

# The Nutrition Reporter™

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## Supplemental Vitamin C Reduces Blood Pressure, Risk of Heart Disease and Diabetes

Vitamin C offers impressive benefits in the prevention of heart disease and diabetes, according to three recent studies.

In the first study, British researchers reported that modest supplementation resulted in a slight decrease in systolic blood pressure (the “upper” number, now regarded as the most important).

Martin D. Fotherby, MD, of the Glenfield Hospital, Leicester, and his colleagues asked 40 men and women, 60 to 80 years old, to take 500 mg of vitamin C daily. The study was a crossover design, meaning that half the subjects took vitamin C and the other half took a placebo for three months, and then the placebo and vitamin C were switched for another three months. The subjects had “mildly elevated” blood pressure at the start of the study.

Daytime systolic blood pressure dropped by an average 2 mmHg; however nighttime blood pressure did not change. In addition, women in the study had a slight increase in the “good” high-density lipoprotein (HDL) form of cholesterol.

“We cannot exclude the possibility that vitamin C supplements given for a longer duration or at a higher dose would not result in further changes to plasma lipids or blood pressure,” wrote Fotherby and his colleagues.

Meanwhile, Hirofumi Yasue, MD, and his colleagues at the Kumamoto University School of Medicine, Japan, reported that an intravenous infusion of 2,000 mg of vitamin C improved endothelial function (blood vessel flexibility) and significantly improved insulin sensitivity among 20 patients with coronary spastic angina. Blood glucose levels declined by 19 percent after the vitamin C infusion.

Such a reduction in blood glucose and improvement in insulin sensitivity is significant. Poor insulin sensitivity underlies most cases of diabetes, and diabetics have a much higher than normal risk of developing heart disease.

The protective effect of vitamin C was borne out by another study, this one conducted at Cambridge

University. Lincoln A. Sargeant, DM, and his colleagues analyzed vitamin C and glycosylated hemoglobin levels among a group of 6,458 men and women 45-74 years old. Glycosylated hemoglobin is a marker of free radical damage to red blood cells, as well as a standard measure of diabetic control.

Sargeant and his collaborators found that people with the highest blood levels of vitamin C had the lowest levels of glycosylated hemoglobin. Conversely, those with the highest glycosylated hemoglobin – those with diagnosed or undiagnosed diabetes – had the lowest vitamin C levels. “This suggests that vitamin C may protect against impaired glucose regulation,” the researchers wrote.

References: Fotherby MD, Williams JC, Forster LA, et al. Effect of vitamin C on ambulatory blood pressure and plasma lipids in older persons. *Journal of Hypertension*, 2000;18:411-415. Hirashima O, Kawano H, Motoyama T, et al. Improvement of endothelial function and insulin sensitivity with vitamin C in patients with coronary spastic angina. *Journal of the American College of Cardiology*, 2000;35:1860-1866. Sargeant LA, Wareham NJ, Bingham S, et al. Vitamin C and hyperglycemia in the European prospective investigation into cancer – Norfolk (EPIC-Norfolk) study. *Diabetes Care*, 2000;23:726-732. □

### Moms-to-Be: Taking Multivitamins Reduces Risk of Heart Defects in Infants

Women who take multivitamins before becoming pregnant or during the first month of pregnancy give birth to infants with a relatively low risk of heart defects.

“The timing of multivitamin use appeared to be critical, in that the apparent risk reduction was evidence for use around the time of conception or early in the first month of pregnancy, but not for use starting during the second or third month of pregnancy,” reported Lorenzo D. Botto, PhD, of the Centers for Disease Control and Prevention, Atlanta.

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In general, congenital cardiac defects – most often characterized by a “hole” in the heart – affect a fairly high percentage of infants, approximately one in 150 newborns. They are also a common cause of infant death.

Botto and his colleagues compared the vitamin-taking habits of almost 4,000 women. Of these, 958 gave birth to infants with cardiac defects and 3,029 did not. The most common diagnoses were septal, obstructive, and outflow defects.

Overall, infants born to women taking multivitamins were 24 percent less likely to have heart defects. But the benefits were far greater for two specific types of heart defects. Women taking vitamins were 54 percent less likely to deliver an infant with outflow tract defects and 39 percent less likely to give birth to infants with ventricular septal defects.

