

# Cholesterol

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What is Cholesterol?

High cholesterol is a leading risk factor for coronary heart disease and stroke. Cholesterol is a waxy substance made by the liver and also comes from the animal dietary products such as meats, poultry, fish, eggs, and dairy products. Cholesterol circulates in the blood and insulates nerves. It is an important part of cell membranes and certain hormones. However, since the human body makes enough cholesterol, dietary cholesterol is not essential. Hypercholesterolemia is the term for high levels of blood cholesterol.

The majority of the cholesterol you need is produced in your own body, while the rest comes from animal-based saturated fatty foods you eat. These saturated fats and trans-fatty acids raise your blood cholesterol levels. Most dietary cholesterol comes from the following animal-based products: meats, poultry, fish, eggs, butter, cheese, and whole milk.

There are two kinds blood cholesterol. The low-density lipoprotein (LDL) is known as the "bad" cholesterol. The high-density lipoprotein

(HDL) is known as the "good" cholesterol. Cholesterol has important functions in your overall health and body function. Cholesterol builds and repairs cells; produces hormones such as estrogen and testosterone; and circulates in the bile acids, aiding fat digestion. Since cholesterol and other fats cannot dissolve in the blood, special carriers called lipoproteins transport them to and from the cells to the liver where they are metabolized.

### **What is a cholesterol tie?**

**Atherosclerosis:** This term may look long and scary, but in reality, it simply refers to a build-up of plaque in the arteries. Cholesterol tie is the direct link between the blood cholesterol (especially the LDL or the bad cholesterol) and the plaque build-up in the blood vessels. Plaque build-up is a process where there is a deposition of cholesterol and other materials in the inner arterial lining, leading to a progressive blockage of the arterial lumen. The arteries have three layers: the intima (inner cellular layer), the media (middle muscular layer), and the adventitia (outer fibrous layer). The inner layer consists of endothelial cells that protect the arterial wall. The media provides elasticity to the arteries. The adventitia, or the fibrous layer, provides the blood vessel with framework, structure, and stability.

Whenever there is damage to an arterial inner lining, the healing process begins with an infiltration of inflammatory cells into this lining. The damaged inner lining also allows the migration of cholesterol into these inflammatory cells, which are referred to as mast cells. Along with the duplication of the media's smooth muscle cells, the gradual build-up of cholesterol in the mast cells leads to a mound of plaque to rise inside the arterial lumen. When this bulging mound occupies more than 70% of the arterial lumen, people begin to experience symptoms of chest pain during moderate exertion. If the blockage progresses to 90 to 95% of the arterial lumen, then patients begin to have symptoms of chest pain with minimal exertion or even at rest. Frequently, the plaque tip ruptures, leading to the formation of a blood clot. This clot can completely block the artery, causing a heart attack or stroke.

The LDL (the bad) cholesterol is deposited into the plaque along the arterial linings. The circulating HDL (the good) cholesterol enters

the plaque mound, removes the deposited LDL cholesterol, and then returns it to the blood circulation, where it is either reused or converted into bile acids and disposed of. The higher your LDL level is, the greater your chances are of plaque development. The good news is that the higher your HDL levels are, the lower your risk of plaque build-up.

Numerous studies have established a direct correlation between elevated cholesterol levels and increased risk of heart disease or stroke. Lipid Research Clinics-Coronary Primary Prevention Trial (1984) confirmed a direct link between high blood cholesterol and heart disease. This study also showed that lowering the total and LDL (bad) cholesterol levels would significantly reduce your heart disease risk. In that same study, every 1 mg% reduction in the total cholesterol level corresponded to a 2% reduction in the heart disease risk. Thus, when a person's cholesterol was reduced from 250 mg% to 200 mg%, there was a 100% reduction in that person's heart disease risk. Heart disease is uncommon at cholesterol levels below 150 mg%. More than 50% of all adult Americans have high levels of cholesterol. Interestingly, more than 40% of people who have had a heart attack have cholesterol levels below 200 mg%. It brings up the question—what cholesterol level is ideal or desirable?

### **Cholesterol Levels**

**Desirable:** If your total cholesterol is less than 200 mg%, your heart attack risk is relatively low unless you have other risk factors. Even if you have a low cardiac risk, it is still sensible to eat foods low in saturated fat and cholesterol as well as to get plenty of exercise.

