

COMBINING FUNCTIONAL MEDICINE WITH TRADITIONAL CHINESE MEDICINE

Cardiovascular Disease

Jake Paul Fratkin, OMD, L.Ac.

Notes based on Wikipedia;

and lecture notes of Nigel Plummer, Ph.D and Dicken Weatherby, ND

1. **Cardiovascular disease (heart attack and stroke) top killer in US**
 - a. 80 million affected
 - b. Mortality: 865,000/year
 1. 65% is after age 75
 2. 20% age 65-75
 3. 15% before age 65
 - c. Elevated cholesterol > 240 mg/dL
 1. 16% of population
 - d. "Combined Hyperlipidemia"
 1. Condition that shows ↓HDL; ↑LDL; ↑triglycerides
 2. 20% of people who develop CHD before age 60 have this pattern
 - e. Good resource: <http://www.optimal-heart-health.com/>

2. **Causes**
 - a. **Risk factors for CVD**
 1. Smoking
 2. Cholesterol
 3. Obesity
 4. Diabetes -2
 5. Adrenal fatigue coupled with stress

b. Effects of inflammation

1. CVD requires a combination of bad blood fats and blood vessel epithelia inflammation
2. As inflammation is repaired, low-density cholesterol, combined with macrophage debris, is enmeshed in the repair, causing soft plaque
3. Soft plaque can break off and cause embolism in coronary or cerebral blood vessels
 - a. Hard established plaque will not break off
 - b. Think of scar tissue (old) versus a scab (new)
4. Heart attack due to stenosis alone accounts for 15% of heart attacks
 - a. 85% is from soft plaque breaking off
5. Origin of plaque requires inflammatory agents coming from within the artery wall

c. Causes of inflammation

1. Excess fats (in tissue or as triglycerides)
 - a. Release free radicals (oxidative stress) which injures epithelia
 - b. Stimulate release of inflammatory cytokines
2. Excess blood insulin
 - a. Highly inflammatory
 - b. Insulin acts like a solvent, telling cell walls to open up so as to transport insulin and other nutrients into cell, while allowing cellular debris to exit the cell
 - c. Levels should be below 4 about 1-2 hrs after eating
 - d. Accounts for high heart disease in diabetics, who have chronically elevated insulin due to injections
3. Cytokines
 - a. IL-6 is inflammatory, until turned off by IL-10
 - b. Low IL-10 allows IL-6 to persist

1. Low IL-10 is due to adrenal stress
 - c. Cytokine activity rises as we age
 1. Controlled (neutralized) by IL-10
 2. IL-10 production decreases as we age
 3. Will increase with sweating exercise, 45-60 minutes a day
 4. Environmental toxins, including heavy metals, chemicals
 - a. These cause oxidative stress (free radical damage)
 5. Microbial agents
 - a. Chlamydia can induce inflammation
 - b. Other microbes under consideration
 1. Clostridium, h. pylori, cytomegalovirus, periodontal infections
- d. **Treatment** should focus on inhibition of inflammation as well as reduction of LDL and triglycerides

e. The Inflammatory cascade

1. Inflammation starts with cytokine release
 - a. IL-1, IL-6, TNF
 1. Secreted by endothelium, leucocytes, macrophages
 - b. Involves three systems:
2. Blood vessel endothelium
 - a. Cytokines trigger adhesion molecules
 - b. Attracts leucocytes and platelets
 1. Includes monocytes which become macrophages
 - c. Allows endothelial dysfunction
 - d. Allows lipid deposition
 - e. Leads to atherosclerosis
3. Bone Marrow
 - a. Cytokines increase production and release of monocytes and platelets into blood plasma

- b. This affects blood endothelium
 - c. Leads to atherosclerosis
- 4. Liver
 - a. Cytokines release acute-phase proteins
 - 1. Including C-Reactive protein
 - 2. Serum amyloid A
 - b. Release fibrinogen
 - c. Leads to thrombosis

