



Nutrition Nuggets



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HOW VITAMIN D IMPACTS OUR HEALTH

Low levels of vitamin D are implicated in numerous disorders such as osteoporosis, cancer, diabetes, heart disease, hypertension, gum disease, muscle weakness in the elderly, and autoimmune diseases including multiple sclerosis, lupus erythematosus, rheumatoid arthritis, and inflammatory bowel disease (Crohn's).

Osteoporosis

People with insufficient vitamin D have limited ability to absorb calcium and phosphorus from their diet (less than 10% absorption of calcium in those most deficient). In such cases, the body accesses these minerals from bone to maintain functional capabilities. Osteoporosis or porous, brittle bones is a disorder common to elderly women and is created by insufficient amounts of calcium and vitamin D over many years.

Vitamin D adequacy is often overlooked by medical professionals, even in women being treated for osteoporosis, according to data presented at the 2004 meeting of the American Society of Bone and Mineral Research (ASBMR). Clifford Rosen, MD, a past president of ASBMR and director of the Maine Center for Osteoporosis Research in Bangor states, "At least half the patients with hip fractures that we see are vitamin D deficient. We don't stress enough the idea of taking vitamin D supplements along with bisphosphonates."

Heart Disease

Without adequate sun exposure, the cholesterol-like vitamin D precursors are converted into cholesterol. Experts suggest that prevailing higher cholesterol concentrations during the winter months may be a factor in the higher incidence of heart disease in northern states and in winter. Additional evidence is the fact that heart attacks peak in winter and decline in summer in temperate latitudes.

Low levels of vitamin D are associated with up to 60% higher risk for heart disease and double the risk for a heart attack. Research also indicates that those with insufficient vitamin D are three times more likely to be diagnosed with high blood pressure.

Cancer

Cellular growth is promoted by hormones and growth factors such as insulin, estrogen and human growth hormone which encourage rapid cell division. In mutated cells, this can result in the development of cancer.

Michael Holick, MD is head of the Vitamin D, Skin and Bone Research Laboratory in Boston, Massachusetts. He states, "Activated vitamin D is one of the most potent inhibitors of cancer cell growth."

In view of powerful growth promoters, the body requires opposing factors to keep things under control and an important one is the active form of vitamin D, the hormone, calcitriol. It aids the natural process in which cells mature, stop growing and eventually die.

Cancer cells, in contrast, remain perpetually immature, rapidly divide and are immortal. In studies of animals with malignant tumors, calcitriol has been shown to dramatically slow down the growth of cancer. Vitamin D has also been demonstrated to curb growth of new blood vessels and that is evidenced by reduction in the network of vessels that supply nutrients to tumors.

Population studies show a negative relationship between sun exposure and risk of developing and/or surviving cancer - that is, the less sunshine, the higher the death rate due to cancer. As you go farther north in the United States, incidence of certain kinds of cancer increases, particularly prostate and colon.

Data covering over 4 million cancer patients from 13 countries reveal a marked difference in cancer incidence between sunny and more temperate latitudes. Numerous studies have conclusively shown vitamin D to have a protective effect against colon, premenopausal breast, ovarian, prostate and pancreatic cancers.

Weak Muscles and Gums

Just as vitamin D contributes to the strength of bones, it also plays a key role in muscular performance. Muscle fibers have receptors that are designed to accept the active form of the vitamin and the tissue doesn't function efficiently when calcitriol is not present in adequate amounts.

When elderly, vitamin D deficient women are given supplemental vitamin D, the resulting increase in protein synthesis creates significant muscle growth, performance on tests of muscle strength rise dramatically, the women are able to stand and walk more quickly, and they fall less frequently.

Gum disease is the leading cause of tooth loss, particularly in older people. It's the result of long term, chronic inflammation and accompanying gum recession. Calcitriol is powerfully anti-inflammatory and boosts immune response, lowering risk for infections, including gingivitis, the precursor to periodontal disease. In a clinical trial published in the American Journal of Medicine, older people who took 700 IU of vitamin D each day for three years experienced 60% less tooth loss than participants who received a placebo.

Auto-Immune Diseases

Recent studies link vitamin D deficiency with several autoimmune diseases, including multiple sclerosis (MS), type I diabetes, lupus erythematosus, rheumatoid arthritis (RA), and Crohn's disease. The incidence of MS is nearly zero in equatorial regions and increases dramatically with distance from the equator, both north and south. Some researchers believe that susceptible individuals could in many cases prevent the onset of the disease with supplemental vitamin D.

Extensive research has revealed that vitamin D supplementation in pregnancy and early childhood is associated with reduced risk of type I diabetes. A study of over 10,000 infants in Finland found that giving 2000

IU daily for the first year of life resulted in 80% reduced risk of insulin-dependant diabetes over the following 30 years.

