
Non-Drug Ways to Promote Health by Lowering Cholesterol

What is cholesterol?

Cholesterol is a waxy, fat-like substance found in the blood and the cells of the body. The body gets cholesterol in two ways. Some is made in the liver. The rest comes from eating foods from animals such as egg yolks, meat, and whole-milk dairy products. Cholesterol is important for good health. It is needed for making cell walls, tissues, hormones, vitamin D, and bile acid, which aids in the digestion of food.

How does a body get too much cholesterol?

A person can get too much cholesterol in two ways. 1) High blood cholesterol can run in families. The amount of cholesterol your body makes and the way your body controls its cholesterol levels can be affected by your family health history. 2) A person's diet may include too many foods high in cholesterol. Any type of food, whether from animals or plants, can contain fats, which cause the body to make even more cholesterol.

How will I benefit by lowering my cholesterol?

Too much cholesterol in the blood can build up in the walls of blood vessels and block blood flow to tissues and organs. This can increase the risk of developing heart disease and stroke (also known as a brain attack).

- **For people without heart disease:** studies have shown that lowering cholesterol levels can reduce the risk of developing heart disease, including heart attacks and deaths related to heart disease. This is true for both those with high cholesterol levels and those with average levels.

- **For people with heart disease:** studies have shown that lowering cholesterol can reduce the risk of dying from heart disease, having a nonfatal heart attack, and needing heart bypass surgery or angioplasty (surgery to unblock or repair a blood vessel).

How is cholesterol measured?

Cholesterol is measured through a simple blood test known as a lipoprotein profile.

What cholesterol levels are considered good?

The desirable ranges include:

- Total cholesterol: Less than 200 mg/dL
- Low Density Lipoprotein (LDL) cholesterol ("bad" cholesterol): Less than 100 mg/dL
- High Density Lipoprotein (HDL) cholesterol ("good" cholesterol): 40 mg/dL or higher
- Triglycerides (another kind of fat found in the blood): Less than 150 mg/dL.

How can cholesterol be lowered?

Eating right, exercising regularly, and managing your weight are the most important ways to lower your cholesterol and prevent heart disease.

Are there other ways to prevent heart disease?

Avoid smoking. Smoking lowers HDL (the good cholesterol) in your body. It also makes it difficult to get the activity you need to help reach healthy cholesterol levels.

Although there are no known data to show that emotions affect cholesterol, studies show that stress is one of the key risk factors for developing heart disease. Cultivating positive



Non-Drug Ways to Promote Health by Lowering Cholesterol

emotions (e.g., peace, compassion) can significantly improve health and quality of life if you tend to feel negative emotions (e.g., anger, hostility) often throughout the day.

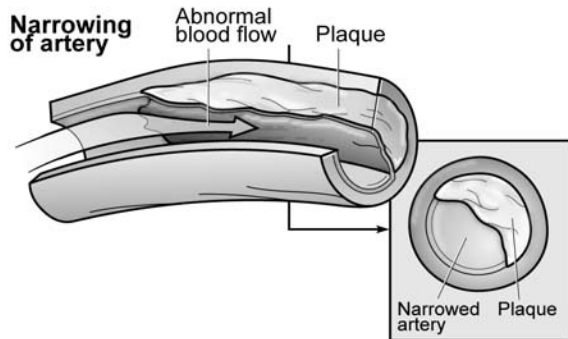
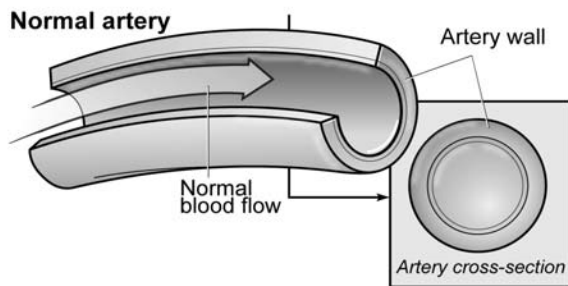
Are non-drug therapies just as helpful as medications for heart health?