**Borderline risk:** People whose total cholesterol level ranges from 200 to 239 mg% have an increased cardiac risk. About 30% of American adults are in this borderline group.

**High risk:** If your total cholesterol level is 240 mg% or more, your heart disease risk is very high. People who have a total cholesterol level of 250 mg% have twice the risk of a heart attack than people with cholesterol levels of 200 mg%.

By age 40, you should have a complete lipid profile, which test your LDL cholesterol, HDL cholesterol, and triglyceride levels. Have your cholesterol levels measured at least every five years if you are a man over 45 years or a woman over 55 years. Get your cholesterol

levels checked during your first visit to your physician. If you have cholesterol problems, heart disease, or you are on lipid-lowering drugs, you should get your blood tested every six months.

Avoid eating or drinking anything other than water for at least 12-14 hours before you get your cholesterol test. Do not exercise before the blood is drawn. Since cholesterol goes up with age, start an aggressive lifestyle change program now, even if your cholesterol levels are normal at present. If you have a strong family history of heart disease, you may have to aim for cholesterol levels below 150 mg% to minimize your heart disease risk.

**LDL (bad) cholesterol:** The LDL cholesterol level greatly affects your heart attack and stroke risk. The lower your LDL cholesterol, the lower your risk. In fact, it is a better heart-disease risk parameter than your total cholesterol. Ironically, the LDL cholesterol level goes up with increasing age (5 mg per every 5 years). Obesity, high intake of saturated fats, and lack of exercise also contribute to the elevated LDL cholesterol levels. Your ideal LDL cholesterol level should be less than 100 mg%. Recent research highlights the importance of keeping LDL levels less than 80 mg% for those with heart disease or multiple cardiac risk factors. If three months of proper diet, weight control, and exercise does not lower your LDL cholesterol to the desired level (80-100 mg%), then ask your doctor for appropriate medicines to lower your LDL cholesterol. If your LDL cholesterol levels are above 150- 200 mg%, then simultaneous lifestyle modifications and drug treatment may be needed. Time is of the essence in this situation.

**HDL (good) Cholesterol:** Normally, HDL cholesterol levels range from 40 to 50 mg% in men and 50 to 60 mg% in women. HDL cholesterol levels below 40 mg% increase the heart disease risk. The HDL level does not change very much during the adult lifespan. However, vigorous lifestyle modifications (including a heart-healthy diet, weight control, exercise, and smoking cessation) can increase your HDL cholesterol level by 10 to 15%. People with high triglyceride levels usually have lower HDL levels and a higher heart disease or stroke risk. Progesterone, anabolic steroids, and male sex hormones (testosterone) also lower HDL cholesterol levels. Female sex hormones raise the HDL cholesterol levels. While a small amount of HDL does come from your diet, the majority of the HDL cholesterol is made in

the liver. If you are wishing for an HDL cholesterol-rich diet or a pill that drastically increases your HDL, then dream on! The present day dream-pill spells: *heart-healthy diet, exercise, and weight control*. I am sorry if you do not agree with me!

**Cholesterol ratio:** When referring to cholesterol levels, some physicians and cholesterol technicians place emphasis on using the ratio of one's total cholesterol to HDL cholesterol. However, instead of just using a ratio, the American Heart Association recommends that the absolute numbers for one's total, LDL and HDL cholesterol be used. The actual values are more useful to your physician than the cholesterol ratio in determining the appropriate combination of treatment plans for you. The most commonly used ratio is obtained by dividing the total cholesterol level by HDL cholesterol. For example, if your total cholesterol level is 200 mg% and your HDL cholesterol level is 50 mg%, then the ratio would be 4:1. The goal is to keep it below the optimal ratio of 3.5:1.

