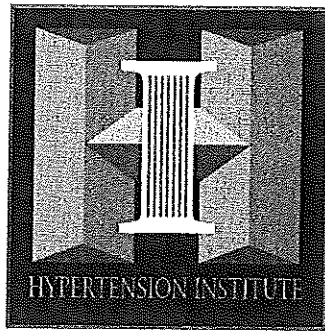


CHOLESTEROL

AN OWNER'S MANUAL



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This booklet is designed to explain the basic facts about lowering and/or controlling your blood cholesterol. The evidence linking high blood cholesterol with increased risk of premature stroke and premature development of (CHD) coronary heart disease (blockages in heart arteries that lead to heart attacks) is overwhelming. In addition, dementia, carotid artery disease, peripheral arterial disease and kidney disease are reduced by lowering cholesterol. A host of genetic, nutritional, and clinical studies performed during the past 50 years support the fact that the higher the blood cholesterol level, the greater the risk of coronary heart disease and other vascular events. Intake of a high cholesterol, high saturated fat, trans-fats (processed fats), refined carbohydrates, calorie-rich diet is a major contributing factor to high blood cholesterol levels and increased coronary risk, stroke and vascular disease.

Other risk factors such as a family history of premature coronary heart disease, cigarette smoking, the presence of hypertension, diabetes mellitus, excessive weight or obesity, homocysteine, sedentary lifestyle, and stress increase the absolute risk imparted by high blood cholesterol. Lowering of elevated blood cholesterol levels by prudent, sustained intake of healthy foods, exercise, weight loss and the judicious use of medications under medical supervision can reduce one's risk for coronary events such as heart attack and other vascular events. Reduction or elimination of other modifiable risk factors at any given cholesterol level is beneficial, and should be part of your treatment plan.

WHAT IS CHOLESTEROL AND WHERE DOES IT COME FROM?

Cholesterol is a soft, odorless, waxy-type substance which is part of all animal and human cells. It is one of a number of fats, called lipids, found in the blood.

There are two primary sources of cholesterol:

1. Within the body—the liver, intestine and skin produce all the cholesterol the body needs.
2. In food we eat—foods only of animal origin such as:
Egg yolks, dairy products, meats, poultry
The cholesterol content of meat is found mostly in the lean tissue not the fat. A food may contain substantial cholesterol but

only a moderate amount of fat. Foods of plant origin have no cholesterol.

The amount of cholesterol produced by the body is determined primarily by genetics and your body's chemistry and, to a lesser extent, by the amount of cholesterol you eat.

HOW CHOLESTEROL TRAVELS THROUGH YOUR BODY

Since cholesterol is a fat, it does not mix with water or blood, cannot travel in the bloodstream by itself, so cholesterol and other fats (lipids), must be "wrapped" in protein. The combination of cholesterol or other fats and protein are called "lipoprotein's".

The 3 lipoproteins we will be concerned with are:

1. Very low density lipoprotein cholesterol (VLDL)
2. Low density lipoprotein cholesterol (LDL)
3. High density lipoprotein cholesterol (HDL)

Lipoproteins

Lipoproteins are classified by weight or density of the protein:

- VLDLs (Very Low-Density Lipoproteins) carry some cholesterol but mainly triglycerides which the liver produces from excess caloric intake. When the VLDLs travel through the blood stream, the majority of triglycerides are removed to be used as energy or stored as fat. As the process occurs, the VLDLs are gradually converted to LDLs. There are many types of VLDL, some are more atherogenic than others.
- LDLs (Low-Density Lipoproteins) carry about 75-80% of the blood cholesterol. Cholesterol is transported by the LDLs from the liver to other parts of the body where it can be used for essential functions. LDLs appear to be responsible for depositing unused cholesterol in the artery walls leading to atherosclerosis. LDLs foster coronary heart disease and have become known as the "bad" cholesterol. There are many types of LDL, some are more atherogenic than others. LDL must be "oxidized" to LDL-OX to be harmful and atherogenic. This is one reason that anti-oxidants and vitamins may protect against CHD and other vascular atherogenic events.