In the Lyon Diet Heart Study, the effectiveness of a Mediterranean type diet was tested in people who had already had one heart attack. After four years, compared to people who ate a careful diet (low fat), the people who ate the Mediterranean type diet had 50-70% lower risk for recurrent heart disease (12% fewer heart events for the Mediterranean diet people vs. 4% fewer events for the people eating a low fat diet). The Mediterranean diet was three times more effective than statin drugs in preventing a second heart problem. (Statins are drugs that are prescribed to lower cholesterol levels). A logical reason for this is that the Mediterranean diet provides the body many more benefits than

the drug does. The vegetables, fruits, fiber and essential fatty acids in the diet help not only reduce cholesterol but also reduce inflammation, cancer risk, the development of arthritis and Alzheimer's disease. Good nutrition increases the health of the whole body not just the heart.

What is the Mediterranean diet?

People who live in countries bordering the Mediterranean Sea have been found to have less heart disease than those in the U.S. and other western countries. There is no one standard Mediterranean diet. Diets in these countries differ but have some common features. The Integrative Medicine Program at the University of Michigan has developed an easy-to-follow food pyramid that defines key ingredients of a Mediterranean diet. It can be accessed at the following website: <http://www.med.umich.edu/umim/food-pyramid/about.htm>.



Smooth artery results from:

Eating right (Mediterranean diet) exercising regularly, managing your weight, and cultivating positive emotions such as a sense of peace



Plaque build-up results from:

Smoking, obesity, and eating processed foods high in saturated fat, and experiencing negative emotions such as anger and hostility





Non-Drug Ways to Promote Health by Lowering Cholesterol

What are the best ways to lower cholesterol through diet?

Eating or taking the following are the best ways to lower cholesterol through diet: fiber that absorbs water or that is thick and sticky, fiber supplements, soy protein, plant sterols and stanols, sterol or stanol supplements, and nuts.

Fiber that absorbs (takes in) water or that is thick and sticky

Fiber that absorbs water does three things well in promoting health: 1) Reduces the absorption of cholesterol. (Absorption is the process of taking nutrients from the digestive system into the blood, so they can be used by the body). 2) Reduces the speed at which starches and sugars in food are absorbed by the body [[See our handout on Glycemic Index & Glycemic Load](#)], and 3) If taken before meals, promotes weight loss by absorbing water and giving the sense of being full.

Good sources of helpful fiber:

- **Pectin** is a fiber that binds to bile acids (acids made in the liver from cholesterol) and to cholesterol preventing its absorption. Pectin is found in fruits, vegetables and seeds. Carrots, apples and the white substance on the inside of citrus rinds are excellent sources of pectin. A Scottish study found that eating 2 carrots a day decreased cholesterol by about 10%.
- **Oat bran** binds cholesterol and prevents absorption. A British study showed a 5% reduction in cholesterol by eating oat bran cereal each day.
- **Ground flax seed** also has the benefit of being rich in omega-3 fatty acids. The best and most cost-effective way to take flax seed is to buy the seed in bulk and grind up a week's worth in a coffee grinder. Once you grind the seed, it spoils quickly so store it in the refrigerator. Take 1-2 Tbsps. daily over

salads, with cereal (oat bran), in smoothies or with water/juice.

Nutritional fiber supplements

These can be taken at a dose of 1 Tbsp. in 8-10 oz of water daily or 1 tsp. in 6-8 oz of water before each meal.

- **Psyllium** (*Metamucil* and others)
- **Methyl cellulose** (*Citrucel*)
- **Guar gum** (*NOW Foods guar gum powder*)
Less gritty and tastes better than psyllium.
- **Ground flax seed**

NOTE: Allow at least an hour between taking a fiber supplement and any vitamins or prescription drugs you may take. Fiber can limit the absorption of prescription medications as well as some vitamins such as calcium, iron, zinc, and vitamin B₁₂, so you will not get their full effect if taken with fiber.

Soy protein

Soy has ingredients that can lower cholesterol by limiting absorption.

The daily dose of soy protein for lowering cholesterol is between 20-50 gms.