**Triglycerides:** Triglycerides are the free-floating fatty acids found in your blood stream. They come from your diet and are a by-product of your fat metabolism. High or elevated triglyceride levels are noted during excess carbohydrate or fat ingestion, alcohol consumption, prolonged fasting, a hypothyroid state, or during hormone replacement therapy. Obese and diabetic people also have a tendency for higher triglycerides and lower HDL levels. The normal triglyceride level ranges from 50 to 150 mg%. Since triglycerides are the precursors of your LDL cholesterol, the higher your triglycerides are, the higher your LDL levels will be. Triglycerides are an independent heart-disease risk factor among women and diabetics. Since triglyceride levels go up following a meal, you must fast for twelve hours before measuring your triglyceride levels.

Total cholesterol	<200	Ideal <160
LDL cholesterol	<100	Ideal <80
HDL cholesterol	> 40	Ideal >50
Triglycerides	<150	Ideal <150

**Special Message for Women:** Premenopausal women are usually protected from heart disease because of their elevated HDL levels, resulting from the female sex hormone estrogen. As woman get older and gain weight, their triglyceride and cholesterol levels go up,

increasing their heart disease risk. Postmenopausal women have the same risk as their male counterparts. Postmenopausal hormone therapy (PHT) may benefit some women with osteoporosis or other conditions associated with menopause. However, a large clinical trial showed no cardiovascular benefit from hormone therapy in women who previously had a heart attack. Recent clinical trials appear to confirm that PHT does not reduce the risk of cardiovascular disease or stroke in postmenopausal women, even though it may reduce osteoporosis.

### **What foods raise cholesterol levels?**

Your body makes all the cholesterol it needs. Until it is used, this cholesterol circulates in your blood. Liver is the main organ where cholesterol is produced. High glycemic-index carbohydrates and saturated fatty acids are broken down in the liver into smaller components called acetate fragments. The liver uses these acetate fragments to produce cholesterol.

Dietary cholesterol comes from animal foods such as meat, fish, poultry, egg yolks, butter, cheese, and other dairy products. Foods from plants (fruits, vegetables, grains, nuts and seeds) do not contain cholesterol. As expected, eating cholesterol-rich foods raise your blood cholesterol levels. Egg yolks have drawn special attention because each egg yolk contains two hundred and seventy-four mgs of cholesterol. The American Heart Association recommends eating no more than two eggs per week. However, recent literature supports a more liberal intake of eggs (one per day) without fear of significantly elevated cholesterol levels.

Saturated fats and *trans-fatty* acids raise blood cholesterol levels. Saturated fats come from animal foods such as meat, lard, poultry fat, butter, cheese, and other whole-milk dairy products. Vegetable sources such as coconut oil, palm oil, palm kernel oil, and cocoa butter also contain saturated fats. Many scientists believe that saturated fats and *trans-fats* have a greater impact than dietary cholesterol in raising blood cholesterol levels. This is especially true for the LDL (bad) cholesterol.

**Heredity:** Some people may have a family history of elevated cholesterol levels and heart disease at a very young age. The siblings of such members are at increased risk for heart disease. You should get a

complete cardiovascular evaluation if you have a family member who has had heart disease while in his early forties. If your physician determines that you have a high cholesterol level, do some research to determine if other family members have/had the same problem. Inquire what medications or therapies helped them. More than likely, that same approach may help you. Your genes also influence your LDL cholesterol level and how fast LDL is made and removed from your blood. Familial hypercholesterolemia, an inherited high cholesterol disorder that affects 1 in 500 people, is associated with premature heart disease.

**Diabetics:** It is not uncommon to see diabetics with high blood pressure and a history of smoking to have heart disease in their thirties. They also have a tendency to have severe generalized coronary atherosclerosis. Hence, it is very important for diabetics to take an aggressive approach to reduce their cholesterol levels to as low as 150 mg%.

**Weight:** Excess weight increases your LDL (bad) cholesterol level. The good news is that weight loss lowers your LDL cholesterol, triglyceride levels, and raises your HDL (good) cholesterol levels.

**Physical Activity:** The numerous benefits of exercise are outlined in the chapters on *Exercise*. Even a routine 30 to 45 minute walk everyday can help you to loose weight, lower your LDL cholesterol level, and reduce triglyceride level. Exercise is one of the few ways in which you can increase your HDL cholesterol level. Moderate exercise such as jogging for 20 minutes three times-a-day can make a big difference in optimizing your cholesterol levels and maintaining a heart-healthy lifestyle.

