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CHOLESTEROL, FATS, AND HEART ATTACKS – PART III

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Most people associate heart attacks with "deposits of cholesterol" that "clog" the opening in blood vessels (lumen of the coronary arteries). Yet the plaques lining the inside of blood vessels contain other substances such as white blood cells, calcium, platelets, and more. Cholesterol is not even the principle component of arterial plaque. Protein, mostly as scar tissue, is more abundant. Besides, 50 to 60% of people who had heart attacks did not have high cholesterol levels.

Actually, many heart attacks occur in people who have calcification of the middle layer of the coronary arteries, not excessive plaquing inside the vessel walls. This calcification or hardening of arterial walls – **arterio**sclerosis – can work its way to the outside of the artery. It occurs to reinforce weakness in or injury to the arterial wall, sort of like plaster or cement pumped in to strengthen a debilitating structure. Further deterioration of or stress on blood vessel walls or loss of elasticity (due to weakness or replacement of elastic tissue with a harder calcium substance) can lead to an aneurysm – a sudden rupture or "blow out" – resulting in hemorrhage and possibly death.

Atherosclerosis, though, has to do with plaque build-up on the inner wall of the coronary arteries, almost always at "stress points" or areas that receive the most pressure or mechanical tension. These areas are first to deteriorate (develop lesions) if there is injury, insult, or gradual degeneration of blood vessel walls. It has been known since the 19th century that degeneration of blood vessel walls starts BEFORE plaques appear in the lesions. Cholesterol is one substance used to patch or repair damaged or fragile areas of arterial walls. Blood vessel walls are in trouble BEFORE cholesterol-containing plaques appear. Plaques are the means by which the body attempts to prevent leakage and death.

Platelets stick to each other and to damaged tissue wherever there is injury, "plugging up holes" in blood vessel walls, for example, and providing "glue" by which cholesterol and other patch materials can adhere to vessel walls and to each other. The resultant blood clot causes the arterial cells to release protein growth factors that attempt to stimulate growth of muscle cells within artery walls. A complex combination of scar tissue, cholesterol, platelets, calcium, triglycerides, and white blood cells is attracted to the site in order to try to repair injured or deteriorating areas. This mass of fibrous tissue causes the plaquing where it is reinforcing the arterial wall and attempting to heal tissues. The plaque grows inside the artery wall, becomes part of it. Because strong circular muscles in the wall prevent the plaque from expanding outward, it pushes inward where (if large enough) will narrow the artery opening. The more damage, deterioration, or chronic stress in the affected area, the more the plaque may grow, causing the opening to narrow. With substantial narrowing, or more likely, with constriction or spasm of the coronary artery, blood flow to the heart is interrupted or stopped. A heart attack.

In response to arterial injury, more cholesterol is directed to the affected area for reinforcement and mending. "Cholesterol is one of the body's major repair substances." Since cell walls and organelle membranes contain a lot of polyunsaturated fatty acids that are more easily oxidized than cholesterol, the cholesterol becomes oxidized in the plaque to try preserving the inner cells. HDL-cholesterol carries oxidized cholesterol back to the liver for disposal. LDL-cholesterol delivers fresh cholesterol to the site. As one pathologist put it, cholesterol does not cause plaquing any more than white blood cells cause an abscess.

Recent research has explored the inflammation process in relation to CHD. Some feel CHD does not occur in the absence of inflammation. When there is damage or deterioration of arterial walls, the inflammatory response is a protective and proactive attempt by the body to strengthen and repair tissues. Due to continual stress or breakdown, chronic inflammation may develop in an area. The body's efforts cannot keep up with continuous assaults OR there is a lack of nutritional fuel to accomplish adequate repair and strengthening. C-reactive protein (CRP) is one marker of systemic inflammation; levels rise when cellular injury and/or bacterial accumulation (due to cellular damage) occur. CRP levels may be useful in indicating acute coronary syndromes. Chemical mediators called cytokines are also being monitored in CHD. They elicit important effects in the inflammatory response, such as giving rise to platelet aggregation and coagulation or spurring functions of various white blood cells.