- You can get about 10 gms of soy from 1 to 2 cups of soy milk, 4 oz of tofu, 1 oz of soy flour, or 1/2 cup of textured soy protein.
- Eating the whole foods works better than taking a soy supplement unless the supplements contain whole soy protein. Soy supplements often only include isoflavones (one helpful ingredient in soy) and do not include the fiber or the plant sterols. This limits their effectiveness in lowering cholesterol.

Plant sterols and stanols

Sterols and stanols are types of fat found in plants such as fruits, vegetables, nuts, seeds,



Non-Drug Ways to Promote Health by Lowering Cholesterol

cereals, legumes (e.g. peas, beans, lentils, peanuts), and vegetable oils (particularly soybean oil). They limit cholesterol absorption through the gut by approximately 50%.

A Mediterranean diet that is rich in plants is a good source of plant sterols and stanols and is the best way to lower cholesterol. If it is difficult to change your diet, the following products can be used to lower cholesterol.

Foods containing plant sterols/stanols:

- Spreads: *Take Control* and *Benecol*
- Fortified Orange Juice: *Minute Maid Premium Heart Wise*

NOTE: The helpful dose of plant sterols/stanols in supplement form is 2-3 gms a day. One Tbsp. of a fortified spread = 0.85-1 gm. Two to three Tbsps. of these spreads is a high amount. It can lead to eating too many calories, making weight loss difficult.

Nutritional supplements

- Beta-sitosterol – Doses can range from 100-1000 mg of beta-sitosterol based on the product available. The most effective dose is 700 mg to 1 gm 30 minutes before each meal.

Nuts

Nuts are an excellent source of omega-3 polyunsaturated fat, fiber, plant sterols and flavonoids. These are all helpful for cholesterol and heart health. Unfortunately, nuts are also high in calories so the dose should remain less than ¼ cup or about a handful a day (1 oz) unless you need to gain weight. “Eat a handful, not a can full.” Eating nuts to lower cholesterol works best if you eat them in place of saturated fats found in meats, dairy products, and some vegetable oils. Research has shown that eating nuts on a regular basis can reduce the risk of heart disease by 37%.

The Portfolio Diet

The portfolio diet is a Mediterranean eating plan that includes the diet suggestions described above. It has been found to reduce LDL (“bad”) cholesterol by about 30%. This is similar to taking 20 mg of the drug lovastatin.

The Portfolio Diet (daily amounts)

- 30 grams of almonds – about 23 almonds (one ounce). Walnuts, cashews, brazil nuts and macadamia nuts are also good for you.
- 20 grams of thick, sticky fiber from foods such as oats, barley, psyllium, and certain fruits and vegetables. (< 1 ounce)
- 50 grams of soy protein from foods such as tofu, soy meat alternatives and soy milk. 10 gms of soy can be obtained from 1 to 2 cups of soy milk, 4 oz of tofu, 1 oz of soy flour, or 1/2 cup of textured soy protein
- 2 grams (.064 ounces) of plant sterols from foods such as Benecol® or Take Control® spreads (one Tbsp. = 1 mg). Other food sources include: avocado, soybeans, olive oil and green leafy vegetables.

What other foods are helpful for lowering cholesterol?

Other helpful foods include essential fatty acids, garlic and onions, artichokes, grapes and other foods rich in polyphenols. Niacin (Vitamin B₃) is also helpful.

Essential fatty acids

There is a difference in the type of fats that people eat and their effects on cholesterol levels. In general, limit the amount of food you eat that contains saturated fat. This includes foods such as meat, eggs, butter, whole milk, fried foods and tropical oils such as palm and coconut. Cholesterol, triglycerides, and inflammation can be reduced by replacing saturated fats with monounsaturated fatty acids (MUF) and polyunsaturated fatty acids (PUF).

- **Monounsaturated Fatty Acids (MUF)** – Monounsaturated fats (olive and canola oils,



Non-Drug Ways to Promote Health by Lowering Cholesterol

avocados and nuts) lower LDL and may even raise HDL. Olive oil is particularly useful because it contains squalenes that may also help prevent colon, lung and skin cancer.

