

# The NUTRITION REPORTER™

THE INDEPENDENT NEWSLETTER THAT REPORTS VITAMIN AND MINERAL THERAPIES © FEBRUARY 1998 VOL 9 NO 2 BY JACK CHALLEM

## Eating a High-Fat Diet? Vitamins C and E Provide Some Protection for the Heart

Taking supplements of vitamins C and E can block some of the heart-damaging effects of high-fat foods, according to a study in the *Journal of the American Medical Association*.

High-fat foods rapidly boost blood levels of triglycerides, a type of fat, which prevents the heart's endothelium from momentarily relaxing while pumping blood. The endothelium is a layer of cells that line the heart and blood vessels, and impaired endothelial function is associated with all major coronary risk factors.

Gary D. Plotnick, MD, of the University of Maryland School of Medicine, Baltimore, fed 20 healthy men and women one of three breakfasts: (1) a high-fat meal consisting of an Egg McMuffin, Sausage McMuffin, and two hash brown patties, (2) a high-fat breakfast after the subjects were given 1,000 mg of vitamin C and 800 IU of vitamin E, and (3) a low-fat breakfast of cereal, skim milk, and orange juice.

Plotnick found that a single high-fat meal increased blood triglyceride levels by more than 60 percent and substantially decreased endothelial function for two to four hours. Furthermore, the decrease in endothelial function correlated with the increase in triglyceride levels, but not with fasting triglyceride levels.

However, taking vitamins C and E right before the high-fat meal helped maintain normal endothelial function. In fact, the effect of the vitamins was comparable to eating the low-fat meal, which produced no increase in triglycerides or decrease in endothelial function.

"Pretreatment with antioxidant vitamins eliminated the decrease in endothelial function following the high-fat meal," Plotnick wrote.

Reference: Plotnick GD, Corretti MC, Vogel RA, "Effect of antioxidant vitamins on the transient impairment of endothelium-dependent brachial artery vasoactivity following a single high-fat meal," *JAMA*, 1997;278:1682-1686.

Several other recent studies have explored the roles of vitamins and antioxidants in preventing cardiovascular diseases.

- Researchers measured the thickness of the intima in the carotid arteries of 231 people with atherosclerosis and an equal number of healthy people. The intima is the innermost layer of blood vessel walls and a thickened intima is a sign of cardiovascular disease. High blood

levels of carotenoids, particularly lutein and zeaxanthin, correlated with normal intima thickness. (Iribarren C, Folsom AR, Jacobs DR, et al., "Association of serum vitamin levels, LDL susceptibility to oxidation, and autoantibodies against MDA-LDL with carotid atherosclerosis," *Arterioscler, Thromb, and Vasc Biol*, 1997;17:1171-1177.)

- In an experiment with rabbits, blood flow decreased and red blood cells clumped together in small blood vessels of rabbits fed a high-cholesterol diet. However, when rabbits were also fed supplemental vitamin C, blood flow was almost normal. (Freyschuss A, Xiu R-J, Zhang J, et al., *Arterioscler Thromb Vasc Biol*, 1997;17:1178-1184.)

- Various types of heart cells, including endothelial cells, can oxidize the low-density lipoprotein (LDL) form of cholesterol and promote the development of cardiovascular disease. When human endothelial cells are rich in vitamin C, they are less likely to oxidize LDL. (Martin A and Frei B, *Arterioscler Thromb Vasc Biol*, 1997;17:1583-1590.) □

### Various Foods, Nutrients May Reduce Risk of Prostate Cancer

A study comparing the dietary habits of men with prostate cancer and healthy controls has identified some potentially protective foods and supplements.

Scientists at the Imperial Cancer Research Fund, Oxford, England, analyzed the diets of 328 men diagnosed with prostate cancer and an equal number of age-matched healthy subjects. Men who ate the largest quantities of garden peas—more than five times weekly—were 65 percent less likely to develop prostate cancer compared with men who infrequently ate the vegetable. Eating frequent servings of baked beans and garlic was also associated with a significantly lower risk of developing prostate cancer.

A low risk of prostate cancer was also found in men who ate foods rich in carotenes (beta-carotene, alpha-carotene, and cryptoxanthin), vitamin B6, and potassium. Supplements of vitamin B6 and garlic slightly decreased the risk of prostate cancer.

Although vitamin E intake did not statistically appear to influence prostate cancer risk, the researchers noted

Continues on next page

that only one prostate cancer patient took vitamin E supplements. In contrast, five of the healthy subjects took vitamin E.