Repeated cycles of insult, irritation, injury, repair attempts, and re-injury to blood vessel walls may

occur. Without sufficient support from a strong, healthy immune system, without ample supplies of all nutrients needed for inflammatory functions and for the strength and integrity of tissues involved, plaques may rupture, prompting emergency clots to form in order to prevent arterial rupture. This may lead to a heart attack (myocardial infarction) or a heart attack may lead to formation of emergency clots. Or, biochemical imbalances or deficiencies in nerves or smooth muscle tissues of blood vessels may result in spasm (sudden contraction), cutting off blood flow to the heart. Or, with severe arterial weakness, an aneurysm (excessive dilation and rupture of a blood vessel, like a bubble and blowout in an old bicycle tire) will also naturally prompt a clotting response, or, even worse, a massive, rapid loss of blood. When arterial degeneration exists, heart attack prevention means: (1) the plaques or 'patches' must be strong enough to protect the arterial lesion or weak area, and/or (2) the arterial walls must not reach a point of deterioration that is so severe that plaquing cannot keep up with degeneration, and/or (3) extensive plaquing that dangerously narrows blood vessel openings does not develop so that a spasm or constriction will obstruct blood flow. Nutrition may play a vital role.

The strength, integrity, proper elasticity and relaxation of blood vessel walls are thus prime considerations. However, in even healthy people, some thickening or fatty streaks may be found where arteries branch or make a turn – areas subjected to the greatest amount of pressure from blood. If the person's blood vessels are healthy and robust, and – should there be some injury – the 'patching' is strong enough, then excessive narrowing or severe constriction does not occur. [i]

NUTRITION AND CHD

Numerous researchers have been critical of the cholesterol/ fat/ heart attack hypothesis. Dietary intervention trials with low-cholesterol, low-fat diets have failed to support the flawed premise. The hypothesis "was formulated and popularized before adequate evidence was collected to establish its efficacy this evidence, to date, is still lacking." Incomplete and invalidated research "continues to be used as the ultimate basis for dietary recommendations." Studies have shown that dietary fat does not necessarily raise serum cholesterol levels, that serum cholesterol levels are not a principle cause of arterial plaquing, that atherosclerosis does not always lead to frank cardiac disease. Clinical manifestation of CHD is low compared with the prevalence of coronary plaquing. Death may occur with minimal atherosclerosis; extensive atherosclerosis may not become clinically apparent, let alone result in death. Major studies on therapies that lower cholesterol may show some decrease in cardiac mortality but not in total mortality, "even after applying questionable selection methods and statistical treatment exaggerating effects of drugs and diet." Epidemiologic studies are inconsistent. For example, it has been shown that the rate of CHD in Japan decreased 40% over the previous 25 years as total dietary fat doubled and saturated fat intake increased. Many populations consume a high amount of saturated fatty acids without increased incidence of CHD.

The cholesterol/ fat/ heart attack premise has "always been a hypothesis in search of verification." Although cardiologists understand and evidence proves CHD to be a multifactor process, the popular conception of CHD as the end result of fat and cholesterol accumulation still prevails. "The public is led, or misled, to believe that prevention is mostly a matter of cutting back on fat intake, whereas nutrition is assigned the singular role of instructing people to reduce saturated fat" or total dietary fat. The scientific literature, however, testifies that many nutrients and foods help to prevent and treat CHD, such as:

Vitamin C complex with its rutin and flavonoids intact is critical to the strength and integrity of blood vessel walls as well as to the maintenance of proper elasticity in the vasculature. Vitamin C complex is imperative to the production of collagen and all connective tissue (including the musculature of vascular walls) and to oxygen metabolism. Studies have linked low blood levels of vitamin C to increased risk for heart attack. In fact, 70 to 80% of patients with heart disease have very low levels of vitamin C in their blood. Low plasma concentrations of vitamin C predict the presence of "unstable coronary syndrome," but the extent of atherosclerosis does not. Stress quickly depletes tissue levels. A deficit results in increased susceptibility of arterial walls to weakness, tearing, and chronic inflammation.

