

# Coronary Heart Disease (CHD)

*Coronary heart disease is the leading cause of death in the United States.*



**Definition**

**Risk Factors**

**Diet**

**Smoking Cessation**

**Herbal Supplements**

**Exercise**

**Yoga/Tai Chi/Qigong**

**MindBody Therapies**

**Spirituality**

**Pet Therapy**

**Music Therapy**

**Naturopathy**

**Homeopathy**

**Ayurveda**

## **DEFINITION**

Coronary heart disease (CHD) and its related conditions are the most common cause of death in the United States. Over 925,000 Americans died of cardiovascular disease in 1995, accounting for 42% of all deaths (1). There are over 1.5 million heart attacks in the United States each year with one-third of these patients dying before they reach the hospital. The cost of lives lost is high and so is the financial burden. Over \$100 billion is spent in the United States annually on cardiovascular related conditions.

The build-up of plaque, known as atherosclerosis, within the heart's arteries is responsible for the morbidity and mortality related to this condition. This plaque, made up of a lipid-rich core and covered with a fibrous cap, can obstruct the heart arteries leading to heart-related chest pain, also known as angina, shortness of breath, or fatigue. The symptoms can vary widely between individuals, especially women (2). Rupture of this plaque may form a blood clot which can obstruct the artery leading to death of the heart muscle supplied by that artery. This condition is known as a myocardial infarction (MI) or more commonly, a heart attack.

## RISK FACTORS

There are several risk factors for the formation of atherosclerosis. Those which are not modifiable, include age, gender, race, and a family history of premature CHD (3,4). The incidence of CHD increases with age and men typically present with symptoms of CHD on average 10 years earlier than women. This "protective effect" in women is felt to be secondary to the hormonal state of women during menses, however this advantage gradually fades in menopause leading to a similar incidence of CHD in the elderly. CHD rates are 30 to 70 percent higher among blacks than among whites of the same age up until age 74 and the current decline in CHD rates is much less apparent in blacks than in whites (5). The exact reason for higher incidence of CHD in blacks is not known, but perhaps hypertension, more commonly found in blacks, may play a role. Simply having a first degree relative with CHD is not enough to be classified as having a family history of CHD. Since nearly half of all Americans will develop cardiovascular disease, it is the premature onset of CHD (defined as a male less than 55 years old or a female less than 65

years old) within siblings or parents which increases the level of risk. There are several risk factors that are modifiable including smoking, hypertension, elevated cholesterol, diabetes, obesity and physical inactivity.

**Smoking** is one of the greatest risk factors for CHD and its cessation is one the most effective ways to reduce risk (6,7). Even within the first year of quitting there appears to be a reduction in the incidence of CHD related events. Switching to a low-tar or low-nicotine cigarette does not appear to be of benefit.

**Hypertension** (elevated blood pressure), is not only a risk factor for CHD but is the most common cause of stroke. Hypertension can be defined as a systolic (upper number) of 140 or greater or a diastolic (lower number) of 90 or greater (8). Its treatment leads to a reduction in CHD.

**Elevated cholesterol** (total cholesterol value of over 200) has been consistently shown to confer an increase risk of CHD. This risk appears to exist throughout the whole range of elevated cholesterol values and not just those near the top (9). A desirable

total cholesterol is less than 200. Reducing cholesterol, specifically the LDL cholesterol or "bad cholesterol," has been shown to lower the risk of coronary heart disease (10).

**Diabetes** is also a risk factor for the development of CHD regardless of whether it is juvenile onset or adult onset, insulin dependent or not (11). The risk of CHD appears to be increased approximately 3-fold in diabetic men and perhaps even more in women (12-14).

**Obesity** is associated with several other risk factors for CHD such as adult-onset diabetes, elevated cholesterol, and hypertension. Its direct association with CHD is related to a certain pattern of obesity known as visceral obesity characterized by a protuberant abdomen and a waist-to-hip ratio greater than 0.9 in men and 0.8 in women (14-16).

While **physical inactivity** in and of itself is not considered a risk factor for the development of CHD, a regular exercise routine appears to reduce the risk of CHD and therefore the lack of physical activity should be considered a modifiable risk factor (17). It is also worth noting that

regular exercise promotes a healthy weight, a reduction in blood pressure, an increase in HDL or "good cholesterol," and reduces the risk for the development of adult-onset diabetes (18-21).

Great strides have been made in the past 20 years developing better prescription drugs for the treatment of modifiable risk factors. As a result, if the medication is taken as prescribed, an individual at risk for CHD or already having CHD can reduce their chance of experiencing a heart attack, requiring coronary bypass surgery, or even dying of cardiovascular disease.

Holistic approaches often serve best in addition to traditional medical treatment, NOT as a substitution for well-researched therapies.

If drugs are prescribed by a medical provider remain compliant with their use recognizing that holistic approaches serve as an adjunct to treatment and not a substitution for well-researched, thoroughly-tested, FDA-approved therapies. This is not to belittle the potential benefit of holistic approaches, but simply to acknowledge the role they play in CHD or any other medical condition.

### DIET

Eating right may reduce your risk of a heart attack. Most of the dietary recommendations for reducing the risk of CHD relate to the reduction of cholesterol within the bloodstream. As a result, they will not all be repeated here, but visit our sections on Cholesterol and Dietary Therapies under Conditions, as well as our Nutrition section under Therapies for more in-depth discussions.

Lower fat intake. The National Cholesterol Education Program (NCEP), under the auspices of the National Institutes of Health (NIH) set-out to establish dietary guidelines for reducing high cholesterol. The second report of this expert panel, published in 1993, identifies three

major dietary factors which contribute to high blood cholesterol (5). They are a high intake of saturated fat and/or dietary cholesterol, and an imbalance between caloric intake and energy expenditure. In order to meet appropriate dietary guidelines of this expert panel, two diet plans are suggested, with the Step I diet being less stringent and the Step II diet plan being more stringent.

For every 1% reduction in total cholesterol, a 2% reduction in the risk of Coronary Heart Disease is realized.

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, 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.

A low-fat diet can make a difference? The predicted reduction in total cholesterol from the Step I diet is 5 to 7 percent and progressing to the Step II diet should yield an additional 3 to 7 percent. Response varies and can be quite dependent on dietary habits prior to initiation of the diet plan. A reduction in total cholesterol does correspond to a decrease in your risk of developing heart disease. In fact, for every 1% reduction in total cholesterol, the risk of developing heart disease is reduced by 2% (22). Other studies, such as those conducted by Dr. Dean Ornish have examined the response to a very low fat diet on regression of coronary artery disease. His approach to cardiovascular health has also been shown to reduce the incidence of heart disease (23).

Increase fruits and vegetables. Any diet should contain the necessary nutrients to meet the Recommended Dietary Allowances (RDA). See page five for the list of common RDA's.

Fruits and vegetables are healthy sources of fiber, folic acid, vitamin C, vitamin A and many other minerals, all of which promote a healthy cholesterol or provide anti-oxidant properties.

Hypertension is a major risk factor for the development of CHD and diets composed largely of vegetables have been demonstrated to significantly lower blood pressure. For instance, the DASH (Dietary Approaches to Stop Hypertension) diet study examined 459 patients eating one of three diets (24). While no patients lowered their blood pressure that ate high fat diets, those on a near vegetarian diet noted significantly improved blood pressure. The average drop in systolic and diastolic blood pressure was 6 points and 3 points respectively. The mechanism for this reduction is felt to involve increased potassium consumption from fruits and vegetables (25). A second contributing factor may be increased fiber intake by vegetarians, which is also felt to lower blood pressure (11). Caution in consuming extra fruits and vegetables should be exercised in those individuals taking potassium sparing diuretics such as spironolactone (Aldactone), or those with kidney failure, either of which could lead to dangerously high levels of potassium.

