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Green Tea Has Acute Beneficial Effect on Endothelial Function

Scientists studied the effects of 6 grams of green tea, 125 mg of caffeine (the amount contained in 6 grams of tea), or hot water on flow-mediated dilation of the brachial artery in healthy subjects. Flow-mediated dilatation (FMD) of the brachial artery is related to coronary endothelial function and is an independent predictor of cardiovascular risk. FMD increased significantly with tea, whereas it did not change with caffeine or the hot water placebo. This indicated that green tea's positive effects were not related to the caffeine, rather that green tea's polyphenols were more than likely responsible for its effects on blood vessel health.

Alexopoulos N et al. The acute effect of green tea consumption on endothelial function in healthy individuals. *European Journal of Cardiovascular Prevention Rehabilitation* 15:300-5, 2008.

Higher Vitamin D Levels Needed for Better Health Outcomes

Experts have called for raising the RDA for vitamin D based on extensive safety assessments and a review which concluded that at least 1,000 IU of vitamin D is needed to bring serum levels into the range associated with beneficial health outcomes such as risk for falls, dental health, fractures and colon cancer. Findings from the above-cited two studies reinforce the call for higher vitamin D. The first study looked at 18 clinical trials of vitamin D, each of which reported results for total mortality. Those who received vitamin D in the studies had a significant 7% reduction in death from any cause. No harm was noted from the doses given, which ranged from 300-2000 IU vitamin D daily. More compelling evidence comes from the second study, a randomized trial that supplemented postmenopausal women with 1,100 IU vitamin D plus calcium, calcium alone, or placebo for 4 years. Only women who received vitamin D had significantly fewer cancers of all types.

Autier P, et al. Vitamin D supplementation and total mortality: a meta-analysis of randomized controlled trials. *Archives of Internal Medicine* 167:1730-7, 2007. Lappe JM, et al. Vitamin D

and calcium supplementation reduces cancer risk: results of a randomized trial. *American Journal of Clinical Nutrition* 85:1586-91, 2007.

Experts Conclude Evidence Supports Use of Daily Multivitamin

A panel of experts from Harvard, Tufts, UC Berkeley, UCLA, and other universities met to examine the state of the science supporting multivitamin use and health protection. Their key findings: vitamin supplementation has been demonstrated to prevent birth defects and improve immune function; other research suggests that their use contributes to a reduced risk of AMD, coronary heart disease, cancer and osteoporosis. This summary paper discusses the research and suggests that the available evidence is sufficiently robust for physicians to confidently recommend a daily multivitamin for general health promotion and disease prevention.

Blumberg J and Heber D, eds. *Multivitamins and Public Health: Exploring the Evidence. Summary statement from Oct, 2003 conference; Washington DC New York, NY: BioScience Communications, 2004.*

Combination of Alpha, Gamma Vitamin E Better for Oxidative Stress

Researchers evaluated supplementation with gamma tocopherol (GT), alpha tocopherol (AT), the combination or placebo for 6 weeks on biomarkers of oxidative stress, and inflammation in subjects with metabolic syndrome. Hs-C reactive protein levels significantly decreased in the combined AT+GT group, as did tumor necrosis factor. Plasma lipid peroxides were significantly decreased with AT, GT, or in combination. Nitrotyrosine levels were significantly decreased only with GT or GT+AT but not with AT compared to placebo. Thus, the combination of alpha and gamma vitamin E supplementation appears to be superior to either vitamin E form alone on biomarkers of oxidative stress and inflammation and needs to be tested in prospective clinical trials to elucidate its utility in CVD prevention.

Devaraj S et al. Gamma-tocopherol supplementation alone and in combination with alpha-tocopherol alters biomarkers of oxidative stress and inflammation in subjects with metabolic syndrome. *Free Radical Biology Medicine* 44:1203-8, 2008.

Berry Consumption Lowers Biomarkers for Heart Disease

Researchers report that people consuming a variety of berries, a rich source of polyphenols, experienced a number of changes that could lead to a lower risk of heart disease. In this intervention study, half of the middle-aged volunteers were randomly assigned to eat a set amount of a variety of berries daily for 8 weeks. A number of cardiovascular health biomarkers in this group were compared with those in non-berry group. The berry eaters were found to have reductions in systolic blood pressure, especially among those who had higher blood pressures to start with. While total cholesterol levels were unchanged in the berry group, they experienced a significant increase in HDL levels. Platelet function also changed in the direction associated with a lower risk of heart disease.

Erlund I, et al. Favorable effects of berry consumption on platelet function, blood pressure, and HDL cholesterol. *American Journal of Clinical Nutrition* 87:323-31, 2008.

