



Kimberly Bender DC DACBN CCN

Phone: 727-559-7881

Email: drbender@tampabay.rr.com Web: www.benderchiropractic.net

Definition

Hyperlipidemia is an elevation in one or more of the following lipids: cholesterol, cholesterol esters, triglycerides or phospholipids. High cholesterol levels in the blood have been shown to accelerate atherosclerosis (hardening of the arteries), heart disease, strokes and peripheral vascular disease (blockage of circulation to the extremities, usually the legs). High levels of cholesterol in the blood is influenced by hereditary factors and diet (mostly saturated fat). By the age of 20, cholesterol levels begin to rise in both men and women. Women usually have lower cholesterol levels than men prior to menopause, but the levels actually increase above men's levels after menopause. Individuals with cholesterol levels greater than 240 mg/dl double the risk of developing atherosclerosis.

Cholesterol

Cholesterol is found naturally in the body including the liver, blood, brain, nerves and bile. It is produced mainly in the liver and is used for digestion (bile acids), membrane integrity and as a sex hormone precursor. If cholesterol is not used up by the body, it remains in the blood where it can become oxidized and form plaques or lesions on the arterial walls.

Two types of cholesterol:

1) LDL (Low Density Lipoprotein)

LDL is considered the "bad cholesterol" that picks up cholesterol and deposits it in the arteries and tissues. It appears that LDL cholesterol may only become harmful when it is oxidized.

2) HDL (High Density Lipoprotein)

HDL is considered the "good cholesterol" that picks up cholesterol and transports it back to the liver for elimination.

Triglycerides

Triglycerides are blood fats composed of three fatty acids attached to a glycerol backbone.

Averages:

1) Total Cholesterol

Average = 200 mg/dl
Borderline High = 200 - 239 mg/dl
High Risk = 240 mg/dl and above

2) HDL

Average = Men: 45-50 mg/dl
Women: 50-60 mg/dl
Higher Protection = 70-80 mg/dl
High Risk = < 35 mg/dl

3) LDL

Recommended level = < 130 mg/dl

4) Triglycerides

Recommended level = 50-150 mg/dl

Health Concerns

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Signs and Symptoms

- Total Cholesterol levels >200 mg/dl
- HDL levels <35 mg/dl
- LDL levels >130 mg/dl

Possible Causes or Contributing Factors

- 1) Poor diet consisting of refined, fatty or nutrient-deficient foods - "Excess amounts of animal protein in the absence of the micronutrients (specifically vitamin B-6) promotes the accumulation of homocysteine, which is a potent smooth muscle cell and arterial endothelial poison derived from incomplete degradation of sulfur-containing amino acids." (Linder, M., Nutritional Biochemistry and Metabolism with Clinical Applications, 1991, Appleton and Lange, CT, p. 456). Homocysteine is found in high amounts in red meat and dairy products. Homocysteine is considered to be a strong risk factor for coronary artery disease.
- 2) Oxidized cholesterol in the blood - Oxidized cholesterol enters the blood through a variety of ways. Processed foods, environmental pollutants, trauma, infection, metabolism of animal products and stress can all trigger the formation of oxidized cholesterol. Two chemicals, which are both found in our drinking water, can affect the arteries (chlorine) and lower thyroid function (fluoride).
- 3) Stress increases free radical production and stimulates adrenaline production, which causes platelet aggregation and thickening of the blood.
- 4) Lack of exercise - the American Heart Association recommends a minimum of 30 minutes of exercise 3-4 times per week.
- 5) Environmental pollutants
- 6) Trauma
- 7) Infectious agents such as Chlamydia pneumoniae have been shown to be present in higher amounts in patients with coronary artery disease. Inflammation is also a contributing factor. C-reactive protein, which is an inflammatory marker, is being studied as a predictor for future cardiovascular events in men.
- 8) Hereditary factors - genetics increase the risk of developing heart disease.
- 9) Smoking is a major factor in increasing the risk for developing heart disease. Smokers are three to four times more likely to experience a cardiac event than non-smokers. The risk of coronary heart disease drops nearly to non-smoking levels within two years of quitting smoking.
- 10) Obesity (20-30% overweight)
- 11) Alcohol abuse
- 12) Fat metabolism problems (gallbladder/liver)
- 13) Diabetes - LDL glycation (LDL alteration) may occur in diabetes. The American Heart Association recommends the HbA1C (glycosylated hemoglobin used to monitor blood glucose over a long period of time) be less than 7%.
- 14) Hypertension is a dominant risk factor for coronary heart disease and stroke.

