SOURCE NATURALS®

Strategies for Wellness℠

HEART SCIENCE™

A Five-Tiered Approach to Heart Health

Your heart is crucial to every function of your body. It is the sole organ which pumps oxygen-rich blood through the entire circulatory system, feeding your cells and making life possible. Only recently are Americans realizing the importance of a proper low-fat diet, regular exercise, giving up cigarette smoking, and cutting down alcohol consumption to maintaining a healthy heart. Unfortunately, there has been a huge gap in the number of nutritional supplements which provide nutrients and herbs to support normal heart function. That's where Source Naturals HEART SCIENCE comes in. Two years in the making, and backed by numerous scientific studies, the nutrients in HEART SCIENCE are some of the most soundly researched of all. Combining high potencies of these super-nutrients, HEART SCIENCE is the most comprehensive, cutting edge nutritional approach to proper heart care available.

Source Naturals HEART SCIENCE — The Five Tiered Approach to Heart Health

Your heart never rests. Even while you sleep, your heart must keep working, relying on the constant generation of energy by the body for its very survival. If this vital organ stops beating for even a short amount of time, all bodily functions cease and life ends. Source Naturals HEART SCIENCE helps support heart function on the chemical, cellular, structural, and energetic levels. This broad spectrum formula includes ingredients specifically geared for 1) generating energy, 2) decreasing harmful homocysteine levels, 3) fighting oxidized cholesterol, 4) maintaining the heart's electrical rhythm, and 5) protecting artery and capillary linings.

Energy Generators for An Energetic Organ

Every day, the human heart beats about 104,000 times, pumping over 8,000 liters of blood through the body! Because it requires so much energy to perform efficiently, the experts at Source Naturals included specialty nutrients in HEART SCIENCE such as Coenzyme Q10 and L-Carnitine — integral factors in the body's energy production cycles — to enhance the body's energy supply.

There are three main interconnected energy generating cycles in our cells — the Glycolytic (sugar-burning) cycle, the Krebs' (citric acid) cycle, and the Electron Transport Chain. Together they supply about 90 to 95% of our body's entire energy supply, using fats, sugars, and amino acids as fuel. **Coenzyme Q10** is one of the non-vitamin nutrients needed to maximally convert food into ATP (the energy producing molecule). It is the vital connecting link for three of the four main enzyme complexes in the Electron Transport Chain, the next step in energy generation after the Krebs' cycle. Using the raw materials generated by the Krebs' cycle, the Electron Transport Chain produces most of the body's total energy! The heart is one of the bodily organs which contains the highest levels of CoQ10, precisely because it needs so much energy to function efficiently.

CoQ10 is one of the most promising nutrients for the heart under investigation today. It has been postulated that as a result of its participation in energy production, CoQ10 improves heart muscle metabolism and the electrical functioning of the heart by enhancing its pumping capacity.[8] Many factors such as a high fat diet, lack of exercise, and cigarette smoking can lead to suboptimal functioning of the heart, and therefore failure of the heart to maintain adequate circulation of blood. Interestingly, people whose lifestyles reflect the above factors also tend to have depleted levels of CoQ10 in the heart muscle.[10]

Researchers suggest taking between 10-100 mg per day of CoQ10;[18,29] HEART SCIENCE provides an impressive 60 mg of CoQ10 per 6 tablets.

Similar to CoQ10, **L-Carnitine** is important for energy production in heart cells. It is a natural amino acid-like substance which plays a key role in transporting fatty acids, the heart's main source of energy, to the mitochondria, the "power plants" of each cell, where they are utilized for the production of ATP. Heart and skeletal muscles are particularly vulnerable to L-Carnitine deficiency. Studies have shown that supplementation with L-Carnitine improves exercise tolerance in individuals with suboptimal heart and circulatory function, and seems to lower blood lipid status and increase HDL (good) cholesterol.[16, 22] Each daily dose of HEART SCIENCE contains 500 mg of this extremely important compound.

