

## **CARDIOVASCULAR DISEASE**

by  
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Cardiovascular disease is still the leading cause of death in the United States. The American Heart Association estimates that over **57,490,000 Americans have one or more forms of cardiovascular disease.**<sup>1</sup> The Heart Association's most recent annual statistics reported that in 1994, 954,720 Americans died from cardiovascular-related diseases, accounting for **41.8 percent of all deaths.** It is staggering to realize that over 2,600 people in the United States die from cardiovascular disease EVERY DAY.

There are numerous nutritional influences on cardiovascular disease, including magnesium, vitamin E, vitamin C, coenzyme Q10, folic acid, niacin, chromium, omega-3, and potassium. Epidemiological studies clearly show that higher consumption of fresh fruits and vegetables is associated with a **reduced risk of cardiovascular disease.**<sup>2</sup> Dietary factors such as salt, fat and phytochemical intake are important, as are lifestyle factors such as exercise, use of estrogens, smoking and psychological stress. Biological risk factors include elevated blood pressure,

elevated cholesterol, homocysteine and lipoprotein(a).

There are some genetic components to this condition; however, the majority of risk factors of cardiovascular disease are associated with diet, nutrition and lifestyle. These cardiovascular risk factors, which are largely within an individual's control, will be reviewed in this article.

### **DIETARY FACTORS**

**Fat and cholesterol are the two most common dietary factors associated with cardiovascular health.** For many years, saturated fat and dietary cholesterol were thought to be the primary risk factors for atherosclerosis. While they are major risk factors, more recent data indicates that this is a very complex area with many variables. Focusing primarily on dietary intake of fat and cholesterol is an oversimplification of the issue. On one hand, numerous studies have shown that, in general, people with cholesterol levels above 240 mg/dl have a **two to three times greater risk of cardiovascular disease** than those with levels below 200 mg/dl.<sup>3</sup> On the other hand, from recent research we

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<sup>1</sup>Heart & Stroke A-Z Guide, American Heart Association Statistics, 1997.

<sup>2</sup>Gaziano JM, et al. Natural antioxidants and cardiovascular disease: Observational epidemiologic studies and randomized trials. Natural Antioxidants in Human Health and Disease, Academic Press, 1994, pp.387-409.

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<sup>3</sup>Mechcatie E. HDL cholesterol, triglycerides best CVD predictors. Family Practice News Vol. 23, August 15, 1994.

know that **high-density lipoprotein (HDL) is cardioprotective**, whereas elevated low density lipoprotein (LDL) increases the risk. Thus, it is much more meaningful to know HDL and LDL levels rather than just total cholesterol. The problem with high LDL levels is that when LDL gets oxidized, it is capable of **damaging the arteries and initiating the process of atherosclerosis**. Thus, antioxidant nutrients provide a protective effect because they prevent free radical oxidation of LDL cholesterol.

Further confounding the issue, polyunsaturated vegetable oils were thought to be the heart healthy alternative to saturated fats. This now appears to have been erroneous advice. High intake of polyunsaturated **fats and oils without adequate antioxidant protection appears to increase the risk of cardiovascular disease**. Polyunsaturated oils are easily oxidized, creating free radicals, which can lead to vascular damage.

Another confounding factor to understanding the role of fats in cardiovascular disease is the problem of fats developed with the industrial process of partial hydrogenation. The process of partial hydrogenation results in a longer shelf life for polyunsaturated fat products such as margarine, shortening and thousands of other processed food items. The problem is that **partial hydrogenation alters the structure of fats, creating trans fatty acids which have now been shown to be positively associated with increased risk of cardiovascular disease**. Trans fatty acids actually block an enzyme that would normally metabolize cholesterol to bile acids for excretion. Thus, while margarine and

other trans fatty acid-containing foods may be **cholesterol-free, they actually inhibit the body's ability to eliminate cholesterol**. For example, in one study, individuals who consumed the most trans fatty acids (average of 5.7 gm/day) were found to be 50% more likely to develop cardiovascular disease than people who consumed the least (2.4 gm/day).<sup>4</sup> Partially hydrogenated products were initially recommended because it was thought that they would decrease cholesterol levels, however, it is now known that the trans fatty acids in these products increase total cholesterol, LDL cholesterol, triglycerides and lipoprotein(a) while lowering levels of HDL cholesterol. All of these are negative changes that create a lipid profile that substantially **increases the risk of cardiovascular disease**.<sup>5</sup>

**Olive oil appears to be the healthiest dietary fat/oil to use on a daily basis**. The much-publicized Mediterranean diet which contains 30 to 40% fat, predominantly from monounsaturated olive oil, is known to have a low incidence of heart disease. Interest in the Mediterranean diet began 30 years ago when researchers discovered that heart disease rates in Greece and Crete were **90% lower than in the United States, even though the people were consuming a 40% fat diet**.<sup>6</sup>

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<sup>4</sup>Lichtenstein A. Trans-fatty acids, blood lipids, and cardiovascular risk: Where do we stand? Nutrition Reviews 51(1):340-343, 1993.

<sup>5</sup>Khosla P, Hayes KC. Dietary trans-monounsaturated fatty acids negatively impact plasma lipids in humans: Critical review of the evidence. J Am Coll Nutr 15(4):325-339, 1996.

<sup>6</sup>Mason, M. The man who has a beef with your diet: Harvard's Walter Willett thinks the usual warnings about fatty foods are wrong. Hippocrates 31-37, May 1994.

**Essential fatty acid (EFA)** intake is another important aspect in the relationship of fats and cardiovascular health. Low levels of omega-3 (alpha-linolenic acid) and a tremendous imbalance in the omega-3/omega-6 ratio are critical nutritional problems in America. A deficiency of **omega-3 and excess consumption of omega-6 from polyunsaturated vegetable oils contributes to elevated triglycerides and blood pressure.** This also contributes to increased platelet stickiness, which, in turn, increases the likelihood of blood clots.<sup>7</sup> Flaxseed oil, which contains approximately 58-60% omega-3 and 18-20% omega-6, is the best way to normalize EFA imbalances and improve the aforementioned risk factors associated with cardiovascular disease. The usual adult dosage is one tablespoon daily.

