

High Cholesterol (Hypercholesterolemia)

Definition

Diet

Herbal Supplements

Exercise

Yoga/Tai Chi/Qigong

MindBody

Pet Therapy

Naturopathy

Homeopathy

Ayurveda



DEFINITION

Cholesterol is one of many lipids found throughout the body. Lipids are fat-like substances, but cholesterol should not be confused with dietary fat. For instance, avocados contain fat, but no cholesterol. Only foods derived from animal sources, such as meats, provide dietary cholesterol. Cholesterol is an important building block in the formation and repair of cell walls, function of nerve tissue, and the production of hormones such as testosterone, estrogen, and the stress hormone, cortisol. The majority of cholesterol identified in our bloodstream is not from our diet, but instead

produced in our own liver. The liver produces approximately 3000 mg of cholesterol in a 24 hour period which is more than enough for the average person. What we consume is simply “extra.”

Once produced within the liver, cholesterol circulates within the bloodstream and combines with proteins to form lipoproteins. High-density lipoprotein (HDL), also known as the “good cholesterol,” acts by carrying cholesterol back from the cells to the liver where it can be eliminated. A high HDL is beneficial while a low HDL (< 40) is associated with

plaque formation within the heart arteries and related events such as heart attacks and cardiovascular death.

A second lipoprotein is low-density lipoprotein, or LDL, which is also known as “bad cholesterol.” An elevated LDL is associated with plaque formation, heart attack and cardiac death. The detrimental effects of LDL occur only after it has been combined with oxygen. This process known as oxidation, perhaps may be prevented, or at least limited, by a variety of vitamin and nutritional supplements such as vitamin B6, vitamin B12, folic acid, and vitamin E as well as others.

Triglycerides are lipids, but not lipoproteins. They too circulate in the bloodstream. Triglycerides are the main source of fat storage within the body. Elevated triglycerides (>200) are associated with plaque formation within the heart arteries, albeit to a lesser degree than elevated LDL cholesterol (1). While some rare genetic disorders may lead to elevated triglycerides, there are several

| In adults without CHD | |
|--------------------------|---------------|
| Total Cholesterol | |
| Desirable | < 200 mg/dl |
| Borderline High | 200-239 mg/dl |
| High | > 240 mg/dl |
| HDL Cholesterol | |
| Desirable | > 40 mg/dl |

more common conditions which contribute to elevated triglycerides.

Diabetes may elevate triglyceride levels, particularly if blood sugars are poorly controlled. Excessive alcohol intake may also elevate triglyceride levels. Low thyroid hormone levels and kidney failure may also contribute, although infrequently, to elevated triglyceride levels.

Primary prevention is the reduction of adverse event rates, such as heart attack and cardiac death, in persons who are at risk, but who do not yet have evidence of coronary heart disease (CHD). There have been over 50 trials that have demonstrated the ability to reduce cholesterol through a wide variety of means. In a combined analysis of 28 such trials, each 10% reduction in total cholesterol yielded a 22% reduction in coronary heart disease at 2.1 to 5 years (2). In one such trial, West of Scotland Coronary Prevention Study (WOSCOPS), at 4.9 years the average total cholesterol reduction was 20%, LDL

reduction 26%, triglyceride reduction 12%, and HDL rise 5% using the common statin medication, pravastatin (Pravachol) (3). Along with the significant reduction in cholesterol came a 31% reduction in heart attack and heart related deaths. The need for angioplasty or heart surgery was also reduced 37%. It is important to know, and understand, what the level of cholesterol means.

Secondary prevention is an attempt to decrease future cardiac events in individuals who already have known CHD. Most have already suffered a heart attack, undergone angioplasty or had coronary artery bypass surgery. Many studies have shown tremendous benefit to lowering cholesterol with dramatic declines in death, heart attack and the need for additional cardiac procedures. The Scandinavian Simvastatin Survival Study (4S)

Can lipid values be lowered and if so, does it make any difference?

Yes to both

Does cardiovascular prevention in people who already have coronary heart disease (CHD) have an impact?

