Coming to Grips with a Cholesterol Problem

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One of the major risk factors for coronary heart disease (CHD) is elevated serum cholesterol. The National Heart Foundation in Australia presently recommends that adults should aim for a cholesterol level of less than 5.5 mmol/1 (4.5 mmol/1 for children) and a triglyceride level of between 0.5 - 2.0 mml/1.

Cholesterol and other plasma lipids are carried by lipoproteins which comprise high density lipoproteins (HDL), low density lipoproteins (LDL), very low density lipoproteins (VLDL) and chylomicrons. The VLDL's and chylomicrons are rich in triglycerides. When the VLDL's have donated their triglycerides to blood vessel endothelial cells the surface remnants (phospholipids, protein and cholesterol) are used to make HDL while the remaining VLDL remnant called IDL (intermediate density lipoprotein) is transported to the liver where it is modified to form LDL.

HDL and LDL both carry cholesterol. HDL removes cholesterol from the arterial wall and other tissues and in this respect is considered protective against CHD. LDL on the other hand (as well as VLDL and IDL) are atherogenic.

Many different types of cells carry LDL receptors on their surface including the endothelial cells of the blood vessel walls. These cells recognize a surface marker on the LDL package (called apo-B protein) and bind it. Then through the process of endocytosis the LDL is taken into the cells by invagination of the membrane to form vesicles which fuse with lysosomes. The digestive enzymes inside the lysosomes break down the LDL to release cholesterol. The free cholesterol is then utilized by the cell. Genetic defects in this receptor-mediated uptake of LDL by cells are the basis for the disorder Familial Hypercholeste-rolaemia.

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Due to the nature of the high cholesterol diets in our society, blood LDL concentrations are far greater than those necessary to saturate the LDL receptor. Hence most cells get all the cholesterol they need from circulating LDL. Endogenous cholesterol synthesis is suppressed in most tissues with the exception of the liver and intestines.

However, LDL can also gain entry into cells by non-specific mechanisms when the blood level is high enough and it is this non-specific uptake that may play a major contributory role in the formation of atherosclerosis.

The most commonly used index of CHD risk is the ratio of HDL to total cholesterol. We presently should be aiming to keep levels of HDL above 0.9 mmol/1 and LDL below 4.6 mmol/1 with an HDL/total cholesterol ratio between 0.23 - 0.29, ideally > 0.29.

Indicator Ratio (or Coronary Heart Disease (CHD)

HDL/Total Cholesterol Ratio CHD Risk	**Female**	**Male**
Very low	> 0.29	> 0.29
Below average	0.23-0.29	0.23-0.29
Average	0.19-0.22	0.16-0.22
High	0.09-0.18	0.07-0.15
Very high	< 0.09	< 0.07

Dietary factors which have proved to be beneficial in lowering cholesterol include bran (especially oat bran), apples, garlic, salmon and a diet low in coffee, alcohol and sugar. Supplemental chromium, magnesium, Max EPA and niacin have also been found to be useful in reducing cholesterol levels. An effective regime for a person with a cholesterol greater than 8.00 mmol/1 is as follows:

Permitted Foods

Predominating in cruciferous vegetables (broccoli, cabbage, cauliflower, watercress),

also leeks, onions, garlic and ginger, lentils, beans, raw salad vegetables, fruit (especially 2-3 apples each day), whole grains, added oat bran, brown rice, salmon, fresh fish, turkey, pork fillet trimmed, top side corner.

Disallowed Foods

Animal fat, butter and other high fat dairy products, alcohol, caffeinated beverages, refined carbohydrates, sucrose and salt.

Nutritional Supplements — Daily Dose (with meals)

Sustained release niacin (TRI B3) 250 mg capsules — 2 daily for three days then raise dose by 2 capsules every two days until 8 capsules per day has been attained.

Garlic capsules — 4 capsules (2 morning and 2 evening).

GTF Chromium (glucose tolerance factor) containing 50 mcg elemental chromium — 4 capsules (2 morning and 2 evening).

Magnesium Orotate 400 mg tablets — 4 tablets (2 morning and 2 evening).

Max EPA 500 mg capsules — 4 capsules (2 morning and 2 evening).

This regime allows for 4 glasses of alcoholic beverages each week and four cups of tea but absolutely no salt, coffee or sugar other than a small amount of sugar in oat bran muffins. Fish should be eaten every other day either as tinned salmon or tuna, sushi, sashimi or fresh market fish such as flathead, mullet, tuna, salmon, leather jackets or gem fish. Lots of brown rice should be eaten and bran muffins for those with a "sweet tooth" — no sweets, chocolates, etc.

Magnesium Orotate has been known to increase cholesterol levels during the first month presumably because it is mobilizing cholesterol from vessel walls. If the cholesterol is greater than 9 mmol/1 lower the magnesium Orotate to half the dose at the outset. Micellized vitamin E (1 ml daily) may also be added to this regime if there is a previous history (or a family history) of thrombosis, stroke, coronary heart disease or intermittent claudication. Supplemental zinc can elevate cholesterol in high doses and should be balanced with copper in at least a 10:1 ratio.

Patients should embark upon a daily (aerobic-type) exercise programme commensurate with their physical condition and slowly increasing in duration. Ideally brisk walking or swimming should be considered.

Stress is a definite risk factor for CHD and should be assessed in each patient. If there is any indication that stress may be a problem, the patient should undergo a course in stress management, or meditation and be encouraged to take up stress lowering activities such as Tai Chi, Yoga, Golf, Bush Walking, etc.

Check total cholesterol and HDL cholesterol at three monthly intervals until the HDL/Total Cholesterol ratio is greater than 0.23. At this stage the patient should discontinue the supplementation but more or less maintain that same basic diet for several years while checking cholesterol at least once yearly. With the exception of familial hypercholesterolaemias elevated cholesterol is usually a lifestyle problem.