**Salt is another dietary factor** that has a major impact on cardiovascular disease. Approximately 60% of people with hypertension are “salt sensitive”. In these individuals, increased salt (sodium chloride) sends blood pressures higher, and salt restriction lowers readings.<sup>8</sup> These people also benefit from increased intake of potassium and calcium because they increase urinary excretion of sodium. Many people who “put away the salt shaker” are unaware of how unsuccessful they are at salt restriction because of the enormous amount of “hidden salt” that is added into fast foods and processed foods. Recent studies suggest that **chloride sensitivity may actually be a cause**

<sup>7</sup>Nordoy, A. Fish consumption and cardiovascular disease: A reappraisal. Nutrition and Metabolism in Cardiovascular Disease 6:103-109, 1996.

<sup>8</sup>Haddy FJ, Pamnani, MB. The role of dietary salt in hypertension. J Am Coll Nutr 14(5):428-438, 1995.

**for concern** for some hypertensive individuals.

**Alcohol consumption at moderate levels** (especially wine) has been shown to be inversely correlated with heart disease. The flavonoid antioxidants in wines probably prevent the oxidation of LDL cholesterol. Some wines also contain levels of **salicylic acid sufficient to contribute to cardiovascular wellness** in a manner similar to aspirin (aspirin decreases platelet stickiness).<sup>9</sup> However, for obvious reasons, many scientists researching these effects are reluctant to promote the use of alcohol as a public health measure for the prevention of cardiovascular disease.

## NUTRITIONAL FACTORS

**Magnesium is a nutritional superstar** when it comes to cardiovascular disease. Magnesium is a muscle relaxant and nature’s equivalent to calcium channel blocker drugs. Magnesium deficiency is associated with increased incidence of atherosclerosis, hypertension, strokes and heart attacks. Low levels of magnesium can cause stiffness in the vasculature, which elevates blood pressure and can cause a contraction or spasm in the heart muscle that may result in sudden death. It is now recognized that many heart attacks happen to individuals with relatively healthy hearts. It is a **magnesium deficiency that causes a cardiac spasm that results in death.**<sup>10</sup>

<sup>9</sup>Muller CJ, Fugelsang KC. Take two glasses of wine and see me in the morning. Lancet 343:1428-1429, June 4, 1994.

<sup>10</sup>Eisenberg MJ. Magnesium deficiency and sudden death. Am Heart Journal 124:545-549,1992.

Magnesium single-handedly influences many of the activities associated with a wide variety of cardiac medications. For example, **magnesium inhibits platelet aggregation (like aspirin), thins the blood (like Coumadin), blocks calcium uptake (like Procardia) and relaxes blood vessels (like ACE inhibitors such as Vasotec).** Magnesium also increases oxygenation of the heart muscle by improving cardiac contractibility.<sup>11</sup>

Magnesium's protective effect against heart attacks was shown in a study where intravenous magnesium was given during the early stages of a heart attack, resulting in a **71% reduction in deaths during the critical initial four weeks after the attack,** compared to placebo controls.<sup>12</sup> When magnesium (400 mg/day) was given to individuals with elevated cholesterol and low HDL for four months, the average cholesterol level fell from **297 to 257 mg/dl, while the good HDL cholesterol increased by 33%.**<sup>13</sup> Over 30 clinical trials have reported that magnesium can lower elevated blood pressure, although results from some other studies have not been consistent with these results.

One important study revealed that hypertensive individuals have lower serum magnesium levels than people with normal blood pressure and people

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<sup>11</sup>Gaby AR. Magnesium: an inexpensive, safe, and effective treatment for cardiovascular disease. J Advancement Med 1:179-181, 1988.

<sup>12</sup>Shechter M, et al. Beneficial effect of magnesium sulfate in acute myocardial infarction. Am J Cardiol 66:271-274, 1990.

<sup>13</sup>Davis WH, et al. Monotherapy with magnesium increases abnormally low high density lipoprotein cholesterol: a clinical assay. Curr Ther Res 36:341-346, 1984.

with the highest blood pressures had the lowest magnesium levels.<sup>14</sup> Because magnesium is safe, inexpensive and has a wide range of beneficial effects on the cardiovascular system, it should not be overlooked as part of a treatment program.

**Vitamin E** has been shown to play a powerful role in the prevention of heart attacks because it can reduce platelet adhesion and prevent oxidation of LDL cholesterol. In the now-famous CHAOS study (Cambridge Heart Antioxidant Study), patients with coronary atherosclerosis were randomly given either vitamin E (400 IU or 800 IU per day) or a placebo. Compared with placebo controls, **vitamin E treatment resulted in a 47% reduction in follow-up heart attacks.**<sup>15</sup>

**Vitamin C** also can have an effect on cardiovascular disease. It has been shown that individuals consuming **vitamin C at two to three times the RDA, have improved lipid profiles corresponding to a reduced risk to cardiovascular disease.**<sup>16</sup> In one small study, 60% of the participants taking vitamin C for up to six months actually exhibited a reversal of atherosclerosis.<sup>17</sup> It is speculated that a beneficial aspect

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<sup>14</sup>Resnick LM, et al. Intracellular free magnesium in erythrocytes of essential hypertension: relation to blood pressure and serum divalent cations. Proc Natl Acad Sci 81:6511-6515, 1984.

<sup>15</sup>Stephens NG, et al. Randomized controlled trial of vitamin E in patients with coronary disease: Cambridge Heart Antioxidant Study (CHAOS). Lancet 347:781-786, 1996.

<sup>16</sup>Hallfrisch J, et al. High plasma vitamin C associated with high plasma HDL and HDL2 cholesterol. Am J Clin Nutr 60:100-105, 1994.