Yes it does.

involved 4444 people with cardiac chest pain or a previous heart attack along with elevated cholesterol levels (4). Those involved were all placed on a cholesterol lowering diet and then randomized to either simvastatin (Zocor) or placebo. Over 5.4 years, simvastatin led to a 25% reduction in total cholesterol and 35% reduction in LDL cholesterol. These dramatic reductions were associated with a 42% reduction in heart-related deaths and a 37% reduction in the need for further cardiac procedures such as angioplasty or bypass surgery. These results held true for the elderly and women as well. In fact in a separate trial, Cholesterol and Recurrent Events (CARE), women benefited substantially more than men with a 46% reduction in major heart-related events for women and a 20% reduction for men (5). The results of these trials have served as powerful testaments to the ability of traditional medications to lower cholesterol and in so doing,

dramatically reduce untoward heart-related events.

In order to provide uniform standards, the National Cholesterol Education Program (NCEP) was formed to develop treatment guidelines for elevated cholesterol in adults (Adult Treatment Panel III, or ATP III) (6). In these new guidelines, LDL cholesterol remains the "primary target" of cholesterol-lowering therapy.

All adults age 20 years or older should have a fasting lipoprotein profile performed including total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides obtained once every five years. An individual's ideal LDL cholesterol is then determined based upon other cardiovascular risk factors. For those individuals with none or one risk factor, other than diabetes, their goal LDL cholesterol is <160 mg/dl. For individuals with 2 or more risk factors, excluding diabetes, their goal should be an LDL cholesterol <130 mg/dl. Finally, for individuals with known coronary heart disease, or diabetes, their goal LDL cholesterol is <100 mg/dl.

A definition of a low HDL cholesterol has been

modified in the latest guidelines and is now <40 mg/dl, rather than 35. A low HDL cholesterol is considered a risk factor in determining an individual's goal LDL cholesterol. However, ATP III stops short of recommending a goal for LDL raising.

Given all of the evidence, there is little doubt that lowering cholesterol saves lives and reduces heart attacks in individuals at risk for heart disease or with established CHD. The effectiveness of pharmacologic therapies is well established. Therefore, a holistic approach to cholesterol lowering should never be substituted for proven therapies without the consent of your medical provider. Instead, holistic therapies should be viewed as complementing the traditional approach for lipid lowering including diet, exercise, and medications. Due to a lack of funding, it is not surprising that there are fewer studies examining the potential role of holistic therapies in lipid lowering. Regardless, the effectiveness of pharmacologic therapies is well established and a holistic approach to cholesterol lowering should never be

substituted without the consent of your medical provider. Instead, holistic therapies should be viewed as potentially complementing the traditional pharmacologic approach to lipid lowering. It is also not surprising that fewer studies, involving fewer patients, have actually examined the success of non-pharmacologic treatments in lowering cholesterol and preventing untoward cardiovascular events. Regardless, while less well studied, many of the holistic approaches to cholesterol lowering promote a healthier lifestyle through better eating and exercise.

DIET

Much can be said about the benefits of diet therapy and lowering cholesterol. For additional information about diet and cholesterol lowering, visit our Holistic Heart Library.

The NCEP has outlined two diet plans for the reduction of cholesterol. The Step I diet is a low fat diet with no more than 30% of total calories coming from fat.

Saturated fat such as animal fat can be no more than 8 to 10% of calories and dietary cholesterol is recommended at less than 300 mg. If after 3 to 6 months the target cholesterol is not achieved, the Step II diet should be tried. In this more stringent plan, saturated fat is kept to 7% of total calories, and dietary cholesterol is held at 200 mg. Other cholesterol lowering diets worth considering are the Ornish diet and the Pritikin diet. Both are highly restrictive of fat intake.

Popularized in the late 1970's, the Ornish diet restricts fat intake to less than 10% of total calories and includes other holistic therapies such as meditation. The Ornish approach

to cardiovascular health has been shown to reduce the incidence of heart disease (8). Developed in the 1950's by Nathan Pritikin, the Pritikin diet severely restricts fat to 5 to 10% of total calories in favor of vegetables, fruits and grains (9). While not for everyone, these diets are effective in lowering cholesterol and may allow you to avoid costly medications without the potential cost and side effects. It is also worth noting that triglyceride levels frequently increase in response to a low fat diet, however this increase can be offset by maintaining high fiber intake and through weight loss.

Very low fat diets (15-20% of total calories) can reduce your total cholesterol and LDL cholesterol by 10-20% (10). Obviously, less stringent diets are less effective. Community-based studies examining people with high cholesterol who have received standard instructions for cholesterol lowering generally see only a 2% reduction in total cholesterol. Therefore, despite individual exceptions, most people will fail to attain "desirable" cholesterol levels with diet alone (11).