Additionally, a growing body of data links low blood levels of vitamin D with lupus. Many studies show an association between higher disease activity and vitamin D deficient status.

Low levels of vitamin D are seen in over 75% of those with rheumatoid arthritis (RA). Some researchers believe supplemental vitamin D can make the difference in whether the early inflammatory form develops into full-fledged RA.

Research at McGill University in Montreal revealed that vitamin D is able to switch on genes responsible for fighting Crohn's. Scientists who were involved in the study advise siblings of Crohn's patients who haven't contracted the disease to supplement in order to reduce their risk.

Type II Diabetes and Kidney Disease

Vitamin D is necessary for normal insulin secretion as well as the body's sensitivity to this hormone. Dr. Michael Holick of the Boston University School of Medicine states, "Vitamin D stimulates your pancreas to make insulin. It also regulates your immune system."

Deficiency contributes to the development of type II diabetes by slowing the release of insulin and increasing glucose intolerance (cell membrane receptors become less responsive to insulin, preventing sugar from entering the cell where it can be used for energy). After 17 years of following 4000 adults, researchers found those with the highest blood levels of vitamin D had 40% lower risk for insulin-resistant diabetes.

A high prevalence of vitamin D deficiency has been observed in those with chronic kidney disease and supplementation is stressed by many physicians as important for slowing progression of the disease. In the Third National Health and Nutrition Examination Study, involving 15,000 adults, risk for subnormal kidney function increased in stepwise fashion as blood levels of vitamin D decreased.

Asthma

As nations become more industrialized, less time is spent outdoors, leading to decreased vitamin D production. Starting in the 1960's, asthma and allergies began to increase, now affecting more than 300 million people worldwide.

The anti-inflammatory properties of hormonal vitamin D have a protective effect on lung tissue and airways, reducing tissue reactivity against environmental allergens and disease organisms. Low calcitriol blood levels are associated with reduced lung function and greater medication use in persons with asthma.

Adequate vitamin D in pregnancy has been demonstrated to be protective against asthma and allergies in offspring. In a clinical study where pregnant women were given supplemental vitamin D, by the time their offspring reached three to five years old, a reduction of up to 40% in these children's risk for asthma was observed.

Chronic Pain

Low levels of vitamin D are frequently associated with pain syndromes, including fibroneuralgia (nerve pain) and fibromyalgia (pain involving nerves, joints and muscles). In studies of individuals with chronic pain, those with lower blood levels of vitamin D suffer more than those whose calcitriol levels are within normal ranges. In fact, some physicians believe approximately half of nerve pain syndromes are related to vitamin D deficiency.

In a study of diabetics who were suffering from neuropathy, the vitamin D deficient patients were given approximately 2000 IU a day. Follow-up after three months revealed a substantial drop in pain scores.

In research conducted by Mayo Clinic in 2007, a link was identified between inadequate vitamin D and the amount of medication needed for pain control. Participants who were deficient required nearly twice the dose of narcotics as those having calcitriol blood levels within normal ranges.

CONCLUDING STATEMENTS

Many social, political and agricultural factors have been changing mankind's nutrient availabilities and requirements ever since the advent of industrialization and now so much more with our increasingly technological world. Experts attempt to discern exactly where we are falling short and in the case of vitamin D, point to its insufficiency as a leading factor in the mushrooming incidence of many of our modern maladies.

However, nutrition science is known for promoting new theories with regularity which often conflict or even reverse at a later date upon discovery of greater revelation. But given the preponderance of evidence, only just touched upon here, I believe prudence favors taking a dose of inexpensive health insurance in the form of supplemental vitamin D on a daily basis.

RESOURCES

Vitamin D. (2008, November) Linus Pauling Institute [On-line].
Available: <http://lpi.oregonstate.edu/infocenter/vitamins/vitaminD/>

Understanding Vitamin D Cholecalciferol. (Year unknown) Vitamin D Council [On-line].
Available: <http://www.vitamindcouncil.org/>

Vitamin D. (2010, June) Mayo Clinic [On-line].
Available: http://www.mayoclinic.com/health/vitamin-d/NS_patient-vitamind

Dietary Supplement Fact Sheet: Vitamin D. (2009, November) Office of Dietary Supplements, National Institutes of Health [On-line]. Available: <http://ods.od.nih.gov/factsheets/vitamind.asp>

Vergili, Joyce M. (2009). Vitamin D: Promise of a Panacea? Numedix Continuing Professional Education Provider European Society of Cardiology (ESC) (2010, September 5). Vitamin D is a prognostic marker in heart failure, study finds. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2010/08/100831122055.htm>

Wellcome Trust (2010, August 24). Vitamin D found to influence over 200 genes, highlighting links to disease. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2010/08/100823172327.htm>

University of California - Riverside (2010, August 9). Biochemist proposes worldwide policy change to step up daily vitamin D intake. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2010/08/100809133325.htm>