In contrast to other research, this study did not find that high fat intake increased the risk of prostate cancer. Nor did it find that lycopene reduced the risk of prostate cancer.

Reference: Key TJA, Silcocks PB, Davey GK, et al., "A case-control study of diet and prostate cancer," *British J Cancer*, 1997;76:678-687. □

## **"Good" Bacteria Help Fight Those That Cause Disease**

Consuming two species of "good" bacteria, sometimes called probiotics, can help your immune system fight disease-causing germs.

In a recent experiment, European researchers fed 28 volunteers daily glasses of milk spiked with strains of either *Lactobacillus acidophilus* or *Bifidobacterium bifidum*, two of the several hundred types of bacteria normally found in the intestine.

After three weeks of drinking milk with *B. bifidum*, the ability of phagocytes, a type of white blood cell, to capture *Escherichia coli* bacteria nearly doubled. People drinking milk with *L. acidophilus* had the same benefit.

The ability of phagocytes to capture bacteria decreased after the subjects stopped drinking the milk, but at six weeks it was still substantially above normal.

Reference: Schiffrin EJ, Brassart D, Servin AL, et al., "Immune modulation of blood leukocytes in humans by lactic acid bacteria: criteria for strain selection," *Am J Clin Nutr*, 1997;66:515S-520S. □

## **Topical Application of Fatty Acids Can Prevent Bed Sores**

Patients who cannot freely move about—such as those restricted to a bed or wheelchair—have the greatest risk of developing bedsores, also called pressure ulcers. However, applying a topical solution containing essential fatty acids (EFAs) and vitamins can maintain normal skin hydration (water content) and elasticity and help prevent bedsores, according to a study in *Ostomy/Wound Management*.

In a study at the Vasconcelos Hospital in São Paulo, Brazil, 86 patients received standard care for the prevention of bedsores, including repositioning every two hours and the use of pressure-reducing mattresses. Half of the patients were also rubbed down every eight hours with a solution containing linoleic acid (an EFA from sunflower seeds) and vitamins A and E; 43 other patients were rubbed down with a solution containing mineral oil instead of linoleic acid.

The topical EFA solution dramatically improved the hydration and elasticity of the skin. Other studies

have shown that EFAs, taken internally, help maintain the integrity of the skin and function as a water barrier, preventing moisture loss and dry and scaly skin.

In the EFA group, only two patients (4.6 percent) developed Stage I bedsores, characterized by reddening. Forty two of the patients (98 percent) had well-hydrated skin and 32 (76 percent) maintained normal skin elasticity.

In the mineral oil group, 12 patients (27 percent) developed more serious Stage II bedsores, characterized by swelling and blistering. Only nine (22 percent) had hydrated skin, while 34 developed serious dehydration and scaly skin. Similarly, only 10 (24 percent) maintained normal skin elasticity, whereas 33 (76 percent) had a significant loss of elasticity.

Reference: Declair V, "The usefulness of topical application of essential fatty acids (EFA) to prevent pressure ulcers," *Ostomy/Wound Management*, 1997;43:48-54. □

## **Prenatal Supplements Lower Risk of Brain Tumors in Children**

Pregnant women who take prenatal vitamin supplements—including vitamins A, C, E, and folic acid—are half as likely to have a child who develops a brain tumor, compared with women don't take vitamins during pregnancy.

"The longer that women took supplements, either prescribed or over-the-counter, the greater the protection appeared to be...There was, moreover, increased protection with increasing dose," according to a news article describing a study's preliminary findings in the *Journal of the National Cancer Institute*.

The research, conducted by Susan Preston-Martin, PhD, a researcher at the University of Southern California, Los Angeles, compared 377 children with brain tumors and 576 healthy children.

The vitamins may protect against cell damage caused by N-nitroso compounds, such as those formed in the stomach after a person eats nitrite or nitrate-containing cured meats. Women who ate large amounts of cured meats and did not take vitamins were 2.6 times more likely to have a child who developed a brain tumor.

Reference: McNeil C, "Vitamins during pregnancy linked to lower risk of childhood brain tumors," *J Natl Canc Inst*, 1997;89:1481-1482. □

## **Vitamin E Protects Against Early Stage of Reperfusion Injury**

Vitamin E is well known for its ability to prevent free-radical damage during ischemia-reperfusion injury. Researchers have now discovered that the vitamin does more than just scavenge free radicals. It prevents some of

the early steps leading to ischemia-reperfusion injury.