Fish contain polyunsaturated fatty acids, particularly the omega-3 form, which is important in building healthy

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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 (26). Diets low in omega-3 fatty acids may actually lead to a reduced HDL cholesterol and high triglycerides. In those who consume fish oils on a regular basis, there has been an evident decrease in triglycerides (up to 43%) and raised HDL cholesterol (up to 18%) (27,28). 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 (29). In this study,

## Recommended Daily Allowances (RDA) for common supplements

Supplement	Women	Men
Protein	44 g	56 g
Vitamin A	800 mcg	1000 mcg
Vitamin D	7.5 mcg (300 IU)	7.5 mcg (300 IU)
Vitamin E	15 mg (250 IU)	15 mg (250 IU)
Vitamin C	75 mg	90 mg
Thiamine	1.1 mg	1.5 mg
Riboflavin	1.3 mg	1.7 mg
Niacin	14 mg	19 mg
Vitamin B6	2 mg	2.2 mg
Folic acid	400 mcg	400 mcg
Vitamin B12	3 mcg	3 mcg
Pantothenic acid	4 - 7 mg	4 - 7 mg
Biotin	100-200 mcg	100-200 mcg
Calcium	1000 mg	1000 mg
Phosphorus	700 mg	700 mg
Magnesium	255 mg	255 mg

g=grams, mg=milligrams, mcg=micrograms, IU=international units

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 (30).**

Fish highest in omega-3 fatty acids include mackerel, herring, sardines, salmon, tuna and trout. While these cold-water fish may be high in fat as well, they are packed with omega-3 fatty acids. If unable or unwilling to consume 3 ounces of fish 3-4 times per week, consider supplemental gel caps containing omega-3 fatty acids. Most supplements also contain high amounts of vitamin A and D as well.

The French have long been known to have less heart disease than Americans despite their diet containing high-fat food (31). So far this obser-

### Soy lowers cholesterol by (36):

- \* 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

vation, known as the "French Paradox," has been attributed to a rise in HDL cholesterol afforded to those who consume alcohol on a regular basis, particularly red wine (32). Trans-resveratrol is a naturally occurring antioxidant found in red wine that inhibits production of factors within the blood that may damage artery walls or promote clotting (33,34). It seems that intake is inversely correlated with the development of CHD, and therefore,

drinking a glass of red wine each night may be good for heart health (35). Of course, one should not consume more than 2 alcoholic beverages per day. Keep in mind that one drink of alcohol equals 12 oz of beer, 4 oz of wine or 1 1/2 oz of hard alcohol. Excessive alcohol has been linked to elevated bloodpressure as well as a host of other deleterious effects. It is also worth noting that a 4-ounce glass of wine contains approximately 80 calories and therefore even modest daily use can lead to gradual weight gain.

Soy may do the heart some good. 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 decreasing the risk of coronary heart disease.

Fish	Omega-3 Fatty Acid Content (18)
Mackerel	1.8-5.3 grams
Herring	1.2-3.1 grams
Salmon	1.0-1.4 grams
Tuna	0.5-1.6 grams
Trout	0.5-1.6 grams
Halibut	0.4-0.9 grams

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 per day may reduce the risk of heart disease. One serving of [name of food] provides \_\_\_\_ grams of soy protein" (37). Soy protein bars, soy flour, or black or green soybeans offer a healthy source of soy protein.

The Mediterranean diet has become increasingly popular as a heart healthy style of eating. Olive oil and whole-grain bread alone can account for up to 50-60% of total calories, however this diet is also rich in beans, fresh fruits, and vegetables (38). Much of the fat from this diet plan is monounsaturated fat from olive oil which appears to raise the level of HDL. Perhaps the benefits of this diet plan are best illustrated by a study conducted by Dr. Ancel Keys and his wife nearly 50 years ago and known as the Seven Countries Study (39). This study included participants from the United States, the Netherlands, Japan, Italy, Finland, Greece and Yugoslavia. It was based upon the simple observation of the development of CHD. At 10 years, 28% of participants from

Finland had developed heart disease while only 5% of the Japanese had developed heart disease. Most impressive were the Greeks from the island of Crete. Only 2% had developed heart disease after 10 years and none of them had died. What makes this even more notable was that the Greeks were eating almost as much fat as the Finns, but far less saturated fat. Therefore, this diet plan is worth a look, but careful attention to total fat intake is especially important. If prone to weight gain, be especially cautious.

A Harvard study examined the potential association between egg consumption and heart disease (40). They found that eating one egg per day-that's seven eggs per week-did not increase the risk of heart disease or stroke for healthy adults who did not have diabetes.

Next to water, tea is the most commonly drunk beverage in the world. Tea is high in specific anti-oxidants called polyphenols which make up 30% of its dry weight. Tea has been touted for its potential ability to reduce the risk of heart disease and cancer, decrease blood pressure, soothe headaches, treat stomach

**While the available research still remains inconclusive, for those who enjoy tea, drink green or black tea as part of a heart healthy diet. It can't hurt and it may just be good for you!**

disorders, and even prevent tooth decay. Black, green, and oolong tea all contain antioxidants such as polyphenols. However, only green tea contains a specific antioxidant known as catechin which is felt to play a role in the prevention of plaque formation within the heart arteries (41,42). Milk inhibits the effect of catechins and therefore its addition to green tea should be avoided. Black tea has also been found to be beneficial in preventing heart disease. At a presentation of

the Society of Medicine Conference in London in July of 1999, drinking at least one cup of black tea per day was found to reduce the risk of heart attack by 44% (38,43). It didn't appear to matter if it was hot or cold, with or without milk. In five studies conducted to examine the protective role of flavonols in cardiovascular disease, three have suggested a benefit, while one showed no benefit and one suggested perhaps even an adverse association between tea consumption and coronary heart disease (43). Therefore, the available literature on tea consumption and the prevention of cardiovascular disease has not yet led to a definitive recommendation. However, for those who enjoy tea, at least one cup of either black or green tea per day may be included in a heart healthy diet.

## SMOKING

Smoking is the single most important preventable cause of death and disability. It doesn't matter if it is cigarettes, cigars or a pipe. It doesn't matter if it is low tar or not. Approximately 50 million Americans still smoke and annually 23 billion dollars is spent in related medical costs (44). Smoking kills at least 400,000 Americans

# ten

## basic principles to quit smoking\*

1. Set a stop date
2. Involve other people
3. Switch to a less appealing brand and begin to taper
4. Take it one day at a time
5. Change your routine
6. Alter your surroundings
7. Time the urge
8. Practice positive thinking
9. Consider using aids such as nicotine gum
10. Do your homework first

each year and negatively impacts nearly all the organs in the body (45). **For smokers the risk of developing CHD is 2.8 times that of a non-smoker** (46).

Fortunately by quitting, the risk of having a heart attack is lower within 2 years (47).

## HERBAL SUPPLEMENTS

**Selenium** is an antioxidant that regulates important enzymes that protect against oxidized molecules such as low density lipoproteins

(LDL). It also inhibits the aggregation of platelets, which are small blood components that build up on plaque within the heart arteries, form blood clots, and can lead to a heart attack (49). Based upon the above mechanisms, selenium is hypothesized to be protective against the development of plaque formation within the heart arteries, but this has not been established in clinical trials. Until more research

is available, selenium supplementation is not advised for CHD. Keep in mind that selenium may still play a role in other cardiovascular conditions involving heart muscle disorders not involving coronary heart disease.

### **Folic Acid, vitamin B6 and B12**

may be the appropriate choice.

Homocysteine is an amino acid which is abnormally elevated in 30% of people. Its elevation in the blood stream has been clearly linked to the formation of plaque within the heart arteries (50). Low folic acid levels have been linked to elevated homocysteine levels and an increased risk of myocardial infarction, commonly known as a heart attack (51). In affected individuals, folic acid taken along with vitamins B6 and B12 can reduce these levels (50,52-54). While this combination of supplements has been shown to improve blood flow through the heart arteries in healthy volunteers, limited research has been done demonstrating a reduction in either plaques within the heart arteries or the associated heart attacks, death, etc. which result from plaque formation (55). While it is a logical extension to think

folic acid, vitamin B6 and B12 treatment for people with elevated homocysteine levels may reduce heart attacks and other cardiovascular events, it has yet to be demonstrated in any clinical trials. Based upon what is currently known, supplementation is felt to have a positive effect, particularly in those individuals identified as having an elevated homocysteine level. Prior to supplementation with folic acid, and vitamins B6 and B12, consider the appropriate medical testing. The supplementation level of folic acid is 800 mcg taken along with a multivitamin, which commonly supplies an additional 400 mcg, for a total daily dosage of 1200 mcg. The supplementation level of vitamin B12 is 1000 mcg, or 1 mg daily, and for vitamin B6, 100 mg. For effective treatment of elevated homocysteine, all three supplements are required.