A Healthy Diet Plan

Include all food groups

Emphasize a variety in food choices

Include personal food preferences

Develop for life long use, not a "quick fix"

Not reliant on supplements or special foods

Minimum intake of 1200 kcals per day

Individuals who should not consume a very low fat diet: (9)

Insulin dependent diabetics

People with hypertriglyceridemia

Persons with eating disorders

Elderly

Carbohydrate malabsorption illnesses

Pregnant women

Another dietary approach to lowering your cholesterol is by increasing your fiber intake. Dietary fiber is classified by its solubility in water. Insoluble fiber such as bran cereals, popcorn, brown rice, whole grain breads, vegetables (beets, carrots, kale, okra, peas, spinach) and fruits (apples, pears, berries), serve to speed transit through the intestines. While insoluble fiber has many desirable qualities, it has little impact on cholesterol levels.

Soluble fiber on the other, such as fruits (apricots, mangoes, oranges, peaches, plums, rhubarb), dried beans and peas, oat products, psyllium, and vegetables (broccoli, cabbage, white potatoes) act as a cement within the intestine binding cholesterol and carbohydrates and preventing their absorption. The American Heart Association

recommends 25-30 grams of fiber from foods per day. Unfortunately, the average American intake is 15 grams per day. Fiber, in the form of oatmeal, was the first food approved by the FDA to have a specific health claim.

“Soluble fiber from oatmeal, as part of a low saturated fat, low cholesterol diet, may reduce the risk of heart disease.” Regular ingestion of

oat foods leads to a 2-19% decline in total cholesterol in individuals with elevated cholesterol (12). Increasing your fiber intake is a natural way to promote a lower cholesterol and a healthier diet.

Try pectins. While there are many health benefits to eating more fruits, the pectins particularly prevalent in apples have been identified to actually lower cholesterol (13). Other good sources of pectins include pears, oranges, grapefruit and carrots. Foods rich in soy protein are becoming increasingly recognized as heart healthy. Several mechanisms, including cholesterol reduction, have been touted for the role of soy in

| Soyfood | Grams Soy Protein (15) |
|--|------------------------|
| 1 soy protein bar | 14 |
| 1/4 cup dry textured soy flour | 8 |
| 1/4 cup dry textured soy protein concentrate | 12 |
| 1/2 cup black soybeans | 9 |
| 1/2 cup green soybeans | 7 |

decreasing the risk of coronary heart disease. Soy lowers cholesterol by (14):

- decreasing its absorption
- increasing LDL receptor activity and thus increasing its uptake from the bloodstream,
- increasing bile acid excretion leading to elimination of cholesterol into the gut
- stimulating thyroid hormone production and a resultant fall in cholesterol

The FDA has now approved the following health claim for soy protein: "Diets low in saturated fat and cholesterol that include 25 grams of soy protein may reduce the risk of heart disease. One serving of [name of food] provides _____grams of soy protein." (15)

Is it margarine, butter or better? Both Take Control and Benecol are spreadable products, which are utilized in the diet similar to butter or margarine. They can be purchased in the dairy section of the grocery store. Both contain canola oil, plant stanol esters, and soybean oil as well as other constituents. Both actually lower total cholesterol and LDL cholesterol with no effect on HDL cholesterol. It is recommended that you consume 3 servings per day of Benecol, containing 45

calories each and 5 grams of fat. A "light" version is also available which contains 3 grams of fat. It is recommended by the manufacturer to consume 2 servings per day of Take Control which each contains 50 calories, and 6 grams of fat. Of course, neither product contains cholesterol.