<sup>17</sup>Willis GC, et al. Serial arteriography in atherosclerosis. Can Med Assoc J 71:562-568, 1954.

of vitamin C may be related to its ability to regenerate the reduced form of vitamin E. Thus, adequate vitamin C will increase the antioxidant effectiveness of vitamin E. A review of the epidemiological data, though not totally consistent, generally supports the hypothesis that antioxidants such as **vitamin E, C and beta-carotene reduce the risk of cardiovascular disease.**<sup>18</sup>

**Folic acid** is gaining recognition in the scientific community as one of the most important “heart healthy” nutrients. **Folic acid is necessary for the metabolism and elimination of a toxic compound called homocysteine.** Homocysteine is capable of damaging blood vessels and promoting atherosclerosis. Postmenopausal women have higher levels of homocysteine, which contributes to the risk of cardiovascular disease. Supplemental folic acid (5 mg/day for 4 weeks) produced approximately a **30% drop in homocysteine levels.** Significant benefits were also produced for women who were not folic acid deficient. The results of this study concluded that moderate elevations of homocysteine contribute to both postmenopausal atherosclerosis and osteoporosis and that folic acid supplementation may have a preventive effect.<sup>19</sup>

Another study reported that modest levels of folic acid (400 to 650 mcg/day) are effective in **reducing elevated**

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<sup>18</sup>Manson, JE, et al. Antioxidants and cardiovascular disease: A review. J Am Coll Nutr 12(4):426-432, 1993.

<sup>19</sup>Brattstrom IE, et al. Folic acid responsive postmenopausal homocysteinemia. Metabolism 34:1073-1077, 1985.

**homocysteine levels.** There was a **69% increase in coronary mortality** in individuals with the lowest 25% serum folic acid compared to individuals with the highest 25%.<sup>20</sup> The authors of this study state, “If proven that lowering homocysteine levels reduces cardiovascular events, then tens of thousands of cases of cardiovascular disease each year can be prevented at a very low cost with few, if any, side effects.” They publicly urged the National Institutes of Health to serve the public interest by funding such trials as soon as possible.

**Vitamins B-6 and B-12** are two other nutrients necessary for the metabolism of homocysteine. In almost every study, when homocysteine is elevated, it is associated with low levels of vitamin B6, vitamin B12 and folic acid and increased cardiovascular risk.<sup>21</sup> It is important for healthcare providers to realize that many **prescription drugs interfere with the absorption of one or more of these homocysteine-metabolizing nutrients** which can ultimately increase the risks of cardiovascular disease: estrogen-containing medications, diuretics, anticonvulsants, anti-inflammatory drugs, antibiotics and ulcer medications.

**Coenzyme Q10** was first recognized by the Japanese as very beneficial to heart patients. It is now one of the most common methods of **treating cardiovascular disease in Japan.** Coenzyme Q10 is intimately involved in the production of energy at the cellular level and is critically important for the

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<sup>20</sup>Stampfer MJ, Rimm EB. Folate and cardiovascular disease: Why we need a trial now. JAMA 275(24):1929-1930, June 26, 1996.

<sup>21</sup>Mason, Michael. The B Vitamin Breakthrough. Hippocrates, September 1995, pp. 39-43.

body's most active muscle, the heart. It is now thought that congestive heart failure may be largely due to a coenzyme Q10 deficiency. In one double-blind study, 641 individuals with severe CHF were given 150 mg/day of CoQ10. CoQ10-treated patients had a **38% decrease in hospitalizations due to worsening of heart failure** when compared to the control group. At the same time, episodes of pulmonary edema decreased by **60% and angina episodes decreased by 53%**.<sup>22</sup>

**Potassium** has been shown as effective in preventing both hypertension and strokes. A meta-analysis of 19 clinical trials evaluating the relationship between blood pressure and dietary intake of potassium revealed that **increasing potassium intake lowers both systolic and diastolic blood pressure** (the effect is greater in patients with higher blood pressure).<sup>23</sup> Results of a 12-year study revealed that individuals who died from strokes had significantly lower potassium intake than survivors of strokes and individuals who died from other causes. This study emphasizes that, regardless of other risk factors, increased intake of potassium decreases stroke risk while decreased intake of potassium increases the risk.<sup>24</sup>

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<sup>22</sup>Morisco C, et al. Effect of coenzyme Q10 in patients with congestive heart failure: a long-term multicenter randomized trial. Clin Invest 71:S134-S136, 1993.

<sup>23</sup>World Hypertension League Bulletin of the World Health Organization. "Can non-pharmacologic interventions reduce doses of drugs needed for the treatment of hypertension?" 70(6):685-690, 1992.

<sup>24</sup>Khaw KT and Berrett-Connor E. Dietary potassium and stroke-associated mortality: A 12-year prospective population study. N Eng J Med 316:235-240, 1987.

**NOTE:** An important finding reported in the above study is that just eating one serving of a potassium-rich fresh fruit or vegetable daily provides a **40% reduction in stroke risk!**

## LIFESTYLE FACTORS

**Exercise** is one of the most important controllable risk factors. Over 3,000 people were followed for an average of eight years at the Cooper Clinic in Texas. Low fit individuals were **seven times more likely to die from cardiovascular disease than those who were highly fit**.<sup>25</sup> Another study revealed that vigorous exercise is not necessary to gain significant improvements in lipoprotein profiles; walking at intensities that may not significantly improve cardiorespiratory fitness may still be able to improve the cardiovascular risk profile as well as more intense exercise.<sup>26</sup>

**Psychological and emotional stress** are now known to be associated with cardiovascular disease. Epidemiological research has identified specific psychosocial risk factors such as hostility, lack of social support and job strain, associated either with development of the disease or contributing to a worse prognosis once the disease has been diagnosed.<sup>27</sup> These psychosocial risk factors can

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<sup>25</sup>Blair SN. Exercise and diet in prevention of cardiovascular disease and cancer in women. J Am Coll Nutr 11(5):615/Abstract 63, Oct. 1992.

<sup>26</sup>Duncan JJ, et al. Women walking for health and fitness: How much is enough? JAMA 266:3295-3299, Dec. 18, 1991.