**Vitamin E** is a good antioxidant to remember. The biologic activity of vitamin E appears to prevent damage to cell walls through a variety of mechanisms in part due to its antioxidant effects. Its role in preventing heart disease in patients without known heart disease has been encouraging. The Health Professionals' Follow-up Study examined 39,910 males without known disease

or diabetes mellitus. Participants who took 100 IU (International Unit) of vitamin E daily for at least two years had a 39% reduction in heart disease or cardiovascular surgery (56). The US Nurses' Health Study included 121,000 female nurses between 30 and 44 years old (57). Participants taking 100 IU of vitamin E daily had a 34% lower incidence of coronary heart disease after just two years compared to those participants not taking vitamin E.

The above positive results also prompted large-scale randomized trials to further examine the benefits of vitamin E in patients with known heart disease or at very high risk. Initial studies were very encouraging. The Cambridge Heart Antioxidant Study (CHAOS) focused on whether supplements - either 400 or 800 IU of vitamin E daily - would prevent future cardiovascular events in patients with known coronary artery disease (58). Of 2,002 patients with documented coronary artery disease, treatment with vitamin E instead of placebo significantly reduced the incidence of non-fatal

myocardial infarction (heart attack) by 77%, without an effect on mortality. This reduction was due to a significant decrease in non-fatal heart attack, with no difference in cardiovascular death. However, this trial was followed by two large randomized trials that have been less supportive. The Heart Outcomes

#### Prevention Evaluation

Study (HOPE) examined 9,541 patients with either known heart disease or diabetes mellitus who received 400 IU of natural vitamin E for a mean of 4.5 years (59). There was no reduction in heart attack, stroke or death for the patients taking vitamin E instead of placebo. In the GISSI-Prevention study, 11,000 patients who had recently survived a heart attack were given 300 mg of synthetic vitamin E for a mean of 3.5 years (60). Again, there were similar rates of heart attack, stroke and death for patients taking synthetic vitamin E instead of placebo.

Therefore, no clear benefit of vitamin E has been established for patients who already know they have heart disease or are at very high risk.

Unfortunately, this study utilized synthetic vitamin E, which is felt to be less

effective than the natural form, and therefore may have minimized the benefit of E vitamins in high-risk patients. They also studied a very high risk group of patients who may have already had advanced plaque formation within their heart arteries, thus mitigating the potential benefit of early prevention with supplementation.

Perhaps a combination of antioxidants may be required to reduce plaque formation. Vitamins E and C have been studied in the Antioxidant Supplement Atherosclerosis Prevention (ASAP) Study. In this trial, high-risk men taking vitamin E (200 mg daily) and vitamin C (500 mg daily) for three years had a 45% reduction in the progression of atherosclerosis (coronary artery plaque) (61). A reduction in cardiovascular events and death from all causes was also found in over 11,000 elderly persons taking a combination of vitamins E and C (62). However, a combination of vitamin E and beta-carotene has not been shown to affect symptoms or disease progression (63).

As the above discussion indicates, vitamin E supplementation for CHD prevention remains controversial. Although the widespread benefits for vitamin E for the

prevention of cardiovascular disease may not be as great as originally predicted this isn't to say that benefit does not remain for select patients utilizing the correct form, dosage, and potentially the correct combination of antioxidant supplements. Thus, while the debate rages on, vitamin E supplementation with 400 IU may be the best course of preventative action.

**Vitamin C** may not be what the heart needs. This vitamin is involved in many cellular processes and acts as an antioxidant. Vitamin C consumption is certainly essential, and vitamin C levels within the blood have been inversely correlated with the incidence of coronary heart disease, the lower the level, the higher the incidence of disease (64,65). However, there really is no clinical research which has found that vitamin consumption actually reduces your risk of developing cardiovascular disease. Today's best advice is to eat plenty of fruits, especially citrus fruits, as well as vegetables rich in vitamin C. Additional supplementation cannot be supported for the prevention of CHD.

**Superoxide Dismutase** (SOD) will not help the heart. SOD is felt to prevent oxygen-related damage to the body's cells. It has been studied to examine its potential role in preventing or decreasing heart muscle damage in the setting of a heart attack (66,67). To date, the data does not support its use and **it is important to recognize that SOD cannot be absorbed if taken orally.** SOD can only be administered by injection. Therefore, SOD does not appear to be useful for the prevention of CHD.

**DHEA** won't soothe the heart. Produced by the adrenal glands, dehydroepiandrosterone (DHEA), is the most abundant steroid in the human body. Levels peak at approximately age 30 and decrease to 5 -15 percent of those levels by age 60 (68). DHEA levels within the blood stream have been demonstrated to be low in men with CHD (69). However, supplementation as a means of reducing the risk of CHD, has not been studied. Therefore, the link cannot be drawn that by raising blood levels of DHEA one may actually decrease their risk of heart disease. It is also

important to recognize that while DHEA has been shown to lower triglyceride levels, it has also been demonstrated to reduce HDL levels, the "good cholesterol" (70). Finally, supplementation with this hormone may actually be harmful by potentially promoting hormone sensitive tumors and altering the body's own natural hormone cycle. The bottom line-DHEA is best avoided for the prevention of heart disease until further studies have been performed.

**Magnesium** may reduce heart pains (also known as angina). This essential element is found mainly in bone, but it is also important in the function of every other cell in the body. Magnesium plays a key role in energy formation within the cell, as well as playing a part in over 300 cellular processes. It is not surprising that magnesium supplementation is suggested for many medical conditions including heart-related ailments. The intravenous form has been extensively studied for its role in the immediate stages of a heart attack (71). In its role as a preventative agent, oral magnesium has been supported in some research to reduce the frequency of angina (72). As previously mentioned, hypertension is a major risk factor for the development of CHD

and magnesium supplementation has been found to be useful in regulating blood pressure and potentially treating mild to moderate hypertension (73-76). A dose of 600-1000 mg of elemental magnesium has been used for patients with mild to moderate hypertension (73,74). Other trials have suggested little benefit to magnesium supplementation on treating hypertension (77). Keep in mind that magnesium supplementation should be avoided in individuals with renal insufficiency, which may lead to dangerously high levels of magnesium.

**Coenzyme Q-10** may aid in the relief of angina. This supplement is both a potent antioxidant and cofactor in the formation of energy within the body's cells. It has been advocated in cardiovascular disease as an aid to the treatment of congestive heart failure, hypertension and CHD. With regard to the later, coenzyme Q-10 may play a role in reducing the frequency of angina (78). Research is limited and more needs to be done before its use can be unequivocally accepted. No specific dose has been identified; however, 200 to

300 mg per day in two or three divided doses is most likely appropriate.

**Garlic** is one of the most commonly ingested herbal supplements with a wide range of reported health benefits. Its role in cardiovascular disease has mainly focused on reducing cholesterol levels, but 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. Studies have suggested that garlic supplementation can reduce age-related vascular changes including plaque formation within the heart arteries, also known as atherosclerosis, and may prevent recurrent heart attack and death following an initial heart attack (79,80).

Additional randomized trials are necessary before these claims can be fully supported. When choosing to take garlic, remember it is the ability of the supplement to yield allicin that confers benefit. When selecting a garlic preparation, 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 (81). The typical dosage is 900 mg daily, given in three

Daily Supplementation Levels for Coronary Heart Disease	
Folic Acid	1200 mcg
Vitamin B12	1000 mcg or 1 mg
Vitamin B6	100 mg
Vitamin E	400 I.U.
Magnesium	600-1000 mg
Coenzyme Q10	200-300 mg in 2 or 3 divided doses
L-Carnitine	2 grams taken in 2 doses

divided doses or 4 grams of fresh garlic.

**Hawthorn's** potential benefits and its uses in cardiovascular disease have mainly focused on congestive heart failure rather than CHD. Research has suggested that hawthorn supplementation can increase the blood flow through heart arteries, but this has not yet been linked to any clear benefit in people with CHD (82).