Normal Blood Pressure: 120/80 mmHg

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Possible Causes or Contributing Factors

Diastolic (bottom number): Borderline: >90 mmHg; High: >100 mmHg
Systolic (top number): Borderline High: 135-159 mmHg; High: >160 mmHg

- 15) Long-term birth control use - the pill has been shown to increase cholesterol levels.
- 16) Drug use (especially steroids), diuretics and L-Dopa (a drug used for Parkinson's Disease) all increase cholesterol levels.
- 17) Dyslipidemia (abnormal lipid profiles) is a major contributing risk factor in coronary heart disease. The total cholesterol (LDL, VLDL and HDL) to HDL (protective lipid) ratio should be below 3, which indicates the least amount of risk. A total cholesterol to HDL cholesterol ratio between 3-5 is considered normal. Ratios above five increase risk proportionately.

Nutrient Applications

- 1) Antioxidants are beneficial to prevent oxidation of LDL cholesterol.

Vitamin C

Vitamin C is an antioxidant that aids in collagen synthesis, which is important for arterial wall integrity. Vitamin C has been shown to reduce the mortality rate from coronary heart disease in men by over 40%. Supplementation also improves lipid profiles. Vitamin C, at doses above 1000 mg per day, decreased total cholesterol, LDL cholesterol and triglycerides, while increasing HDL cholesterol.

NOTE: In one study, the RDA amount of vitamin C (60 mg) demonstrated no protection against heart disease, but when that amount was increased to approximately 3000 mg for a 154-pound human, arterial damage was reversed. (Burton Goldberg Group, *Alternative Medicine: The Definitive Guide*, 1993, Future Medicine Publishing, Inc. WA, p. 716.)

It has been suggested that vitamin C in combination with lysine aids in dissolving blood clots and may increase HDL while decreasing LDL. (Burton Goldberg Group, *Alternative Medicine: The Definitive Guide*, 1993, Future Medicine Publishing, Inc. WA, p. 716.) Vitamin C also enhances the conversion of gamma-linolenic acids (i.e. black currant seed oil) to antiinflammatory prostaglandins of the one series.

Recommended Dosage: 1-3 grams per day, or to bowel tolerance.

References: *Atherosclerosis* (2001) 158: 1-12, *Arch Dermatol* (1987) 123: 1684-6, *Epidemiology*. May1992;3(3):194-202, *Am J Clin Nutr*. 1994;60:100-105, *Epidemiology*. 1994;5(1):19-26, *J Am Coll Nutr*. 1998;17(3):250-5.



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Nutrient Applications

Vitamin E

Vitamin E aids in prevention of lipid peroxidation and inhibits platelet aggregation. Vitamin E also helps to repair the arterial walls. Sixteen hundred milligrams per day of vitamin E was reported to decrease LDL oxidative damage by 50% in one study. Vitamin E (at doses of 400-800 IU per day) had an overall reduction in non-fatal second heart attacks by 77%. Vitamin E deficiency may be more important as a risk factor for coronary heart disease than smoking, hypertension or high cholesterol.

NOTE: At the American Heart Association Annual Meeting in 1992, studies were presented. They suggested that a daily intake of 100 IUs of vitamin E for two years decreased the risk of heart disease in a group of 87,000 female nurses by 41%. Males decreased their risk by 37%. The higher the dose, the better the results. (Newsweek, May 31, 1993, p. 62.)

Recommended Dosage: 400-800 IU per day.

References: Curr Atheroscler Rep (2002) 4: 373-80, Exp Biol Med (Maywood) (2001) 226: 5-12, Arterioscler Thromb. Apr1993;13(4):590-600, Lancet. Mar1996;347(9004):781-6, Am J Clin Nutr. 1991;53:326S-334S.

Selenium

Reduced levels of selenium decrease the levels of glutathione peroxidase, a powerful antioxidant enzyme. Low plasma levels of selenium (<45 micrograms/L) have been associated with an increased risk of cardiovascular disease.