<sup>27</sup>Dembroski TM, et al. Components of hostility as predictors of sudden death and myocardial infarction in the Multiple Risk Factor Intervention Trial. Psychosomatic Medicine 51:514-522, 1989.

elevate both cholesterol levels and blood pressure, cause coronary artery spasm and induce cardiac arrhythmia. Any of these influences could prove fatal in an individual who already has elevated cardiovascular risk factors to begin with.

**Obesity** is a serious risk factor for heart disease because it is associated with increased blood pressure, cholesterol levels, vascular damage and incidence of stroke. According to Harvard health researchers, **obesity is responsible for approximately 19% of the costs related to cardiovascular disease, which now exceed \$29 billion per year.**<sup>28</sup>

**Cigarette smoking** is still the major preventable risk factor for cardiovascular disease. Deaths caused by cardiovascular disease attributed to cigarette smoking in the United States are estimated at more than **150,000 annually.** Highly **reactive free radical oxidants generated by smoking are believed to be the major factors** creating cardiovascular-related damage.<sup>29</sup>

## BLOOD LEVEL RISK FACTORS

**Lipoprotein(a)** is a powerful new cardiovascular disease risk factor that has been discovered. Its structure is similar to low density lipoprotein; it is laid down in atherosclerotic plaques. Elevated levels are consistently found in patients with heart disease. Trans fatty acids and saturated fat have been reported to raise lipoprotein(a) levels,

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<sup>28</sup>Obesity, appearing in Nutrition Week 25(28):7, July 28, 1995.

<sup>29</sup>Peto R, et al. Mortality from tobacco in developed countries: indirect estimated from national vital statistics. Lancet 339:1268-1278, 1992.

while omega-3 fatty acids and niacin are able to reduce its concentration.<sup>30</sup>

**Fibrinogen** is a blood component that can adversely affect blood vessels, coagulation and platelet aggregation. Elevated plasma fibrinogen levels have been epidemiologically shown to increase the risk of cardiovascular disease. Plasma fibrinogen can be increased by cigarette smoking, **oral contraceptives, sedentary lifestyle, being overweight, high blood pressure, elevated cholesterol and menopause.** Fibrinogen can be lowered by exercise, weight reduction, smoking cessation and fish consumption or omega-3 supplementation.<sup>31</sup>

## HERBS

**Hawthorn Berry**, also known as Crataegus extract, is an herbal compound that works in a variety of ways to increase cardiovascular health. It **increases the blood supply to the heart and improves its metabolic activity.** These benefits enhance the efficiency of the heart by allowing it to pump more blood to the body. Hawthorn berry also increases cardiac output and dilates coronary vessels, which makes it an excellent anti-hypertensive agent. It is also often **capable of correcting arrhythmias.** The active ingredients in hawthorn also provide strong antioxidant protection throughout the cardiovascular system. It is believed that proanthocyanidin bioflavonoids in hawthorn are responsible for most of its

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<sup>30</sup>Heller FR, et al. The lipoprotein(a): Significance and relation to atherosclerosis. ACTA Clinica Belgica 46(6):371-383, 1991.

<sup>31</sup>Lip GYH. Quarterly Journal of Medicine 88:155-165, 1995.

cardiovascular activity and it provides all these benefits with virtually no side effects.<sup>32</sup>

The most commonly used extracts are standardized to contain either oligomeric procyanidins (18.75%) or total flavonoid content (2.2%) with the daily dosage being from 300 to 900 mg daily.

**Garlic** is an herb that effectively lowers elevated serum cholesterol and triglycerides, inhibits platelet aggregation and increases fibrinolysis.<sup>33</sup> In the last twenty years, over 32 studies have documented garlic's lipid-lowering properties. Garlic has also been shown to provide a mild antihypertensive effect as well as antioxidant activity. For therapeutic purposes, people are advised to chew one fresh clove of garlic daily. Enteric-coated products are available which minimize the characteristic odor.<sup>34</sup>

## AMINO ACIDS

**L-aurine** is an amino acid that helps to regulate the heart and cardiovascular system in several ways. It aids in fat digestion, cardiac function, atherosclerosis, hypertension and edema. The highest concentrations of L-aurine are found in the heart muscle and central nervous system. Taurine is

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<sup>32</sup>Petkov V. Plants with hypotensive, antiatheromatous and coronarodilating action. Am J Chinese Medicine 7:197-236, 1979.

<sup>33</sup>Kleijnen J, et al. Garlic, onion, and cardiovascular risk factors. A review of the evidence from human experiments with emphasis on commercially available preparations. Br J Clin Pharmacol 28:535-544, 1989.

<sup>34</sup>Lawson LD Bioactive organosulfur compounds of garlic and garlic products. In :Kingham AD, Balandrin MF, eds. *Human Medicinal Agents from Plants*. American Chemical Society, Washington, DC, 1993, p. 306-330.

a primary constituent of bile, which is necessary for the digestion of fats, the absorption of fat soluble vitamins and the regulation of serum cholesterol levels. It also helps regulate the calcium-based signaling mechanisms such as Ca-ATPase and Na/Ca transport enzymes within the heart that normalize heart muscle contraction.<sup>35</sup> Daily dosages generally range from 500 to 1,000 mg/day.

**L-carnitine** is an amino acid that regulates fat metabolism. It facilitates the transportation of long chain fatty acids across cellular membranes into the mitochondria where the fat is metabolized to produce energy. However, it also increases the rate of oxidation so that more fat is burned and more energy is produced. L-carnitine also improves the contraction of the heart muscle which allows the heart to utilize its oxygen supply more efficiently.

Carnitine can also lower triglyceride and total cholesterol levels while increasing levels of the good HDL cholesterol. In addition to improving blood lipid profiles, carnitine has also been shown to improve heart arrhythmias, lower the frequency of angina attacks and improve exercise tolerance in patients with coronary artery disease.<sup>36</sup>

## PREVENTIVE TREATMENT

**Niacin**, at doses of 1.5 to 3.0 mg/day, decreases triglycerides, total serum and LDL cholesterol, and

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<sup>35</sup>McCarty MF. Complementary vascular-protective actions of magnesium and taurine: a rationale for magnesium taurate. Medical Hypothesis 46:80-100, 1996.