Like CoQ10 and L-Carnitine, **B Vitamins** help improve the ability of the heart muscle to function optimally. Each B Vitamin, after being converted to its active coenzyme form, acts as a catalytic "spark plug" for the body's production of energy. Vitamin B-1, for example, is converted to Cocarboxylase, which serves as a critical link between the Glycolytic and Krebs' Cycles, and also participates in the conversion of amino acids into energy. A deficiency of B coenzymes within contracting muscle cells can lead to a weakened pumping of the heart.[21]

HEART SCIENCE is formulated with high quantities of the most absorbable forms of B Vitamins providing maximum nutrition for the high energy demands of heart cells.

Homocysteine Regulators

B Vitamins also play a crucial role in the conversion of homocysteine, a group of potentially harmful amino acids produced by the body, to methionine, another more beneficial amino acid.

While it is normal for the body to produce some homocysteine, even a small elevation in homocysteine levels can have negative implications. It is well documented that individuals who are genetically predisposed to having elevated homocysteine levels (homocysteinemics) tend to have excessive plaque accumulation in the arteries and premature damage to endothelial cells (cells lining the blood vessels and heart).[26] Researchers have found that even those without this genetic abnormality, whose homocysteine levels are much lower than those of homocysteinemics, still have an increased risk for premature endothelial damage and the development of plaque in the arteries.[24, 26] One study conducted among normal men and women found that those with the highest levels of homocysteine were twice as likely to have clogged arteries as were those with the lowest levels.[24] Furthermore, it was found that the lower the research subjects' blood levels of folate and B-6, the higher their homocysteine levels.[24] Another study found that Folic Acid administered to normal men and women who were not even deficient in folate caused a significant reduction in plasma concentrations of homocysteine![3]

In order to regulate homocysteine levels, it is critical to provide the body with sufficient amounts of B-6, B-12, and Folate, whether through the diet or through supplementation. HEART SCIENCE includes high levels of these three nutrients, providing B-6 in the regular and coenzyme form for maximum utilization.

The Dangers of Oxidized LDL Cholesterol

While many people have heard that high cholesterol levels may negatively affect normal heart function, few people understand exactly what cholesterol is, or how it can become harmful. Cholesterol is a white, waxy substance produced in the liver by all animals, and used for a variety of necessary activities in the body. Your liver also manufactures two main kinds of carrier molecules which transport cholesterol throughout the system: Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL).

Cholesterol is either carried out by LDL from the liver to all tissues in the body where it is deposited, or carried back by HDLs which remove cholesterol deposits from the arteries and carry them to the liver for disposal. Because of this, LDL cholesterol is considered damaging, while HDL is considered protective. Problems occur when there is too much LDL cholesterol in the body and not enough HDL.

When the body becomes overloaded with fat, an over-abundance of LDL particles are manufactured to process it, and they in turn become elevated in the body to a degree that the liver cannot handle. Rich in fatty acids and cholesterol, these particles are highly susceptible to free radical attack (oxidation). Once oxidized, LDL particles are no longer recognized by the body, which attacks them with immune cells. Immune cells which are bloated by oxidized lipids (called foam cells) are a key factor in the development of "fatty streaks" — the first sign of excess arterial fat accumulation. The bloated immune cells accumulate in artery lesions and create plaque in blood vessels, leading to obstruction and constriction of the vessels. Plus, these lodged foam cells continue to secrete free radicals into the bloodstream, making the problem worse.

The development of lesions in the arteries is not an uncommon problem. Arterial (and all blood vessel) walls are composed of a chemical matrix which holds the endothelial cells in place. That endothelial layer is the first and most important line of defense in preventing large molecules, such as cholesterol and fat, from entering the vessel wall. This matrix is composed of proteins, collagen, elastin, and glycosaminoglycans (amino sugars). Arterial lesions can be caused by suboptimal collagen and elastin synthesis due to three factors:
1. Vitamin C deficiency (since Vitamin C is a key building block for collagen and elastin);
2. excessive consumption of rancid fats, or heavy usage of alcohol or cigarettes; and 3. free radical damage. Once these lesions are created, the body attempts to repair them by depositing LDL cholesterol — similar to the way one would patch a tire. If that cholesterol is not oxidized, i.e. chemically changed to a harmful, unstable molecule, then this process does not create a problem. But when arterial lesions are "patched" with foam cells, arterial walls suffer

even more damage, because those foam cells release free radicals which can further damage cell membranes.