Recommended Dosage: 50-200 mcg per day.

References: Am J Physiol (1989) 257: L393-8, Sci Total Environ (2002) 291: 135-41, Experientia. 1991;47:187-193.

Beta-Carotene

Beta-carotene is a powerful antioxidant.

Recommended Dosage: 15-50 mg (15 mg = 25,000 IU) per day.

References: J Nutr (2003) 133: 381-8, Toxicology (1999) 137: 69-80.

Coenzyme Q10

Coenzyme Q10 is an antioxidant known to strengthen the heart. Coenzyme Q10 aids in energy production because it is one of the main components in the Krebs Cycle. Many studies have shown the therapeutic value of coenzyme Q10 supplementation in coronary heart disease. Coenzyme Q10 (150 mg per day) reduced episodes of pulmonary edema and angina episodes, while decreasing hospitalizations in congestive heart failure patients. Coenzyme Q10 also helps prevent the oxidation of LDL cholesterol. It is important to note that the "statin" cholesterol lowering drugs deplete coenzyme Q10.

Recommended Dosage: 50-150 mg per day.

References: Mol Aspects Med (1994) 15 Suppl: s287-94, Clin Investig (1993) 71: S51-4.

2) Niacin

Niacin is very effective at decreasing LDL and triglyceride levels while increasing HDL levels. High potency niacin for long periods of time does have side effects including flushing, liver inflammation and increased uric acid levels.

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Nutrient Applications

Recommended Dosage: 300 mg three times per day. High doses niacin should only be taken at the advice of a licensed healthcare professional.

References: Diabetes Obes Metab (2002) 4: 255-61, Metabolism (2002) 51: 1120-7.

3) Pantothenic Acid

Pantothenic acid has been shown to decrease cholesterol and triglyceride levels. Pantethine, the active form of pantothenic acid, has been successful at increasing HDL cholesterol, while lowering triglycerides and LDL cholesterol.

Recommended Dosage: 300 mg three times per day.

References: Boll Soc Ital Biol Sper (1965) 41: 308-10, Vopr Pitan (1966) 25: 58-60, Int J Clin Pharmacol Ther Toxicol. 1986;24(11):630-7.

4) Magnesium

Magnesium levels are repeatedly shown to be decreased in people with coronary heart disease. Magnesium deficiency also leads to low levels of potassium because without magnesium the heart muscle cannot retain potassium. Magnesium is effective for artery dilation and aids in decreasing total blood cholesterol levels while increasing HDL cholesterol. Magnesium also inhibits platelet aggregation and prevents irregular heartbeats (arrhythmias). NOTE: Excess vitamin D intensifies magnesium deficiency; however, it is estimated that most people have low intakes of vitamin D.

Recommended Dosage: 350-800 mg per day, or to bowel tolerance.

References: Science (1980) 208: 198-200, Med Hypotheses (1979) 5: 843-8.

5) Calcium

Calcium decreases cholesterol levels and is protective against coronary heart disease.

Recommended Dosage: 1000 mg per day.

References: MMW Fortschr Med (2002) 144: 63, MMW Fortschr Med (2001) 143: 53.

6) Chromium

Chromium decreases LDL and triglyceride levels in the blood and increases HDL cholesterol.

Recommended Dosage: 200 mcg per day.

References: J Am Coll Nutr (1985) 4: 107-20, Hokkaido Igaku Zasshi (1987) 62: 913-32, West J Med. 1990;152(1):41-45.

7) L-Carnitine

L-Carnitine is an amino acid found in food or made by the liver or kidneys from lysine and methionine. It transports long-chain fatty acids across the membrane into the mitochondria (the energy center of the cells) and is an important nutrient for cardiovascular health. Decreased carnitine levels lead to decreased energy production by the cells. Carnitine supplementation may be beneficial in angina and other cardiovascular events. NOTE: Deficiency of L-carnitine has been implicated in angina and severe confusion. L-carnitine aids in decreasing blood lipids (mainly triglycerides) and increasing HDL.

Recommended Dosage: 2-3 grams per day.

References: Johns Hopkins Med J (1982) 150: 51-4, G Clin Med (1982) 63: 841-9, Drugs Exp Clin Res. 1991;17(4):225-35.