The association of excessive homocysteine with CHD has renewed focus on the importance of the vitamin B complex. Deficiencies of vitamins B_6, B_{12}, and folate are related to the severity of the hardening or stiffness of arteries as well as the degree of plaque buildup. Other B vitamins are also essential in areas such as nerve function and thus to blood vessel constriction and dilation, heart muscle function, and more. A deficiency of vitamin B_1 (involved in the heart's production of energy) increases the chances of having a heart attack. Refined carbohydrates deplete B_1 stores in the body as well as other B vitamins and associated nutrients. Overcooking and over-processing of foods depletes or obliterates B vitamins. Synthetic B_1 and B_2 added to enriched flours interferes with proper use of B_6.

Vitamin E complex, including its selenium component, is supportive to blood vessel pliancy and integrity, heart function and rhythm, and adequate oxygen transport. Among other uses, oxygenation of the blood can help neutralize toxic waste particles that injure the lining of blood vessels and the heart. This contributes to the body's ability to break down and eliminate injured cells and to generate new cells. The E complex is essential for cellular respiration, especially in cardiac muscle. It promotes relaxation and proper dilation of blood vessels. High intake of omega-6 fatty acids from refined vegetable oils can increase the body's requirements for vitamin E. Refining and bleaching of flour abolishes the vitamin E content of grains. Intake of vitamin E results in up to 40% fewer coronary events.

Adequate intake of various minerals and trace minerals including magnesium, potassium, calcium, selenium, chromium, copper, zinc, and others is important to protect blood vessels and cardiac muscle. A combination of magnesium deficiency and consumption of trans fatty acids can produce atherosclerosis. Supplemental magnesium can reduce the risk of angina, cardiac arrest, and death. It may help prevent coronary artery constriction as does potassium and other minerals. Copper deficiency can damage arteries and the heart. Copper and zinc help create healthy collagen. Selenium deficits have been linked to CHD and to fibrotic lesions in the heart. With the rest of the vitamin E complex, selenium may reduce or eliminate angina attacks.

Omega-3 fatty acids lower the incidence of CHD as does consumption of any unrefined, unaltered fat and foods containing natural fats. Carotenes, vitamin A complex, lipoic acid, vitamin D complex, numerous phytochemicals (such as flavones, sterols, allicin, capsaicin, flavonoids like quercitin, etc.), co-enzyme Q-10 (and other coenzymes) glutathione, and various other amino acids, all play roles in cardiovascular well-being and healing. Both vitamins A and D complexes have several functions including that of catalysts for protein and mineral assimilation, and in supporting inflammation processes. Stress depletes vitamin A levels. Vitamin D helps prevent hypertension and protects against spasm. Various amino acids in bioavailable form are essential to the transport of fatty acids used by the heart to manufacture energy, to the strength and health of cardiac muscle and smooth muscle of blood vessels, to nerve conduction, to cholesterol and triglyceride levels, and more. Coenzyme Q-10 (Co Q-10) and associated coenzymes are involved in the production and transportation of energy in the heart. There is more CoQ-10 in the heart than in any other organ. It is involved in inflammatory processes as well. Cholesterol-lowering drugs greatly increase the body's need for CoQ-10. The antioxidant portions of nutritional complexes may perform as protectors – preventing damage from highly processed vegetable oils and prematurely oxidized bodily fats and cholesterol. Many other nutrients – or lack thereof – have been shown to influence cardiovascular health.

Consumption of refined sugars and starches, altered fats – particularly trans fatty acids – and any other food denatured or adulterated to the point of becoming a non-food or anti-food should be reduced or avoided.

Real foods and herbs such as onions, garlic, brassacia vegetables (broccoli, cabbage, etc.), green leafy vegetables, citrus fruits, berries, peppers, ginger, turmeric, ginkgo, legumes, apples, whole grains, and others too numerous to list here have been shown to protect tissues and help repair. Virtually ANY whole, natural food studied seems to show favorable effects. CHD is halved, for instance, in people with a high intake of fruits and vegetables. "The concept of synergy dictates that a broad spectrum" of nutrients serve best in preventing and ameliorating CHD. Whole foods are the best way to obtain the synergistic packages of nutrients and other ingredients embodied by Nature's balanced organization.