**Alcohol:** Alcohol intake increases HDL cholesterol but does not lower LDL cholesterol. Since there are three different forms of HDL in the body, it is not clear whether the increase in HDL cholesterol by alcohol really helps the heart or not. Some studies have shown that people who consume two drinks per day have slightly lower incidence of heart disease. Consumption of too much alcohol can damage your liver or heart muscle and lead to high blood pressure and triglyceride levels. Some people are sensitive to even small amounts of alcohol. Because of the risks, alcoholic beverages should not be used as a way to prevent heart disease.

Stress: Stress has been shown in several studies to raise blood cholesterol levels. One way that stress may do this is by affecting your habits. For example, when some people are under stress, they console themselves by eating fatty foods. The saturated fat and cholesterol in these foods contribute to higher levels of blood cholesterol.

### **Why lower cholesterol?**

Without a doubt, lowering your LDL cholesterol is a huge step in bringing your total cholesterol down to a desirable level. The main benefits of lowering LDL include:

- Decreased heart attack and/or stroke risk
- Reduced formation of new cholesterol plaque
- Reduced arterial blockage and existing plaque size
- Prevention against plaque rupture

### **Natural ways to lower your cholesterol levels**

Calorie cutback: Calorie reduction must be the initial step in your overall cholesterol reduction plan. This leads to a decline in the total and LDL cholesterol levels. Any excess calories coming from carbs, proteins, or fats, if not used for immediate energy, will eventually turn into fat that can raise your cholesterol levels. You can safely reduce your calorie intake to 1200 calories without compromising the nutritional value of your diet. Any excess calories you consume beyond that should be proportional to your physical activity and the amount of calories burned during those activities. Diabetics, no matter what type of lifestyle they are involved in, do well on 1800 calories per day. You can safely reduce your calorie requirements to what your body actually needs and not what your taste buds demand. Using my recommendation of fresh fruits, salads, beans, and grilled foods, you can eat normal foods and loose weight at the same time. The sugar in sweets very quickly spikes triglycerides in people. Avoid fruit juices, soda, pastries, pies, candy, cookies and sweet desserts.

**Dietary cholesterol:** If you eat one whole egg a day (one egg has 274 mg of cholesterol), try to avoid or limit other sources of dietary cholesterol on that day. You could eat 2 to 3 egg white per day, or egg substitutes, in place of whole eggs. Drastically reduce your

consumption of fried foods, saturated fats, chicken skin, meats with visible fat, and spreads that have *trans-fatty* acids. Avoid eating baked goods (like muffins, cookies and cakes) that are rich in carbs, fats, and cholesterol from egg yolks. Make sure your meat choices are lean and no more than 4-6 ounces per meal. Select cholesterol-free vegetarian choices in place of meats for one of your daily meals.

**Fiber:** Since fiber can lower your LDL cholesterol level by 10-15%, include foods high in fiber such as green, leafy-vegetables, whole grains, and beans in your daily meals. Soluble fibers are also found in fiber supplements or in fruits such as apples, grapes, and citrus fruits. The fiber in these foods helps lower total cholesterol levels and often raises HDL levels. It is believed that fiber binds to cholesterol in the small intestine and prevents cholesterol absorption into the bloodstream, thus reducing cholesterol levels. You need to consume at least 30 grams of fiber per day. One example is Psyllium, a fiber that is seen primarily in Iran or India. It is primarily used in traditional herbal medicines and is a common ingredient in bulk laxative products as well. A study of psyllium showed that consumption of psyllium through supplements lowered LDL cholesterol levels. The same study showed LDL level improvement in both children and adults. This benefit of psyllium is believed to come from its soluble fiber component. Another fibrous example is oat bran, a common breakfast staple. In one study, eating two ounces of oat bran per day showed a 16% reduction of LDL levels and a 15% increase of HDL levels. Oat bran and barley have a soluble fiber known as Beta Glucan that lowers cholesterol levels.

**Body Weight:** Obesity is a major cause of high triglyceride levels. If you are overweight, lose weight with regular exercise and by reducing your total calorie intake.

**Red wines:** Red wines such as Cabernet, Sauvignon, Merlot, and Pinot Noir contain antioxidants that slow down the oxidation of LDL cholesterol that reduces the amount of LDL deposited in the plaques. Limit your intake of red wine to no more than 1-2 glasses per day.

