Flaxseed or linseed, Walnuts, Wholemeal bread and cereals, Green vegetables and Legumes

Monounsaturated fats are found particularly in olive, canola, peanut and sunflower oils, avocados, olives, nuts and sesame seeds. Monounsaturated fats are good because they decrease LDL cholesterol without much effect on HDL cholesterol. Their consumption may be responsible for the lower incidence of heart disease in Mediterranean countries.

A healthy diet includes lots of fruit, vegetables, whole grain bread, cereals, legumes (peas, beans and lentils). Eat fish at least twice weekly, especially those high in Omega-3. Eat small amounts of only lean meat (fat removed), poultry without skin, and low-fat dairy products. Eat no more than three eggs each week. Use as little fat and oil as possible - grill, boil, steam, bake or microwave rather than fry. Use monounsaturated margarine or oil rather than butter for thin spreading and cooking. Avoid prepared foods - they contain too much fat.

Coffee that is unfiltered (i.e. espresso, plunger or boiled) will raise levels of bad LDL cholesterol. Therefore, it is best to choose filtered, percolated or instant coffee and limit intake to no more than five cups each day.

Recently, some compounds derived from plants ("plant sterols") have been found to lower the bad LDL cholesterol by a further 10-15 percent, over and above what can be achieved by regular dieting alone. These compounds have been incorporated into margarines which are now available in New Zealand as Flora Pro-Activ and Logicol.

A modest intake of alcohol may be healthy by increasing HDL cholesterol and reducing the risk of heart attacks. Alcohol intake should be limited to two standard drinks daily for women and three standard drinks daily for men (see table at bottom for standard drink definitions). Red wine contains antioxidants that may increase its beneficial effect.

One Standard Drink equals 10 g of Alcohol- see table below

1 (300 ml) glass of ordinary strength beer

1 (60 ml) glass of fortified wine (sherry, martini, port)

1 (30 ml) pub measure of spirits (whisky, gin, vodka)

1 (100 ml) glass of table wine

## Drugs

"Statins" are the most commonly used class of drugs. They reduce cholesterol levels by 30-50 percent and reduce heart attacks by a similar amount. In patients following a heart attack, and certain other 'high-risk' patients they improve life expectancy.

"Fibrates" are not as powerful as statins at lowering total and LDL cholesterol. However, they are effective at increasing HDL cholesterol.

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## **Prognosis**

### Controversies and Uncertainties

Antioxidants may reduce the amount of damage that LDL cholesterol causes to your arteries. A diet rich in leafy green and yellow vegetables (which contain antioxidants) is beneficial. However, taking vitamin supplements has been tested in a number of excellent studies without finding any benefit. There is no evidence that using supplements of vitamin A, C or E is beneficial.

Triglycerides are another blood lipid. They may be increased in people who are overweight and in those who eat too much refined sugar, alcohol and fat. Evidence is starting to gather that triglycerides may cause atherosclerosis, especially in people with diabetes.

Garlic may be part of a normal varied diet. Currently, there is not sufficient evidence to support claims that it prevents heart disease.