There is no question that the "real" nutrient content of diets – the intricate, co-dependent, intact network of interrelated nutrients and other natural components (known and unknown) as found in whole foods – has declined during the last 70 or more years. Processed, denatured, refined non-foods have replaced many nutrient-dense real foods. The content of minerals and other valuable substances have declined in soils. Manufactured, maimed, mutated, and embalmed fabrications are consumed with relish while real foods (like those containing the falsely-accused fats) are neglected. Synthetic, isolated, inorganic, or fractionated 'nutrients' in popular supplements are ingested in a vain attempt to make up for what is not consumed in wholesome, dynamic natural foods. Nutrient values in real foods will naturally vary. It is not the specific measurement of nutrients in foods that is most important. It is the synergistic power of the whole that packs the punch. Nutrients in whole foods work more efficiently and are needed in smaller quantities than synthetic imitations or separated portions. [ii]

CHOLESTEROL BALANCE

Thyroid imbalance, blood sugar disruption, liver stresses, genetic tendencies, overweight, eating disorders, and other factors may cause blood cholesterol elevations or decreases. Insult or injury to blood vessels or other tissues may also

be causes. Unbalanced cholesterol or lipids are not diseases, but are signs that something is askew and the body is doing what it needs to do. What a person eats can also influence cholesterol levels, but not in the way usually publicized.

For example, the effect of any type of dietary fat on serum cholesterol levels depends on the original cholesterol levels, why the levels are where they are, and the fat itself. Most ALL natural, unaltered fatty acids will help reduce elevated serum cholesterol levels and increase low levels. Although some studies seem to give an edge to monounsaturated fats (like olive, canola, or peanut oils) in lowering cholesterol, other studies do not. Highly polyunsaturated oils can "impressively" lower cholesterol. Diets rich in saturated fats can reduce total and LDL cholesterols. The key is the quality and form of the fat such as how the oil or fat is extracted and processed, whether or not it is rancid or contains toxins, if it has been altered. ANY fat the body does not recognize as a real and beneficial food will stress the liver and other areas, nudging extra production of cholesterol.

Low cholesterol values appear in both those who eat small amounts of animal fat and those who eat large amounts. Some studies try to prove that animal fats increase cholesterol levels by using a diet that lasts only a few weeks or even one day, but any sudden change in diet can cause temporary biochemical adjustments, not reflecting a food's actual effects. The best information comes from surveys conducted over long periods of time and during different seasons of the year. When this time-consuming, expensive method is used, researchers do not find any correlation between animal-fat intake and blood cholesterol.

People with elevated cholesterol levels "are likely to have a deficiency of essential fatty acids (EFAs)." Without sufficient EFAs, the liver may compensate by increasing cholesterol production. Correcting EFA insufficiency often helps lower elevated cholesterol levels. Most Americans are deficient in omega-3 fatty acids which, when supplied, reduce elevated cholesterol levels. Other fatty acids can be just as effective. Omega-6 fatty acids are consistently effective in lowering cholesterol. Gamma-linolenic acid (as in evening primrose or black currant seed oils) is often helpful.

Almost any whole, natural food can be favorable to cholesterol balance. Phytochemicals (such as phytosterols and saponins), fiber, legumes, whole grains, fruits, and vegetables can all lower total and LDL cholesterol. Garlic, ginger, cayenne, reishi, Indian myrrh tree, and psyllium have been studied for their beneficial effects on cholesterol balance. Liver-supporting foods and herbs often assist, such as dandelion, beets, radishes, milk thistle, burdock, Oregon grape root, and so on. Choline, inositol, and the rest of the B complex are needed by the liver to process cholesterol. Calcium, magnesium, potassium, and chromium have positive effects on cholesterol, LDL, HDL, and triglycerides. Blood levels of HDL-cholesterol rise in step with blood levels of vitamin C; higher blood levels of vitamin C are associated with lower total and LDL cholesterol. Tocotrienols, components of vitamin E complex, have cholesterol-balancing effects. High vitamin A intake correlates with higher plasma HDL and apo A-1. "Weight loss is the most effective means" of balancing cholesterol, lipoprotein, and triglyceride values in overweight people. Regular exercise, especially if combined with a diet of natural, whole foods, will significantly assist cholesterol levels.