Reference: Botto LD, Mulinare J, Erickson JD. Occurrence of congenital heart defects in relation to maternal multivitamin use. *American Journal of Epidemiology*, 2000;151:878-884. □

## Vitamin E Significantly Reduces Mutations in Cancer Cells

A study published a couple of years ago suggested that vitamin E supplements might reduce the risk of cancer. Now, researchers have published hard evidence of vitamin E’s anticancer properties.

Like other antioxidants, vitamin E quenches free radicals, which can cause mutations to DNA, the building blocks of genes. Vitamin E also has anti-inflammatory properties, and chronic inflammation generates large numbers of free radicals.

In a recent series of experiments, H. Chaim Birnboim, MD, of the Ottawa Regional Cancer Centre, Canada, studied the effect of natural vitamin E on laboratory mice. The animals received 2 IU of natural vitamin E daily per kilogram of body weight, roughly the equivalent of 140 IU for an adult human.

In three of the experiments, mice consuming vitamin E had average reductions of 25, 69, and 84 percent in cancer-cell mutations. In mice exposed to high levels of nitric oxide, a specific type of free radical, vitamin E reduced mutations by an average of 61 percent. These reductions are significant because free radicals are known to mutate existing cancer cells, making them more difficult to treat.

The researchers noted that vitamin E appeared to reduce mutations in two ways. One, it scavenged nitric acid, thereby reducing the number of mutation-causing free radicals. Two, vitamin E also reduced the number of neutrophils (a type of white blood cell) infiltrating tumors. Neutrophils produce large numbers of free radicals, which could increase the number of mutations.

Reference: Sandhu JK, Haqqani AS, Birnboim HC. Effect of dietary vitamin E on spontaneous or nitric oxide donor-induced mutations in a mouse tumor model. *Journal of the National Cancer Institute*, 2000;92:1429-1433. □

## New Study Finds that Isoflavones Curb Bone Loss in Perimenopausal Women

Animal studies and small human trials have found that soy isoflavones may increase bone density in women. Isoflavones function as both antioxidants and weak estrogen-like compounds, and they appear to have none of the side effects of estrogen-replacement therapy.

In a recent study D. Lee Alekel, PhD, of Iowa State University, Ames, asked 69 perimenopausal women to consume high-isoflavone soy, low-isoflavone soy, and isoflavone-free whey in addition to their usual diets. The high-isoflavone soy provided 80 mg daily of isoflavones. All of the diets were followed for 24 weeks.

Women consuming the high-isoflavone soy had a slight increase in bone-mineral content and a negligible decrease of bone-mineral density in the lumbar spine. Women in the other two study groups had significant declines in both bone-mineral content and density. Lean body mass – i.e., muscle – at the start of the study was an indicator of long-term bone-mineral content and density.

“In summary, the results of this study suggest that isoflavones attenuated bone loss from the lumbar spine in estrogen-deficient perimenopausal women, who may otherwise be expected to lose 2-3 percent of bone (per) year,” wrote Alekel. “This attenuation of loss, particularly if continued throughout the postmenopausal period, could translate into a decrease in lifetime risk of osteoporosis.”

Reference: Alekel DL, St. Germain A, Peterson CT, et al., Isoflavone-rich soy protein isolate attenuates bone loss in the lumbar spine of perimenopausal women. *American Journal of Clinical Nutrition*, 2000;72:844-852. □

## Low Antioxidants, High Free Radicals Linked to Pre-Diabetic Condition

Insulin resistance is a prelude to – and a characteristic of – type 2 (adult-onset) diabetes. It is the result of elevated glucose levels and the over-production of insulin, the hormone needed to shuttle glucose into cells. Eventually, the body’s cells become overwhelmed by, and then resistant to, high insulin levels – and glucose levels remain high.

With elevated glucose comes another problem: high levels of problem-causing free radicals. Wherever you find free radicals, you’ll also find antioxi-

dants, so a team of researchers at the University of California, San Francisco, and Stanford University, investigated how they all interact.

Francesco S. Facchini, MD, and his colleagues studied 36 healthy nondiabetic subjects. They measured levels of insulin, glucose, free radicals, and antioxidants under a variety of conditions, such as when the subjects received intravenous insulin and glucose.