JAMA Review Supports Daily Multivitamin Use for Adults

This scientific review highlights the relationship of B vitamins to cardiovascular disease, neural tube defects, and colon and breast cancer, as well as that of vitamin D to osteoporosis. The reviewers also point out that low intake of antioxidant vitamins (A, C, E) may increase the risk of several chronic diseases. According to guidelines appearing in the same issue of JAMA, “sub-optimal intake of some vitamins—above levels causing classic vitamin deficiency—is a risk factor for chronic diseases and common in the population, especially the elderly”. Acknowledging that it is often difficult to get patients to change their dietary patterns, the American Medical Association advises all adults to take at least one multivitamin supplement daily.

Fletcher RH and Fairfield KM. Vitamins for chronic disease prevention in adults: Scientific Review. *Journal of the American Medical Association* 287:3116-126, 2002.

Review: Cruciferous Vegetables May Lower Risk of Certain Cancers

Cruciferous vegetables such as broccoli are a rich source of sulfur-containing glucosinolates and their hydrolysis products, including indoles and isothiocyanates. High intake of cruciferous vegetables has been associated with lower risk of lung and colorectal cancer in epidemiological studies. Glucosinolate hydrolysis products alter the metabolism or activity of sex hormones in ways that could inhibit the development of hormone-sensitive cancers, but evidence of an inverse association between cruciferous vegetable intake and breast or prostate cancer in humans is limited and inconsistent. Randomized controlled trials are needed.

Higdon JV et al. Cruciferous vegetables and human cancer risk: epidemiologic evidence and mechanistic basis. *Pharmacologic Research* 55:224-36, 2007.

Multivitamin Use Linked to Prevention of Heart Attack

Swedish researchers examined the relationship between self-selected use of multivitamin supplements and the risk of myocardial infarction (heart attack) in a case-control study. Analysis showed that use of a multivitamin supplement reduced the risk of a myocardial infarction by 21% in men and 34% in women. This association was not modified by such healthy lifestyle habits as consumption of fruits and vegetables, intake of dietary fiber, smoking habits and level of physical activity, although never smoking appeared to outweigh the association in women. Findings from this study suggest that multivitamin use may aid in the primary prevention of heart attack.

Holmquist C et al. Multivitamin supplements are inversely associated with risk of myocardial infarction in men and women. The Stockholm Heart Epidemiology Program (SHEEP). *Journal of Nutrition* 133:2650-2654, 2003.

Vitamin E Lowers Risk of Advanced Prostate Cancer in Smokers

Oxidative damage may play a role in prostate carcinogenesis. These investigators report on the association between dietary and supplemental vitamin E, vitamin C, or beta-carotene intakes and prostate cancer risk among 29,361 men who were randomly assigned to the screening arm of the Prostate, Lung,

Colorectal, and Ovarian Cancer Screening Trial. For current and recent smokers, increasing dose and duration of supplemental vitamin E use was associated with reduced risk of advanced prostate cancer. Supplemental beta-carotene was associated with a decreased prostate cancer risk in men with low dietary intakes.

Kirsh VA et al. Supplemental and dietary vitamin E, -carotene, and vitamin C intakes and prostate cancer risk. *Journal of the National Cancer Institute* 98(4):245-254, 2006

Diverse Intake of Flavonoids Linked to Health Benefits

Earlier population studies have linked higher intakes of antioxidant flavonoids with lower risk of heart disease and stroke. In this study, flavonoid intake from a wide variety of foods was determined in over 10,000 men and compared with the incident cases of specific diseases. Higher amounts of the specific flavonoid, quercetin (onions and other foods) was associated with lower mortality from stroke and lower incidence of asthma. Lower risk of cerebrovascular disease was seen with greater consumption of kaempferol (onions and others), naringenin and hesperetin (citrus and other foods). Men with higher intakes of myricetin (kale, broccoli, other foods) had a lower prostate cancer risk. A diverse array of flavonoids from many foods contributes to the health benefits of consuming produce-rich diets.

Knecht P et al. Flavonoid intake and risk of chronic diseases. *American Journal Clinical Nutrition*. 76:560-8, 2002.

Magnesium Intake Reduces Risk of Ischemic Stroke in Men

Sodium, potassium, calcium and magnesium have all been linked to blood pressure. Following over 29,000 male smokers for 13 ½ years, researchers found that only magnesium lowered the risk of ischemic stroke, and that the risk reduction was more pronounced in men under 60. Magnesium did not seem to influence the risk for the less common type of stroke, hemorrhagic. In addition to lowering blood pressure, magnesium can influence cholesterol concentration and the body's use of insulin. Either of these mechanisms would affect the risk for ischemic but not hemorrhagic stroke. These findings are important because dietary surveys show that a large portion of adults do not meet the RDA for magnesium.