<sup>36</sup>Braverman, ER. *The Healing Nutrients Within*. Keats Publishing New Canaan, CT 1997, p. 368-374.



**substantially elevates HDL cholesterol.**<sup>37</sup> However, these dosages cause a flushing reaction that limits patient compliance. Recently it has been shown that lower doses of **niacin** (100 mg) in conjunction with **chromium** (200 mcg) effectively lower elevated cholesterol levels with little or no flushing.<sup>38</sup> Also, chromium improves insulin sensitivity, which helps to prevent adult onset diabetes. There is increasing evidence that diabetes and abnormalities associated with insulin resistance increase the risk of cardiovascular disease.<sup>39</sup> Inositol hexaniacinate is a newer product that provides the same benefits as niacin but eliminates the flushing side effects of niacin.<sup>40</sup>

**Estrogen replacement therapy (ERT)** has been widely prescribed to reduce the risk of developing cardiovascular disease in postmenopausal women. For example, a 10-year follow-up of 48,000 women in the Nurses' Health Study showed that women who took estrogen postmenopausally had a **50% reduction in cardiovascular disease**, compared to those who did not. However, some physicians are starting to question estrogen's ability to prevent heart disease, pointing out that previous studies all suffer from the same common design flaw known as

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<sup>37</sup>Repka JF. Women's health care: changing concepts. RD, Journal of the American Dietetic Association 93(9):1013-1014, 1993.

<sup>38</sup>Urberg M, et al. Hypocholesterolemic effects of nicotinic acid and chromium supplementation. J Family Pract 27:603-606, 1988.

<sup>39</sup>Hall JE. Insulin resistance, myperinsulinemia and hypertension: Causes, consequences or merely correlations. Proc Soc Exp Biol and Med 208:317-329, 1995.

<sup>40</sup>Head KA. Inositol Hexaniacinate: A Safer Alternative to Niacin. Alt Med Rev 1(3): 176-184, 1996.

"selection bias".<sup>41</sup> Essentially, this means that women who take estrogen are likely to be of a higher socioeconomic class, healthier, and more health conscious than women who do not take estrogen. A prospective trial is currently under way which should provide answers to these questions.

Women's decisions regarding estrogen were made much more difficult when follow-up results from the Nurses' Health Study revealed that women taking estrogen for five years or longer had a **32% increased risk of breast cancer. Taking estrogen plus a progestin increased breast cancer risks by 41%.**<sup>42</sup> Because of the risks associated with estrogen, decisions regarding its use must be made individually by each woman. Women are encouraged to engage their physician in a thorough examination of risk factors, including family history, diet, lifestyle and present health condition before making a final decision.

## SUMMARY OF RECOMMENDATIONS

I urge people to check their blood pressure regularly and retain these records. It is advisable to have your blood pressure checked at least once a year by a qualified health professional. All adults should request an initial laboratory blood workup that provides HDL and LDL cholesterol, homocysteine, lipoprotein(a) and fibrinogen levels. A record of these values should also be kept. People with

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<sup>41</sup>Posthuma WFM, et al. Cardioprotective effect of hormone replacement therapy in postmenopausal women: is the evidence biased? Br Med J 308:1268-1269, 1994.

<sup>42</sup>Colditz GA, et al. The use of estrogens and progestins and the risk of breast cancer in postmenopausal women. New Eng J Med 332(24):1589-1593, 1995.

elevated levels or who are at higher risk should have levels checked more frequently. Individuals who are obese or who smoke are strongly urged to monitor the blood value risk factors regularly.

The prescription for lowering risks of cardiovascular disease starts with a healthful diet consisting primarily of fresh fruits, vegetables, whole grains, legumes, occasional lean meats and monounsaturated oils such as olive oil. In general, people are urged to decrease consumption of total dietary fat, saturated fat, cholesterol, and high omega-6 containing vegetable oils such

as corn, safflower and sunflower oils. **Margarine and other foods containing trans fatty acids from partially hydrogenated fats and oils should be totally avoided.** Flaxseed oil is the recommended omega-3 supplement followed by fish oil or marine lipid capsules if the oil is not tolerated. A well-designed nutritional supplement program containing a multivitamin/mineral supplement and extra antioxidants is suggested. Regular exercise is extremely important and a daily meditation, prayer or relaxation practice can contribute to a healthy heart.

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# Cardiovascular Health: A Practitioner's Perspective

by

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In the past, western medicine has sought to identify one single cause or mechanism of action for a disease pathology. Cardiovascular disease, as with many diseases, is another clear-cut example of a complex biochemical interrelationship, which can involve every aspect of metabolism. To assume that you will stop atherogenesis by simply taking a few antioxidants or vitamins in order to limit homocysteine is a gross oversimplification of the issue. The first step is to evaluate all the possible factors that could be influencing the cardiovascular system and then educate your patients about each of their own influences. Please note, however, that gross **nutritional deficiencies must be dealt with, at a very minimum, in order to reduce cardiovascular risk.**

## Factors Influencing Cardiovascular Health

- Genetics
- Water (quality and quantity)
- Xenobiotic Exposure (heavy metals)
- Elevated Cholesterol
- Diet
- Inadequate Antioxidant Intake
- Coenzyme Q10
- Bowel Terrain
- Homocysteine
- Hyperinsulinemia
- Exercise
- Zinc Deficiency
- Calcium Metabolism
- Stress Reduction

How do we unravel this biochemical soup mix in order to develop a long-range approach to prevention, wellness and adjunctive treatment for

cardiovascular health? First, let us discuss the most obvious parameters that are essential for you, as a health care professional, to consider in counseling your patients.

**Genetics:** We will only briefly visit this first point because, if you do have a strong familial history of heart disease, your only defense is to incorporate as many of the prevention tips as you can into your lifestyle.