3. Functions and facts about cholesterol and triglyceride

a. Recommended levels of cholesterol

1. Total cholesterol: < 200 mg/dL (higher risk: >240)
2. HDL (high density lipoproteins): >45 (higher risk: <35)
3. LDL (low density lipoproteins): <130 (higher risk: >160)

b. Cholesterol

1. Used for membrane formation
 - a. Keeps membrane soft and porous (permeable)
 - b. Aids myelin sheath around nerves
2. Required for steroid hormone production
3. Necessary for production of bile acids and fat-soluble vitamins (A, D, E, K)
4. Created by liver, intestines, adrenal glands, reproductive organs and skin
 - a. Cholesterol creation is turned off if levels are high
5. Excreted by liver via bile duct to small intestine
 - a. 50% is reabsorbed and reused
6. All animal fats contain some cholesterol
 - a. Percentage of triglycerides and phospholipids is higher
 - b. Animal source cholesterol not significant in raising total blood cholesterol levels

1. Includes cheese, egg yolks, beef, pork, poultry and shrimp
 2. Reduction in animal products results in increase of liver making cholesterol, so doesn't reduce blood cholesterol significantly
 - c. More is stimulated by trans-fats and saturated fats-
 1. Pure animal fat contains saturated fats
 2. Hydrogenated oil contains trans-fats
 3. Affects LDL the most
7. Lab levels
- a. Normal range: 100-200 mg/dL
 - b. Optimal range: 160-180 mg/dL
 - c. Higher risk: >240

c. HDL (high density lipoproteins)

1. Function is to transport cholesterol and triglycerides from arteries and tissues back to liver for recycling or excretion
2. Known as "good cholesterol"
 - a. Good in that it is protective
3. Low levels are indicator of higher risk for heart disease
 - a. Hyperlipidemia, atherosclerosis, oxidative stress
 - b. Metabolic syndrome, fatty liver
 - c. Sedentary lifestyle
4. Laboratory levels:
 - a. Normal: 40-90 mg/dL
 - b. Optimal: > 55
 - c. If HDL is only 25% of total cholesterol, high risk of hyperlipidemia
5. To raise HDL:
 - a. Aerobic exercise
 - b. Weight loss
 - c. Remove trans-fats from diet

- d. Moderate amounts of alcohol
 - 1. Liver asks for more HDL to protect membranes from alcohol
- e. Rx: Fibrates
 - 1. Increases HDL, lowers triglycerides
 - 2. Improves insulin resistance
 - 3. Not shown to reduce total death rate, but does reduce total number of heart attacks
 - 4. Used when statins are not tolerated
- f. Niacin (B3)
 - 1. Reduces VLDL
 - 2. Reduces triglycerides
 - 3. Pharmacological niacin 1-3 g. increases HDL by 10-30%
 - a. Greatest single beneficial substance
 - b. Must contain free nicotinic acid
 - 1. "No flush" or "sustained release"
OTC niacin does not work
 - c. Non-Rx that is pharmaceutical grade:
Niavasc (Xymogen)
 - 4. Niacin may increase homocysteine
 - a. Toxic to arteries
 - b. Countered by a B complex supplement
- g. Fish oil raises HDL
- h. Statins have no effect on raising HDL

d. LDL (low density lipoproteins)

- 1. Function is to transport cholesterol and triglycerides from liver and intestines to peripheral tissue
 - a. Cell membranes create LDL receptors so cholesterol can be transported into and absorbed
- 2. Inverse to HDL

- a. When one is higher, the other is lower
- 3. Higher levels are associated with CHD. Mechanism:
 - a. Arterial epithelial cells attract LDL
 - b. With inflammation in the artery wall:
 - 1. Small dense cholesterol is trapped in repair of tissue
 - 2. Macrophages engulf excess LDL particles and further inflammatory response
 - c. Clots are formed > embolism, stroke or heart attack
- 4. High level of LDL associated with:
 - a. Atherosclerosis, hyperlipidemia
 - b. Oxidative stress
 - c. Metabolic syndrome
 - d. Fatty liver
 - e. Due to high refined carbohydrate and sugar diet
- 5. Best to have various kinds of LDL enumerated
 - a. Done with VAP test (“Vertical Auto Profile”)
 - b. Not commonly done due to higher cost and fewer labs
 - c. Pattern B
 - 1. Small dense LDL
 - 2. Higher coronary risk
 - a. Creates “atheroma”, a mix of macrophage debris and cholesterol
 - b. Creates atherosclerosis
 - 3. Associated with elevated triglycerides
 - d. Pattern A
 - 1. Larger and less dense HDL
 - 2. Less risk
 - e. Healthiest presentation is small amounts of Pattern A and no amount of Pattern B
- 6. Lowering LDL