Unfortunately, most people have a lot of oxidized cholesterol floating through the bloodstream. The typical American diet, with its low antioxidant intake and overconsumption of fried and overcooked foods, contributes to the overall levels of harmful oxidized cholesterol. In fact, the average American intake of antioxidants is low even by USRDA standards, making Americans particularly prone to having high levels of oxidized cholesterol.

Cholesterol Fighters

Fortunately, there are concrete steps you can take to prevent the oxidation of cholesterol, and its subsequent ill effects on health. In addition to cutting out high-cholesterol and fatty foods, supplementation can protect existing cholesterol and all tissue cells — from oxidation.

Antioxidants, substances which scavenge and neutralize free radicals, protect the cardiovascular system by halting the oxidation of cholesterol, and helping to prevent plaque accumulation in the arteries and the continual secretion of free radicals by foam cells. Supplementing the diet with high amounts of Vitamin C, a key antioxidant, also encourages a more healthy "patching" of existing lesions by using collagen (made from Vitamin C) instead of cholesterol. HEART SCIENCE contains generous amounts of the following antioxidants for their protective benefits:

• **Beta Carotene**, a plant pigment, is the naturally occurring precursor to Vitamin A. When the body takes in high enough amounts of Beta Carotene, this lipid-soluble free radical scavenger concentrates in circulating lipoproteins and atherosclerotic plaques, where it performs its antioxidant functions. Beta Carotene is particularly unique and powerful as an antioxidant because it is capable of trapping a very toxic form of di-oxygen, called singlet oxygen, which can result in severe tissue damage. Beta Carotene is one of the most efficient quenchers of singlet oxygen thus far discovered. Six tablets of HEART SCIENCE provide an unprecedented 45,000 IU of Beta Carotene!

• **Vitamin C** is found in plasma, the watery component of blood, where it functions as a potent antioxidant. In addition to strengthening artery linings through collagen manufacture, Vitamin C is involved in the regeneration of Vitamin E within LDL particles.

Vitamin C also plays an important role in the conversion of cholesterol into bile acids by the liver, a crucial step in reducing blood cholesterol levels. Once converted into bile acids, and then into bile salts, cholesterol can be excreted from the body, preventing build-up. Supplementation with Vitamin C may lower levels of LDL cholesterol and increase those of HDL cholesterol.[25] It may also have a part in actually removing cholesterol deposits from artery walls — good news for people who are already experiencing plaque buildup.[25] Each daily dose of HEART SCIENCE provides 1,500 mg of Vitamin C in its bioactive mineral ascorbate form.

• **Vitamin E**, together with Beta Carotene, protects lipids from free radical attack. It is the major antioxidant vitamin that is carried in the lipid fraction of the LDL particle, where it protects the LDL particle from damaging oxidation. Within an LDL particle, one molecule of Vitamin E has the ability to protect about 200 molecules of polyunsaturated fatty acids from free radical damage!

Vitamin E also aids in protecting the heart by interfering with the abnormal clumping of blood cell fragments, called platelets, within blood vessels.[4] It has been shown to inhibit the formation of thromboxanes and increase the production of prostacyclins, which together decrease abnormal platelet aggregation.[11] A high potency of Vitamin E — 400 IU's — is included in six tablets of HEART SCIENCE in the natural d-alpha succinate form, recognized by scientific researchers to be the most absorbable form!

• **Selenium** is an important mineral which has only recently gained attention. When incorporated into the enzyme Glutathione Peroxidase, it has highly powerful free radical-scavenging abilities, and has been shown to work synergistically with Vitamins A, C, and E. An essential mineral, Selenium used to be derived from eating foods grown in Selenium-rich soil. However, modern agricultural practices have depleted soil of its

natural Selenium content, leaving many Americans deficient in this vital nutrient. Several epidemiological studies show that the incidence of advanced fatty deposits in blood vessels is much greater in individuals living in geographic areas of the United States and other parts of the world where the Selenium content of the soil is very low.[27]

• **Proanthodyn,**™ an extract of grape seeds, is being called the most powerful antioxidant yet discovered. This highly potent, water-soluble bioflavonoid contains between 93-95% proanthocyanidins, the highest concentration of any nutrient available today. The protective actions of proanthocyanidins may help to prevent the development of plaque in artery walls by inhibiting the free radicals which are produced during the oxidation of cholesterol. The optimal daily amount (100 mg) of Proanthodyn is included in six tablets of HEART SCIENCE.