**Water:** The importance of quality water cannot be stressed enough. Today, however, it is very difficult to ensure good quality water. According to the Environmental Protection Agency, **fifty million Americans drink tap water that is contaminated with heavy metals, feces or other ground water contaminants.** Even if there is a source of quality water, most individuals' water intake is grossly inadequate. The average adult should drink at least two quarts of water daily. In his book, ***Your Body's Many Cries for Water***, F. Batmanghelidj, M.D., makes some salient points on the invaluable aspects of water and its relationship to optimum health. He theorizes that elevated cholesterol is a defense mechanism of the body to protect against a body whose osmotic gradient has increased.<sup>1</sup> The blood pulls water out of the cell membranes in order to maintain its osmotic pressure. As the body becomes more dehydrated, it must use a secondary measure to prevent excess dehydration from the cells. **Cholesterol**

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<sup>1</sup>F. Batmanghelidj, *Your Body's Many Cries for Water* (Falls Church, VA: Global Health Solutions, Inc., 1992, 1995) 84-86.

**is used to fill the “gaps” in the cell membrane.** This short-term solution sounds logical, but the long-term consequence is the reduction in the ability of the cell to allow nutrients to enter into the cell and to allow the by-products of metabolism to be removed. Normally, water is the component that binds the bilipid layer.

**Water also plays an important role in metabolic detoxification.** When the body is exposed to various toxins, it has to convert them in order to make them more water-soluble. The body can then excrete the toxins through the normal pathways of elimination. Inadequate water intake reduces this process and will potentially increase storage of these toxic metabolites. These metabolites often act as **free radicals, damaging enzyme systems, as well as causing lipid peroxidation of cell membranes.** This, of course, is one of the key mechanisms by which cardiovascular pathology begins.

Drinking water is of key importance for sustaining healthy living and is the number one anti-aging act you can perform. If you need to filter water (and most people do), consider the use of a reverse osmosis unit. Prices for these units continue to come down, and if you get one with a five-stage filter, it will provide high quality water for a fraction of the cost of bottled water. If a reverse osmosis unit is too expensive, consider a carbon block with silver nitrate impregnation or a mixed media that will remove organic solvents as well as heavy metals.

**Xenobiotic Exposure:** Industrial living has its positive and negative aspects. On a positive note, it provides, among other benefits, an increased standard of living and an improved quality of life on a macro-system level. Yet, on the other hand, the effects of industrial life on

biological systems, including humans, can be devastating. More and more evidence points to the fact that the massive exposure to **xenobiotics (toxins) contributes significantly to our chronic diseases and may be at least partially responsible for the rise in various immunopathologies.**

Mercury, lead and cadmium are the “big three” heavy metals, with nickel, aluminum and others following close behind. Heavy metals have a very unique characteristic in that they are much more readily absorbed than excreted.<sup>2</sup> **Mercury is the most harmful of the heavy metals and has been implicated as a contributor to elevated cholesterol.** Heavy metals are not the cause of cardiovascular disease; they are simply another primary risk factor that should be examined. In a large number of studies, heavy metals were looked at in relation to cardiovascular pathologies, with resulting positive correlation to cardiovascular disease.<sup>3,4,5,6,7,8</sup>

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<sup>2</sup> H.L. Queen, Chronic Mercury Toxicity- New Hope Against an Endemic Disease: Doctors' Guide to Lifestyle Counseling, vol 1 (Colorado Springs, CO: Queen and Company, 1988) 31.

<sup>3</sup>A. G. Shaper, "Cardiovascular Diseases and Trace Metals," Proceedings of the Royal Society of London. Series B: Biological Sciences 205 (1979) : 135-43.

<sup>4</sup>H. M. Perry and M. W. Erlanger, "Metal Induced Hypertension Following Chronic Feeding of Low Doses of Cadmium and Mercury," Journal of Laboratory and Clinical Medicine 83 (1974): 541-47.

<sup>5</sup>R. B. Singh et al., "Macro and Trace Mineral Metabolism in Coronary Heart Disease," Elements in Medicine 9-3 (1992): 144-156.

<sup>6</sup>Juka T. Salonen et al., "Intake of Mercury from Fish, Lipid Peroxidation, and the Risk of Myocardial Infarction and Coronary and Cardiovascular Death in Finnish Men," Circulation 91-3 (Feb. 1 1995) : 645-655.

<sup>7</sup>Barbara Kotska, "Toxicity of Mercury as a Risk Factor for Cardiovascular Disease," British Journal of Industrial Medicine 48 (1991) : 845-46.

<sup>8</sup>F. Kisters, et al., "Plasma Intracellular Lead Concentrations in Patients with Hypertension," Trace Elements in Medicine 10-4 (1993) : 155-57.

Another correlation is that heavy metals, as well as **halogens (chlorine and fluorine), may compete with iodine for absorption and utilization by the thyroid gland.** This can affect thyroid metabolism and, in general, may down regulate metabolic activity. With subclinical hypothyroidism, we see an increase in lipid levels but, more importantly, an increase in lipoprotein(a), which is a risk factor for heart disease.<sup>9</sup> This makes it vital to assess thyroid function whenever counseling a patient with elevated cholesterol. With millions of people undiagnosed for this condition, subclinical hypothyroidism could very well be a key piece in the puzzle of cardiovascular illness in this country.

There are several methods to assess xenobiotic exposure, if needed. **Hair analysis can provide data to support heavy metal intoxication,** however, it does not always necessarily show up in the hair. Urinalysis using a provocative load of a chelator such as penicillamine, and then collecting a urine specimen, is increasingly being utilized by health care professionals, along with other new tests. Supplements that can help with this type of xenobiotic intoxication through binding and enhancing elimination include ginkgo biloba, alpha lipoic acid, N-acetyl cysteine and chlorella. Homeopathic agents to catalyze detoxification have also been used by natural health practitioners for years, in combination with the above-mentioned supplements.

**Diet:** Our dietary issues in America are quite clear, as pointed out in Dr. Pelton's article. We consume far too many refined carbohydrates, in addition to **150 pounds of sugar per person each**

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<sup>9</sup>A. W. C. Kung, et al., "Serum Lipoprotein(a) in Subclinical Hypothyroidism," Clinical Endocrinology 43 (1995): 445-49.