8) Essential Fatty Acids:

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Nutrient Applications

References: Biochem Soc Trans (1990) 18: 1051-4, Toxicology (2002) 175: 1-13, Int Arch Allergy Appl Immunol (1987) 84: 233-40.

Omega-3 Fatty Acids

EPA-DHA, found in fish oil, is converted into the 3-series prostaglandins. Increased intake of fish oils (as in the Eskimos) has been shown to decrease risk of atherosclerosis, decrease angina pain and decrease triglyceride levels. Since fish oil does thin the blood, it may increase risk of stroke from hemorrhaging, when combined with anticoagulant drugs. Fish oil should not be combined with anticoagulant therapy such as coumadin.

Recommended Dosage: Most people are deficient in omega-3 fatty acids, especially EPA/DHA. Supplementation with essential fatty acids containing high amounts of EPA/DHA would help balance the essential fatty acid ratios. This is because people generally eat far more omega-6 fatty acids than omega-3 fatty acids. The general dosage of EPA (found in fish oil) is 500-2500 mg of EPA per day. Flaxseed oil is rich in alpha-linolenic acid, an omega-3 fatty acid that can be metabolized to EPA and DHA, however, the conversion of flaxseed oil to EPA can be quite limited. Therefore, ultra purified fish oil supplements (independently tested for rancidity, heavy metals, dioxins and PCB's) may be a better way to obtain more beneficial ratios of omega-6 to omega-3 fatty acids.

Omega-6 Fatty Acids

Linoleic acid is an essential omega-6 fatty acid which is necessary to produce arachidonic acid (AA). Arachidonic acid makes the 2-series of prostaglandins. While the 2-series is necessary for proper functioning of the immune system, an overabundance without balance of the omega-3's, and/or gamma-linolenic acid (omega 6), can have detrimental effects, mainly inflammation. Gamma-linolenic acid (GLA) is converted into the 1-series of prostaglandins. It is found in black currant seed oil and evening primrose oil. GLA is antiinflammatory and also decreases the risk of atherosclerosis, however, fish oil has much more abundant research for its benefits against cardiovascular disease.

NOTE: Saturated/hydrogenated fats, refined foods, B-6 and zinc deficiency, excess alcohol consumption, infections and chemicals all decrease the 1-series of prostaglandins in the body.

Recommended Dosage: The general dosage of GLA (found in black currant seed oil, borage oil and evening primrose oil) is 250 mg-2 grams of GLA per day.

9) Proper Zinc to Copper Ratio

An excessively high intake of zinc (>160 mg per day) may decrease HDL levels and increase risk of atherosclerosis, while copper deficiency increases cholesterol levels. Copper is needed for fat metabolism and connective tissue production. (Murray, M. and Pizzorno, J. Encyclopedia of Natural Medicine, 1991, Prima Publishing, CA, p. 166.)

Recommended Dosage: Copper: 1-3 mg per day. Zinc: 15-30 mg per day.

References: J Am Coll Nutr (1989) 8: 400-6, Sci Total Environ (1985) 42: 197-200.

10) Lecithin

Lecithin is also known as phosphatidyl choline (choline plus phosphorus, glycerol and fatty acids). Lecithin and choline are known for their cholesterol lowering effects, and as protectors against heart disease. They have been known to help alleviate fatty livers in animals.

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Nutrient Applications

Recommended Dosage: 350 mg three times per day with meals.

References: Biochim Biophys Acta (1998) 1393: 223-34, Biochim Biophys Acta (1998) 1390: 282-92.

11) Inositol

Inositol aids in cholesterol and triglyceride reduction and is a protective factor in coronary heart disease.

Recommended Dosage: 500 mg 2-3 times per day.

References: J Vitaminol (Kyoto) (1969) 15: 204-7, Biochem Soc Trans (1995) 23: 429S.

12) Fiber

Fiber, especially soluble fiber such as apple pectin, is suggested. Fiber binds to bile acids and lowers cholesterol. Psyllium has been extensively studied to reduce cholesterol levels. Flaxseed meal is also very beneficial in decreasing cholesterol levels.

Recommended Dosage: 35-50 grams per day.