Whole, natural foods and herbs have benefits, not in direct action "against" cholesterol, but in their ability to empower the body's innate regulatory or management processes AND in their ability to reduce the need for aberrant cholesterol and lipid levels. Still, the principle of biochemical individuality must be considered. What will lower or balance cholesterol and lipids for one person may not do so for the next. [iii]

CHANGES, CHANGES

Many foods have experienced status changes in relation to CHD and cholesterol levels. Eggs are one example. Egg yolks are among the most concentrated sources of cholesterol (about 215 mg each, whereas the recommended limit of cholesterol is 300 mg/day). People stringently restricted themselves to the occasional use of only egg whites. Now eggs, including yolks, are okay since they do not raise blood cholesterol levels. One major Harvard study found no association between consumption of one egg a day and greater risk for CHD or stroke. More eggs on a daily basis were not tested. The implication was that two eggs or more each day might be risky. But there is no evidence that eggs will cause any risk. "Feel free to eat all the eggs you want." The rediscovered egg is now praised for its health benefits as it contains nutrients such as folate, other B vitamins, 'antioxidants,' and unsaturated fats.

Nuts are a high fat food, previously prohibited and now allowed. Many studies have shown positive associations between nut consumption and cardiovascular health and reduced CHD risk. Walnuts, pecans, hazelnuts, pistachios, almonds, macadamias, and other nuts have been studied. They are excellent sources of monounsaturated and polyunsaturated fatty acids; minerals like

magnesium, potassium, and copper; fiber; vitamin E complex (nuts are one of the best sources); and protein. Total and LDL-cholesterol elevations are reduced when nuts are part of the diet; HDL increases. Nuts do not contribute to obesity and can actually aid in weight loss programs. The public "should not be afraid of nuts." Eaten raw, nuts are not harmful, and "contain nutrients that make important contributions to a healthy diet."

Beef has been shunned by cholesterol-conscious people for years. But the various fatty acids in beef – especially from grass-fed cattle – do not pose the risk once feared. Most Americans identify replacing red meat with poultry and fish as an action that will help lower blood cholesterol levels. "However, elimination of beef from the diet may not be necessary" since both lean beef and lean chicken produce "significant decreases" in total and LDL cholesterol levels. No significant differences in total, LDL, or HDL cholesterol or in triglycerides were found when beef or chicken diets were consumed. Red meat is "a nutrient dense food" containing very important B vitamins, zinc, iron, and higher amounts of some trace minerals than poultry or fish.

For years people were warned to avoid shellfish due to its high cholesterol content. However, "this advice has been reversed." Even large quantities in the diet have "little or no effect" on blood cholesterol levels. No natural, unaltered food – including those rich in fats – will clog arteries or cause heart attacks or any other biochemical imbalance or health problem. Avocados, for example, are high in fat, rich in fiber, and are high in carotenes, vitamin C complex, E complex, and potassium. They are healthful, not harmful, as are any natural, intact, untampered-with foods.

Volunteers in a cardiovascular rehabilitation program for more than a year were placed on an elimination and rotation diet. The diet eliminated all refined, processed, manufactured, and fried foods. At each meal, one or two types of food "in their natural state" were eaten, and unlimited quantities were allowed. There was a significant lowering of blood pressure and serum lipids and triglycerides. Body mass was lowered, HDL-cholesterol was increased, glucose and insulin levels normalized. Fats are not the problem. Depleted, massacred, mangled, denatured, damaged, bungled non-foods stand guilty.

For the past 90 years (during which time CHD rates were rising), the amount of fat in the American diet has been fairly constant at 35 to 40% of calories. The amount of fat in the diet is not a problem. Some traditional diets (Eskimo, Native American, African Masai, etc.) contained 60 to 80% of calories as fat with virtually no incidence of heart disease. However, the **quality** or **form** of the fats IS an issue. Stable, nutrient-dense animal fats (butter, meats, eggs, seafood, etc.) and other whole, fat-rich intact foods (nuts, seeds, whole grains, avocados, olives, coconuts, etc.) have been replaced by refined, processed, often rancid vegetable oils; by stripped, depleted grains and refined sugars; and by other disassembled, depreciated, adulterated, perverted concoctions that are nutritionally impoverished, high in imbalanced components or toxic by-products; and devoid of the delicate synergy Nature places in all natural foods. Non-foods and reformed-foods lack the nutrients needed for a healthy cardiovascular system, cause imbalances that predispose to CHD, and provide toxins or breed harmful chemical descendants that harm or weaken cardiovascular tissues and functions. [iv]