**year.** This undoubtedly contributes to the hyperinsulinemia and insulin resistance phenomenon that is sweeping our country. It also affects bowel terrain, which we will cover in depth in a future issue. We consume too many saturated fats and trans-fatty acids (margarine and hydrogenated oils). This causes a rise in low-density lipoprotein (LDL) cholesterol and an increase in the lipid peroxidation processes. We also consume too much omega-6 fatty acids and not enough omega-3 fatty acids in our diet. This imbalance once again leads to atherogenesis.

As discussed above, we do not drink enough water and, for the most part, few of us eat the "**5-a-day rule**" for fruits and vegetables (get five servings of fruits and vegetables daily). This is particularly important because **fruits and vegetables provide roughage for the intestines and fiber to help process cholesterol, as well as providing antioxidant flavonoid compounds that act as potent inhibitors of free radical damage and lipid peroxidation.**<sup>10</sup> This strikes at the heart of our **inadequate antioxidant intake.** Even if we eat correctly, we would probably need to supplement with a multiple antioxidant to provide added protection against peroxidation. Agents such as **coenzyme Q10**, alpha lipoic acid, beta carotene with mixed carotenoids, selenium and vitamin C, as well as a host of herbal antioxidants (including ginkgo biloba, ginger and milk thistle) can play an important role in the prevention of cardiovascular pathologies, while offering the body other benefits as well. Compared to elevated cholesterol, **vitamin E**

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<sup>10</sup>Helmut Sies and Wilhelm Stahl, "Vitamins E and C, Beta Carotene, and Other Mixed Carotenoids as Antioxidants," American Journal of Clinical Nutrition 62 (supp 1995): 1315s-21s.

**deficiency is twice the predictor of cardiovascular disease.** Our children are quickly becoming at risk for cardiovascular disease because of these factors. In one small study, 25% of the teens studied had at least two risk factors for cardiovascular disease.<sup>11</sup> In another study, young children considered physically unfit were found to be at risk with elevated cholesterol.<sup>12</sup> It is time for us to demand that our children eat healthier for their sake. Get them out from in front of the TV and computer terminal to get some exercise.

**Bowel Terrain: Good intestinal health is a central factor in controlling cholesterol.** The key concept to understand is that when a dysbiotic condition is present (meaning that healthy bowel flora are not present in sufficient quantities), enteropathy takes place due to a breakdown or eroding of the microvilli of the colon. When this occurs, the **body cannot absorb the nutrients needed to maintain health.** Consequently, the activity of free radical scavenging nutrients in our system is reduced. Additionally, putrefaction of the bowel allows for the evolution of mycotoxins, which have a direct impact on atherogenesis. Also, toxins in the bowel may influence liver and pancreatic metabolism, which can down regulate the body's ability to deal with cholesterol and insulin, respectively. **Dysbiosis has also been linked to hypothyroidism,** which, as mentioned before, is a cause of elevated cholesterol and serum lipoprotein(a), a known risk factor for cardiovascular disease. Moreover, deficiencies in

vitamins such as B12, B6 and folic acid could occur through malabsorption syndromes. These vitamins are of key importance in another risk factor, homocysteine levels.

**Homocysteine:** Homocysteine is considered an independent risk factor for heart disease. In fact, **homocysteine is now thought to be a more important risk factor than elevated cholesterol.** As homocysteine levels go from 10 to 15umol, coronary risk increases 40%. Homocysteine is an amino acid that damages the arteries. Supplementation with vitamins B6, B12 and folic acid, in addition to supporting the liver, can reduce levels to normal.

**Hyperinsulinemia:** Refer to Issue 9 of **The Herbal Pharm** (August 1997) for a complete rundown on the mechanisms regarding insulin resistance and hyperinsulinemia. The main points are that excess insulin can lead to an accumulation of LDL cholesterol in the arterial subendothelial spaces. This leads to decreased high-density lipoproteins (HDL) and elevated triglycerides and increases the risk of atherosclerosis.<sup>13</sup> Excess blood sugar, through dietary intake and the inability to process it, leads to glycosylation of LDL cholesterol. Glycosylation of LDL cholesterol stimulates the pathways of formation of plaque on the artery walls. In addition to this, abdominal fat, which is a primary risk factor for impaired glucose tolerance (IGT), is associated with a 20-25% increase in apolipoprotein B levels, which correlates to an eleven-fold increase in cardiovascular risk. **It is vitally important to control insulin resistance and the evolution of**

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<sup>11</sup>Teen Health, " Nutrition Week, March 15, 1996, Journal of the American Dietetic Association 7-3 (March 1996): 238-42.

<sup>12</sup>Ronald L. Hager, et al., "Aerobic Fitness, Blood Lipids, and Body Fat in Children," American Journal of Public Health 85-120 (December 1995) : 1702-06.

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<sup>13</sup>Mary Jean Pramik, "Exercise May Improve Insulin Sensitivity," Medical Tribune (July 18,1996) : 7.

**hyperinsulinemia.** Key steps to achieve this include:

1. Improve the diet by reducing or eliminating refined sugar intake.
2. Moderate the intake of complex carbohydrates (refer to the Life-Span **Healthy Living Guidelines, Phase I** for more information on this subject). High-carbohydrate, high-fat diets are associated with increased LDL and triglycerides and lowered HDL.
3. Increase lean protein intake (moderately) from sources like turkey and soy. Soy protein can have a profoundly positive effect on blood lipid levels<sup>14</sup> and is a rich source of phytonutrients.
4. **Exercise, Exercise, Exercise!!!** You must emphasize the value of exercise to improve insulin utilization. It has a beneficial effect on blood lipids as well. Of course, diabetics with blood sugar levels over 240 should be careful about exercising. However, some experts feel that mild exercise would not create a problem.
5. Consider using supplements to help with blood sugar regulation. Key agents include:

**ZINC:** Zinc deficiency has been identified as **a risk factor in plaque development.** Zinc deficiency, as well as poor utilization, is common in the diabetic and IGT population. Cyclo Hispro is an important natural agent that has been clinically proven to dramatically improve zinc and insulin utilization.<sup>15</sup>

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<sup>14</sup>Carole Bulloch, "Soy Protein Has Profound Effects on Blood Lipid Levels," Medical Tribune (June 8, 1995): 14.