References: Am J Clin Nutr. Jan1999;69(1):30-42, JAMA. Jun1992;267(24):3317-25, Drugs 1990;39:917-28.

13) Quercetin

Quercetin is a potent bioflavonoid and antioxidant shown to protect LDL cholesterol from oxidative damage.

Recommended Dosage: 200-400 mg three times per day before meals.

References: Ophthalmic Res (1989) 21: 112-7, East Afr Med J (1996) 73: 752-7.

14) Policosanol

Policosanol is a fraction of sugar cane that has demonstrated the ability to lower cholesterol and triglyceride levels. Policosanol is a group of eight to nine "long-chain alcohols" (solid, waxy compounds) and may be more effective than some drugs in reducing cholesterol levels.

Recommended Dosage: 10-20 mg daily.

References: Int J Tissue React. 1999;21(3):85-92, Int J Clin Pharmacol Ther. Mar1996;34(3):134-7, Rev Med Chil. Mar1999;127(3):286-94.

15) Soy Isoflavones

Soy isoflavones, particularly genistein, has been shown to inhibit platelet aggregation and smooth muscle cell proliferation. Phytosterols in soy have been reported to lower cholesterol levels.

Recommended Dosage: 50-100 mg per day.

References: Euro J Biochem. 1993;216:639, N Engl J Med 1995;333:276-82.

16) Beta-Glucans

Beta-glucan is a fiber type polysaccharide (complex sugar) found in oat bran fiber, baker's yeast, barley fiber and medicinal mushrooms. Beta-glucan is the primary ingredient that gives oat bran its cholesterol-lowering benefits. Beta-glucan helps bind cholesterol and eliminates it in the feces.

Recommended Dosage: 100-1000 mg daily on an empty stomach.

References: Crit Rev Food Sci Nutr 1999;39:189-202 [review], J Am Coll Nutr 1997;16:46-51, JAMA 1991;265:1833-9.

Botanical Applications

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Botanical Applications

1) Guggul

Guggul is an Ayurvedic herb that has been approved in India for decreasing cholesterol levels. One double blind study showed guggul decreased serum cholesterol by 17.5%.

Recommended Dosage: Standardized Extract: Gugulipid standardized to 2.5% guggulsterone per 500 mg capsule – two capsules three times daily or guggulipid standardized to 99% E & Z guggulsterones per 75 mg capsule - 2 capsules daily. Tinctures are hard to get a hold of and clinical studies have been done on the crude herb.

References: Indian J Med Res. Oct1969;57(10):1950-62, Indian J Med Res. Apr1988;87:356-60.

2) Garlic

Garlic has demonstrated an ability to lower cholesterol. Garlic inhibits HMG Co-A reductase, the enzyme which regulates cholesterol. Garlic contains sulfur compounds that work as antioxidants and aid in dissolving blood clots (Burton Goldberg Group, Alternative Medicine: The Definitive Guide, 1993, Future Medicine Publishing, Inc. Puyallup, WA, p. 718). Garlic also helps decrease cholesterol and triglyceride levels, and increase HDL levels.

Recommended Dosage: Standardized Extract: 600–900 mg (delivering approximately 5,000–6,000 mcg of allicin potential) per day in two or three divided amounts, Garlic Cloves: 1-10 cloves of fresh garlic (one clove of raw garlic daily provides about 5000 mcg allicin), Dried Powder: 0.4-1.2 grams of dried powder per day, Tincture: 2-4 mL tincture (1:5, 45% ethanol) three times a day.

References: Lancet 1997;349(9045):131, Am J Clin Nutr 1996;64(6):866-70.

3) Green Tea

Green tea has been shown to lower cholesterol and increase the "good cholesterol", known as HDL.

Recommended Dosage: Standardized Extract: 300 – 400 mg of green tea polyphenols per day, Tea: Approximately 3 cups (750 ml) per day (providing 240–320 mg of polyphenols) (one cup of green tea beverage contains about 50 – 100 mg polyphenols, depending on the quantity and quality of tea leaves used).

References: Prev Med 1992;21:526–31, Chem Pharm Bull 1990;38(3):790–3.

4) Artichoke

Artichoke has been shown to decrease cholesterol levels in a few human trials.