- a. Px: high LDLs are treated with statins
 - 1. Lowers heart attack risk by 60%
 - 2. Lowers stroke risk by 17%
 - 3. By 2003, Lipitor was the best-selling pharmaceutical medicine in history
 - 4. MDs recommend statins if LDL is > 130 mg/dL
 - a. This should be high risk people
 - b. People with no other risk factors can wait until >190, but should undertake lifestyle change and nutrient support
- b. Fish oil lowers LDL
- c. CoQ10 reduces LDL oxidation
 - 1. This oxidation is the inflammatory stress that leads to atherosclerosis

7. Lab levels

- a. Normal: <130
- b. Optimal: <100
- c. Higher risk: >160

e. VLDL (Very Low Density Lipoproteins)

- 1. Made in liver
 - a. Composed of triglycerides, cholesterol and apolipoproteins
- 2. Acts as an internal transport system of lipids
 - a. Transports cholesterol, phospholipids and triglycerides
 - b. Triglycerides is released from VLDL to be used as energy source
 - 1. Eventually, converted in bloodstream to LDL
- 3. Elevated VLDL = elevated triglycerides
- 4. Lab level: <25 mg/dL

- 5. Treatment:

- a. Low fat, low carbohydrate diet
 - 1. Control blood glucose level
- b. Niacin (B3)
- c. Rx: statins, nicotinic acid, Lopid (fibrate)

f. Triglycerides

- 1. Most abundant fat in the blood stream and tissues
 - a. An ester derived from glycerol and 3 fatty acids
 - b. Excess calories are converted to triglycerides
 - c. Triglycerides cannot enter cell directly
 - 1. Broken into 3 fatty acids which are absorbed, and then reformed into intra-cellular triglyceride
- 2. Main component of VLDL
- 3. Production of triglycerides:
 - a. Forms when there is excess blood glucose
 - 1. Excess carbohydrates are turned into glucose
 - 2. Glucose is used for energy production by cells
 - b. Any excess glucose is sent back to liver and converted to glycogen
 - 1. Glycogen circulates in blood and is stored in muscles
 - a. Glycogen is similar to starch
 - b. Acts as energy reserve to release glucose
 - 2. Muscles can retain only small amounts of glycogen
 - 3. Excess glycogen is sent back to the liver where it is converted into triglycerides
 - 4. Triglycerides are stored as fat, or circulate in blood
- 4. Triglycerides are energy source for cell
 - a. Twice as much energy as protein or carbohydrates
 - b. Cells use for energy
 - 1. Converted by lipase

- c. Glycerol component can be converted into glucose for brain
- 5. Higher levels correspond with greater likelihood of heart attack, stroke and atherosclerosis
 - a. Excess levels thicken blood, which increases possibility of clotting and blockage
 - 1. Triglyceride fats may be trapped in blood vessel walls with accompanying inflammation
 - b. Strong inverse relationship with HDL
 - c. Major component of belly fat
 - 1. This can act as reservoir of chronic inflammation
 - 2. Major risk factor for heart disease
 - d. Usually indicative of Metabolic Syndrome
 - 1. Excess blood glucose
 - 2. Insulin resistance
- 6. Levels:
 - a. Testing must be done with at least 8 hrs of fasting
 - b. Normal 50-150 mg/dL
 - c. Optimal: 70-80
 - d. High: > 200
 - e. Dangerous: >500
 - f. Should be half of total cholesterol
 - g. If low (<40) may be indicative of auto-immune disorder
- 7. Causes:
 - a. Diets high in sugars and refined carbohydrates > elevated triglycerides
 - 1. Eating more than you burn!
 - a. Esp. sugar and alcohol
 - 2. BMI ↑28
 - b. Insulin resistance
 - c. Low thyroid
 - d. Rx that can induce hypertriglyceridemia:

1. Steroids, beta blockers, diuretics, estrogen, tamoxifen, birth control pills

8. Treatments

- a. Dietary caloric restriction, especially refined carbohydrates, sugars and alcohol
- b. Exercise – enough to burn up the fats
 1. 45-60 minutes a day of sweating exercise
 2. Once blood triglycerides come down, then stored fat can be broken down
- c. Omega 3, 2-3g a day
 1. Fish oil
 2. Flax seed oil
 - a. Much less effective
 3. Much scientific evidence to show that fish oil lowers triglycerides
- d. Vitamin C, 1-2 g. per day
- e. CoQ10
- f. Carnitine
 1. Amino acid that moves fats into cellular mitochondria to be burned as fuel
 2. Effective if combined with sweating exercise
- g. Rx: Statins with Fibrates (Tricor, Lopid)
 1. The combined approach has many side effects
 2. If you lower cholesterol too much, cell membranes are jeopardized
 3. Will lower CoQ10 levels

g. Lp(a) Cholesterol

1. Lipoprotein similar in structure to LDL
2. Elevated amounts is a strong risk factor for:
 - a. Coronary heart disease, cerebrovascular disease, atherosclerosis, thrombosis and stroke

3. Lp(a) increases coagulation and triples CVD risk (!)
4. Elevated amounts are usually due to hereditary
 - a. Do not seem to elevate based on diet
5. Function
 - a. May involve coagulation
 - b. Attracts inflammatory agents
 - c. People with low Lp(a) appear to be healthy
6. Levels
 - a. Desirable: < 14 mg/dL (< 35 nmol/l)
 - b. High risk: 31 - 50 mg/dL (75 - 125 nmol/l)
 - c. Very high risk: > 50 mg/dL (> 125 nmol/l)
 - d. African-Americans often have 2-3 fold increase of these numbers
 1. This may be normal
7. Treatment/control
 - a. Statins have no effect on level
 - b. Niacin (nicotinic acid), fish oil and aspirin beneficial
 - c. Moderate alcohol consumption reduces level

4. The Process of Atherosclerosis

a. Due to Excess LDL

1. Excessive plasma levels of LDL leads to some accumulating in intima
 - a. Tunica intima (or just intima) is the innermost layer of an artery or vein
2. Fatty acids in “trapped” LDL undergo oxidation
 - a. Proteins of LDL undergo oxidation and glycation
3. Oxidized LDL is not recognized in intima
 - a. Macrophages produce and induce endothelial cells to produce IL-6, TNF and IL-1
 - b. This stimulates endothelial cells to produce adhesion molecules

- c. Macrophages increase, and engulf oxidized LDL and become foam cells
 1. Foam cells are unique to LDL and blood vessel endothelia
 2. Foam cells produce fatty like streaks
 3. Typically line the tunica intima of the vasculature
4. T-cells (Th-1) migrate to fatty streak and perpetuate inflammatory response
5. Monocytes, macrophages, endothelial cells and smooth muscle cells secrete chemokines (small cytokines) to form fibrous accumulation (“fibrous cap”)
 - a. The smooth cells release adhesive factors to recruit monocytes
 1. Monocytes migrate under cell to become macrophage
 2. Macrophage dies and accumulates, coating the endothelia
 3. This accumulates as plaque
 - b. Becomes like a forest on the artery wall interior surface
 - c. Stable caps form with a mesh of collagen fibres
 1. This won’t break apart
6. Continued inflammation in intima allows macrophages and foam cells to secrete matrix-degrading enzymes
 - a. These can degrade stable collagen
 - b. Cap becomes weak and begins to tear
 - c. “Platelet tissue factor” (strong clotting agent) is activated, forming a combination lipid-blood clot
 1. Also prevents clearance of the clot by normal mechanisms
 - d. This breaks off to cause heart attack or stroke

b. Due to normal cholesterol plus inflammation

1. Chronic inflammation can form the same process, if enough inflammatory agents are available
 - a. Rheumatoid arthritis patients, for example, usually die of heart attack
2. Chronic cytokine production (IL-1, TNF, and IL-6) will also lead to endothelial forest

c. Direct effects of cytokines towards heart failure

1. Heart failure used to be thought of as a disease of the myocardium with sx like fatigue
2. Now, the inflammatory model is considered the underlying pathology
 - a. TNF and IL-6 are elevated in proportion to severity of heart failure
 - b. Raise IL-6 can affect pulmonary and ventricular functions of the heart