- **Polyunsaturated Fatty Acids (PUF)** – PUF are better than MUF at lowering triglycerides and reducing risk for heart disease. The GISSI study, which included over 11,000 men with heart disease in Italy, showed that 850 mg of omega-3 fatty acids reduced the risk of sudden death due to heart problems by 45%. PUF include both omega-3 fatty acids and omega-6 fatty acids. The amount of omega-6 fatty acids that a person eats compared to omega-3 fatty acids is important. Ideally people should eat 4 times as many Omega-6 Fatty Acids than Omega-3 Fatty Acids. However, since so much partially hydrogenated oil is used in cooking, people are often eating 25 times more Omega-6 Fatty Acids. In order for the body to benefit from the anti-inflammatory effects of the omega-3 fatty acids, people often need to increase the omega-3 fatty acids they eat and decrease the amount of omega-6 fatty acids in their diet.

- ↑ Omega-3 Fatty Acids: Cold water fish, nuts, vegetables, flax seed, soy, hemp.
- ↓ Decrease Omega-6 Fatty Acids: Partially hydrogenated vegetable oils found in foods with a long shelf life such as chips, crackers and cookies. Sources of both saturated fat and omega-6 fatty acids also include red meat and dairy products.

- **Reducing Triglycerides with Fish Oil** – Both fish oil and flax seed oil can help lower cholesterol. An advantage of fish oil is that it already contains the two active ingredients Eicosapentaenoic Acid (EPA) and docosahexaenoic acid (DHA). The body needs to change flax seed oil into EPA and DHA. To lower triglycerides, take 3-4 gms of EPA + DHA in the form of fish oil each day.

Ground flax seed has fiber, which is also helpful and can be used along with the fish oil at a dose of one Tbsp. daily.

Dosing fish oil

Fish oil capsules often come in a total oil dose of 500-1000 mg. It is important to look at the amount of EPA + DHA in each capsule. This ratio is generally about 3:2 EPA to DHA. If 1 gm of fish oil capsule has 300 mg of EPA and 200 mg of DHA (total of 500 mg EPA + DHA), you would need to take 2 capsules to = 1 gm of omega-3 essential fatty acids in a dosage adequate for fighting or preventing disease.

- **Sample brands of fish oil (over-the-counter):** NOW, Nordic Naturals, Solaray, Twin Labs. Example: 2 capsules of Super EPA (NOW brand) has 720 mg (EPA) + 480 mg (DHA) = 1200 mg. Two pills each day would be enough to help prevent heart disease in general. Six tablets each day would be needed to lower triglycerides. The cost for 20 tablets is about \$20.
- **FDA approved fish oil (prescriptions only):** lovaza 1 capsule = 465 mg EPA and 375 mg DHA. If your triglycerides are too high, your health care practitioner may prescribe 2 gms of lovaza twice a day. The cost for 120 tablets is about \$170.

The only benefit of this prescription compared to over-the-counter fish oil is that the concentration of EPA/DHA ratio is higher and that the Food and Drug Administration (FDA) monitors the quality of these capsules.

NOTE: If you often burp a fishy taste, your fish oil may be spoiled, and you should replace it. You can also freeze the capsules and take them at night to reduce this side effect.



Non-Drug Ways to Promote Health by Lowering Cholesterol

Garlic & Onions

It seems that foods that cause your breath to smell are also very good for you. Garlic and onions are from the allium family. Garlic appears to be most helpful if you chop it and then eat it 10-15 minutes later. Chopping activates allicin, which is one of the active ingredients. Eating ½-1 clove of fresh garlic a day can reduce cholesterol by 10%. Garlic in capsule or supplemental form does not appear to help cholesterol levels. Garlic also modestly lowers blood pressure, reduces “hardening of the arteries” (a build-up of cholesterol and other substances in the blood vessels), and helps prevent blood clots by thinning the blood. This helps promote heart health. It is a good idea to eat these vegetables regularly.

Artichoke

Substances in artichoke extract work similarly to statin medications in lowering cholesterol. Try to eat the whole food as a part of your Mediterranean diet.

- **Artichoke Extract Supplement** – Some promising research suggests that a supplement of artichoke extract may be able to lower LDL cholesterol by 23% over a 6-week period. Possible side effects include abdominal gas or an allergic reaction. Otherwise artichoke appears to be safe with no known drug-herb interactions.