In addition to the protective actions of antioxidants, several other nutrients can contribute to healthier cholesterol ratios.

• **Chromium** is a trace mineral which functions to aid the entrance of glucose into cells. Six tablets of HEART SCIENCE provide 300 mcg of Chromium in the form of Chromate® Chromium Polynicotinate and Chromium Picolinate — the most bioactive forms of Chromium.

Not many people are familiar with the vital role **Copper** plays in the body. This trace mineral is found in all tissues of the body, and is particularly concentrated in the heart. Copper is part of several enzymes, and, in this capacity, is necessary for the development and maintenance of the cardiovascular system, including the heart, arteries, and other blood vessels. Because of its role in elastin production, Copper deficiency can severely damage blood vessels and heart tissue. In fact, researchers have found an inverse relationship between Copper status and increased risk for heart damage.[10]

• **L-Proline and L-Lysine** are two natural amino acids which show exciting promise in helping to prevent fatty deposits in blood vessels. Researchers have recently identified a particle associated with LDL called apoprotein (a) which is believed to be a main culprit in plaque development.[17] Scientific investigation has revealed that the lipoprotein (a) particle has an adhesive quality that makes the lipoprotein fat globule stick inside blood vessels. The sticky fat globules accumulate, leading to fatty deposits in blood vessels and the subsequent clogging of the arteries. L-Proline and L-Lysine tend to form a barrier-like layer around the apoprotein (a) particle, helping to push it away from the blood vessel wall, and impeding deposit.[21]

The Regulating Trio

Three nutrients — Magnesium, Potassium, and Taurine — work closely together in the body to help maintain the normal electrical rhythm of the heart, promote proper fluid balance, and prevent excessive Calcium levels from building up in the heart and artery linings.

• **Magnesium** is one of the single most important nutrients for maintaining a healthy heart. It plays an extremely vital role in maintaining the electrical and physical integrity of the heart muscle. It has been well established that Magnesium deficiency predisposes humans to serious disruptions of normal cardiac rhythm. One theory is that because Magnesium has a relaxing effect on muscle tissue, inadequate Magnesium stores may make the coronary arteries more susceptible to muscle spasm.[10] Too little Magnesium can cause a Calcium/Magnesium imbalance, which can lead to the influx of too much Calcium into heart cells, and potentiate spasms in heart tissue. Another point for consideration is that because it relaxes the blood vessels, Magnesium keeps these vessels open, allowing for maximum blood flow to the heart.

Magnesium also has the unique ability to stop unnecessary blood clotting by helping to reduce platelet adhesion.[31] Blood clots are naturally produced by the body as a protective device to stop excessive blood flow when the body is injured. The clotting response happens when the body senses that the normally smooth blood vessel linings are rough, indicating that there is a cut. However, sometimes the body mistakes the rough surface of plaque-covered arteries as cuts, and creates unnecessary blood

clots. Or, if a high fat meal has just been eaten, tiny fat globules called chylomicrons enter the bloodstream and can cause platelets to become abnormally sticky, possibly creating clots. When these clots flow through the bloodstream and reach a part of the artery which has plaque buildup, normal blood flow is blocked, and the amount of blood which reaches the heart is severely compromised.

Magnesium is also crucial for the entrance of Potassium — a key mineral for many bodily functions — into the cells. Even if the body's Potassium stores are high, without enough Magnesium, the Potassium will not be able to enter the cells and be utilized by the body. 300 mg of Magnesium (75% of the U.S.RDA) are contained in each daily dose of HEART SCIENCE.