Larsson S, et al. Magnesium, calcium, potassium and sodium intakes and risk of stroke in male smokers. *Archives of Internal Medicine* 168:459-65, 2008.

Overview: Alpha Lipoic Acid Improves Mitochondrial Function

Research has shown that an important factor in aging is the decay of the mitochondria—the cellular organelle that converts amino acids, fatty acids and sugars into energy. It's been demonstrated that as we age, the efficiency of mitochondria diminishes, as does their quantity per cell. One hypothesis is that accumulated oxidative damage to mitochondria, genetic material and other structures in the brain may lead to nerve cell death and cognitive decline with age. This review summarizes in vivo protective effects and possible mechanisms of alpha-lipoic acid on age-associated cognitive and mitochondrial dysfunction of the brain. Alpha lipoic acid and its derivatives improve mitochondrial structure and function, inhibit the age-associated increase of oxidative damage, elevate the levels of antioxidants, and restore the activity of key enzymes.

Leu J. The effects and mechanisms of mitochondrial nutrient alpha-lipoic acid on improving age-associated mitochondrial and cognitive dysfunction: Overview. *Neurochemistry Research* 33:194-203, 2008.

Vitamin C, Magnesium Support Healthy Lung Function

This study reports that higher dietary intakes of vitamin C and magnesium are associated with improved lung function in adults. Researchers measured respiratory symptoms, performed a test for pulmonary function, and examined dietary intake in a large group of people who were then followed and retested over a 9 year period. Higher intakes of vitamin C and magnesium were linked to better results on objective measures of lung function, suggesting that ample intake of these nutrients can help preserve respiratory function over time.

McKeever TM et al. Prospective study of diet and decline in lung function in a general population. *American Journal of Respiratory Critical Care Medicine* 165:1299-1303, 2002.

Meta-analysis Finds Modest Cholesterol Lowering Effect of Vitamin C

A meta-analysis of 13 double-blind trials concluded that vitamin C at a minimum dose of 500 mg daily can lower elevated LDL cholesterol by an average 5% and triglycerides by nearly 9%. While the reductions are modest, they translate to an estimated 7% lower risk of CHD. The researchers state that even small changes can have beneficial effects on the incidence of CHD, especially in light of the low cost and safety of supplemental vitamin C within the range of 500-1000 mg daily. Vitamin C may work by protecting LDL from damage, allowing LDL to be recognized by receptors in the liver and removed from the circulation.

McRae MP. Vitamin C supplementation lowers serum low-density lipoprotein cholesterol and triglycerides: a meta-analysis of 13 randomized controlled trials. *Journal of Chiropractic Medicine* 7:48-58, 2008.

Vitamin E Clinically Reduces Respiratory Infections in Elderly

In 1997, Tufts researchers showed that supplemental vitamin E could enhance immunity in healthy older individuals. In that study, older subjects taking vitamin E supplements in doses of 60, 200 and 800 IU reported experiencing fewer respiratory infections-about a 30% reduction compared to placebo takers. In this follow-up study, elderly nursing home residents taking 200 IU vitamin E for 1 year were found to have significantly fewer colds, and fewer people in the supplement group acquired 1 or more upper respiratory tract infections (mostly colds) during the study period compared to placebo takers. The protective effect of Vitamin E against colds is noteworthy because colds are common in the elderly overall, and often lead to increased disease in this age group.

Meydani SN et al. Vitamin E and respiratory tract infections in elderly nursing home residents. A randomized controlled trial. *Journal American Medical Association* 292:828-836, 2004.

Study Reports that Vitamin B6 Deficiency is Common

One of the largest population-health studies to evaluate B6 levels reports that inadequate blood concentrations of this B-vitamin are much more common than previously believed. B6 is needed for red blood cell formation, protein metabolism, immune function and cardiovascular health. Four groups were identified as being particularly deficient:

women of childbearing age, men who smoke, Afro-American men, and people over 65. Among the women, current and former oral contraceptives users had significantly lower levels; 75% of those who used oral contraceptives, without B6 supplements, were deficient.

Morris MS et al. Trends of vitamin B6 status in US population sample. *American Journal of Clinical Nutrition* 87:1446-54, 2008.

