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Latest Research on Vitamin D Shows Remarkable Range of Health Benefits

Research on the health benefits of vitamin D is growing at a breathtaking pace. These are summaries of some of the latest studies.

Vitamin D and Type 2 Diabetes Risk. Claudia Gagnon, MD, of the University of Melbourne, Australia, and her colleagues studied 5,200 men and women whose glucose tolerance was assessed in 1999-2000. Five years later, their glucose tolerance and insulin sensitivity was reassessed, and 199 of the subjects were diagnosed with type 2 diabetes.

People with low blood levels of vitamin D and low calcium intake were more likely to develop type 2 diabetes. Each increase of 10 ng/ml (25 nmol/L) increase in blood vitamin D levels was associated with a 24 percent lower risk of diabetes. Calcium intake did not influence the risk of diabetes.

Reference: Gagnon C, Lu ZX, Magliano DJ, et al. Serum 25-hydroxyvitamin D, calcium intake, and risk of type 2 diabetes after 5 years. *Diabetes Care*, 2011;34:1133-1138.

Vitamin D and Insulin Function. Anastassios G. Pittas, MD, of the Tufts University Medical Center, Boston, enrolled 92 prediabetic men and women in a 16-week study. The subjects had an average age of 57 years, were obese, and had an average glycated hemoglobin ($HbA1_c$) of 5.9%. They were given one of the following: vitamin D (2,000 IU/day) and calcium (400 mg/day), vitamin D or placebos, calcium or placebos, or placebos.

People taking vitamin D, but not calcium or placebo, had improvements in pancreatic function and significant increases in insulin secretion. In addition, their $HbA1_c$ was slightly less compared with those not receiving vitamin D. Pittas noted that the improvement in insulin secretion with vitamin D might have benefits in people with type 1 diabetes, but that studies were needed to confirm this benefit.

Reference: Mitri A, Dawson-Hughes B, Hu FB, et al. Effects of vitamin D and calcium supplementation on pancreatic beta cell function,insulin sensitivity, and glycemia in adults at high risk of diabetes: the calcium and vitamin D for diabetes mellitus (CaDDM) randomized controlled trial. *American Journal of Clinical Nutrition*, 2001: doi 10.3945/ajcn.111.011684.

Vitamin D and Metabolic Syndrome. Metabolic syndrome, also known as Syndrome X, is a cluster of symptoms that increases the risk of type 2 diabetes and heart disease. These symptoms include elevated blood sugar or insulin, abdominal obesity, hypertension, and elevated total or low-density lipoprotein cholesterol.

Researchers at Georgia State University, Atlanta, studied 5,867 adolescents, ages 12 to 19 years old, and found that those with the lowest blood levels of vitamin D were 71 percent more likely to have signs of metabolic syndrome, including greater waist circumference, higher systolic blood pressure, and poorer glucose tolerance.

Reference: Ganji V, Zhang X, Shaikh N, et al. Serum 25-hydroxyvitamin D concentrations are associated with prevalence of metabolic syndrome and various cardiometabolic risk factors in US children and adolescents based on assay-adjusted serum 25-hydroxyvitamin D data from NHANES 2001-2006. *American Journal of Clinical Nutrition*, 2011;94:225-233.

Vitamin D During Pregnancy. Pregnant women can feel safe taking up to 4,000 IU of vitamin D during pregnancy, according to a study conducted at the Medical University of South Carolina, Charleston. Bruce Hollis, PhD, and his colleagues gave 350 women supplements containing 400 IU, 2,000 IU, or 4,000 IU of vitamin D daily, starting at 12 to 16 weeks of gestation and continuing until delivery. Women receiving 4,000 IU of vitamin D were more likely to achieve normal levels of vitamin D, as were their newborn babies.

Reference: Hollis BW, Johnson D, Hulsey TC, et al. Vitamin D supplementation during pregnancy: double blind, randomized clinical trial of safety and effectiveness. *Journal of Bone Mineral Research*, 2011:epub ahead of print.

Vitamin D and Allergies. A deficiency of vitamin D is associated with greater risk of IgE (immunoglobulin E) mediated allergies to pollens and some foods. In a study conducted at Rush University Medical Center, Chicago, doctors measured vitamin

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D levels and IgE allergic sensitization in 3,100 U.S. children and 3,400 adults. Seventeen allergens were tested and 11 were more common in children and adolescents with vitamin D deficiencies. Peanut, ragweed, and oak allergies were most strongly associated with vitamin D deficiencies.