Along with Magnesium, **Potassium** helps to regulate normal heartbeat and blood pressure, and is necessary for the contraction and relaxation of muscle tissue. Potassium and Sodium are present in all body fluids; Potassium is found primarily within cell fluids, while Sodium is usually present in fluids surrounding cells. Together, they function to maintain the normal balance and distribution of fluids throughout the body. The body ideally should have a Potassium/Sodium balance of about 1:1; however, because the body holds onto Sodium, yet eliminates Potassium quickly, it is important that the dietary ratio of these two minerals be at least 3:1.

Unfortunately, the typical American diet, with its emphasis on processed, salty (Sodium-rich) foods and lack of fresh fruits and vegetables, severely alters the body's natural Potassium/Sodium balance. Diets in the United States are extremely high in Sodium — sometimes containing as much as 15 times the recommended daily intake! A high Sodium/low Potassium diet interferes with the normal regulation of heartbeat and blood pressure, and has been linked with elevated blood pressure.[25]

Taurine is an amino acid which helps normalize electrical and mechanical activity of the heart muscle by regulating Potassium flux in and out of the heart muscle cells.

Artery Lining Protectors

Your arteries form an integral part of your cardiovascular system, carrying blood away from the heart to nourish other parts of the body. In a healthy heart, blood surges through the arteries with every beat of the heart. The arteries expand with each pulse to accommodate the flow of blood. When arteries become hardened and narrowed by the build-up of plaque, they can't expand and are not able to transport blood efficiently throughout the body. This inability to open up increases blood pressure, putting a strain on the heart as well as the arteries. HEART SCIENCE includes ingredients specifically geared to protect against plaque formation within arteries and maintain the flexibility of these vital blood vessels.

N-Acetyl Glucosamine (NAG) is a key amino sugar which forms the building blocks of mucopolysaccharides. Mucopolysaccharides, which are long chain sugars, are an integral component of connective tissue. They combine to form gel-like matrixes which are present throughout tissues in the body, helping to maintain the elasticity of blood vessels which must continually adapt to the changing pressures of blood flow. Each daily dose of HEART SCIENCE provides 500 mg — a substantial amount — of this vital tissue building block.

There is evidence indicating that **Silicon**, a natural mineral, may protect against plaque formation in the arteries. Silicon is found mainly in connective tissues, where it helps bind the body's chemical matrix. Bound Silicon is found in high amounts in arterial walls. Researchers have found that there is a steady decline in the Silicon content of the aorta and other arteries as we age. This may be due to the low fiber content of the typical American diet, since fiber is a key dietary source of Silicon.[23] HEART SCIENCE includes 400 mg of Horsetail herb extract, a natural source of Silicon.

Hawthorn Berry is without question the herb most widely used to encourage normal heart function. The beneficial actions of Hawthorn Berry on cardiac function have been repeatedly demonstrated in experimental studies. Supplementation with Hawthorn Berry has been shown to improve both the blood supply to the heart by dilating coronary vessels, and the metabolic processes in the heart, resulting in

normal, strong contractions of the heart muscle.[34] Also, Hawthorn may inhibit the angiotensen converting enzyme, which is responsible for converting angiotensen I to angiotensen II, a powerful constrictor of blood vessels.[34]

Bromelain, a natural enzyme derived from pineapples, has become well-known for its neuromuscular relaxing properties. Researchers have reported favorable results when using Bromelain for soothing vascular linings. Initial research also indicates that Bromelain may break down fibrin, the glue which holds platelets together to form blood clots.[6]

Capillary Strengtheners

Capillaries are the smallest, yet some of the most important, blood vessels. If you think of your cardiovascular system as a series of roads which transport blood and oxygen, then your arteries are akin to interstate highways, your arterioles are the main city boulevards, and your capillaries are local residential streets. Capillaries are so small, in fact, that single red blood cells actually have to fold up to fit through them. Because of their tiny size and the intricate nature of their network throughout the body, capillaries are responsible for actually nourishing each individual tissue cell!

Along the length of the capillaries are small openings called slit pores through which oxygen, glucose, and nutrients leave the capillaries and enter the surrounding interstitial fluid. From there, they cross cell membranes and nourish the cells. Similarly, the waste products of cells enter the fluid and cross over into the capillaries, where they are then transported to the liver and kidneys for disposal. If the capillary slit pores are torn or have lesions, then blood proteins and Sodium will leak out and cause the interstitial fluid to take on a more gel-like nature. This makes the transfer of oxygen and nutrients to the cells more difficult, as well as the disposal of cell waste products, turning the fluid into a stagnant swamp instead of a flowing river.