- HDLs (High-Density Lipoproteins) carry about 20-25% of the blood cholesterol. They transport cholesterol from the body's tissues and blood vessels to the liver where it is eliminated. HDLs may also carry cholesterol away from cells in the artery walls back to the liver for reprocessing or removal from the body through the bile acids. This process aids in lessening the possibility of plaque build-up, thus HDLs have become known as the "good" guys, or "good cholesterol". There are many types of HDL-C, some are more protective against CHD than others.

Why Are LDLs Called "bad" Cholesterol?

Each cell in your body has receptors which reach out to the LDLs in the blood stream and pull the LDLs into the cell for productive work in cell growth. A genetic predisposition along with a diet rich in cholesterol or saturated fats causes fewer receptors for LDLs to be made. If there are too few receptors for the amount of LDLs circulating in the bloodstream, some LDLs will be left in the bloodstream and return to the liver where they will be disposed of. But there will be some that will not be disposed of, and these are the ones that will become stuck on the artery walls and begin the build up of plaque. Hence the name "bad cholesterol".

Within the artery walls of a given individual who has too many LDLs floating around, plaque build up may continue until the opening of the artery becomes so narrow that the blood flow is restricted or stopped completely, or the plaque ruptures and a clot forms in the artery occluding blood flow and causing a heart attack. Increased levels of LDL cholesterol is more closely related to increased risk of coronary heart disease than total cholesterol. Therefore a low level of LDL cholesterol, under 130 or less, depending on other diseases, such as Diabetes Mellitus or CHD, is what one should strive for.

Why Are HDLs Called "good" Cholesterol?

It is thought that the HDLs may remove excess cholesterol from the artery walls before it has a chance to build up into a restrictive plaque. The HDLs carry the cholesterol back to the liver for processing or removal from the body. Therefore, HDLs have become known as the "good" guys or "good cholesterol". You should strive for a relatively high level of HDL cholesterol.

What Are Triglycerides and What Do They Do?

Triglycerides are fats formed in the liver when more calories are eaten than can be immediately used. They travel from the liver and intestines to the body's cells to be used for energy or stored in fatty tissues. Triglycerides make up most animal and vegetable fats and comprise the major portion of the fat in your body. Triglycerides are produced mostly from high refined carbohydrate or sugar intake. They are associated with increased risk of CHD. The blood levels should be below 150mg/dL.

WHAT IS HIGH BLOOD CHOLESTEROL?

"High blood cholesterol means that you have more cholesterol present in your bloodstream than is necessary for normal, healthy functioning.

In general, the risk of a heart attack increases as the:

- triglyceride level rises above 150 for men and 110 for women
- the LDL cholesterol level rises above 130
- the HDL cholesterol falls below 40.

What About Ratio?

The relationship between your total cholesterol and your HDLs is one indicator of your risk for cardiovascular disease. The relationship is referred to as your TC/HDL ratio. The lower your ratio number, the lower your risk for cardiovascular disease. To find your ratio, divide your total cholesterol number by your HDL number.

For example:

- If your total cholesterol number is 210 and your HDL number is 35, divide 210 by 35 which equals 6, and 6 is bad,
- If your total cholesterol is 210 and your HDL is 60, your ratio would be 3.5, which is very good.

Strive for a high HDL cholesterol and low total cholesterol with a TC/HDL ratio of 3.5 or less.

THE FAT OF THE LAND

The new guidelines recommend intensified use of nutrition, physical activity and weight control in the treatment of elevated LDL. Dietary recommendations continue to emphasize low saturated fat (less than 200 mg per day), but now allow 25 to 35 percent of caloric intake to be from fat. We are now less concerned about limiting total fat intake than its composition. Saturated fats and transfatty acids are harmful and should be restricted, but polyunsaturated fats, omega 3 fatty acids, and monounsaturated fats can be desirable, as they may actually help reduce triglycerides and reduce LDL-C raise HDL levels.

Americans and Western Europeans consume a lot of fat and animal protein. The caloric composition of the American diet is 43 percent fat, 12 percent protein, and 45 percent carbohydrate. Unfortunately, the emphasis in the United States is animal protein: eggs and bacon for breakfast, hamburger or some other fast food for lunch, and the ever present steak for dinner.