Reference: Sharief S, Jariwala S, Kumar J, et al. Vitamin D levels and food and environmental allergies in the United States: results from the national health and nutrition examination survey 2005-2006. *Journal of Allergy and Clinical Immunology*, 2011;127: 1195-1202.

Vitamin D and Skin Cancer. Some studies have suggested that high blood levels of vitamin D protect against both melanoma and nonmelanoma skin cancer. Jean Y. Tang, MD, of the Stanford University School of Medicine, Redwood City, California, and her colleagues tracked 36,282 postmenopausal women who were asked to take 400 IU of vitamin D and 1,000 mg of calcium or placebos daily for an average of seven years.

Although the overall incidence of skin cancer did not differ among women getting vitamin D and calcium, benefits were found in a specific subgroup of women. Women with a history of nonmelanoma skin cancer had a 57 percent lower risk of developing melanoma if they took vitamin D and calcium supplements.

Reference: Tang JY, Fu T, LeBlanc E, et al. Calcium plus vitamin D supplementation and the risk of nonmelanoma and melanoma skin cancer: post hoc analyses of the women's health initiative randomized controlled trial. *Journal of Clinical Oncology*, 2011;29:3078-3084. ❑

Perspectives

How Much Vitamin D For You?

Late last year, a committee of researchers at the U.S. Institute of Medicine (IOM) decided that the vast majority of Americans didn't need to take more than 600 IU of vitamin D daily and that everyone was fine as long as their blood level of vitamin D was above 20 ng/ml.

The question most vitamin D experts asked was: What on earth was going through their heads? After all, a blood level of 20 ng/ml is a sign of vitamin D deficiency.

Finally, the Endocrine Society, whose members are hormone specialists, weighed in with more rationale guidelines: that infants less than one year old get 400 up to 1,000 IU of vitamin D daily, that older children and teenagers get 600 up to 1,000 IU daily, and that adults get 1,500 to 2,000 IU of vitamin D daily.

The Endocrine Society went a step further. It advised doctors that up to 10,000 IU daily might be needed to correct vitamin D deficiency in adults.

The ideal approach is to ask your doctor to measure your blood level of vitamin D. If it's less than 30 ng/ml, you're deficient. An optimal range is most likely between 40 and 60 ng/ml, though many people have higher amounts without any ill effects. If you are deficient, you may need between 2,000 and 10,000 IU daily to bring your level up to normal.

Reference: Holick MF, Binkley NC, Bischoff-Ferrari HA, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an endocrine society clinical practice guideline. *Journal of Clinical Endocrinology and Metabolism*, 2011:96:1911-1930. ❑

Researchers Find That Vitamin C Plays Vital Role in Eye Health

Vitamin C's diverse roles in health are well known, but researchers at Oregon Health Sciences University, Portland, have discovered that the vitamin is also crucial for normal functioning of the retina.

Henrique von Gersdorff, PhD, and his colleagues studied goldfish retinas, which are biologically similar to those found in people. They focused on cell receptors for gamma amino butyric acid (GABA), a calming neurotransmitter. Cell receptors are like docking stations, in this instance for GABA.

The GABA receptors are saturated with, and their function is enhanced by, vitamin C, according to von Gersdorff's findings. When the vitamin was removed, the GABA receptors stopped functioning.

The researchers believe that vitamin C might also play a pivotal role in the brain and rest of the central nervous system.

Reference: Calero CI, Vickers E, Moraga Cid G, et al. Allosteric modulation of retinal GABA receptors by ascorbic acid. *Journal of Neuroscience*, 2011;31:9672-9682. ❑

Taking Vitamin Supplements Aids Memory and Cognition

Taking modest amounts of vitamins for about eight years leaves a lasting improvement in memory and brain function, even after people stop taking the supplements.

Emmanuelle Kesse-Guyot, PhD., of the University of Paris XIII, France, and her colleagues studied the long-term effects of vitamin supplements in a group of 4,446 adults who had been part of an earlier study. In that clinical trial, subjects were given either supplements containing vitamin C (120 mg), beta-carotene (6 mg), vitamin E (30 mg), selenium (100 mcg), and zinc (20 mg) or placebos daily for eight years.