**L-Carnitine** may give the heart a boost. It is also known as simply carnitine. Manufactured in the liver, kidneys, and brain, this B vitamin is important in the transportation of energy molecules within heart muscle cells. For people living with

CHD, L-Carnitine levels have been identified as reduced in heart muscle during periods of activity, and its supplementation has been shown to reduce chest pain attributed to the heart (angina), improve exercise tolerance, and improve the electrocardiographic changes frequently identified in CHD patients during exercise (83,84). L-Carnitine 1 gram taken twice a day has been suggested as the appropriate dose. **It is important not to take D- or DL-carnitine which are found in some over-the-counter preparations and may lead to some severe side effects or symptoms suggestive of L-Carnitine deficiency (70).**

## EXERCISE

Regular exercise should be a part of life's daily routine. It has been well described to have many positive effects on the risk factors which contribute to CHD.

There are several other benefits to routine exercise, which likely indirectly affect the risk of CHD, such as stress reduction. Exercise is well known to release endorphins which are the body's own chemicals that can reduce pain and invoke mild euphoria. Perhaps it is this later benefit which reduces emotional stress, and as a result, lowers blood pressure and therefore the risk of developing CHD. For individuals who do not yet have evidence of CHD, clinical research such as The Harvard Alumni Health Study have demonstrated that regular vigorous exercise translates into a lower risk of future CHD events—chest pain, heart attack, heart-related death, and the need for bypass

surgery or angioplasty (85). For those who already have CHD, The National Exercise and Heart Disease Project randomized 651 men, 2 to 36 months after a heart attack, to an exercise program for 3 years (86). In these individuals, there was a 37% reduction in heart related death and 5% reduction in other cardiac events such as heart attack. A second study examined 303 men after a heart attack and found a 42% reduction in mortality after slightly more than two years (87). The findings in neither study were statistically significant, but they certainly suggest the potential for a strong benefit from a routine exercise program.

Marathon running is not required to see a heart healthy benefit from regular exercise. In a recent study of 772 middle aged men with CHD that were followed for up to 5 years, recreational activity of at least 4 hours on the weekend, moderate

or heavy gardening, and regular walking (>40 min/day) was associated with a significant reduction in death from all causes including heart related (89). In this study, even men who were sedentary and initiated light exercise derived some benefit. The Centers for Disease Control and Prevention and the American College of Sports Medicine agree that even 30 minutes of moderate exercise on most days, if not all, will lead to improved cardiovascular health (90). So what does "moderate" mean? Walking at 3 to 4 miles per hour would be a good example. Of course there are many other enjoyable forms of exercise and all likely derive similar benefits as long as the duration is similar and the energy expended is the same. In addition to walking, consider swimming, rowing, biking, or cross-country skiing.

Does duration matter? Up until recently, it was

**a** regular  
exercise  
routine:

- \* lowers LDL, the "bad cholesterol"
- \* raises HDL, the "good cholesterol"
- \* lowers blood pressure
- \* lowers body fat

## **An interesting study**

**examined the benefit of an exercise program along with a diet program plus psychological health education (88).**

**There was a significant reduction in heart-related deaths of 19%, although no difference in the number of deaths due to all causes.**

**Not surprisingly, this study emphasizes the need to address the whole person through a variety of modalities in order to achieve heart wellness.**

A recent study has found that short segments of exercise throughout the day (as long as the energy expended is the same) are as beneficial to heart health as one long exercise session.

commonly stated that daily exercise had to be performed all at once rather than in shorter segments. However, a recent study has found that the duration of exercise did not matter on the reduction of CHD risk as long as the energy expended was the same (91). In other words, short segments of exercise throughout the day were equally beneficial to one long exercise session. This finding is especially important to people who have a very busy schedule or physical limitation which make it very difficult to exercise for prolonged periods of time.

While aerobic exercise such as walking, swimming, etc is good for the person with CHD, isometric exercise, such as lifting weights, may actually raise a person's blood pressure (92). As a result, it has been suggested that weight lifting and strength training may not be appropriate for some individuals. Recent research has shed some light on this question by examining 65 healthy elderly men who participated in a strength training program (93). In these men, a strength training program was well tolerated with no adverse heart-related events. It is important to point out that none had evidence of CHD prior to initiating the program and much different results may be found in individuals who have CHD. Before initiating any weight lifting program, it is important to consult a medical provider. If not strength training, perhaps muscle toning with light weights may still be appropriate. This likely has little effect on blood pressure or underlying CHD. It is important that when lifting any weights for simple muscle toning or strength

training that a person continue to breathe throughout the exercise and not hold their breath and bare down which tends to increase blood pressure.

Before starting out on an exercise program, make sure that one's CHD is considered stable by a medical provider and that high blood pressure is also under adequate control.

### **YOGA/TAI CHI/QI GONG**

Exercise and relaxation are a healthy combination. Yoga was developed in ancient India as a set of practices intended to integrate the mind, body, and spirit. Yoga has long been touted as beneficial to those with cardiovascular disease or at risk of developing cardiovascular disease. While there are many forms of yoga, Hatha yoga is the most commonly practiced form within the United States. There are three basic practices which make up Hatha yoga. \* Asanas involves a variety of physical postures and exercises.

\* Pranayama comes from the Sanskrit word prana, which means life energy and ayam which means control. Pranayama is similar to the "qi" in ancient Chinese medicine. By utilizing breathing exercises, pranayama

attempts to remove the harmful effects of stress, toxins, and improper diet.

\* Dhyana, or meditation, is felt to have beneficial effects on the autonomic nervous system, which regulates excitability within the body as well as hemodynamic factors such as blood pressure and heart rate. Clinical research regarding the preventative benefits of yoga is in its infancy within the United States. There have been several non U.S. studies which have examined the hemodynamic benefits of yoga. Beginning in 1973, a study in London combined yoga along with biofeedback and noted that 25% of those studied were able to stop using anti-hypertensive medications (94). A second study in 1993 examined physical fitness teachers who practiced yoga for 3 months. The participants showed a significant reduction in blood pressure, heart rate, respiratory rate, and body weight (95). While the role of yoga in the prevention of CHD has not yet been entirely defined, what data is available appears very encouraging. In fact, yoga, like Tai Chi and Qi Gong, may be ideally suited for the person who is unable to participate in regular aerobic exercises and yet wishes to reduce their risk of CHD



*25% of those studied were able to stop using antihypertensive medicine from a combination of yoga and biofeedback therapy.*

through routine physical activity coupled with stress relief.

Tai Chi was developed in China in the 1200's and has become the most popular form of exercise in that country. Tai Chi is increasingly popular in the United States as a form of mild to moderate aerobic activity. It combines slow, graceful movements combined with deep breathing and mental attention. A typical work-out lasts only 15-20 minutes and ideally is performed twice per day either individually or in a group. The body's response to Tai Chi has been studied and found to lower blood pressure and heart rate (96). In fact in this study, Tai Chi was found to confer equivalent benefit to

brisk walking. However, not all studies have found similar results. No studies have specifically examined tai chi in the prevention of CHD, but as previously mentioned, light exercise has been shown to reduce the risk of CHD over a sedentary lifestyle (89).

Qi Gong (pronounced chee gong) also involves movements and deep breathing exercises. It too was developed in ancient China and has become increasingly popular in the United States. The qi is a person's vital energy, which circulates within the body in small channels known as meridians. Qi Gong is intended to channel that energy and promote health. While limited research is available in the United States. A twenty-year study completed in China in 1993 found lowered blood pressure and a 50% decrease in death and illness from stroke in persons utilizing Qi Gong.(97) No specific research is available on Qi Gong in the prevention of CHD, however the regular physical activity along with stress relief appears ideally suited for the person at risk for CHD.

## **MIND/BODY**

If healing literally means "to make whole," the body

cannot truly be healed without healing the mind.

Ancient Chinese medicine considered the mind and body as comprising the whole self. However, modern medicine has segregated these entities and focused on scientific methods, which provide targeted therapies to the body, without examining the necessary "wellness" process needed to simultaneously treat the mind-the Mind/Body connection. For example, in cardiovascular disease, medications are provided to lower a person's elevated blood pressure. These medications certainly do not relieve stressors or spiritual concerns which may be contributing to, or inhibiting, the healing process.