Vitamin D and diabetes. (2010, March) PubMed [On-line]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/20304061>

Vitamin D may Curb Type 2 Diabetes Risk. (2007, November) Reuters [On-line]. Available: <http://www.reuters.com/article/idUSCOL96182020071119>

The Role of Vitamin D and Calcium in Type 2 Diabetes. (2007) The Journal of Clinical Endocrinology & Metabolism [On-line]. Available: <http://jcem.endojournals.org/cgi/content/abstract/92/6/2017>

Vitamin D and Diabetes: Let the Sunshine In. (2008) The Diabetes Educator [On-line]. Available: <http://tde.sagepub.com/content/34/6/939.full.pdf+html>

Is Vitamin D Deficiency to Blame for the Asthma Epidemic? (2007, November) PubMed [On-line]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/17919705>

National Jewish Medical and Research Center (2010, April 20). Low vitamin D levels associated with more asthma symptoms and medication use. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2010/04/100415143906.htm>

Vitamin D and the Cardiovascular System. (2009, August). CJASN [On-line]. Available: <http://cjasn.asnjournals.org/cgi/reprint/4/9/1515>

American Heart Association (2008, January 8). Lack of Vitamin D May Increase Heart Disease Risk. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2008/01/080107181600.htm>

Vitamin D and Cardiovascular Disease. (2009, July). PubMed [On-line]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/19601865>

Vitamin D and multiple sclerosis. (1997, October). PubMed [On-line]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/9316607>

The Vitamin D and Multiple Sclerosis Link. (2009, February). About.com [On-line]. Available: <http://ms.about.com/b/2009/02/09/the-vitamin-d-and-multiple-sclerosis-link-a-cure-for-ms-not.htm>

Vitamin D and multiple sclerosis. (2010, June). The Lancet [On-line]. Available: [http://www.thelancet.com/journals/lancet/article/PIIS1474-4422\(10\)70086-7/abstract](http://www.thelancet.com/journals/lancet/article/PIIS1474-4422(10)70086-7/abstract)

McGill University Health Centre (2010, January 27). Vitamin D supplements could fight Crohn's disease. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2010/01/100127104904.htm>

Vitamin D in Systemic Lupus Erythematosus. (2008, October). Medscape [On-line]. Available: <http://www.medscape.com/viewarticle/579395>

Vitamin D deficiency in systemic lupus erythematosus. (2006, February). PubMed [On-line]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/16431339>

Vitamin D: Vital Role in Your Health. (Date unknown). WebMD [On-line]. Available: <http://www.webmd.com/rheumatoid-arthritis/features/vitamin-d-vital-role-health>

Do Vitamin D Levels Affect Disease Outcomes in Rheumatoid Arthritis? (Date unknown). The Johns Hopkins Arthritis Center [On-line]. Available: <http://www.hopkins-arthritis.org/arthritis-news/2007/affects-of-vitamin-d-on-rheumatoid-arthritis.html>

Vitamin D intake is inversely associated with rheumatoid arthritis: results from the Iowa Women's Health Study. (2004, January). PubMed [On-line]. Available: <http://www.ncbi.nlm.nih.gov/pubmed/14730601>

Vitamin D Often Overlooked When Treating Osteoporosis. (2004, October). Medscape Medical News [On-line]. Available: <http://www.medscape.com/viewarticle/490672>

You need Calcium and Vitamin D for Good Bone Health. (2009). St. Anthony's Medical Center, Your Health Today [On-line]. Available: http://www.stanthonysmedcenter.com/YHT/2009_fall/bone_density.asp

Vitamin D for Fibromyalgia Pain. (2008, November). Quality Health [On-line]. Available: <http://www.qualityhealth.com/pain-articles/vitamin-d-fibromyalgia-pain>

Vitamin D and Healthy Bones. (2003, December). New York State Department of Health [On-line]. Available: <http://www.health.state.ny.us/diseases/conditions/osteoporosis/vitd.htm>

Facts about Vitamin D. (2009, April). University of Florida, IFAS Extension [On-line]. Available: <http://edis.ifas.ufl.edu/pdf/files/FY/FY20700.pdf>

How Much Vitamin D is Enough? (2005, October). UC Berkeley Wellness Letter [On-line]. Available: <http://www.wellnessletter.com/html/wl/2005/wlFeatured1005.html>

International Osteoporosis Foundation (2010, May 10). New vitamin D recommendations for older men and women. ScienceDaily. Retrieved October 4, 2010, from <http://www.sciencedaily.com/releases/2010/05/100510105027.htm>

Vitamin D: Many Benefits; Optimal Dose Uncertain. (2009, September) Mayo Clinic [On-line]. Available: <http://www.mayoclinic.org/news2009-mchi/5417.html>