5. Important Lab Markers for CVD Risk

a. Fibrinogen

1. A soluble plasma glycoprotein, synthesized by the liver, that is converted by thrombin into fibrin during blood coagulation
 - a. Involved in clot formation
 - b. Binds to LDL and converts to fibrin mesh
 - c. This decreases blood flow and allows platelet aggregation
2. Elevates with inflammation
3. Elevated levels correlate with CVD, Metabolic syndrome, obesity
4. Elevate with BC pills and HRT
5. Blood levels
 - a. Normal: 193-423 mg/dl
 - b. Optimal: 200-300

6. Effective therapies: fish oil, Nattokinase, niacin, beta carotene, B12, 6, aspirin

b. C-reactive protein

- a. It's an acute-phase reactant
 1. Rises with inflammation
 - a. Usually rises along with IL-6
 2. Produced in liver during inflammation
- b. Elevates in various illnesses
 1. Heart disease and stroke
 2. Diabetes
 3. Hypertension
 4. Depression
 5. Increased Alzheimer's risk
 6. Elevated trans-fats in diet will make it rise significantly
 - a. Can cause plaque to rupture
 7. Belly fat > elevated IL-6 and CRP
 8. Will rise with periodontal disease
 9. People with chronic periodontal disease have higher levels of heart disease
 - a. Double the risk of a heart attack
- c. Elevates with smoking, hypertension, BC pills, HRT
- d. Normal test not specific for heart
 1. Elevations can be inflammation anywhere in body
- e. Ask for hs-CRP, highly sensitive c-reactive protein
- f. Lab range
 1. Normal: 0-3 mg/L
 2. Optimal: Men: <0.55 mg/L; women, <1.5 mg/L

c. Erythrocyte sedimentation rate (ESR, Sed rate)

- a. Rate at which red blood cells precipitate in a period of 1 hour
- b. Acts as a non-specific marker for inflammation

- c. Governed by balance between pro-sedimentation factors, mainly fibrinogen, and factors resisting sedimentation, namely the negative charge of the erythrocytes
- d. When an inflammatory process is present, the high proportion of fibrinogen in the blood causes red blood cells to stick to each other
- e. The ESR is increased by any cause or focus of inflammation
 - 1. Pregnancy
 - 2. Rheumatoid arthritis
 - 3. Autoimmune disease including lupus
- f. Level is age dependent

d. Homocysteine

- a. An amino acid
 - 1. Precursor of cysteine
 - 2. Synthesized by body, not from diet
- b. Elevated levels of homocysteine linked to cardiovascular disease
 - 1. Raises with meat consumption
 - 2. Elevated levels associated with plaque build-up
 - a. Causes endothelial dysfunction and damage
 - b. Attracts LDL and blood particles to form scab
 - c. First step towards atherosclerosis
 - 3. Lowering homocysteine levels may not improve outcome
- c. Can be lowered with folic acid, B6 and B12
- d. Reference ranges:
 - 1. Normal, men: 4.3-15.3 umol/L; women: 3.3-11.6 umol/L
 - 2. Optimal: <7.2
 - 3. > 15 has 24.6 % risk of dying in 3.9-5.3 years
 - 4. > 11 has 74% increased risk of stroke

e. Uric acid

1. Increased levels good marker for increased inflammation or oxidative stress
2. Lab Range
 - a. Normal: 4.0-8.0
 - b. Optimal: men, <5.9; women, <5.5

f. LDH (Lactate dehydrogenase)

1. Elevated levels can show tissue damage or tissue breakdown
 - a. Especially if total protein is elevated
2. Often aggravated by B12 and folate deficiency
 - a. Hemolytic anemia

g. Lp-PLA-2 Enzyme

- a. Lipoprotein-associated phospholipase A2
 1. Also known as platelet-activating factor acetylhydrolase (PAF-AH)
- b. Enzyme which is activated in the presence of inflammation and oxidized phospholipids of LDL cholesterol
- c. Excellent marker for degree of soft plaque
 1. Marks vascular-specific inflammation
 2. Powerful predictor of stroke and heart attack risk
 3. Based on a meta-analysis involving a total of 79,036 participants in 32 different studies
- d. Available from Berkeley Heart Lab: <http://www.bhlinc.com>

h. HDL and LDL sizes

1. Seven subclasses of LDL
2. Five subclasses of HDL
3. VAP and other labs will measure some or all of these, which indicate higher risk factors