What most people don't realize is that foods of animal origin are mostly caloric fat. Lean beef, for instance, is almost 40 to 60 percent caloric saturated fat while sirloin steak is almost 85 percent saturated fat calories. Hard cheeses referred to as high-protein food are 65 to 85 percent saturated fat calories, while mayonnaise, margarines, and butter are almost 100 percent saturated fat calories. Second, these foods have no carbohydrates or fiber present which are both essential for optimum human health. High-saturated fat foods are disastrous to the human system which was designed for low-fat foods (fruits, vegetables, legumes, seeds and grains) that are high in fiber, antioxidants, vitamins and minerals (Paleolithic diet).

IN SUMMARY:

Eat more monounsaturated fats

(canola and olive oils) =

Lower LDL cholesterol level
Lower triglyceride level
Higher HDL level

Eat less saturated fat =

Lower total cholesterol level
Lower LDL level
Lower triglyceride level
Higher HDL level

Eat less calories,
reduce weight =

Lower triglyceride level
Lower LDL level
Higher HDL level

Exercise more =

Higher HDL level
Lower LDL level
Lower triglyceride level

Eat less saturated fat and exercise more =

Lower total cholesterol/HDL ratio

MEDICATIONS FOR LOWERING YOUR CHOLESTEROL

In accordance with the National Cholesterol Education Program, patients whose LDL cholesterol levels remain high despite adequate dietary therapy should be considered for drug treatment by their doctor. For individuals with severe elevations of LDLs (>225mg/dL) or with definite coronary heart disease (CHD) for whom dietary therapy alone is unlikely to be adequate or for whom the urgency of achieving substantial cholesterol lowering is greater, it may be appropriate to consider drug therapy along with diet earlier.

If medication is prescribed, you must still continue your exercise and diet, since diet always remains the cornerstone of a cholesterol lowering plan and the combination may allow you to take less medication.

... THE BOTTOM LINE

In May 2001, the National Cholesterol Education Program, an expert panel on cholesterol coordinated by the National Heart, Lung and Blood Institute, published its long awaited revised guidelines on management of high cholesterol in adults in the Journal of the American Medical Association. Previous guidelines were issued in 1988 and 1993.

The new guidelines call for a more stringent lower target for LDL cholesterol for patients with heart disease and diabetes mellitus as well as those whose risk of developing CHD over the next 10-20 years is high. The LDL level should be targeted to less than 100 milligrams (mg) per deciliter (dL) if significant risk factors are present.

The latest cholesterol guidelines also reflect new findings about the significance of HDL (high-density lipoprotein, or "good cholesterol"). HDL cholesterol protects against heart disease, so a higher HDL concentration is better. A level less than 40mg/dL is defined as low and is now considered a major risk factor for developing heart disease. HDL levels of 60 mg/dL or more help to lower risk heart disease, according to the guidelines.

The new guidelines recommend intensified use of nutrition, physical activity and weight control in the treatment of elevated LDL. Dietary recommendations continue to emphasize low-saturated fat (less than 7 percent of daily calories) and low cholesterol (less than 200mg per day), but now allow 25 to 35 percent of caloric intake to be from fat. There is less concern about limiting total fat intake than its composition. Saturated fats and transfatty acids are harmful and should be restricted, but unsaturated fats, both polyunsaturated fatty acids (PUFA) and monounsaturated fatty acids (MUFA), can be desirable, as they may actually help reduce triglycerides and raise HDL levels.

Another change recognizes the link between Type 2 diabetes (noninsulin-dependent diabetes) and heart disease. Diabetes is now considered to have the same risk as a previous heart attack and documented coronary disease. Besides increasing short-term risk for a coronary event, diabetes poses as great a risk for having a heart attack in the next 10 years as heart disease itself, the guidelines state.

Obesity, insulin resistance and inactivity can also contribute to high LDL and low HDL levels. Moderate aerobic exercise and regular physical activity, stress reduction and weight reduction do the following:

- Increase the "good" HDLs - age has no effect on the benefit but if you smoke, you may not receive the benefit
- Lowers triglycerides
Lowers "bad" LDL cholesterol

Stop smoking, stop drinking coffee and reduce alcohol:

- Smoking lowers your "good" HDLs and raises your "bad" LDLs.
- Unfiltered coffee may raise your blood cholesterol, triglycerides and lower your "good" HDLs.
- Alcohol in a small quantity may have benefit. One glass of red wine per day may have beneficial effects on CHD (French paradox). One should limit alcohol to these levels.