Mind/Body therapies actually include a wide array of modalities which all center around the connection in healing between the mind and body. Extensive research has been performed in many of these areas:

\* *Meditation and relaxation* are invaluable to the person with CHD. These individuals are frequently involved in very stressful lives with little, if any, time to unwind. Emotional stress has clearly been linked to many medical conditions and CHD is just

one of them.

Researchers suggest that the risks associated with stressful occupations may be equivalent to other major CHD risk factors (98). Meditation is a critical component in both the reduction of stress and the recovery from disease. Meditation has been described as one component to the behavioral approach to CHD (99, 100).

**People in high-stress**

**jobs may have 3.8 to 4.8**

**times as many heart**

**attacks as their counter-**

**parts in low-stress jobs.**

Transcendental Meditation was studied in 21 patients with CHD. After eight months of performing 20 minutes of these relaxation techniques twice a day there was a 15% increase in exercise tolerance (101). A second study was conducted of over 1000 patients who had recently suffered a heart attack and were considered to be "type A" personalities (102). After 3 years, those patients who had adopted a lifestyle

more compatible with a type B personality had reduced their risk of a second heart attack by half, compared to those who had not. Not surprisingly, meditation is probably the simplest, and perhaps, most fulfilling of all holistic therapies.

*Imagery and Visualization* are therapeutic techniques which lead the participant through a series of images that promote relaxation with the result of calming the body's natural anxiety provoking chemicals. These "images" may involve several of the body's senses such as touch, sight, smell, motion, and hearing. With proper training, a person can learn to guide themselves through those states, which provide a calming effect and can reduce their heart rate and blood pressure. Experiments in humans have demonstrated the ability to control the hemodynamic response of stress (103). This calming effect may reduce the need for medications or their associated side effects. In addition, these techniques may help to alter behaviors and risk factors which contribute to the development of CHD. The benefits of such therapy can last even after the participant is no longer engaged in the activity.



*Biofeedback* utilizes instruments which monitor bodily functions and allow the participant to regulate those functions. For instance, by listening to their heartbeat, a person is able to consciously increase or decrease their heart rate. Likewise, such techniques have been utilized to effectively lower blood pressure, a major modifiable risk factor for the development of CHD (104). Like many Mind/Body therapies, consistent utilization of these techniques serve to lower emotional stress and anxiety. Such factors may not only play a role in the development of CHD, but also be important following a serious heart-related event like a heart attack or coronary artery bypass surgery.

*Cognitive Behavioral Therapy* is a Mind/Body technique, which uses brief psychotherapy to reduce the stress response and induce relaxation. It is particularly useful

in individuals with chronic illness, such as CHD, who require permanent behavioral change and acceptance of that change. These techniques teach individuals how to identify stress triggers and actively treat them. There are several components to cognitive behavioral therapy including behavioral rehearsal, education, group support, and training in coping skills and motivation techniques. Support groups are one example of a therapy frequently utilized in patients with heart disease.

*Hypnosis* in essence is a form of deep relaxation. It is a state of focused concentration allowing the mind to be highly receptive to suggestion (68). While not extensively studied for the treatment of CHD, hypnotherapy has been demonstrated to lower blood pressure and heart rate, induce a state of deep relaxation, and decrease the output from nerve fibers—all effects which should be beneficial to the person with CHD. Further studies on its longterm effects on this condition have yet to be performed.

## **SPIRITUALITY**

Spirituality is the belief in something, not necessarily

someone, greater than oneself. This should not be confused with religious belief for a person can be spiritual without being religious. Unfortunately with the advent of modern scientific medicine came a clear separation between spiritual, religious, and scientifically founded beliefs. With the emergence of holistic therapies, there has been a resurgence in promoting spiritual and religious healing and studying its effectiveness in a whole host of disorders.

Spirituality includes an array of beliefs including a feeling of love, compassion, empathy, gratitude, and a sense of inner peace. There is a diminished focus on self (68). Love and social support are a part of a person's spirituality which provides healing and influences cardiovascular disease. A study examining individuals who described their parents as providing loving support in the 1950's went on to show that these individuals developed less hypertension and heart disease as well as fewer other non-cardiac conditions later in life (105).

*Therapeutic Touch*, a therapy that draws upon some of the principles of spirituality and spiritual beliefs, was

developed in the United States in the 1970's. It draws much of its premise from ancient Chinese medicine, as well as modern medicine. At the root of therapeutic touch is the belief in a common "life force" or energy field. By interacting with this energy field, it is believed a person can influence the healing of another. Surprisingly, it does not actually involve touching a person, but instead the provider holds their hands at a short distance from the person receiving the care and the provider moves their hands throughout the person's perceived energy field. These techniques have been widely embraced by nursing schools and now they are being taught throughout the United States. In a 1984 study, these techniques were provided to patients in a cardiovascular unit and those receiving such treatments showed a marked reduction in anxiety, important to the reduction of blood pressure and heart rate, key components to the treatment of individuals with CHD (106).

**Religious belief** is a part of the American fabric. In fact, 96 percent of Americans believe in God or a universal spirit (107). These beliefs impact healing. In a study conducted at Georgetown University School of Medicine

in 1995, religion was found to be beneficial to healing 81% of the time, neutral 15% of the time, and harmful 4% of the time (108). In cardiovascular disease, religious older adults have been shown to have lower blood pressure and lower death rates from CHD than their nonreligious peers (109). While not specifically identified as treating cardiovascular disease, faith, hope and forgiveness are tenets of most religions and have also been identified as important to a person's healing response. Prayer is also a part of most American religions and it too has important healing power. A 1986 poll by MD magazine found that one-half of doctors believe that prayer helps patients and two-thirds reported praying for patients (110). By praying, a relaxed state is induced in which breathing, heart rate and metabolism slow, blood pressure drops, and brain waves become less active.

## **PET THERAPY**

Pet therapy could easily have been included in the Mind/Body or Spirituality sections of this article because it crosses over to so many facets of holistic therapies. Pets are loved by their human companions

and in return can be powerful stimulators of health. A study of people hospitalized for a heart attack found a significant association between subsequent survival and pet ownership (111). In fact, having a pet proved to be more important than having a spouse or other extended family support. 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 (112). A study of the therapeutic benefit of pet therapy on the elderly was conducted with the Visiting Nurses Association of Eastern Montgomery County in Pennsylvania (113). Retirement home residents demonstrated a significant reduction in blood pressure and pulse rate following a pet visit, this reduction did not occur following a visit from a human. Pet ownership may also be an important motivator of daily exercise, an important component of a heart-healthy lifestyle.

### **MUSIC THERAPY**

Music is a great "spice of life." It inspires the soul and perhaps it even heals the mind-or in this case,

the heart. Music is enjoyed by all in a great variety of melodies and rhythms. The healing power of music rests within its ability to be utilized in behavioral therapy and modification.

Music has been shown to bring about changes in behavior, emotions and physiology-all key elements in the modification of cardiovascular disease. Psychological factors that have been examined include anxiety, emotional state, and pain intensity (114-117). Physiologic parameters have included blood pressure, pulse, skin temperature, respiratory rate and myocardial oxygen demand (114-117). Most, but not all, have found a positive effect with music therapy. A recent randomized study was conducted at three hospitals in Minneapolis, Minnesota examining the response of music therapy on patients following cardiac surgery (118). Not surprisingly, patient anxiety and pain was greatest within the first 48 hours following surgery. The addition of music therapy to this population had a significant effect on lowering anxiety and blood pressure, with a trend in lowering pain and heart rate compared to those who received standard care. The addition of music therapy in the early period following

cardiac surgery appears to be of great value. Similar research has been conducted following a heart attack and these positive effects may apply to other cardiac conditions as well.