<sup>15</sup>M. K. Song, et al., "Animal Prostate Extract Ameliorates Diabetic Symptoms by Stimulating Intestinal

**CHROMIUM:** Chromium is known to help **reduce insulin resistance and to have a positive effect on blood lipid levels** in chromium-deficient individuals. This is relatively common because our diet is chromium-poor. Refined carbohydrate intake increases urinary chromium output, as does exercise. Alpha lipoic acid has shown to improve insulin receptor sensitivity, and because it is such a powerful free radical scavenger, it will reduce the amount of lipid peroxidation and free radical damage that occurs. For a complete summary of nutrients to assist in hyperinsulinemia, refer again to **Hyperinsulinemia and Health Management**, Issue 9 of **The Herbal Pharm** (August 1997).

**Calcium Metabolism:** Calcium antagonists have been shown **to reduce plaque formation and directly inhibit atherogenesis.**<sup>16</sup> My thought on this is that perhaps what we are really dealing with here is an imbalance in calcium and magnesium ratios. It is well established that calcium excess will lead to plaque processes and that magnesium acts in several positive ways to improve cardiovascular function. It is also well documented that, as a population, we are deficient in magnesium by about 100mg, based on the RDA.

New research also indicates that certain bacteria and viruses may contribute to vascular damage.<sup>17</sup> **Chlamydia**

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Zinc Absorption in Rats," Diabetes Research 31 (1996): 157-70.

<sup>16</sup>R. Paoletti, et al., "The Atherosclerotic Effects of Calcium Antagonists," Journal of Cardiovascular Pharmacology 25-3 (supp 1995): S6-S10.

<sup>17</sup>Geoffery Cowley, "The Heart Attackers," Newsweek (August 11, 1997) 54-59.

**pneumoniae, which is a cause of respiratory illness, is linked to damaging the arteries.**

People with gingivitis, caused by Porphyromonas gingivalis, tend to have more coronaries, and cytomegalovirus (CMV) has a tendency to worsen vascular conditions. This new area of research may lead to another important risk factor for cardiovascular illness. As a side note, coenzyme Q10 and green tea are excellent supplements for oral hygiene health, as is using white oak bark rinse for gingivitis.

**Stress Reduction:** As mentioned in Dr. Pelton's article, stress is a primary risk factor for developing and exacerbating cardiovascular disease.

Learning stress management and coping mechanisms will not only save your heart, but also make those around you much happier!

In summary, cardiovascular disease is a complex issue that plagues our country. As much as one-fifth of our population has some clinical sign of it.

However, for the most part, it is a symptom of antimetabolic function. To truly gain control of this disease, you must address these key points:

- Heavy Metal Burden
- Subclinical Hypothyroidism
- Hyperinsulinemia
- Selection of Healthy Whole Foods
- Exercise
- Adequate Antioxidant and Nutrient Intake to Reduce Homocystinemia
- Adequate Hydration (Water !!!)
- Mineral Balance for Magnesium, Zinc and Calcium
- Bowel Terrain
- Stress Reduction

As you can see, preventing cardiovascular disease involves a commitment to lifestyle changes in order to gain optimum results.

-THE END-

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# Compound of the Month

Formula for cardiovascular support. 1 capsule contains:

<b><u>Formula</u></b>	<b><u>Dosage</u></b>
Aorta Extract	200mg
Coenzyme Q10	5mg
Vitamin E (mixed tocopherols)	50 IU
B12	500mcg
B6	10mg
Folic Acid	200mcg
Green Tea (standardized extract)	200mg
Ginger (standardized extract)	100mg
Hawthorn (standardized extract)	150mg
Magnesium Citrate	100mg

Dosage: 2 capsules, 3 times a day for 90 days, then 1 capsule three times a day.

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## Cardiovascular Product List

Below are the products referenced in the newsletter. Recommended suppliers are also listed for those individuals wishing to purchase the products.

PRODUCT	SUPPLIER
<b>Nutritionals</b>	
<u>Nutritional Agents:</u> C.V. Support Formula or Ultra Preventive® III Cardio Guard (specific formulation for Homocysteine) Men's Multi	Douglas Labs Vinco Vinco
<u>Chelation or Heavy Metal Detoxification:</u> Advantage Plus™ II (oral chelation product) N-Acetyl-L-Cysteine 500mg Pro Systox-I	Douglas Labs Douglas Labs PHP
<u>Specifics:</u> Coenzyme Q-10 with Lipoic Acid Flax Seed Oil Capsules Magnesium/Potassium Citrate Natural Vitamin E Complex 400 IU DEPA or Super-EPA 500 (Omega-3 fatty acids) Ultra-C Aorta Complex Cardio Complex Eco B12 Folic Acid Flax Oil or High Lignan Flax Oil Omega Plus (Omega-3 fatty acids) Pro C Ascorbate Alpha-Lipoic Acid Chromacin	Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs PHP PHP PHP PHP PHP PHP PHP Vinco Vinco
<b>Herbals</b>	
Hawthorne (standardized extract) Chinese Garlic (standardized extract) Ginger Root (standardized extract) Ginkgo Biloba Forte or Ultra Green Tea Extract Kava Kava (standardized extract) Max-Carnitine 500mg Beni Koji Red Rice Yeast Ayur-Guggulipid or Ayur-Triphala Garlic Concentrate Pro Ginkgo Biloba Pro Hawthorn Berry Proandin	Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs Douglas Labs PHP PHP PHP Vinco
<b>Homeopathy</b>	
Amalgam Kidney Liquesence Liver Liquesence Liver Gallbladder Drops Metex Neuro Calming Formula Insomnia/Stress	PHP PHP PHP PHP PHP PHP Vinco