Facchini found that high levels of glucose and free radicals were directly related to elevated blood pressure, one of the complications of diabetes. They also noted that levels of several antioxidants – vitamin E, beta-carotene, alpha-carotene, and lutein – were low when glucose levels were high.

The researchers concluded that levels of free radicals in the blood are “increased in insulin-resistant individuals at an early, preclinical stage, i.e., well before the development of glucose intolerance and type 2 diabetes.”

Reference: Facchini FS, Humphreys MH, DoNascimento CA, et al. Relation between insulin resistance and plasma concentrations of lipid hydroperoxide, carotenoids, and tocopherols. *American Journal of Clinical Nutrition*, 2000;72:776-779. □

## Creatine Supplements Help Patients with Severe Muscle Disorders

Creatine monohydrate has become a staple among body builders who want a natural supplement to increase their strength and muscle size. Numerous studies support its benefits in athletics, likely by helping recycle adenosine diphosphate (ADP) back to adenosine triphosphate (ATP), the chemical form of energy.

Now, two studies have found that creatine monohydrate supplements can help patients with severe muscle-wasting diseases.

In the first study, Maggie C. Walter, MD, of the Friedrich-Baur Institute, Germany, asked 32 patients with various types of muscular dystrophies to take creatine supplements or placebos daily for three weeks. Adults in the study took 10 grams of creatine and children took 5 grams of creatine daily, then creatine and placebos were switched after a three-week period without supplementation.

“There was mild but significant improvement in muscle strength and daily-life activities...” as measured by standard tests, wrote Walter.

In the other study, M. Vorgerd, MD, asked nine patients with McArdle disease to take a loading dose of creatine for five days, followed by a maintenance dose for about four weeks. People with McArdle disease have exercise intolerance and suffer fatigue and muscle pain.

The loading dose was about 10.5 grams of creatine for a 150-pound person, and the maintenance dose was about 4.2 grams. As in the first “crossover” study, the creatine and placebo were switched after a four-week period of no supplementation.

All nine patients reported improvements. “Of the nine patients, five reported subjective improvement of severity of muscle pain with creatine and wanted to continue taking it,” wrote Vorgerd. “The remaining four patients had a lower frequency of muscle pain with creatine.”

References: Walter MC, Lochmuller H, Reilich P, et al. Creatine monohydrate in muscular dystrophies: a double-blind placebo-controlled clinical study. *Neurology*, 2000;54:1848-1850. Vorgerd M, Grehl T, Jager M, et al. Creatine therapy in myophosphorylase deficiency (McArdle disease). *Archives of Neurology*, 2000;57:956-963. □

## Fish Oil Supplements Reduce Risk of Premature Births in European Study

Daily capsules of fish oils significantly reduced the risk of premature births in a group of about 1,000 women, Danish researchers have reported.

Niels J. Secher, PhD, and his colleagues at 19 European hospitals participated in six related trials of fish oils and high-risk pregnancies. Two of the studies focused on the preventive use of fish oils in pregnant women who had previously experienced premature delivery, gestational hypertension, or intrauterine growth retardation.

Secher wrote that “the present study indicates that fish oil supplementation may be beneficial in women with a pre-term delivery in an earlier pregnancy, as it reduced the risk of pre-term delivery and of early pre-term delivery in such women.”

The researchers found that fish oil supplements cut the risk of premature delivery by half. Twenty-one percent of the women taking fish oil capsules had premature births, compared with 33 percent of those taking placebos.

Women in the prevention trials took 2.7 grams of omega-3 fish oils from about the 20th week of pregnancy until delivery. Women in the therapeutic trials took 6.1 grams of omega-3 fatty acids daily from the 33rd week through delivery. The fish oil capsules contains 32 percent eicosapentaenoic acid (EPA) and 23 percent docosahexaenoic acid (DHA).

EPA and DHA are known to be essential for the normal development of the nervous system of fetuses and infants.

Reference: Olsen SF, Secher NJ, Tabor A, et al. Randomized clinical trials of fish oil supplementation in high risk pregnancies. *British Journal of Obstetrics and Gynaecology*, 2000;107:382-395. □

# Quick Reviews of Recent Research

**• Carotenoids and other antioxidants protect eyes**

Two carotenoids, lutein and zeaxanthin, reduce the risk of macular degeneration, the leading cause of blindness among the elderly. In a study with eye cells, researchers found that both of these nutrients protected against free radical damage. However, protection of eye cells was best when lutein and zeaxanthin were combined with vitamins E and C and other antioxidants.