Ischemia-reperfusion injury occurs during various surgical procedures, such as coronary artery bypass, when blood flow is interrupted (ischemia) and later resumes (reperfusion). Much of the cell damage occurs during reperfusion, when neutrophils (a type of white blood cell) infiltrate tissues and release free radicals.

Researchers at the University of Florence, Italy, gave 20 male patients either 600 IU of vitamin E or a placebo daily for eight days before undergoing surgery for an abdominal aortic aneurysm.

During reperfusion, endothelial cells in the blood vessels release large amounts of two "adhesion proteins," E-selectin and ICAM-1. These proteins promote the adhesion and accumulation of neutrophils, setting the stage for free-radical damage.

However, vitamin E prevented the activation of the adhesion proteins and helped maintain normal endothelial cell function.

Reference: Formigli L, Manneschi LI, Tani A, et al., "Vitamin E prevents neutrophil accumulation and attenuates tissue damage in ischemic-reperfused human skeletal muscle," *Histology and Histopathology*, 1997;12: 663-669. □

## Monounsaturated Fat Less "Fattening" Than Beef Fat

A calorie-rich high-fat diet will increase your body fat—that's one of the truisms in nutrition. But according to a recent study with mice, some types of dietary fat may be less likely to make *you* fat, even when you eat a lot of them.

Australian researchers fed laboratory mice a low-fat diet, a high beef-fat diet, and high-fat diet from canola oil. Some of the mice were allowed access to exercise wheels, and others were not given an opportunity to exercise.

While a low-fat diet resulted in the least amount of body fat in the mice, the diet high in canola oil proved almost as good. Canola oil (like olive oil) is rich in monounsaturated fat, whereas beef fat is high in saturated fat.

Sedentary mice eating the low-fat diet developed only about 14 percent body fat. In contrast, mice eating a lot of beef fat eventually gained 23 percent body fat. Mice eating the same overall quantity of fat, but from canola oil, developed only about 17 percent body fat.

Body fat was substantially lower among the mice allowed to exercise—running an average of eight miles daily—but the overall pattern remained the same. The exercising mice on a low-fat diet gained 7.4 percent body fat. Those eating the high-fat canola oil diet developed almost 10 percent body fat, and those eating high beef fat

gained about 13 percent body fat.

Reference: Bell RR, Spencer MJ, Sherriff JL, "Voluntary exercise and monounsaturated canola oil reduce fat gain in mice fed diets high in fat," *J Nutrition*, 1997;127:2006-2010. □

## Oral Contraceptives Lower Folic Acid, Increase Risk of Blood Clots

Women deficient in the B-vitamin folic acid and who take oral contraceptives may have an increased risk of developing blood clots, according to an animal study by French researchers.

Denis Blache, PhD, recently showed that a lack of folic acid increased the stickiness of blood platelet cells and made them more likely to clot. In his latest study, he demonstrated that oral contraceptives further decreased folic acid levels and increased the risk of blood clots.

Blache fed laboratory rats diets with either adequate or low levels of folic acid. When he gave oral contraceptives to the animals, blood levels of folic acid decreased and homocysteine increased. Homocysteine is a risk factor for coronary heart disease and stroke.

However, the effect of oral contraceptives was greater among animals deficient in folic acid. "We found that feeding rats with a folic acid-deficient diet enhanced oral contraceptive-induced platelet hyperactivity....We also confirmed that folic acid deficiency increased lipid peroxidation and, in parallel, decreased cellular antioxidant defense," Blache wrote.

Reference: Durand P, Prost M, Blache D, "Folic acid deficiency enhances oral contraceptive-induced platelet hyperactivity," *Arterioscler Thromb Vasc Biol*, 1997;17: 1939-1946. □

## Vitamin E Protects Against Iron-Generated Free Radical Damage

High blood levels of iron have been linked to an increased risk of coronary heart disease and stroke in men. A recent animal study investigated how iron stresses the body's antioxidant defenses—and how vitamin E can protect against excess iron.

Researchers found that high doses of iron supplements increased the oxidation of proteins and lipids in the livers of laboratory rats. Iron also decreased the activity of antioxidant enzymes, specifically catalase and superoxide dismutase, and significantly lowered coenzyme Q10 levels. Vitamin E supplements increased liver levels of antioxidants, bolstering cellular defenses against the iron.