Fish contain polyunsaturated fatty acids, particularly the omega-3 form, which is important in building healthy muscle cell membranes, as well as brain, nerve and eye tissue. Their deficiency in the diet can actually contribute to obesity, adult onset diabetes, hypertension and coronary heart disease (17). Diets low in omega-3 fatty acids may actually lead to a reduced HDL cholesterol and high triglycerides. In individuals with normal lipid values, supplementation with fish oils have been demonstrated to lead to a 25% lower triglyceride level with no significant effect on HDL or LDL (18,19). In individuals with elevated levels of lipids, fish oils have been demonstrated to decrease triglyceride levels 28% with a slight increase in LDL, but also an increase in HDL. Finally, in people with severe elevations in triglycerides, fish oils have been demonstrated to decrease triglycerides 25% and

Fish highest in omega-3 fatty acids

include mackerel, herring, sardines, salmon, and trout.

increase HDL 14% when taken at 2 grams/day and lower triglycerides 43% and increase HDL 18% when consumed at 4 grams/day (18,19). In addition, a recent study examining the health benefits of increased fish intake found a 44% reduction in cardiac events such as heart attack and heart related chest pain in the individuals who consumed the largest quantity of fish in their diet (20). In this study, there was a significant rise in their HDL cholesterol as well.

Current dietary recommendations are to consume 0.65 grams per day of omega-3 fatty acids, which corresponds to 20-62 grams of fatty fish (21). While these cold-water fish may be high in fat, they are packed with omega-3 fatty acids. Individuals not

consuming 3 ounces of fish 3-4 times per week may consider supplemental gel caps containing omega-3 fatty acids. Most supplements also contain high amounts of vitamin A and D as well.

Omega-3 Fatty Acid Content (21)

| Fish | (% by weight) |
|----------|---------------|
| Mackerel | 1.8-5.3 |
| Herring | 1.2-3.1 |
| Salmon | 1.0-1.4 |
| Tuna | 0.5-1.6 |
| Trout | 0.5-1.6 |
| Halibut | 0.4-0.9 |

Flax seed is rich in both omega-3 and omega-6 fatty acids. A heart healthy omega-3 fatty acid, alpha-linolenic acid (ALA), is found in particularly high concentration in flax seed. Flax seed is also an excellent source of dietary fiber.

These properties make it an excellent dietary supplement for maintaining a healthy cholesterol. In order to obtain all of the potential benefits of flax seed, purchase the milled flax seed or grind it yourself at home. The seeds must be broken in order to reap the benefits. Due to the high fiber content, start by consuming a low amount such as 1 tsp 2-3 times per day and work up to 2 1/2 tsp with meals (10 grams/day). It's worth noting that flax seed can become rancid due to its high rate of

oxidation, however it generally can be stored for up to 30 days in the refrigerator. Flax seed oil can also be taken as a supplement (1 tbsp 1-3 times per day) or 1000 mg of ALA daily, however this only provides the omega-3 benefit without the fiber. The oil supplement may actually be preferred if avoiding the extra fiber.

Nuts obtain about 80% of their total energy from fat, largely monounsaturated fat. In some nuts, such as walnuts, this may mean a significant amount of heart healthy omega-3 fatty acids. Research has actually demonstrated that eating nuts can lower total cholesterol, LDL and triglycerides (22,23). Nuts are also a good source of dietary fiber, copper, magnesium, and potassium. Nuts are an excellent natural source of vitamin E, as well as rich in the amino acid arginine. Keep in mind that eating nuts does contribute fat calories to a diet. Those extra calories should be taken into account when calculating daily nutritional needs and calorie intake.

Avoid both margarine and peanut butter, which contain trans fat. Most come from partially hydrogenated oils and are added to foods in

order to stabilize them. These foods may actually elevate cholesterol and provide no benefit. Other foods high in trans fat include all restaurant fried foods and almost all commercial cakes, cookies, snack foods and chips.

Derived from the words Canadian and oil, canola oil was developed in Canada from a genetic variation of rapeseed. Canola contains the lowest levels of saturated fatty acids of any vegetable oil and is high in monounsaturated fatty acids—a winning combination. Like all vegetable oils, its cholesterol free.

Having wine with dinner may be of benefit in raising HDL. Researchers have known for many years that the French appear to have less heart disease than Americans (24). The reason for this occurrence is felt to be a rise in HDL afforded to those who consume red wine on a regular basis (25). While recent studies have demonstrated this to be directly correlated with the amount consumed (26), excessive alcohol intake can have many negative effects on the heart as well as other organs and thus must be consumed in moderation. Therefore, if

choosing to drink red wine, consume no more than two 4-ounce glasses per day. Also keep in mind that a 4-ounce glass of wine contains approximately 80 calories and thus even modest daily use can lead to gradual weight gain.