### **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, psychotherapy, herbal medicine, nutrition counseling, physical therapy, and homeopathy discussed below. While the constituent parts of naturopathy have been studied for their beneficial effects in the treatment of cardiovascular disease and specifically CHD, 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 specifically CHD. 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 CHD. One study performed in India examined the healing power of two Ayurvedic tonics in the reduction of chest pain (angina) attributed to the heart (119). These tonics, Maharishi Amrit Kalash 4 and 5 (MAK-4, MAK-5), both contain a large number of ingredients. In this study, those actively treated

for six months showed a significant reduction in chest pain events from 8.87 to 3.3 episodes per month. In addition, 5 of 11 participants had a drop in blood pressure. There was also an insignificant rise in HDL. Other components of Ayurvedic Medicine have demonstrated benefit in reducing the risk factors associated with the development of CHD. For instance, yoga has been shown to lower blood pressure (see Yoga). For now, more studies are needed in order to better clarify the role of Ayurvedic Medicine as a whole in the prevention and treatment of CHD.

**Study participants treated for six months with Maharishi Amrit Kalash 4 and 5 (MAK-4 and MAK-5) demonstrated a significant reduction in chest pain events.**

## REFERENCES

1. Heart and Stroke Facts: 1995 Statistical Supplement by American Heart Association
2. Diamond GA, Staniloff HM, Forrester JS et al. Computer-

assisted diagnosis in the noninvasive evaluation of patients with suspected coronary artery disease. *J Am Coll Cardiol* 1983;1:444-455

3. Chesebro JH, Fuster V, Elveback LR, et al. Strong family history and cigarette smoking as risk factors of coronary artery disease in young adults. *Br Heart J* 1982;47:78

4. Phillips AN, Shaper AG, Pocock SJ, et al. Parental death from heart disease and the risk of heart attack. *Eur Heart J* 1988;9:243

5. Second report of the expert panel on detection, evaluation, and treatment of high blood cholesterol in adults. The National Cholesterol Education Program. Bethesda (MD): National Institutes of Health, National Heart, Lung, and Blood Institute;1993. NIH Publication No. 93-3095. I-13

6. LaCroix AZ, Lang J, Scherr P, et al. Smoking and mortality among older men and women in three communities. *N Engl J Med* 1991;324:1619-1625

7. Wolf PA, D'Agostino RB, Kannel WB, Bonita R, Belanger AJ. Cigarette smoking as a risk factor for stroke: the Framingham Study. *JAMA* 1988;259:1025-9

8. Joint National Committee. The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Bethesda (MD): National Institutes of Health, National Heart, Lung, and Blood Institute;1993. NIH Publication No. 93-1088. 49 p
9. Stamler J, Wentworth D, Neaton JD. Is the relationship between serum cholesterol and risk of premature death from coronary heart disease continuous and graded? Findings in 356,222 primary screenees of the Multiple Risk Factor Intervention Trial (MRFIT). *JAMA* 1986;256:2823-8
10. Buchwald J, Varco RL, Matts JP, et al. Effect of partial ileal bypass surgery on mortality and morbidity from coronary heart disease in patients with hypercholesterolemia: report of the Program on the Surgical Control of Hyperlipidemias (POSCH). *N Engl J Med* 1990;323:946-955
11. Heyden S, Heiss G, Bartel AG, Hames CG. Sex differences in coronary mortality among diabetics in Evans County, Georgia. *J Chronic Dis* 1980;33:265-273
12. Stamler J. Epidemiology, established major risk factors, and the primary prevention of coronary heart disease. In: Parmley WW, Chatterjee K, editors. *Cardiology*. Philadelphia: J.B. Lippincott, 1987;1-41
13. Barrett-Connor E, Wingard DL. Sex differential in ischemic heart disease mortality in diabetics: a prospective population-based study. *Am J Epidemiol* 1983;118:489-496
14. Larsson B, Svardsudd K, Welin L, Wilhelmsen L, Bjorntorp P, Tibblin G. Abdominal adipose tissue distribution, obesity, and risk of cardiovascular disease and death: 13 year follow-up of participants in the study of men born in 1913. *Br Med J* 1984;288:1401-4
15. Larsson B, Bengtsson C, Jorntorp P, et al. Is abdominal body fat distribution a major explanation for the sex difference in the incidence of myocardial infarction? The study of men born in 1913 and the study of women. *Am J Epidemiol* 1992;135:266-73
16. Freedman DS, Jacobsen SJ, Barboriak JJ, et al. Body fat distribution and male/female differences in lipids and lipoproteins. *Circulation* 1990;81:1498-506
17. Leon AS, Connett J, Jacobs DR Jr, Rauramaa R. Leisure-time physical activity levels and risk of coronary heart disease and death: the Multiple Risk Factor Intervention Trial. *JAMA* 1987;258:2388-95
18. Wood PD, Stefanick ML, Williams PT, Haskell WL. The effects of plasma lipoproteins of a prudent weight-reducing diet, with or without exercise, in overweight men and women. *N Engl J Med* 1991;325:461-6
19. Manson JE, Colditz GA, Stampfer MJ, et al. A prospective study of maturity-onset diabetes mellitus and risk of coronary heart disease and stroke in women. *Arch Intern Med* 1991;151:1141-7
20. King H, Kriska AM. Prevention of type II diabetes by physical training: epidemiological considerations and study methods. *Diabetes Care* 1992;15(11):1794-9
21. Helmrich SP, Ragland DR, Leung RW, Paffenbarger RS Jr. Physical activity and reduced occurrence of non-insulin-dependent diabetes mellitus. *N Engl J Med* 1991;325:147-152
22. Law MR, Wald NJ, Thompson SG. By how much and how quickly does reduction in serum cholesterol concentration lower risk of ischaemic heart disease? *BMJ* 1994;308:367-373
23. Ornish D, Brown SE, Scherwitz LW, Billings JH, et al. Can lifestyle changes reverse coronary heart disease? The Lifestyle Heart

- Trial. *Lancet* 1990;336:129-133
24. Appel LJ, Moore TJ, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. *NEJM* 1997;336(16):1117-24
25. Cappuccio FP, MacGregor GA. Does potassium supplementation lower blood pressure: a meta-analysis of published trials. *J Hypertens* 1991;9:465-473
26. Simopoulos AP. Essential fatty acids in health and chronic disease. *Am J Clin Nutr* 1999;70(Suppl):5605-5695
27. Harris WS. Nonpharmacologic treatment of hypertriglyceridemia: Focus on fish oils. *Clin Cardiol* 1999;22(Suppl 6):II-40-43
28. Hornstra G, Barth CA, Galli C, et al. Functional food science and the cardiovascular system. *Br J Nutr* 1998;80(Suppl II):S113-S146
29. Rissanen T, Voutilainen S, Nyyssonen K et al. Fish oil-derived fatty acids, docosahexaenoic acid and docosapentaenoic acid, and the risk of acute coronary events: The Kuopio ischaemic heart disease risk factor study. *Circulation* 2000;102:2677-2679
30. Kris-Etherton PM, Shaffer Taylor D, Yu-Poth S, et al. Polyunsaturated fatty acids in the food chain in the United States. *Am J Clin Nutr* 2000;71(Suppl);179S-188S
31. Rimm EB, Giovannucci EL, Willett WC, et al. Prospective study of alcohol consumption and risk of coronary disease in men. *Lancet* 1991;338:464-468
32. Gaziano JM, Buring JE, Breslow JL, et al. Moderate alcohol intake, increased levels of high-density lipoprotein and its subfractions, and decreased risk of myocardial infarction. *N Engl J Med* 1993;329:1829-1834
33. Sato M, Ray PS, Laulik G, et al. Myocardial protection with red wine extract. *J Cardiovasc Pharmacol* 2000;35:263-68
34. Nigdikar SV, Williams NR, Griffin BA, Howard AN. Consumption of red wine polyphenols reduces the susceptibility of low-density lipoproteins to oxidation in vivo. *Am J Clin Nutr* 1998;68:258-65
35. De Oliveira e Silva ER, Foster D, McGee Harper M, et al. Alcohol consumption raises HDL cholesterol levels by increasing the transport rate of apolipoproteins A-I and A-II. *Circulation* 2000;102:2347-2352
36. Lichtenstein AH. Soy protein, isoflavones and cardiovascular disease risk. *J Nutr* 1998;128:1589-1592
37. Hasler C. Public health implications of the soy protein health claim. *The Soy Connection* 1999-2000;8(1) 38. Busch F. "The New Nutrition: From Antioxidants to Zucchini" John Wiley & Sons. New York, NY 2000
39. Keys, A. (ed.). Coronary heart disease in seven countries. *Circulation* 41(Suppl. 1), 1970
40. Hu FB, Stampfer MJ, Rimm EB, et al. A prospective study of egg consumption and risk of cardiovascular disease in men and women. *JAMA* 1999;281:1387-94
41. Dulloo AG, Duret C, Rohrer D, et al. Efficacy of a green tea extract rich in catechin polyphenols and caffeine in increasing 24-h energy expenditure and fat oxidation in humans. *Am J Clin Nutr* 1999;70:1040-5
42. Graham HN. Green tea composition, consumption, and polyphenol chemistry. *Prev Med* 1992;21:334-50
43. Hollman PC, Feskens EJ, Katan MB. Tea flavonols in cardiovascular disease and cancer epidemiology. *Proc Soc Exp Biol Med* 1999;220(4):198-202
44. Larson DE. Mayo Clinic Family Health Book. William Morrow and Company. New York, NY. 1st ed. 1990;408
45. Thun MJ, Apicella LF, Henley SJ. Smoking vs other risk factors as the cause of smoking-attributable deaths: confounding in the courtroom. *JAMA*