Dose: take 1800 mg of Artichoke Extract each day in divided doses (either 600 mg three times a day or 900 mg twice a day).

Grapes

Grape products contain chemical substances called polyphenols. These don't seem to lower cholesterol, yet they appear to protect the body against heart disease. This is particularly the case for people who eat a diet high in saturated fat. One of the polyphenols found in grapes (particularly pinot noir wine), is called resveratrol. A study in the journal *Nature* found

that rodents fed a high saturated fat diet while given high doses of resveratrol significantly outlived the rats not given resveratrol. They also had better coordination and stamina. But this is not a reason to start drinking wine if you don't do so now. For humans to achieve a similar dose of resveratrol, they would have to drink 150-200 bottles of wine a day! The beneficial phenols found in grapes may help explain why the French who tend to love wine have a lower risk of heart disease, despite a diet high in fat.

Foods rich in polyphenols

Foods rich in polyphenols include: grapes, wine, blueberries, cranberries, bilberries, black currant, peanuts, green and black tea, onions, legumes and parsley. Any blue, purple or dark colored grape or berry will be rich in these polyphenols.

Red Yeast Rice (RYR)

This supplement is made by fermenting white rice with the yeast, *Monascus purpureus*. The fermentation process turns the yeast red and produces mevinic acids. One of these acids is called monacolin K or mevinolin, which is also found in the statin drug, lovastatin. These acids reduce the amount of cholesterol made in the liver. Red yeast also contains sterols, including beta-sitosterol (also found in vegetables); isoflavones (also found in soy); and monounsaturated fatty acids (also found in olive oil). It is likely that red yeast rice lowers cholesterol because of both the mevinic acids and these other ingredients.

A study compared cholesterol levels in two groups of patients. One group received 40 mg of simvastatin (a prescription statin drug) and an educational pamphlet. Another group took 1200 mg of red yeast rice twice a day, about 3.5 gms of fish oil every day and took part in a 12-week program that focused on the importance of a Mediterranean diet, exercise



Non-Drug Ways to Promote Health by Lowering Cholesterol

and relaxation. After 12 weeks, the group who took simvastatin on average reduced their LDL 39%. The people who took the red yeast rice reduced their LDL 42%. Research in China has shown that patients who had a previous heart attack who took red yeast rice during the study were less likely to have another heart attack or die during the study than the group who did not take red yeast rice.

Dose: 1200 to 1800 mg twice daily. (3.6 gms of red yeast rice is similar to 6 mg of lovastatin). If the fermentation process is not done correctly, the chemical *citrinin* may be made. *Citrinin* can damage the kidneys.

Products that have been found to be free of *citrinin* while having high amounts of active ingredients as tested by a private lab (consumerlab.com) include:

- Cholestene Red Yeast Rice, 600 mg capsules.
- Chole-sterin Red Yeast Rice, 600 mg capsules.
- Healthy America Red Yeast Rice, 600 mg capsules.

NOTE: Red yeast rice seems to be less damaging to the muscles than statin drugs. But it can still injure muscles and the liver as do statin drugs. Your primary care practitioner should monitor the health of your liver regularly if you take red yeast rice.

How can niacin help?

Niacin (Vitamin B₃) can decrease the total cholesterol, LDL and triglyceride levels while increasing the good (HDL) cholesterol. Its main drawback is the side effects of flushing and stomach upset. The usual dose of Niacin is 1000-1500 mg daily taken in divided doses. But you need to start low and increase the dose slowly as you are able. See below for a dosage chart. Niacin can affect the liver, so it is a good idea to see your health care practitioner to get a

baseline blood test for liver function before you start taking niacin. If you work up to 800 mg or more per day, you should have a repeat blood test within four weeks of starting this higher dose.

Immediate release niacin

You can buy immediate release niacin over-the-counter without a prescription. It is available in 100 mg, 250 mg, 500 mg, and 1000 mg tablets. Avoid the “no-flush” niacin (Inositol Hexaniacinate) because it is not effective.