Keep in mind that failure to maintain a healthy diet plan with resultant weight gain may adversely affect your lipid profile. Over 50% of Americans are overweight and it's getting worse. In 1980, 25% of Americans were overweight, while in 1999 the incidence has risen to 55%. Increased abdominal fat is particularly associated with an increased risk of adult onset diabetes, which can lead to a marked elevation in triglycerides and LDL cholesterol as well as a reduction in HDL cholesterol. You can assess your ideal weight body proportions by calculating your body mass index (BMI) and waist-to-hip ratio.

Beyond your diet, smoking may also adversely affect your lipid profile. Compared with nonsmokers, smokers of at least 25 cigarettes per day have lower levels of HDL cholesterol and higher levels of LDL cholesterol and triglycerides (27,28).

HERBAL SUPPLEMENTS

Be cautious of red yeast and Cholestin. Cholestin is actually a marketed supplement made from red yeast, which is fermented from rice. Either Cholestin or red yeast can be obtained as a supplement without a prescription. Their active ingredient is similar to the prescription statin-type drug lovastatin (Mevacor). While effective in lowering cholesterol approximately 15%, it is not as effective as lovastatin and is comparable in cost to 5 mg of lovastatin (\$30 to \$37/month) (29,30). There is also data to suggest that Cholestin and red yeast have similar side effects to other prescription statin-type medications, including liver damage (31). If cholesterol levels warrant treatment, stick to the traditional prescribed medications and have their effectiveness and safety followed as recommended by a physician.

Garlic is one of the most commonly ingested herbal supplements with a wide range of reported health benefits. Its role in cardiovascular disease has not yet been proven, but has mainly focused on reducing cholesterol levels. It has also been suggested that garlic may play a role in lowering blood pressure and preventing plaque build-up in the body's

arteries. Numerous studies have supported the benefits of garlic in reducing cholesterol levels, while others have suggested no effect. Two meta-analyses reported that garlic can lower total cholesterol by 12% and 9% respectively (32,33). However, these results have been refuted in several more recent trials, which found garlic to be no better than placebo (34-36). Perhaps as additional, larger studies are performed assessing the potential role of garlic in lowering cholesterol, its role will be better understood in cardiovascular disease. It is also worth noting that garlic works synergistically with fish oils to promote a healthy cholesterol. If choosing to take garlic, remember it is the ability of the supplement to yield allicin, which confers benefit. When selecting a garlic preparation, also make sure that it is stomach coated in order to avoid being broken down by stomach acid. Lastly, some "odor free" garlic preparations may have no active ingredients at all (34). The typical dosage is 900 mg daily, given in three divided doses or 4 grams of fresh garlic.

Niacin is also known as vitamin B3 or niacinamide. Presently, niacin is FDA approved for the treatment of elevated cholesterol and has been recommended by the National Cholesterol Education Program (NCEP) for the treatment of elevated cholesterol not responding to diet therapy alone, or as a second-line agent when diet therapy and a single drug has been inadequate (38). Niacin lowers LDL cholesterol and triglycerides and raises HDL cholesterol. When used at recommended dosages, it has similar effectiveness to statin-type lipid lowering drugs and bile acid sequestrants, but unfortunately has a much higher incidence of side effects (39-41). Flushing is the most common side effect and may be accompanied by headache, pruritus and other skin sensations. Generally these dissipate over the first two weeks of use and can many times be reduced by pre-treating with aspirin 325 mg or by taking it with meals or at bedtime. Dosages of 1.5 to 3.0 grams per day are generally required for maximum benefit, however due to side effects, most people start at much lower doses initially. At doses exceeding 3 grams, niacin may lead to liver toxicity and therefore it is important to have its use

closely followed by your medical provider (42). There are many potential drug interactions to also be aware of. Fortunately, there is a newer prescription formulations of niacin (Niaspan) which is better tolerated and may be the preferred formulation of the active B vitamin.

There is no doubt that vitamin C is an anti-oxidant and essential nutrient. It is involved in a wide variety of metabolic processes throughout the body including lipid synthesis. As a result, it has been supported as a valuable supplement to raise your HDL (43). Unfortunately, while it is true that vitamin C is involved in such synthesis, there is insufficient evidence to suggest ingesting additional vitamin C will actually lead to a higher HDL. The best advice is to eat a balanced diet containing fresh fruits and vegetables rich in vitamin C.