2000;706-12

46. Kannel WB.

Hypertension, blood lipids, and cigarette smoking as co-risk factors for coronary heart disease. *Ann NY Acad Sci* 1978;304:128

47. Kaufman DW, Helmrich, SP, Rosenberg L, et al.

Nicotine and carbon monoxide content of cigarette smoke and the risk of myocardial infarction in young men. *N Engl J Med* 1983;308:409

48. Larson DE. Mayo Clinic Family Health Book. William Morrow and Company. New York, NY. 1990;1st ed:413-415

49. Neve J. "Selenium as a risk factor for cardiovascular diseases." *J Cardiovasc Risk* 1996;3(1):42-7

50. Landgren F, Israelsson B, Lindgren A, et al. "Plasma homocysteine in acute myocardial infarction: homocysteine-lowering effect of folic acid." *J Intern Med* 1995;237(4):381-388

51. Christensen B, Landaas S, Stensvold I, et al. Whole blood folate, homocysteine in serum, and risk of first acute myocardial infarction. *Atherosclerosis* 1999;147(2):317-326

52. Brouwer IA, Van Dusseldorp M, Thomas CM, et al. "Low-dose folic acid supplementation decreases plasma homocysteine concentrations: a randomized

trial." *Am J Clin Nutr* 1999;69(1):99-104

53. Woodside JV, Yarnell JW, McMaster D, et al. "Effect of hyperhomocysteinemia: a double-blind, randomized, factorial-design, controlled trial." *Am J Clin Nutr* 1998;67(5):858-866

54. Brattstrom LE, Israelsson B, Jeppsson JO, et al. "Folic acid-an innocuous means to reduce plasma homocysteine." *Scand J Clin Lab Invest* 1988;48(3):215-221

55. Chao CL, Chien KL, Lee YT. Effect of short-term vitamin (folic acid, vitamins B6 and B12) administration on endothelial dysfunction induced by post-methionine load hyperhomocysteinemia. *Am J Cardiol* 1999;84:1359-1361

56. Rimm EB, Stampfer JJ, Ascherio A, et al. Vitamin E consumption and the risk of coronary heart disease in men. *N Engl J Med* 1993;328:1450-1456

57. Stampfer MJ, Hennekens CH, Manson JE, et al. Vitamin E consumption and the risk of coronary disease in women. *N Engl J Med* 1993;328:1444-1449

58. Stephens NG, Parsons A, Schofield PM, et al. Randomised controlled trial of vitamin E in patients with coronary disease: Cambridge Heart Antioxidant Study (CHAOS) *Lancet* 1996;347:781-786

59. Yusuf S, Dagenais G, Pogue J, et al. Vitamin E supplementation and cardiovascular events in high-risk patients. The Heart Outcomes Prevention Evaluation Study Investigators. *N Engl J Med* 2000;342:154-160

60. GISSI-Prevenzione Investigators. *Lancet* 1999;354:447-455

61. Kehoe WA. Vitamin E and heart disease. *Pharmacist's Letter* 2000;16(3):160307

62. Brzezinski A, Adlercreutz H, Sheoul R, et al. Short-term effects of phytoestrogen-rich diet on postmenopausal women. *Menopause* 1997;4:89-94

63. Tornwall ME, Virtamo J, Haukka JK, et al. The effect of alpha-tocopherol and beta-carotene supplementation on symptoms and progression of intermittent claudication in a controlled trial. *Atherosclerosis* 1999;147:193-197

64. Gey FG, Moser UK, Jordan P, et al. Increased risk of cardiovascular disease at suboptimal plasma concentrations of essential antioxidants: an epidemiological update with special attention to carotene and vitamin C. *Am J Clin Nutr* 1993;57:787S-97S

65. Manson JE, Gaziano JM, Jones MA, Hennekens CH. Antioxidants and

- cardiovascular disease: a review. *J Am Coll Nutr* 1993;12:426-32
66. Flaherty JT, Pitt B, Gruber JW, et al. Recombinant human superoxide dismutase (h-SOD) fails to improve recovery of ventricular function in patients undergoing coronary angioplasty for acute myocardial infarction. *Circulation* 1994;89(5):1982-91
67. Murohara Y, Yui Y, Hattori R, et al. Effects of superoxide dismutase on reperfusion arrhythmias and left ventricular function in patients undergoing thrombolysis for anterior wall acute myocardial infarction. *Am J Cardiol* 1991;67(8):765-7
68. Pelletier KR. "The Best Alternative Medicine: What Works? What does not?" Simon & Schuster. New York, NY 2000;108-110
69. Herrington D, et al. DHEA and coronary atherosclerosis. *Ann of New York Acad Science* 1995;774:271-80
70. Natural Medicines Comprehensive Database. 3rd ed. Stockton, CA. Therapeutic Research Faculty. 2000
71. Micromedex(r) Healthcare Series: Micromedex Inc., Englewood, Colorado. (Vol.101, expires 9/1999)
72. Lasserre B, Spoerri M, Moullet V, et al. "Should magnesium therapy be considered for the treatment of coronary heart disease? II. Epidemiological evidence in outpatients with and without coronary heart disease." *Magnes Res* 1994;7(2):145-53
73. Preuss HG, Gondal JA, Lieberman S. "Association of macronutrients and energy intake with hypertension." *J Am Coll Nutr* 1996;15(1):21-35
74. Yamori I, Nara Y, Mizushima S, et al. "Nutritional factors for stroke and major cardiovascular diseases: international epidemiological comparison of dietary prevention." *Health Rep* 1994;6(1):22-27
75. Sanjuliani AF, de Abrué Fagundes VG, Francischetti EA. "Effects of magnesium on blood pressure and intracellular ion levels of Brazilian hypertensive patients." *Int J Cardiol* 1996;56(2):177-183
76. Widman L, Wester PO, Stegmayr BK, et al. "The dose-dependent reduction in blood pressure through administration of magnesium. A double blind placebo controlled cross-over study." *Am J Hypertens* 1993;6(1):161-165
77. Whelton, P.K., and Klag, M.J.: Magnesium and blood pressure: Review of the epidemiologic and clinical trial experience. *Am J Cardiol* 1989;63:26G
78. Kamikawa T, Kobayashi A, Yamashita T, et al. "Effects of coenzyme Q10 on exercise tolerance in chronic stable angina pectoris." *Am J Cardiol* 1985;56(4):247-51
79. Blumenthal M, et al. Ed. The Complete German Commission E Monographs: Therapeutic Guide to Herbal Medicines. Trans. S. Klein. Boston, MA: *American Botanical Council*, 1998
80. Newall CA, Anderson LA, Philpson JD. Herbal Medicine: A Guide for Healthcare Professionals. London, UK: The Pharmaceutical Press, 1996
81. Imai J, Ide N, Nagae S, et al. Antioxidant and radical scavenging effects of aged garlic extract and its constituents. *Planta Med* 1994;60:417-420
82. Schussler M, Holz J, Fricke U. Myocardial effects of flavonoids from *Crataegus* species. In: *Arzneimittelforschung* 45(8):842-845, Aug, 1995
83. Cacciatore L, Cerio R, Ciarimboli M, et al. The therapeutic effect of L-carnitine in patients with exercise-induced stable angina: a controlled study. *Drugs Exp Clin Res* 1991;17(4):225-35
84. Cherchi A, Lai C,