Sample brands of immediate-release niacin are: Twinlabs, NOW, Nature’s Way, Solaray.

Sample dosing schedule for immediate-release niacin:

Day #	Breakfast 100mg	Dinner 100mg	Total Dose per Day
1 - 3	0	1	100 mg
4 - 6	1	1	200 mg
7 - 9	1	2	300 mg
10 -12	2	2	400 mg
13 - 15	2	3	500 mg
16 - 18	3	3	600 mg
19 - 21	3	4	700 mg
22 - 24	4	4	800 mg **

** Continue the same dose gradually until taking 1000 mg to 1500 mg a day total. A repeat blood test should be done at that time.

Extended-release niacin

Extended-release niacin is more convenient because you can take it once a day at bedtime. It causes less flushing but can also cause problems in the liver. If you take this form of niacin, your health care practitioner should order blood tests regularly to determine that you are not developing liver problems. Extended-release Niacin requires a prescription [Niaspan® \(Abbott Laboratories\)](#) 500, 750 and 1000 ER. Start 500 mg at bedtime and increase by 500 mg each week building up to a maximum dose of 2000 mg at bedtime.



Non-Drug Ways to Promote Health by Lowering Cholesterol

Reducing side effects

The most common side effect from niacin is flushing of the skin. This skin flushing is often described as redness or itching and tingling sensations that usually occur on the face, neck, chest, and back. The flushing sensation can be a nuisance but is not serious. The flushing usually will go away within 10 to 60 minutes. As your body adjusts to the niacin, the flushing will become milder and eventually stop.

Following are some tips to minimize the flushing side effect:

- Do not take niacin with hot beverages, alcohol, or spicy food.
- Increase the dosage VERY SLOWLY, every 3 to 7 days.

- Take the niacin with breakfast and dinner to avoid stomach upset and promote more even absorption.
- Take half of a regular adult aspirin or 81 mg twenty minutes before each niacin dose. You may need to take the aspirin for three to four weeks, until your body adjusts.

NOTE: If your cholesterol remains too high after trying these non-drug ways to lower it, your liver may be making too much cholesterol. It then would be a good idea to try a prescription medication (statin) to reduce your risk for developing heart disease or stroke.

To raise HDL (the good cholesterol) in your body: Each 1 point (mg/dl) rise in HDL reduces cardiovascular risk by 2-3%

- **Avoid smoking:** stopping smoking raises HDL by 4 mg/dl.
- **Engage in aerobic exercise:** the more the better. Aerobic exercise raises HDL 5-10%.
- **Maintain appropriate weight:** 22 lbs of weight loss (10 kg) raises HDL by 20%.
- **Eat a balanced diet, with fewer sugars and starches and more soy protein, fiber, and monounsaturated fats including olive/canola oils and avocados.**
- **Eat foods rich in polyphenols (e.g., dark grapes, blueberries, cranberries)**
- **Consider taking niacin:** at appropriate doses, niacin raises HDL 15-37%.



Non-Drug Ways to Promote Health by Lowering Cholesterol

Summary

	LDL Cholesterol	HDL Cholesterol	Triglycerides
Fiber	↓ 5-26%	–	–
Soy	↓ 13%	↑ 3%	↓ 11%
Plant Stanols/Sterols	↓ 5-17%	–	–
Nuts (Walnuts)	↓ 8-16%	–	–
Fish Oil	–	–	↓ 20-30%
Garlic	↓ 4-12%	–	–
Artichoke Extract	↓ 10-23%	–	–
Red Yeast Rice	↓ 25-35%	–	–
Niacin	↓ 10-15%	↑ 35%	↓ 20-50%

Above chart adapted from Natural Medicines Comprehensive Database. Monograph on Clinical Management of Hyperlipidemia. <http://www.naturaldatabase.com>. Last accessed: 6/23/09.

The information in this handout is for general education. It is not meant to be used by a patient alone. Please work with your health care practitioner to use this information in the best way possible to promote your health.

This handout was created by David Rakel, MD, Asst. Prof. and Director of the Integrative Medicine Program, Dept. of Family Medicine, University of Wisconsin-Madison.

Date revised: July, 2009

NOTES