NOT SO SWEET

The work of numerous investigators has shown that **refined** carbohydrates elevate blood levels of cholesterol and triglycerides regardless of intake of various types of fats. Unrefined, whole-food carbohydrate sources do not have this effect. Epidemiologic data demonstrate an "adverse impact" of sucrose ("white" sugar) and other refined carbohydrates on blood triglycerides and lipoproteins. Sadly, many studies show an association between carbohydrates and CHD risk without clarifying the difference between refined carbohydrates (stripped of most nutrients, co-factors, and fiber) and whole food carbohydrates. Whole foods have far more nutrients, intact fatty acids, and ingredients that aid proper blood sugar metabolism, fat metabolism, and biochemical utilization. They do not increase risk for CHD.

For instance, people on the island of St. Helena have a very high rate of CHD even though they do not smoke much, are physically active, and have a lot-fat diet. However, the islanders do consume an annual average, per person, of 125 pounds of refined sugar. Some investigators are suggesting that carbohydrates should be given various ranks since research indicates that simple, refined carbohydrates increase risk while complex carbohydrates reduce risk. A diet high in refined carbohydrates can cause elevations in total and LDL cholesterol, triglycerides, glucose, insulin; a reduction in HDL; and insulin resistance.

Use of high-fructose corn syrup has increased tenfold since the 1970s. This refined sugar is selectively shunted to the liver without going through some intermediary breakdown steps to which other sugars are subjected. It greatly increases production of triglycerides, leads to insulin resistance, depresses enzymes used for "burning" fat, and increases enzymes that "burn"

sugar rather than fat. Long-term ingestion of refined fructose causes increased fat formation, increased VLDL (so-called "very bad")-cholesterol, increased insulin and triglyceride blood levels, decreased glucose tolerance. Overuse of fructose skews the metabolism toward fat storage (overweight) and increases risk for CHD. Fruit contains fructose, so the sugar is thought to be healthful, natural. But high-fructose corn syrup is a separated, refined, and processed sweetener that "is about the furthest thing from natural that one can imagine, let alone eat." Refined fructose now accounts for 9% of the average American's daily dietary intake and about 20% of the average child's diet. People are inundated with fructose-laden convenience foods, snacks, soda, and candy. Fructose is evidently a contributor to the rampant incidence of obesity, diabetes, and CHD.

Several studies directly linked milk to heart attacks. Theories pointing to unfermented milk protein, milk calcium, butterfat, saturated fat, and cholesterol were made but none of them showed a clear connection. Then lactose and skim milk were found to have high associations with CHD. With pasteurization, milk sugar (lactose) is altered, changed from alpha-lactose to beta-lactose. The enzyme needed to properly digest and absorb lactose (lactase) is destroyed. Essentially, the lactose becomes a refined sugar, stripped of components needed for proper blood sugar metabolism, for handling by the liver, and for utilization by cells. Low-fat and skim milk, lacking the rich flavor and consistency of whole milk, are treated with chemical additives for body, texture, and mouth-feel. Dried milk – superheated with grossly denatured and "modified" protein – is added. Superheated and ultra-pasteurized milk products are heated to 300°F, surpassing the critical temperature (191°F) above which milk becomes toxic or foreign to the body. Unaltered milk and fermented dairy products have cholesterol-lowering effects, increasing HDL and improving LDL/HDL ratios. Fermented products such as yogurt, acidophilus milk, and kefir increase gut bacterial contents which ferment indigestible carbohydrates (like altered lactose), increase short-chain fatty acids in the intestines, and enhance bile acid conjugation.

"The classic diet/heart hypothesis related to dietary fat and cholesterol is shown to be flawed in many respects. A much stronger dietary link to heart disease is consumption of sugars such as fructose, lactose, and sucrose" – REFINED carbohydrates. [v]

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