Higher Blood Levels of Vitamin D Linked to Lower AMD Risk

When participants of the 3rd National Health and Nutrition Examination Survey were split into quintiles based on serum vitamin D levels, those in the highest group had a 40% lower risk of developing early AMD determined by retinal photographs. People who drank D-fortified milk daily decreased their risk, as did those who took supplemental vitamin D consistently. Chronic inflammation has been implicated in the development of AMD, and the study authors suggest that vitamin D may intervene in the macular disease process by helping to reduce inflammation. Vitamin D has been shown to block pro-inflammatory immune cells and to lower a biomarker of inflammation, C-reactive protein.

Parekh N et al. Association between vitamin D and age-related macular degeneration in the Third National Health and Nutrition Examination Survey, 1988 through 1994. *Archives Ophthalmology*, 125:661-9, 2007.

Lycopene Intake Linked to Coronary Artery Thickness

Some recent population-health studies have linked reductions in CVD risk with higher serum levels of lycopene, the carotenoid in tomatoes and other foods. These researchers examined the relationship between thickness of the carotid artery wall with serum lycopene. Increased thickness within this artery precedes artery blockage and is a predictor of coronary events such as heart attack. Middle-aged men with the lowest circulating lycopene levels were found to have significantly increased thickening of the artery wall, suggesting that the concentration of lycopene in blood may play a role in the early stages of atherosclerosis.

Rissanen TH et al. Serum lycopene concentrations and carotid atherosclerosis: the Kuopio Ischaemic Heart Disease Risk Factor Study. *American Journal of Clinical Nutrition* 77:133-8, 2003.

Berry Components Demonstrate Anti-angiogenic Properties

Anthocyanins are flavonoids that impart an intense color to many fruits and vegetables, such as blueberries and their close relative, bilberries. Anthocyanins are thought to help maintain rhodopsin levels-the purple pigment used by the rods in the eye for night vision. Anthocyanins act as antioxidants, are bioavailable in humans and have been shown to protect red blood cells from free radical damage. Studies in aged animals suggest that anthocyanin-rich blueberries may also confer cognitive benefits. In the present study, blueberry and bilberries were shown to possess greater antioxidant capacity than other berries tested. In experiments, both blueberry and bilberry demonstrated anti-angiogenic properties. The ability to impair angiogenesis, if confirmed in humans, could have important application in diseases where the angiogenesis process plays a role such as tumor growth, diabetic retinopathy and age-related macular degeneration.

Roy S et al. Anti-angiogenic property of edible berries. *Free Radical Research* 36:1023-31, 2002.

High Dose Lycopene Clinically Lowers PSA Levels in BPH: Pilot Study

Many, though not all, population health studies have found higher intakes of lycopene to be associated with lower risk for BPH or prostate cancer. Results of a new pilot study report that supplementation with lycopene slowed progression of BPH. Elderly men diagnosed with BPH were given 15 mg of lycopene or placebo daily for 6 months. Those receiving lycopene had a significant reduction of serum prostate-specific antigen (PSA) levels and no further enlargement of the prostate. In contrast, placebo takers had no change in PSA while the prostate continued to enlarge.

Schwarz S, et al. Lycopene inhibits disease progression in patients with benign prostate hyperplasia. *Journal of Nutrition* 1308:49-53, 2008.

Review Concludes that Antioxidants Support Immune Function

Adequate intakes of micronutrients are required for the immune system to function efficiently: Vitamins A, C, E and zinc are required for skin barrier function; Vitamins A, B6, B12, C, D, E and folic acid and iron, zinc, copper and selenium work in synergy to support the protective activities of the immune cells; All of these micronutrients (except C and iron) are essential for antibody production. Harvard researchers reviewed the impact of supplementation with vitamins E and C, carotenoids, and the B vitamins on innate and adaptive immune function reported from clinical trials. They conclude that vitamins E, C and the carotenoids, singly and in combination, have beneficial effects on various immune parameters.

Webb AL et al. Update: effects of antioxidant and non-antioxidant vitamin supplementation on immune function. *Nutrition Reviews* 65:181-217, 2007.

Review Supports Potential Health Benefits of Green Tea Components

Preclinical and clinical studies support the potential benefits of green tea and its most abundant catechin, epigallocatechin gallate (EGCG). Dose-response relationships observed in several epidemiological studies have indicated that CVD and metabolic health benefits can be obtained by regular consumption of 5-6 or more cups of green tea per day. Findings from several randomized controlled trials suggest that green tea extracts can increase fat oxidation during exercise and improve insulin sensitivity in healthy men, decrease oxidized LDL, and reduce the risk of cold and flu by improving immune function. Larger and long-term clinical studies are warranted.

Wolfram S. Review. Effects of green tea and EGCG on cardiovascular and metabolic health. *Journal American College of Nutrition* 26:373S-88S, 2007.