In addition to its powerful antioxidant actions, **Proanthodyn** also helps protect collagen and elastin, the main constituents of tissue in the capillaries, and throughout the body. It is absolutely essential for capillary walls — which are only one cell thick — to be strong and stable, so that they do not allow blood proteins to leak into the interstitial fluid. Once the interstitial fluid takes on a gel-like consistency, the surrounding cells literally become starved from lack of nutrition. The exciting news is that the proanthocyanidins contained in Proanthodyn are among the few substances yet discovered which can help strengthen capillary walls, ensuring the liquid nature of the interstitial fluid.[2] Plus, proanthocyanidins help keep capillary and artery walls flexible, allowing for proper blood flow to the heart.

Heart Smarts

The 1990's mark a decade of increased awareness among Americans of important health issues. Much of the discussion has revolved around protecting that precious center of life we call the heart. Simple lifestyle change is one of the most effective ways to maintain and protect the functioning of the cardiovascular system. In order to take a holistic approach to heart care, make sure you include plenty of fresh fruits and vegetables (organic, if possible) in your diet, and cut down on fatty and cholesterol-forming foods. Reduce your salt and alcohol intake to a minimum. Try to get regular, sustained aerobic exercise for at least 30 minutes three times a week. Don't smoke – or if you do smoke, try to eat even more fresh fruits and antioxidant-rich vegetables to counter the amount of free radicals being produced in your body. Lastly, consider adding Source Naturals HEART SCIENCE to your health regimen.

HEART SCIENCE, the most comprehensive formula of its kind, provides targeted protection to the entire cardiovascular system. By approaching the promotion of normal heart function on five different levels — through the inclusion of ingredients which supply energy, decrease harmful homocysteine levels, fight cholesterol build-up, help regulate electrical rhythm, and protect artery and capillary linings — HEART SCIENCE is the perfect addition to a holistic approach to heart care.

Source Naturals Heart Science™ — The Five Tiered Approach to Heart Health

Six tablets contain:

Vitamins and Minerals	%USRDA
Pro-Vit A (Beta Carotene) 45,000 IU	900%
Vit B1 (Thiamine) 50 mg	3333%
Vit B3 (Inositol Hexanicotinate) 500 mg	2500%
Vit B6 (Pyridoxine HCl) 25 mg	1250%
Coenzyme B6 (Pyridoxal-5-Phosphate) 25 mg yielding: 16.9 mg of Vit B6	845%
(Total Vitamin B6 Activity) (41.9 mg)	(2095%)
Vit B12 (Cyanocobalamin) 500 mcg	8333%
Folic Acid 800 mcg	200%
Vit C (Magnesium Ascorbate) 1500 mg	2500%
Vit E (d-alpha Tocopheryl Succinate) 400 IU	1333%
Chromium (ChromeMate® †Polynicotinate-150 mcg & Chromium Picolinate††-150 mcg) 300 mcg	*
Copper (Sebacate) 750 mcg	37.5%
Magnesium (Ascorbate, Taurinate & Oxide) 300 mg	75%
Potassium (Citrate) 99 mg	*
Selenium (L-Selenomethionine) 200 mcg	*
Silicon (From 400 mg of Horsetail Extract) 13mg	*

* U.S. RDA not established.

Other Ingredients and Herbs	
Coenzyme Q10 (Ubiquinone)	60 mg
L-Carnitine (L-Tartrate)	500 mg
Hawthorn Berry Extract	400 mg
Proanthodyn™ (Yielding 95 mg of Proanthocyanidins from grape seed extract)	100 mg
L-Proline	500 mg
L-Lysine (HCl)	500 mg
NAG™ (N-Acetyl Glucosamine)	500 mg
Bromelain (2000 G.D.U. per gram)	1200 G.D.U.
Taurine (Magnesium Taurinate)	500 mg
Horsetail Extract (Yielding 31 mg of Silica)	400 mg
Inositol (Hexanicotinate)	50 mg

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