**Orange Juice:** In one study conducted at the University of Western Ontario in Canada, twenty-five students drank orange juice every day for a four-week period and had a 21% increase in their HDL levels. The rise in HDL was thought to be related to the flavonoid in the orange juice.

**Beans:** Kidney and red beans are a wonderful choice for raising HDL. The low-glycemic index carbohydrates in these foods cause less profound insulin spikes. People who consume foods rich in low-glycemic carbohydrates have higher HDL levels.

**Fish:** Omega-3-fatty-acid-rich-fish, eaten several times a week, can raise your HDL level. Sardines, salmon, sea bass, herring, mackerel and tuna fall in this category. If you do not like to eat fish, fish-oil capsules can be used as a supplement.

**Olive Oil:** Olive oil, a mono-saturated fatty acid, has been shown to lower blood cholesterol. Extra virgin olive oil is suggested to be better than other varieties. Including 1-2 teaspoons of olive oil with each meal has been shown to reduce cholesterol levels.

**Cholesterol-lowering spreads:** Spreads made with plant stanols and sterols esters have been shown to lower LDL cholesterol by as much as 14%. They do not alter the HDL cholesterol levels. They lower cholesterol to a greater extent in people with elevated cholesterol compared to those with normal cholesterol levels. These sterols trick your intestine into thinking they are cholesterol. When the intestine tries to absorb them, it is not able to, therefore blocking actual cholesterol from being absorbed. The National Cholesterol Education Program of the National Institute of Health recommends adding 2 grams of plant stanols and sterols into a general dietary plan. Presently, two types of these products are available on the market. *Take Control* contains plant sterol esters, and *Benecol* contains plant sterol. *Benecol* can be used as spread or in cooking and baking without altering the food flavor or color. Because it does not contain any trans-fatty acids, it is a safe substitute for all other margarine or spreads. *Take Control* can be used as a spread. However, it is not presently suitable for baking or cooking. Switch your normal margarine or butter choices to *Benecol* or *Take Control* products that are specifically designed to help reduce cholesterol.

**Onions:** Some research suggests that eating one half of a raw onion per day may raise HDL levels by as much as 30%.

**Soy Products:** An analysis of thirty-eight studies on soy confirmed that it lowers total cholesterol, LDL cholesterol, triglycerides, and raises HDL cholesterol. To achieve the desired results (15-25% reduction in cholesterol), you have to consume at least 25

grams of soy protein per day. Soy protein is available in numerous forms such as fresh soybeans, protein bars, shakes, milk and tofu.

**Nuts:** Nuts such as almonds and walnuts have high amounts of monounsaturated or polyunsaturated fatty acids that help lower cholesterol. Researchers at the Loma Linda University found that a diet containing pecans not only lowered total and LDL cholesterol levels significantly, but it also helped to maintain desirable HDL cholesterol levels. Another study found that the Mediterranean style diet, which includes walnuts, lowers cholesterol.

**Trans-Fatty Acids:** Avoid eating trans-fatty-acid-containing-foods such as French fries, cookies, cakes and many of the fried fast foods. They behave as saturated fats and easily raise your cholesterol levels.

**Minimize Carbohydrates:** Minimize your consumption of carbohydrates—sugar, flour, potatoes, white rice, etc.—because they can turn into fat and cholesterol. Blood sugar spikes by carbohydrates can dramatically lower your HDL level.

**Smoking cessation:** According to a study from Vanderbilt, people who quit smoking experienced a rise in their HDL levels by seven points.

**Royal Jelly:** One way to help reduce your cholesterol levels while you quit smoking may be to have a little royal jelly. Surprisingly, this has been noticed to lower cholesterol levels by reducing some of the cholesterol-elevating effects of nicotine.

**Natural Supplements:** Having several different avenues for lowering cholesterol is important because the causes of high cholesterol levels vary greatly from person to person. Natural remedies such as Guggul, Pantethine, Policosanol, Curcumin, and Beta-Sitosterol are just a few supplements that are easily available at a low cost compared to prescribed drugs.