Reference: Galleano M and Puntarulo S, "Dietary alpha-tocopherol supplementation on antioxidant defenses after in vivo iron overload in rats," *Toxicology*, 1997;124:73-81. □

## Quick Reviews of Recent Research

### • Vitamin E may help fight flu

High doses of vitamin E improved the ability of mice to resist influenza (flu) infections. Older mice getting high doses of the vitamin had increases in natural-killer cells (a type of immune cell that attacks viruses) and lower concentrations of viruses. Younger mice had a slight benefit from vitamin E. Low doses of the vitamin did not improve the immune response.

Hayak MG, et al., *J Infect Dis*, 1997;176:273-6.

### • Vitamin C and *Helicobacter pylori*

*H. pylori* infection is a common cause of stomach ulcers, as well as a risk factor for stomach cancer. Vitamin C may reduce the risk of stomach cancer by scavenging free radicals produced during an *H. pylori* infection. In a cell-culture experiment, vitamin C inhibited the growth of *H. pylori* strains. In a study with gerbils, dietary vitamin C significantly decreased *H. pylori* infections.

Zhang HM et al., *Cancer*, 1997;80:1897-1903.

### • Vitamin C increases bone density

In a study of 1,892 women in the Seattle area, researchers compared the effects of dietary and supplemental vitamin C on bone density. Women ages 55-64 had higher bone density if they had been taking vitamin C supplements for at least 10 years, compared with women who had not been taking supplements. Dietary vitamin C did not seem to affect bone density.

Leveille SG, et al., *J Epidem Comm Health*, 1997;51:479-485.

### • Citrus flavonoids reduce hemorrhoids

Diosmin and hesperidin, two of the flavonoids found in citrus, were given to 50 pregnant women eight weeks before and four weeks after delivery. All of the women suffered from acute hemorrhoids. Sixty-six percent of the women had a reduction in acute symptoms after four days of taking the flavonoids. After delivery, 53 percent fewer patients had a relapse. The flavonoids did not affect pregnancy or fetal development.

Buckshee K, et al., *Intl J Gynaecology Obstetrics*, 1997;57:145-51.

### • Lipoic acid improves nerve function

In a study with diabetic rats, alpha-lipoic acid normalized blood flow to feet and improved the speed of nerve signals.

Low PA, et al., *Diabetes*, 1997;46 (Supp #2):S38-S42.

### • Vitamin E and preeclampsia

Lipid peroxides (free-radical damaged fats) and thromboxane levels are abnormally high in preeclampsia. Lipid peroxidation prompts thromboxane to increase vasoconstriction in the placenta. Vitamin E quenches lipid peroxides, reducing placental vasoconstriction and thromboxane release.

Holles SM, et al., *Hypertension in Pregnancy*, 1997;16:389-401.

### • Beta-carotene inhibits cervical dysplasia

Researchers compared the ability of natural 9-cis beta-carotene and synthetic all-trans beta-carotene to suppress the growth of precancerous cervical cells. The natural 9-cis form of beta-carotene was significantly more effective than the synthetic form of the nutrient. Its ability to slow the growth of precancerous cells was dose related—the more 9-cis beta-carotene, the greater was its suppressive effect.

Toba T, et al., *Life Sciences*, 1997;61:839-845.

### • 9-cis beta-carotene well absorbed

The 9-cis form of natural beta-carotene has been difficult to measure in human blood, making many researchers think that it plays no significant role in health. To explore 9-cis absorption, researchers gave 12 healthy, lactating women either seven doses of 9-cis and all-trans beta-carotene or a placebo. Blood, milk and tissue (cheek cell) of both 9-cis and all-trans beta-carotene increased after supplementation.

Johnson EJ, et al., *Nutrition*, 127;1993-1999.

### • Beta-carotene stimulates immune cells

In a study of 50 subjects, researchers found that beta-carotene supplements (30 mg/day) increased the number of two types of immune cells, interleukin-2 receptor-positive and CD4 cells, in patients who had previously been treated for colon cancer.

Kazi N, et al., *Nutrition and Cancer*, 1997;28:140-145.

### • Vitamin E levels low in Alzheimer's

Researchers compared levels of vitamin E in the cerebrospinal fluid and blood serum of 44 apparently well-nourished patients with Alzheimer's disease and 37 healthy patients. Vitamin E levels were significantly lower in the Alzheimer's patients. Other research has shown that high doses of vitamin E can slow the progression of Alzheimer's disease.

Jimenez-Jimenez FJ, et al., *J Neural Transmission*, 1997;104:703-710.

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