- Angelino F, et al. Effects of L carnitine on exercise tolerance in chronic stable angina: a multicenter, double-blind, randomized, placebo controlled crossover study. *Int J Clin Pharmacol Ther Toxicol*, 1985;23(10):569-72
85. Sesso, HD, Paffenbarger RS Jr, Lee IM. Physical activity and coronary heart disease in men: The Harvard Alumni Health Study. *Circulation* 2000;102:975-980
86. Shaw LW. Effects of a prescribed supervised exercise program on mortality and cardiovascular morbidity in patients after a myocardial infarction. *Am J Cardiol* 1981;48:39-46
87. Carson P, Phillips R, Lloyd M, et al. Exercise after myocardial infarction: a controlled trial. *J R Coll Physicians Lond* 1982;16:147-151
88. Hamalainen H, Luurila OJ, Kallio V, Knuts L-R. Reduction in sudden deaths and coronary mortality in myocardial infarction patients after rehabilitation: 15-year follow-up study. *Eur Heart J* 1995;16:1839-1844
89. Wannamethee SG, Shaper G, Walker M. Physical activity and mortality in older men with diagnosed coronary heart disease. *Circulation* 2000;102:1358-1363
90. Manson J, et al. A prospective study of walking as compared with vigorous exercise in the prevention of coronary heart disease in women. *N Engl J Med* 1999;341:650-658
91. Lee IM, Sesso HD, Paffenbarger RS Jr. Physical activity and coronary heart disease risk in men: Does the duration of exercise episodes predict risk? *Circulation* 2000;102:981-986
92. Grossman E, Oren S, Garavaglia GE, et al: Disparate hemodynamic and sympathoadrenergic responses to isometric and mental stress in essential hypertension. *Am J Cardiol* 1989;64:42
93. Berman S. *Medicine and Science in Sports and Exercise* 2000;1845-1848
94. Patel C. Yoga and bio-feedback in the management of hypertension. *Lancet* 1973;1053-1055
95. Telles S, et al. Physiological changes in sports teachers following 3 months of training in Yoga. *Indian Journal of Medical Sciences*. 1993;47(10):235-238
96. Jin P. Efficacy of tai chi, brisk walking, meditation, and reading in reducing mental and emotional stress. *Journal of Psychosomatic Research* 1992;36(4):361-370
97. Wang. Effects of Qigong on preventing stroke and alleviating the multiple-cerebro-cardiovascular risk factors; a follow-up report on 242 hypertensive cases over 30 years. Proceedings, Second World Conference for Academic Exchange of Medical Qigong, Beijing, China. 1993;123-124
98. Karasek RA, Theorell T, Schwartz JE, et al. Job characteristics in relation to the prevalence of myocardial infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). *American Journal of Public Health* 1988;78:910-18
99. Dath NNS et al. Behavioral approach to coronary heart disease. *J Person Clin Stud* 1997;13(1-2):29-33
100. Van Dixhoorn J. Cardiorespiratory effects of breathing and relaxation instruction in myocardial infarction patients. *Bio Psychol* 1998;49(1-2);123-135
101. Zamorra J, et al. Usefulness of the transcendental meditation program in the treatment of patients with coronary artery disease. *Am J Cardiol* 1996;77(10):867-870
102. Castleman, M. *Blended Medicine: The Best*

- Choices in Healing. Rodale. St. Martin's Press. 2000(1st ed);338
103. Sharpley C. Maintenance and generalizability of laboratory based heart rate reactivity control training. *Journal of Behavioral Medicine* 1994;17(3):230-233
104. Nakao M, et al. Clinical effects of blood pressure biofeedback treatment on hypertension by auto-shaping. *Psychosomatic Medicine* 1997;59:331-338
105. Russek LG, Schwartz GE. Narrative descriptions of parental love and caring predict health status in midlife: A 35-year follow-up on the Harvard Mastery of Stress Study. *Alternative Therapies* 1996;2(6):55-62
106. Quinn JF. Therapeutic touch as energy exchange: Replication and extension. *Nursing Science Quarterly* 1989;12:78-87
107. Elgin D, LeDrew C. Global consciousness change. (Unpublished manuscript, 1997)
108. Matthews DA, Larson DB. The faith factor: An annotated bibliography of clinical research on spiritual subjects. *National Institute for Healthcare Research* 1995;3
109. Koenig HG. Intrinsic religiosity and depression. *American Journal of Psychiatry* 1998;110-114
110. Does prayer help patients? *MD* 1986;December:35
111. Friedmann E, et al. Animal companions and one-year survival of patients after discharge from a coronary care unit. *Public Health Rep.* 1980;95(4):307-12
112. Katcher AH, Friedmann E. Potential health value of pet ownership. *Continuing Education* 1980;2(2):117-121
113. Dossey L. The healing power of pets: A look at animal-assisted therapy. *Alternative Therapies* 1997;3(4):8-16
114. Bolwerk, CAL. Effects of relaxing music for patients with AMI music on state anxiety in myocardial infarction patients. *Critical Care Nursing Quarterly* 1999;13:63-72
115. Updike P. Music therapy results for ICU patients. *DCCN* 1990;9(1):39-45
116. White J. Effects of relaxing music on cardiac autonomic balance and anxiety after acute myocardial infarction. *American Journal of Critical Care* 1999;8(4):220-230
117. Zimmerman LM, Pierson MA, Marker J. Effects of music on patient anxiety in coronary care units. *Heart and Lung* 1988;17(5):560-566
118. Miller Eh, Sendelbach SE, Doran KA, Halm MA. Effects of music therapy on physiological and psychological outcomes for patients having open heart surgery. (submitted for publication)
119. Dogra J. Indigenous free radical scavenger MAK 4 and 5 in angina pectoris. Is it only a placebo? *Journal of the Association of Physicians of India* 1994;42(6):466-7

## *Lifestyle Changes May Reduce Your Need for Antihypertensive Medications.*

High blood pressure, also known as hypertension, is a major risk factor for cardiovascular disease. This silent killer frequently has no symptoms until a devastating event such as stroke or heart attack occurs.

Approximately 10% of people in Western countries take medication to control their blood pressure. If simple steps are taken to reduce the need for drug therapy, perhaps some medications may not be required. In a recently published article in the American Journal of Hypertension, Dr. Mark Nelson analyzed the results of 12 studies that examined the effects of withdrawal of high blood pressure medications over at least a one-year period. He and his colleagues identified several predictors of successful withdrawal of medication with continued maintenance of normal blood pressure.

The risk of return to elevated levels was greatest in the

In the present study, 42% of individuals were able to maintain normal blood pressure for one year following the supervised withdrawal of medication.

first 6 months following withdrawal of medication, but some individuals had return of hypertension even after 6 months. It is important to keep in mind that blood pressure may rapidly escalate following discontinuation of therapy, so called "rebound hypertension."

As noted by the researchers, lifestyle modifications play an important role in reducing the need for medications and perhaps facilitating their withdrawal. Previous studies have demonstrated that lifestyle interventions can double the success rate of maintaining a normal blood pressure after withdrawal of medication. Weight loss and sodium restriction were important predictors of success in this study. Reducing alcohol intake and increasing physical activity have also been shown to be beneficial.

This article concludes that appropriate individuals for consideration of withdrawal of antihypertensive medication are those people who are on only one medication and have been well controlled for a long period of time. It is important to never stop taking medications without the consent of a doctor.

Lifestyle changes which may reduce your need for blood pressure medications include:

- Losing weight
- Decreasing sodium intake
- Reducing alcohol consumption
- Increasing physical activity

Title: A Systematic Review of Predictors of Maintenance of Normotension After Withdrawal of Antihypertensive Drugs  
Authors: Mark Nelson, Christopher Reid, Henry Krum and John McNeil  
Source: American Journal of Hypertension. 2001;14:98-105

Those factors most associated with successful withdrawal of high blood pressure medications included:

- Mild blood pressure elevation before drug therapy was begun
- Few drugs required for effective treatment (preferably one)
- Lifestyle intervention