Pantothenic acid remains unproven. Also known as vitamin B5 or as one of its metabolites, pantothenic acid is essential in the metabolism of carbohydrates, proteins, and lipids (43). It also plays a role in the breakdown of carbohydrates, production of sugars within the body, and the manufacturing of cholesterol precursors within the liver.

While it is touted as actually reducing the production of cholesterol (43), there is insufficient evidence to support this claim.

EXERCISE

Make regular aerobic exercise a part of life. Studies which have examined the relationship between exercise and cholesterol levels and have identified a reduction in total cholesterol and LDL cholesterol, combined with an increase in HDL cholesterol in those who exercise on a regular basis (45). For the sake of comparison, running at least 12 miles per week has been shown to raise HDL cholesterol more than alcohol intake (46). However, you don't have to be a long distance runner to achieve the benefits of exercise. In fact, in the Framingham Offspring Study, even one hour of exercise per week conferred an improved cardiac risk profile when HDL cholesterol, heart rate, body mass index, and tobacco use were analyzed (45). Not surprisingly, there is an inverse relationship between HDL cholesterol and obesity - those who exercise raise their HDL cholesterol and maintain a healthy weight.

Just about everyone should participate in an exercise program. However, those over 40 years-old or with any medical conditions, such as cardiovascular disease, should consult a medical provider first. He or she may wish to perform a treadmill exercise test prior to beginning a regular exercise routine. Generally, it is recommended to perform aerobic exercise such as walking, jogging, swimming, or biking at least 3 times per week to at least 70% of your maximum predicted heart rate (220-age in years). However, recent research has suggested that it is the amount of energy expended per week exercising and not necessarily the duration which matters most (48,49). Therefore, it appears short bursts of exercise (10 minutes 3 times per day) may be equivalent in benefit to longer durations once per day. This is good news to those who have limited blocks of time, or physical limitations to prolonged exercise.

YOGA/TAI CHI/QI GONG

Relaxation and exercise make for a healthy combination. For those who are unable to perform vigorous aerobic exercise, yoga, tai chi, or qi gong may be an excellent alternative. While

there is no data to suggest that any of these actually reduce cholesterol levels, all involve relaxation techniques combined with gentle stretching - good habits to get into. Perhaps by reducing stress and feeling good, it may be easier to eat right and engage in other heart healthy habits.

MIND/BODY

Whether or not mind/body techniques can actually lower cholesterol has not been established and most likely has no direct effect.

However, mind/body therapy incorporates relaxation techniques which may be valuable in calming the stress of life and thus promoting a healthier lifestyle, better nutrition, and exercise, all valuable to achieving a lower cholesterol and reduced risk of coronary heart disease.

PET THERAPY

Pet therapy could easily have been included in mind/body medicine or even exercise sections of this article because the positive stimuli received from either owning or visiting with a pet crossover to so many facets of holistic health. Not surprisingly, there is no research to suggest that owning a pet lowers cholesterol directly, but just think how many people attain regular exercise simply because they do own a pet!

In addition, relaxation through pet companionship promotes a healthy lifestyle and happier outlook. In a study at the University of Pennsylvania School of Veterinary Medicine, pet owners had significantly lower blood pressure when they were greeting their pet than when they were reading neutral text (50). A healthier lifestyle equals more exercise, better nutrition, and weight control which are all key components to lowering cholesterol and maintaining it over time.

NATUROPATHY

Naturopathy focuses on the body's own ability to heal itself. Practitioners of naturopathy rely on a variety of techniques founded in ancient Indian, Chinese and Greek medicine. These include relaxation therapy, counseling and psychotherapy, herbal medicine, nutrition counseling, physical therapy, and homeopathy. While the constituent parts of naturopathy have been studied for their beneficial effects in the treatment of cardiovascular diseases, there is little research on naturopathy as a whole in treating these conditions.

HOMEOPATHY

Homeopathy is relatively new compared to many of the holistic approaches discussed already. Founded in 1790 by Dr. Samuel Hahnemann, homeopathy is based upon the belief that "like cures like." Homeopathic therapies involve administering very dilute solutions of herbal substances felt to stimulate the body's own "vital force." By so doing, a person is able to heal himself or herself rather than relying on pharmaceutical agents. To date, there is little research on homeopathic medicine for the treatment of cardiovascular disease and perhaps none directed specifically at elevated cholesterol levels. Therefore, its use for these conditions remains to be established.