Kesse-Guyot followed up six years later to

determine whether the supplements had any lasting effects on cognition. She found that people who had taken the vitamin supplements had better long-term recall of words, as well as better decision-making abilities, compared with people who had taken placebos.

Reference: Kesse-Guyot E, Fezeu L, Jeandel C, et al. French adults' cognitive performance after daily supplementation with antioxidant vitamins and minerals at nutritional doses: a post hoc analysis of the Supplementation in Vitamins and Mineral Antioxidants (SU.VI.MAX) trial. *American Journal of Clinical Nutrition*, 2011: epub ahead of print. ❑

High-Normal Blood Sugar May Double Risk of Type 2 Diabetes

A normal blood sugar level technically ranges from 65 to 99 mg/dl – but the higher part of that range can significantly boost the risk of developing type 2 diabetes.

Paolo Brambilla, MD, PhD, of the University Milano Bicocca, Milan, Italy, and his colleagues, tracked 13,845 men and women, ages 40 to 69 years, between 1992 and 2008. The subjects were tracked for an average of 7.5 to eight years, during which time they had at least three blood draws to measure their fasting blood sugar.

The subjects were grouped according to their blood sugar levels, 51-82, 83-90, and 91-99 mg/dl. People whose blood sugar levels were 91-99 mg/dl had twice the risk of developing type 2 diabetes, compared with those whose blood sugar ranged from 51-82 mg/dl. Even modest increases in fasting blood sugar, in the 83-90 mg/dl range, had a 42 percent greater risk of type 2 diabetes.

An ideal fasting blood sugar level is 79-80 mg/dl.

Reference: Brambilla P, La Valle E, Falbo R, et al. Normal fasting plasma glucose and risk of type 2 diabetes. *Diabetes Care*, 2011;34:1372-1374. ❑

Alpha-Lipoic Acid Supplements Can Ease Diabetic Nerve Disease

A four-year study has found that supplements of alpha-lipoic acid, an antioxidant, can reduce some of the symptoms of diabetic polyneuropathy.

Dan Ziegler, MD, of the University of Dusseldorf, Germany, and his colleagues gave 460 diabetic patients either 600 mg of alpha-lipoic acid or placebos daily. The main outcome they were tracking was diabetic distal symmetric sensorimotor polyneuropathy (DSPN), a cluster of nerve problems that affect about one-third of people with diabetes. DSPN symptoms can include a loss of the ability to feel either light touch or pain – often beginning in the feet – along with muscle weakness.

After four years, Ziegler found no difference between the effects of alpha-lipoic acid or placebo. However, people taking alpha-lipoic acid showed signs of improvement from the beginning of the study in terms of less neuropathy, particularly in the lower limbs, and less muscular weakness.

Alpha-lipoic acid "resulted in a clinically meaningful improvement and prevention of progression of neuropathic impairment..." wrote Ziegler.

Reference: Ziegler D, Low PA, Litchy WJ, et al. Efficacy and safety of antioxidant treatment with alpha-lipoic acid over 4 years in diabetic polyneuropathy. *Diabetes Care*, 2011;34:1-7. ❑

Omega-3 Fish Oil Supplements Ease Depression in Seniors

Taking omega-3 fish oil supplements can reduce symptoms of depression and improve overall quality of life, according to a study by Italian researchers.

Mariangela Rondanelli, MD, PhD, of the University of Pavia, and her colleagues gave 46 depressed women either fish oil capsules or placebos for two months. The women ranged from 65 to 95 years of age, and all were living in a nursing home in Pavia.

The supplements provided 1,670 mg of eicosapentaenoic acid (EPA) and 830 mg of docosahexaenoic acid (DHA) daily.

By the end of the study, the women taking the fish oils had a significant decrease in their symptoms of depression. In addition, they had notable improvements in their perceived quality of life, as defined by their general satisfaction with various aspects of their lives.