Recommended Dosage: Standardized Leaf Extract: 300-640 mg of leaf extract (standardized to 15% chlorogenic acid, or 2-5% cyanarin per dose, or 1% caffeoyl acid derivatives) three times daily, Dried Leaves: 1-4 grams three times daily, Tincture: 6 mL of tincture (1:5 g/mL) three times daily.

References: Zeitschrift für Allgemeinmedizin 1996;72:1–19.

5) Dandelion

Dandelion is an excellent liver remedy and has been shown to decrease cholesterol levels.

Recommended Dosage: Extract: 250-500 mg 2-3 times per day, Dried Root: 2–8 grams or by infusion or decoction three times daily, Dried Leaf: 4–10 grams or by infusion three times daily, Root (Tincture): 5–10 mL (1:5 in 45% alcohol) three times daily, Leaf (Tincture): 2–5 mL per day (can vary based on tincture strength).

References: Newall CA, et al. Herbal Medicines: A Guide for Health Care Professionals. London: The Pharmaceutical Press;1996:96-97.



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Botanical Applications

6) Psyllium Seed

Psyllium seed helps in the management of cholesterol levels. A meta-analysis showed that daily psyllium supplementation lowered total and LDL cholesterol by 4% and 7% respectively.

Recommended Dosage: 2.5-10 grams 2-3 times per day mixed with water or beverage.

References: Am J Clin Nutr Feb2000;71(2):472-9.

7) Fenugreek

Fenugreek seeds contain steroidal saponins that inhibit cholesterol production in the liver and cholesterol absorption in the intestines.

Recommended Dosage: Fenugreek Seed Powder: 6 grams daily, Tincture: 3-4 ml three times daily (can vary based on tincture strength).

References: Lipids 1991;26:191-7.

8) Siberian Ginseng

Siberian ginseng may have some benefit in decreasing cholesterol levels. Siberian ginseng is an adaptogen and helps the body adapt to stress.

Recommended Dosage: Standardized Extract: 300-400 mg per day of concentrated solid extract (standardized on eleutherosides B and E) per day, Dried Root: 2-3 grams per day is commonly recommended, Liquid Extract: 8-10 mL in two to three divided dosages per day (can vary based on tincture strength).

References: Phytomed 1994;1:63-76 [review].

9) Fo-Ti

Fo-Ti may be beneficial in decreasing cholesterol levels.

Recommended Dosage: Crude Herb: 9-20 grams crude herb daily. Dose not standardized.

References: Kee Chang Huang, The Pharmacology of Chinese Herbs. New York: CRC Press, 1999, p121; Burnham TH, et al, Fo-Ti. Facts and Comparisons: The Review of Natural Products. St. Louis: Wolters Kluwer company.

10) Red Yeast Rice

An ingredient in red yeast rice called monacolin K has been shown to inhibit the production of cholesterol. Red yeast rice is actually considered a mild "statin" drug. The raw material is no longer available for resale in the United States if it contains the active ingredient. Red yeast rice (with the active ingredient) acts in a similar fashion to Lovastatin (a prescription drug to lower cholesterol levels).

Recommended Dosage: 2.4 grams (approximately 10 mg monacolins) per day.

References: Current Therapeutic Research 1997;(58):964-78, FASEB J. 1998;12(A206):abstract 1201.

Dietary and Lifestyle Applications

- 1) A detoxification program is beneficial.
- 2) Good dietary habits are essential. A vegetarian based diet, high in vegetables, fruits and grains and low in fat and cholesterol is good. Vegetarians demonstrate lower cholesterol levels than meat-eaters, although if lean meat is substituted into a vegetarian diet and enough fruits and vegetables are consumed, a beneficial

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Dietary and Lifestyle Applications

effect on cholesterol is still seen. Research indicates that organic elk meat can lower cholesterol (Cordain, L. FASEB abstract, San Francisco, Ca. 1998). Also, vegetarian diets are low in methionine and homocysteine. Homocysteine comes from methionine. Methionine is not necessarily a “bad amino acid” to have around, especially in the presence of enough vitamin B-6, folic acid, vitamin B-12 and betaine to facilitate pathways.