AYURVEDA

Ayurvedic medicine was founded in ancient India around 3500 B.C. It is known in Hindu texts as the Vedas, meaning "science of life." In ayurvedic medicine, practitioners prescribe treatment and preventative therapy consisting of diet, herbal supplements, exercise and yoga, as well as other treatments in order to maintain a person's balance in life. Little research is available with regard to the healing

power of ayurvedic medicine for cardiovascular disease, or specifically elevated cholesterol. Ayurvedic practitioners have touted guggul, also known as gugulipid, for the treatment of cardiovascular disease and a means to lower blood cholesterol levels. Select studies have suggested that gugulipid can reduce total and LDL cholesterol, however the effects on HDL cholesterol are less clear (51,52). The doses of gugulipid utilized in this research has been 100-500 mg of gugulipid per day (51,52). The studies to date are inconclusive and its best to await further research on gugulipid.

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Caution! Grapefruit juice may interfere with an increasing list of medications.

Grapefruit juice is certainly one of the most popular, and perhaps healthiest, breakfast drinks in America. Yet for almost 10 years now we have known that consuming this popular drink or eating the fruit may alter the effectiveness of several heart-related medications, as well as several others. First discovered when researchers used grapefruit juice to mask the taste of alcohol, grapefruit juice appeared to increase the effects of felodipine (Plendil), a common blood pressure lowering medication.

Why grapefruit juice and no other fruit juices? It appears that a chemical specific to grapefruit juice inhibits a common enzyme in the intestine. This enzyme typically breaks down medications and therefore decreases the amount of drug available in the body to exert its effects. With this enzyme inhibited, a drug can exhibit a greater effect on the organ's system(s) that it is designed to treat such as the liver, heart, vascular system, or brain. Despite extensive research in this area, the exact chemical in grapefruit that causes this enzyme inhibition remains

unknown and it appears to be specific to grapefruit and does not occur with other fruits and fruit juices.

The common blood pressure medications amlodipine (Norvasc) and nifedipine (Procardia;Adalat) have shown 20-30% increased drug levels in the blood when consumed with grapefruit juice, while the antidepressant buspirone(Buspar) has shown several fold increases in the breakdown products of the drug in the urine. Common "statin" cholesterol-lowering drugs remain a concern as well. The most recent data suggests that consuming one glass of grapefruit juice daily along with the common statin lovastatin(Mevacor) raises the concentration of the active ingredient by 36%. It appears prudent to avoid consuming any statin with grapefruit juice, particularly if taken in high doses or when first initiating a statin medication.

Can you still drink grapefruit juice and avoid the potential interaction? Well maybe. Thirty percent of enzyme inhibition is still present 24 hours after drinking the juice and one glass of juice appears to have the same effect

as several. However, daily ingestion of grapefruit and its juice over a few weeks may lessen its effects, and individuals who regularly drink grapefruit juice without difficulty may never develop a problem with these medications. So far there have been no major problems reported despite the many drugs that appear to be effected by grapefruit. Regardless, it is still best to consult a doctor if planning to eat grapefruit or drink the juice and while taking any of the medications listed below.

The best advice is to be aware of the potential interaction and avoid grapefruit juice if an interaction is at all possible.

Below is a list of medications that have been identified as interacting with grapefruit juice.

Drug-Grapefruit juice interactions*

| | |
|------------------------------|--------------------------|
| Calcium channel blockers | Antihistamines |
| Felodipine (Plendil) | Ebastine |
| Nimodipine (Nimotop) | Terfenadine (Seldane)) |
| Nisoldipine (Sular) | Psychiatric medications |
| Nitrendipine | Buspirone (Buspar) |
| Pranidipine | Carbamazepine (Tegretol) |
| Immunosuppressants | Diazepam (Valium) |
| Cyclosporine (Sandimmune) | Midazolam (Versed) |
| Tacrolimus (Prograf) | Triazolam (Halcion) |
| HMG-CoA reductase inhibitors | Prokinetics |
| Atorvastatin (Lipitor) | Cisapride (Propulsid) |
| Lovastatin (Mevacor) | Others |
| Simvastatin (Zocor) | Methadone |
| | Sildenafil (Viagra) |

* generic name (trade name); some may have multiple trade names not listed

Title: Drug-Grapefruit Juice Interactions

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