Rozankowska MB, et al., *Investigative Ophthalmology & Visual Science*, 2000;41 (4 Suppl):S601, Abstract #3193-B291.

**• Most people still not eating fruits and veggies**

Many public health campaigns have urged people to eat at least five combined daily servings of fruits and vegetables. In surveys of 22,000-32,000 people, researchers have identified only a negligible increase in fruit and vegetable consumption. In 1990, only 19 percent of American adults ate five daily servings of fruits and vegetables. By 1996, this number had increased to only 23 percent. The surveys found that overall, women consumed more fruits and vegetables than did men.

Li R, et al., *American Journal of Public Health*, 2000;90:777-781.

**• Soy isoflavones protect LDL from free radicals**

Twenty-four subjects ate either high-isoflavone or low-isoflavone foods for about two and one-half weeks. Those eating the high-isoflavone diet had approximately 25 percent lower isoprostane levels, indicating lower free radical activity. In addition, the subjects' low-density lipoprotein (LDL) cholesterol was more resistant to free radical oxidation.

Wiseman H, et al. *American Journal of Clinical Nutrition*, 2000;72:395-400.

**• Vitamin E supplements improve liver disorder**

Nonalcoholic steatohepatitis is a common cause of chronic liver disease in obese children. It is characterized by fatty deposits, inflammation, and abnormal fibrous tissue in the liver, as well as elevated levels of alanine aminotransferase and aspartate aminotransferase. Aminotransferase levels normalized in 11 obese children with nonalcoholic steatohepatitis after taking 400 IU-1,200 IU of vitamin E for four to 10 months.

Lavine JE. *Journal of Pediatrics*, 2000;136:734-738.

**• Flavonoid in green tea may aid allergies**

Flavonoids are known to ease allergic reactions through a number of mechanisms. For example, quercetin turns off adhesion molecules, which promote allergic and inflammatory responses. In a cell study, researchers found that epigallocatechin

gallate, one of the principal flavonoids in green tea, inhibited the release of histamine. Histamine is the compound that causes itchiness in allergies.

Yamashita K, et al. *Biochemical and Biophysical Research Communications*, 2000;274:603-608.

**• Women may need extra lutein to protect eyes**

Lutein, an antioxidant carotenoid, appears essential for normal retina function and prevention of macular degeneration. In a study of four women and three men, researchers found that a high-lutein diet (corn and spinach) increase blood levels of the nutrient. However, in women, lutein was preferentially deposited in fat tissue rather than in the retina, suggesting that women may need more of the nutrient for eye protection.

Johnson EJ, et al. *American Journal of Clinical Nutrition*, 2000;71:1555-1562.

**• Vitamin E reduces heart risk factor in diabetics**

Endothelial dysfunction, marked by poor flexibility in blood vessels, is a risk factor for coronary artery disease. Diabetics are more likely to experience endothelial dysfunction and are at a higher risk of heart disease. Researchers asked 41 Type 1 diabetes to take 1,000 IU of vitamin E for three months. Vitamin E supplementation led to a significant improvement in endothelial function and a delay in LDL cholesterol oxidation.

Skyrme-Jones RAP, et al. *Journal of the American College of Cardiology*, 2000;36:94-102.

**• Beta-carotene may protect against oral leukoplakia**

Oral leukoplakia is a precancerous condition that occurs primarily in smokers and heavy drinkers. In a study of 10,000 subjects, researchers found that those with the highest blood levels of beta-carotene had one-sixth the risk of developing oral leukoplakia, compared with subjects who had low blood levels of the nutrient. Vitamins A and E or other carotenoids did not protect against oral leukoplakia.

Nagao T, et al. *Oral Oncology*, 2000;36:466-470.

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Post Office Box 30246 • Tucson AZ 85715-0246 USA

Editor and Publisher: **Jack Challem**

Copy Editor: **Melissa Diane Smith**

Medical Advisors:

**Lendon H. Smith, MD** Portland, Oregon • **Richard P. Huemer, MD** Lancaster, California

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