NOTE: High levels of homocysteine have been shown to increase free radical production, which in turn oxidizes cholesterol. Studies have shown that men with increased homocysteine in their blood have a three time greater risk of having a heart attack. (Peng, S.K. and Taylor, C.B. “Cholesterol Autooxidation, Health and arteriosclerosis. World Reviews of Nutrition and Diet. 1984; 44:117-154.) Avoid saturated fats. They raise cholesterol levels more than dietary cholesterol does.

Gamma linolenic acid, found in black currant seed oil and evening primrose oil, decreases stickiness of platelets. Fish oils (omega-3 fatty acids - i.e. EPA/DHA) found in salmon, mackerel and herring have been shown to:

- 1) decrease VLDL (Very Low-Density Lipoprotein) production.
- 2) decrease blood pressure.
- 3) increase prostaglandins (namely PGI3) that favor vasodilation.
- 4) lower blood cholesterol.
- 5) decrease triglyceride levels.

These are the same effects that are reported with aspirin ingestion, but without the added risks, including ulcers (prostaglandins control mucous production). A study done in the Netherlands suggested that two fish meals per week would lower the risk of fatal heart attacks by 50%.

Avoid chemical preservatives and additives. Crushed garlic and onions may be helpful. They have been shown to lower triglyceride levels and decrease platelet aggregation. Garlic contains alline, the substance partially responsible for garlic's potent odor. When garlic is crushed, allinase (an enzyme), is released that combines with alline to form ajoene. The ajoene is the isolated fraction of garlic responsible for prevention of the platelet aggregation. Garlic taken every day seems to be effective in reducing the risk for heart disease.

Fiber is very important, since fiber binds cholesterol and bile acids and promotes their excretion. Rice bran is an excellent source of fiber due to decreased risk of allergies. Oat bran is high in beta-glucans, a soluble fiber shown to decrease cholesterol levels. Avoid saturated fats and hydrogenated fats, which raise cholesterol. Also avoid trans fatty acids. On the other hand, monounsaturated fats (olive oil) and polyunsaturated fats (vegetable oils) have been shown to lower cholesterol levels.

- 3) Stress reduction is beneficial, including meditation, massage, biofeedback, yoga and any other forms of relaxation. Stress increases the production of cholesterol that is made by the body.
- 4) Obtain optimal weight. Reduce weight if necessary.
- 5) Avoid smoking.
- 6) Acupuncture and chelation therapy may be beneficial in heart disease.

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Dietary and Lifestyle Applications

- 7) Moderate exercise is important. Exercise has been shown to increase HDL.
- 8) Avoid alcohol. Moderate amounts of alcohol have been associated with increased HDL levels, but this study has been refuted by other researchers. There are better approaches to reducing cholesterol without risking injury to the liver. Sugar and alcohol have been shown to increase natural cholesterol production by the body.
- 9) Avoid coffee. Epidemiological studies show that coffee consumption increases cholesterol levels. In a recent nine week study, roasted, ground coffee showed a strong correlation to hypercholesterolemia. The drip filter method, made by boiling and steeping, did not show this correlation. (Bak, AA and Grobbee, DE: New England Journal of Medicine 321: 1132. 1989.)
- 10) A dry brush massage will aid in increasing circulation.
- 11) Soy (soybeans, tofu, tempeh, miso and soy protein powders) has been shown to decrease cholesterol levels. Add these items to your diet (unless soy allergy is present).

Notes

- 1) Several studies, including the Framingham study, found no correlation between cholesterol levels and the amount of eggs a person consumed. Follow-up studies have determined that if eggs are combined with low-fat choices, into a healthy diet, they will not raise blood cholesterol. Saturated fat increases blood cholesterol more than dietary cholesterol does. Eggs from free range chickens have been shown to be high in omega-3 fatty acids.
- 2) Over 80-90% of the cholesterol in the body is manufactured by the body, mainly the liver. Only 10-20% is actually ingested from food. Saturated fat raises cholesterol by upregulating synthesis. Evidence suggests that the real problem is the inability to downregulate endogenous production of cholesterol. Since cholesterol may not be harmful until it is oxidized, the main focus is on the factors that trigger oxidation of LDL. Antioxidants guard against LDL oxidation.

Contraindications/Toxicology

Refer to the individual nutrient or herb for more information regarding interactions, contraindications, precautions or side effects.