Reference: Rondanelli M, Giacosa A, Opizza A, et al. Long chain omega 3 polunsaturated fatty acids supplementation in the treatment of elderly depression: effects on depressive symptoms, on phospholipids fatty acids profile and on health-related quality of life. *Journal of Nutrition, Health & Aging*, 2011;15:37-44. ❑

Zinc Lozenges Shorten the Length of the Common Cold

An analysis of 13 placebo-controlled studies have found that sucking on zinc lozenges does reduce the length of colds. But the benefits depend on the total daily dose of zinc and the type of zinc used in the lozenges.

Harri Hemila, PhD, of the University of Helsinki, Finland, conducted a statistical meta-analysis in which he pooled the data from the 13 studies.

He found that the three studies using at least 75 mg of zinc acetate daily resulted in a 42 percent reduction in cold duration. Other types of zinc supplements led

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Quick Reviews of Recent Research

• Vitamin E reduces risk of ALS

Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease, is a crippling neurological disease. But people who take vitamin E supplements or have a diet rich in the vitamin, appear to have a lower risk of developing ALS. Researchers from Harvard University found that the protective effect of vitamin E supplements was related to how many years they have been taken. People who took vitamin E supplements for at least five years were 36 percent less likely to develop ALS. People who consumed diets rich in vitamin E were 31 percent less likely to develop ALS.

Wang H. *American Journal of Epidemiology*, 2011;173: 595-602.

• Antioxidants may protect hearing

Australian researchers have reported that people consuming diets rich in vitamins A and E are less likely to suffer from hearing loss. The researchers analyzed dietary data from a study of 2,956 Americans. Vitamin A, but not beta-carotene, was associated with a 47 percent lower risk of hearing loss. High vitamin E intake was linked to a 14 percent lower risk.

Gopinath B. *Journal of Nutrition, Health & Aging*, 2011: doi 10.1007/s12603-011-0119-0.

• Curcumin may ease tendonitis

A team of researchers from the United Kingdom and Germany tested the effects of curcumin, an extract of turmeric root, on the inflammatory process that occurs in tendon cells. The researchers reported that curcumin inhibited the cells' production of pro-inflammatory interleukin-1 beta (IL-1b). In turn, IL-1b lowered levels of nuclear factor kappa beta, one of the most pro-inflammatory substances in the body. The findings are consistent with other studies showing an anti-inflammatory effect of curcumin.

Buhrmann C. *Journal of Biological Chemistry*, 2011: doi 10.1074/jbc.M111.256180.

• More eye benefits for lutein identified

Lutein, an antioxidant carotenoid, is known to reduce glare and filter out harmful wavelengths of light in the retina. Japanese researchers have identified some of the molecular mechanisms underlying lutein's benefits. In experiments with mice, they found that exposure to light led to double-strand breakdowns of DNA. This damage to DNA was prevented when mice were fed a high-lutein diet. In addition, the lutein increased DNA repair activities in the retina.

Sasaki M. *Journal of Nutritional Biochemistry*, 2011: epub ahead of print.

• Leucine increases muscle synthesis

Protein consists of amino acids, which are needed for muscle synthesis. L-leucine, an essential amino acid, plays a particularly important role in converting protein to muscle. American researchers gave seven men and one woman supplements containing essential amino acid supplements containing 1,870 mg of L-leucine. In another phase of the study they were given essential amino acid supplements contain 3,500 mg of L-leucine. The larger amount of leucine led to a 33 percent higher increase in muscle production.

Pasiakos SM. *American Journal of Clinical Nutrition*, 2011: doi 10.3945/ajcn.111.017061.

• Vitamin E may help prevent lung disease

Researchers at Cornell University, Ithaca, New York, analyzed data from a study of almost 39,000 women, some of whom took 600 IU of vitamin E daily. Women taking vitamin E had a 10 percent lower risk of chronic lung disease.

Agler AH. *Thorax*, 2011;66:320-325.

Zinc and the Common Cold...

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to a 20 percent reduction in cold duration, so long as the zinc dose was at least 75 mg daily.

Studies that provided less than 75 mg of zinc daily, regardless of the form, had no effect in shortening the length of colds.

Another recent analysis, conducted by the Cochrane Collaboration, found that zinc lozenges reduced the length of colds if people started taking them within 24 hours of their initial symptoms.

Most commercial brands of zinc lozenges provide around 13 mg daily.

Reference: Hemila H. Zinc lozenges may shorten the duration of colds: a systematic review. *Open Respiratory Medicine Journal*, 2011:5:51-58. ❑

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