**Guggul:** A gum resin from the mukul myrrh tree known as Guggul has been shown to lower cholesterol levels. In one trial, the researchers who compared Guggul to *Clofibrate*, a cholesterol-lowering drug, noted that the average fall in serum cholesterol was slightly greater in the Guggul group. The HDL cholesterol level also rose in 60% of people in the Guggul group. Guggul has also been shown to reduce the stickiness of platelets— another effect that lowers the risk of coronary artery disease

**Pantethine:** Some people who have taken pantothenic acid, a naturally occurring substance, have noticed an increase in their HDL levels.

**Policosanol:** One study showed a reduction in total cholesterol levels by 17%, LDL cholesterol levels by 28%, and raise HDL cholesterol levels by 28% in those people who took policosanol compared to those who did not take policosanol.

**Curcumin:** This reduces cholesterol levels by interfering with intestinal cholesterol uptake, increasing the conversion of cholesterol into bile acids, and increasing the excretion of bile acids.

**Niacin:** This naturally occurring vitamin lowers total cholesterol levels, raises HDL levels (as much as 15 to 30%), and reduces triglyceride levels (as much as 50%). It comes in 500 mg tablets and can be taken 2 to 3 times a day. Combining niacin with vitamin B6 can minimize facial flushing, a common side effect resulting from blood vessel dilatation. Another form of Niacin called Inositol has been shown to cause less flushing.

**Chromium:** Chromium supplements have been shown to increase HDL cholesterol levels by an average of nearly 6 points (a 16 % increase), leading to a 20% reduction in the heart attack risk.

**Calcium Citrate:** Taking one gram of calcium daily (as the citrate) has been shown to lower LDL cholesterol levels by 6% and increase HDL cholesterol levels by 7%.

**Vitamins B and C:** Like niacin, B vitamins also lower LDL levels by decreasing the rate at which LDL is oxidized. In addition, Vitamin C has been noted to slightly reduce cholesterol levels.

**Carnitine:** This natural supplement also has been shown to increase HDL levels.

**Coenzyme Q10:** It has been noted to reduce total cholesterol levels. It has also improved the heart function of patients with heart failure.

**Garlic:** This little plant that lowers blood pressure has also been widely studied for its cholesterol-lowering properties.

**Grape Seed Extract:** Another unusual cholesterol-lowering supplement, this has also been noted to reduce total cholesterol serum levels.

**Flaxseeds:** Flaxseeds provide alpha-linolenic acid, a poly-unsaturated fat that has been shown to lower cholesterol while

providing needed soluble fiber. Flaxseed also contains Omega-3 fatty acids that stabilize the arterial lining membranes.

**Red Yeast Rice:** This Chinese red yeast rice comes from fermenting yeast called *Monascus purpureus* over red rice. The red yeast rice has been noted to have a substance similar to certain prescription medications commonly referred to as “statins,” which lower cholesterol. *Monascus purpureus* inhibits the action of an enzyme called HMG-CoA reductase, which is known to raise cholesterol. Presently, the U.S. Food and Drug Administration (FDA) classifies red-yeast rice as a dietary supplement. Some studies of red yeast rice have shown it to reduce total cholesterol levels by 16%, LDL cholesterol by 21%, and triglycerides by 24%, while increasing HDL by 14%. It is available as 500 to 600 mg capsules that can be taken 2 to 4 times daily. However, just as the statins, red yeast rice also has been shown to affect the liver. Hence, you need to monitor your liver tests done if you are taking the pills for a long period.

**Grapefruit Juice:** When grapefruit or grapefruit juice is taken with HMG-CoA reductase inhibitors (such as Atorvastatin, Cerivastatin, Fluvastatin, Lovastatin, Pravastatin, and Simvastatin), it enhances the effect of the medications. It also causes a significant increase in the drug blood levels, leading to a greater risk of serious side effects or liver damage. Because red yeast rice appears to act in much the same way as these cholesterol-lowering drugs, it would be wise to avoid grapefruit, its juice, or other grapefruit products (such as marmalade) while taking red yeast rice.