i. AAA/EPA ratio

1. Measures the ratio of arachidonic acid (AA) to eicosapentaenoic acid (EPA) in plasma
 - a. AA is produced by excess Omega-6 fatty acids
 - b. EPA is produced by Omega-3 fatty acid
2. This ratio of the principle omega-3 and omega-6 fatty acids is a measure of the body's eicosanoid balance
 - a. Eicosanoids are produced by both Omega-3 and Omega-6
 - b. Eicosanoids produced by Omega-6 are more inflammatory
 - c. Aspirin and NSAIDs down-regulate eicosanoid levels
3. Normal values: 1.5 – 3.0
 - a. > 3 inflammation
 - b. Medical people have been satisfied with <10
4. Performed by Metamatrix Labs; Rocky Mtn Analytical Lab

j. Other Markers

1. Testosterone
 - a. Low free testosterone is a cardiac risk factor
 - b. Can lead to stiffened arterial walls
2. Iron
 - a. Elevations cause oxidative stress
3. Vitamin D
 - a. < 50 too low

k. “The Perfect Storm for Heart Disease”

1. High glucose
2. Excess insulin
3. Low free testosterone
4. Low Vitamin D
5. Excess LDL
6. Low HDL
7. Excess triglycerides

8. Excess Fibrinogen
9. Elevated C-reactive protein
10. Excess homocysteine
11. Hypertension
12. Excess belly fat

6. Effective Therapies Against Soft Plaque and Heart Disease

a. Fish Oil

1. Fish oil contains Omega 3 fatty acids EPA and DHA
 - a. EPA = eicosapentaenoic acid
 - b. DHA = docosahexaenoic acid
 - c. These are precursors to eicosanoids which reduce inflammation
2. Fish do not produce Omega-3 fatty acids, but accumulate them through the food chain, their origin being seaweed and micro-algae
 - a. Best source is sardines and anchovies
 - b. Larger fatty fish high in the food chain accumulate heavy metals and toxins
3. Most effective treatment for cardiovascular disease
 - a. Study: 2.3 g reduces mortality rate 29% (without any other factor)
 - b. Beneficial to both high risk and low risk patients
 - c. Benefit at even 1 g. per day
 1. 2–4 grams is better, esp with marked inflammation
 2. Average American intake is < .2g/day
4. Beneficial effects (based on research)
 - a. Reduces triglycerides
 1. Increases action of lipoprotein lipase
 2. Increases fatty acid oxidation in liver
 3. Clears VLDL
 - b. Reduces VLDL cholesterol, raises HDL
 - c. Reduces inflammatory agents

1. DHA suppresses TNF, IL-1, IL-6
 2. Lowers plasma fibrinogen and CRP
 3. Study: 2.3 GLA and 2.4 g. EPA for 6 months in colon cancer reduced:
 - a. IL-1 by 61%
 - b. TNF by 73%
 - c. IL-6 by 83%
 - d. Regulates and smoothes rhythmic beat of heart
 1. Fatal arrhythmias cause 250,000 cardiac deaths per year
 2. Polyunsaturated fatty acids (PUFA) from EPA and DHA slows heart beat
 3. PUFAs dampen response of cells to electrical stimuli
 - e. Enhances efficacy of statins
 1. 4 g/ day of FO gave further significant reductions of plasma triglycerides and total cholesterol
 - f. Also good for depression and anxiety
 1. Countries highest in fish oil in their diet have lowest levels of depression
5. Interactions of Omega 3 and Omega 6
- a. Arachidonic acid is main Omega 6 fatty acid
 1. Sits at head of arachidonic acid cascade
 2. Twenty different signaling paths that control a wide array of functions involving inflammation and the central nervous system
 3. Most AA in the human body derives from dietary vegetable oils and animal fats
 - b. Omega 3 fatty acids (polyunsaturated oils) form cascades that compete with the arachidonic acid cascade, and are anti-inflammatory