## **Cholesterol Lowering Medicines**

Several drugs have been successfully used in lowering cholesterol and reducing the risk of heart attack, according to well-established studies. The HMG-CoA reductase inhibitors, commonly referred to as “statins,” are considered a first-line drug therapy for the treatment of high cholesterol. HMG-CoA reductase is a chemical made in our bodies that helps the liver produce cholesterol. Statins get in the way of that process, thus reducing the amount and frequency of cholesterol being produced. Here is a partial list of some HMG-CoA reductase inhibitor drugs, including their dosages and actions.

Drug	Dose in mg	TC ↓	LDL ↓	HDL ↑	TG ↓
Altocor	10-60mg	18-29%	24-41%	9-13%	10-25%
Crestor	5-40mg	33-46%	45-63%	8-14%	10-35%
Lescol	20-80mg	17-27%	22-36%	3-9%	12-23%
Lescol XL	80mg	25%	33-35%	7-11%	19-25%
Lipitor	10-80mg	25-45%	35-60%	5-9%	19-37%
Mevacor	10-80mg	16-34%	21-42%	2-9%	6-27%
Pravachol	10-80mg	16-27%	22-37%	2-12%	11-24%
Zocor	5-80mg	19-36%	26-47%	8-16%	12-33%

Table Key: TC = Total Cholesterol. LDL = Low Density Lipoprotein (or "bad cholesterol"). HDL = High Density Lipoprotein (or "good cholesterol"). TG = Triglycerides,

Get a comprehensive lipid evaluation before you get on one of these drugs. I would recommend trying the natural approaches described earlier before you start any drug. Even after you get on a drug, make sure that you continue to practice natural cholesterol-lowering techniques to keep your needed drug dose to a minimum. All cholesterol drugs have side effects. Sometimes these side effects can become a limiting factor. Combinations of certain types of drugs, such as a statin and niacin, may not be suitable in diabetic patients. Hence, it is very important for your doctor and you to understand the drug interactions when a combination of drugs is used to lower your cholesterol levels.

Most of the statins lower the total cholesterol level 16 to 46% and the LDL cholesterol level 21 to 60%. They also raise the HDL cholesterol level 2 to 16% and lower the triglyceride levels 10 to 37%.

Statin tend to cause an elevation in the production of liver enzymes. Hence, it is important to get liver function tests (LFTs) three months after you have been on a statin drug. A small percentage of people who try a "statin" get muscle aches and an even smaller percentage in that group have to stop the drug completely because of the severity of the aches.

Triglyceride-lowering drugs: These drugs also increase HDL cholesterol by 10-30%. If your triglyceride levels exceed 500 mg%, then you are at an increased risk of pancreatitis. Most of the cholesterol lowering agents mentioned above also lower triglyceride levels. Gemfibrozil, Fenofibrate, and Clofibrate are approved drugs in the "fibrate" category that are prescribed to reduce the triglyceride levels. They reduce the triglyceride levels by as much as 50 to 60%. Their major side effects include gastrointestinal upset, nausea, and stomach cramps.

### **Cholesterol Myths:**

**Is margarine better than butter?** Both margarine and butter are high in fat, so use both in moderation. Saturated fats increase your cholesterol. Margarines that contain trans-fatty acids are as bad as butter. So keep the amount of total saturated fat you consume to a minimum. Select liquid or tub margarines that are trans-fatty acid free or, better yet, switch to *Benecol* or *Total Control* spreads.

**Thin people do not have high cholesterol:** Even though overweight people have higher cholesterol levels, thin people also can have high cholesterol levels. I have had patients who were less than 100 lbs and who needed heart surgery. If you have a family history of heart disease, then you need to reduce your cholesterol to the minimum levels possible.

**My doctor is not worried about my cholesterol:** If this is your excuse, then find a doctor who cares about your cholesterol levels. High cholesterol levels can be easily lowered with diet, exercise, and lifestyle modifications that can dramatically reduce your cardiac risk!

Since the label does not contain cholesterol, it must be all right: Wrong!!! Remember that your body manufactures cholesterol in the liver from the saturated fats. Hence, the more saturated fats you consume, the greater the cholesterol production in your own body.

Since I am taking cholesterol-lowering pills, I can eat what ever I want: Never believe this lie! If you do try eating whatever you want, you will raise your cholesterol levels, your doctor will increase your cholesterol medications, and you may suffer more side effects from the drugs.