1. Include ALA (alpha-linolenic acid), EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid)
2. EPA provides the most important competing cascade
 - a. Comes from oily fish, hemp oil and flax oil
- c. GLA (gamma-linolenic acid) also provides anti-inflammation
 1. Found in borage oil
- d. Low dietary intake of these essential fatty acids is associated with a variety of inflammation-related diseases
 1. Our hunter-gatherer ancestors had much higher levels of dietary Omega 3 oils
 2. Evidence that increase of dietary Omega 3 reduces inflammatory diseases as well as psychiatric disorders

b. Niacin

1. Vitamin B3, nicotinic acid
2. In large doses can reverse atherosclerosis
 - a. It lowers the levels of LDL, VLDL, total cholesterol, triglycerides
 - b. Increases HDL
 - c. Recommended dose: 2000 mg a day
3. Side effects
 - a. Doses above 1.5 can induce facial flushing
 1. One gains tolerance within a short time
 - b. These doses are not recommended during pregnancy
 - c. May aggravate gout
4. "No-flush" niacin is actually inositol hexanicotinate
 - a. Does not have beneficial effects
5. Nicotinic acid is available as Rx, and from Xymogen and Vital Nutrients

c. Vitamin D-3

1. Produced in skin with exposure to UV sunlight
2. Used by macrophages to fight microbes and pre-cancer cells
 - a. Activates killer T cells
 1. Will remain dormant without Vitamin D
 - b. Enhances natural killer (NK) cells
 - c. Produces antimicrobial cytokine
3. Synthesized in kidney to regulate calcium and phosphate
4. Low levels associated with blood clots
5. Research shows conflicting conclusions on heart disease
6. Recommended dosage: 5000 iu a day
 - a. Human body can make up to 20,000 mg a day

d. Coenzyme Q-10

1. Aka Ubiquinone, CoQ10
2. Created in cell mitochondria
3. Helps generate ATP energy in mitochondria
 - a. Also helps neutralize free radical damage
4. Beneficial in cardiovascular heart disease
5. Depleted by statin medicines
 - a. Helpful to supplement patients on statins
6. Supplement is manufactured by fermenting beets and sugar cane with special strains of yeast
 - a. Most made in Japan
7. Dosage: 50-150 mg/day

e. Folic Acid

1. Vitamin B9
2. Decreases homocysteine levels
 - a. High levels damage coronary arteries and form clots
3. Stroke has lowered 15% since folate fortification required
4. Level: 800 mcg/day

f. Nattokinase

1. An enzyme extracted and purified from Natto, a food made from fermented soybeans
 - a. Uses the bacterium *Bacillus natto* to produce Nattokinase enzyme
 - b. Only Natto contains Nattokinase enzyme
2. Japanese believes it has clot-busting effects similar to aspirin
3. Caution when combining with aspirin

g. Vitamin C

1. Lowers levels of C-reactive protein
2. Prevents oxidation of LDL and Lp(a) by 75%
3. Dose: 1-2 g/ day

h. L-Arginine

1. Promotes nitric oxide (NO)
 - a. An important catalyst for healthy dilation of blood vessels, circulation, and blood flow
2. L-Arginine improves nitric oxide production by vascular endothelial cells
 - a. Increases vasodilation
 - b. Inhibits platelet and monocyte adhesiveness
3. Not recommended following a heart attack
4. Dose: 5 g. a day

i. Other helpful nutrients

1. Chromium, 2000 mcg/day
2. Curcumin, 2 g./day (Turmeric)
3. Vitamin E, 100 mg/day
4. L-Carnitine, 500-2000 mg/day
 - a. Enhances metabolism of fats and triglycerides when combined with aerobic exercise

- b. Also acts as an anti-oxidant

7. Medical recommendations

a. Statins (HMG-CoA reductase inhibitors)

1. Reduces cholesterol by inhibiting the enzyme HMG-CoA reductase
 - a. This plays a central role in the production of cholesterol in the liver
2. Common Rx Statins
 - a. Atorvastatin (Lipitor, Pfizer)
 1. Best selling RX in history
 2. Also available as Torvast
 - b. Lovastatin (Mevacor, Altacor, Altoprev)
 - c. Rosuvastatin (Crestor)
 - d. Simvastatin (Zocor, Lipex)
3. Adverse reactions
 - a. Elevated liver enzymes
 - b. Myalgia or muscle cramps
 - c. If you lower cholesterol too much, cell membranes are jeopardized
 - d. Will lower CoQ10 levels
4. A small group of scientists argue that elevated cholesterol has not been adequately linked to heart disease
 - a. Question large numbers of patients being put on statins

b. Aspirin

1. Reduces platelet aggregation
 - a. Inhibits the production of thromboxane, which binds platelet molecules together
 - b. Creates a patch which covers damage to blood vessel walls
2. Recommended dose: 81 mg/day