Vitamin D3 Health Benefits

By Lita Lee, Ph.D.
May 2008

Natural Vitamin D3 (cholecalciferol) vs Synthetic Vitamin D2 (ergocalciferol)

Vitamin D3 is the healthy kind your body makes when exposed to sunshine. The toxic kind, D2, is made from ergosterol, a fungal steroid. It is the form of vitamin D used in prescriptions in North America. Syntheic vitamin D2 was first produced in the 1920s through ultraviolet exposure of foods. The process was patented and licensed to drug companies for use in prescription vitamins. The vitamin D that is added to milk is not D3 but the highly inferior vitamin D2. (Dr. Ray Peat).

Optimizing your sun exposure and levels of vitamin D3 may be one of the most important physical steps you can take in support of your long-term health. When you get your vitamin D from appropriate sun exposure your body can indeed self-regulate and greatly reduce vitamin D production if you don't need it, which makes it very difficult to overdose on vitamin D from sun exposure.

Ultraviolet-B Is What Generates Vitamin D in Your Skin. UV light is divided into 3 bands, or wavelength ranges, which are referred to as UV-A, UV-B and UV-C. UV-B is sometimes called the "burning ray." It's the primary cause of sunburn caused by overexposure to sunlight. However, UV-B sunlight produces vitamin D on the skin. The amount produced depends on exposure time, latitude and altitude of location, amount of skin surface exposed, skin pigmentation and season. UV-B also stimulates the production of MSH, an important hormone in weight loss, energy production, and in giving you that wonderful tanned appearance.

However, UV-B does not penetrate very deeply into your skin. The darker the pigmentation or more tanned your skin, the less UV-B penetrates. Window glass allows only 5 percent of the UV-B light range that produces D to get into your home or auto.

The timing of your sun exposure is also a major factor. Sun exposure must take place when UV-B is present. The actual dosing of your sun exposure is quite complex, since it involves knowing the amount of UV-B and one's skin color.

This doesn't sound very complex, but the amount of UV-B is not a constant. It is a major variable and is influenced by a number of factors:

- Latitude -- the further north you are the less there is
- Time of Year -- virtually none available in winter in continental U.S.
- Clouds -- can block UV-B
- Pollution -- smog and ozone can block UV-B
- Altitude -- the higher up you are the more UV-B reaches you

Source: www.Mercola.com

Exposure to sunlight supplies us the majority of our vitamin D our bodies require. Darkly pigmented skinned people are the exception because they require 10 to 15 times exposure to the sun to get the same effect as lighter skinned people. A high number of vitamin D deficiency cases have been found in infants who are solely breastfed from adults who have darker skin or lower exposure to the sun.

For those people who don’t get adequate amounts of sunlight, experts recommend a minimum of 1,000 - 4000 IU of vitamin D3 to maintain healthy levels in their blood.

Signs and symptoms of Vitamin D Deficiency

Bone Health

Vitamin D3 is clearly associated with stronger bones and preventing osteoporosis. Vitamin D3 -- and therefore exposure to sunlight -- is essential for maximizing your bone health, and for preventing and treating a variety of bone diseases. But vitamin D deficiency is pandemic, and can cause osteopenia, osteoporosis and osteomalacia. Unlike osteoporosis, osteomalacia causes aching bone pain, and is often misdiagnosed as fibromyalgia, chronic pain syndrome or even depression. Says Dr. James Dowd, associate professor of medicine at Michigan State University and author of *The Vitamin D Cure*: "Bone pain, muscle pain, joint pain [are all signs]," he says. "[The pain] typically moves around—one day it's your back that bothers you, a week later it's your shoulders and the next day it is your feet and hands."

Absorption of calcium and phosphorus

Vitamin D3 enhances your intestinal absorption of calcium and phosphorus which helps explain why this vitamin promotes bone health.. The major source of vitamin D3 is exposure of your skin to sunlight, since very few foods naturally contain vitamin D3 or are fortified with vitamin D3 (most foods are fortified with the less effective synthetic vitamin D2).

Muscle weakness

Vitamin D deficiency also causes muscle weakness, which can increase your risk of falls and fractures.

Fatigue

Dr. James Dowd says that fatigue can be quite severe. In fact, those diagnosed with chronic fatigue syndrome may also suffer from lack of vitamin D, he says.

Difficulty controlling weight

Vitamin D plays a role in regulating weight, and Dr. Dowd says a deficiency may make it difficult to keep your weight in check.

Cancer

http://articles.mercola.com/sites/articles/archive/2007/08/24/lack-of-sunshine-causes-600-000-cancers-a-year.aspx

There is compelling research indicating that "Optimizing your vitamin D levels could help you to prevent many cancers, including pancreatic, lung, breast, ovarian, prostate, and colon cancers." A recent study by William B. Grant, Ph.D. (www.sunarc.org) links UVB as protective to a total of 16 types of cancer, primarily epithelial (pertaining to the surface) cancers of the digestive and reproductive systems [Grant, submitted]. Six types of cancer (breast, colon, endometrial, esophageal, ovarian, and non-Hodgkin's lymphoma) were inversely correlated to solar UVB radiation and rural residence in combination. This result suggests that living in an urban environment is associated with reduced UVB exposure compared to living in a rural environment.

Heart disease

http://articles.mercola.com/sites/articles/archive/2005/12/13/how-vitamin-d-protects-your-heart.aspx This research indicates that vitamin D production through sunlight exposure helps to fight heart disease by increasing the body's natural anti-inflammatory cytokines; suppressing vascular calcification and inhibiting

vascular smooth muscle growth. A study of patients with congestive heart failure found elevated levels of TNF, another marker of inflammation.

Anti-inflammatory properties

Contributed by John Jacob Cannell, MD, executive director of The Vitamin D Council (http://www.vitamindcouncil.org/)

Researchers in Belgium appear to be the first to show that natural vitamin D (cholecalciferol) lowers C - reactive protein (CRP), a measure of inflammation in the body, in critically ill patients. CRP is elevated when there is inflammation going on somewhere in the body, and chronic inflammation is a risk factor for a number of conditions including coronary heart disease (CHD) and diabetes. Numerous studies have shown that vitamin D lowers inflammation and that vitamin D deficiency is associated with increased inflammation. Vitamin D is the pivotal feedstock for a hormone that protects muscle, and inhibits autoimmune disorders from multiple sclerosis and lupus to inflammatory bowel disease.

Multiple sclerosis

Seminars in Neurology 2008; 28: 017-028; www.Mercola.com

Although the risk of multiple sclerosis (MS) is often blamed on genetics, there are significant geographic variations in MS frequency, which suggests strong environmental factors may be at play. Sunlight exposure has been linked to a reduced risk of MS, and vitamin D deficiency (caused by a lack of sun exposure) has been suggested as a cause of MS. MS is rare in Asia, the tropics and the sub-tropics, and strong correlations exist between MS, location, and duration and intensity of sunlight.

A review of epidemiological studies found a protective role of vitamin D for MS. Meanwhile, animal studies have found that an injection of vitamin D3 can prevent experimental autoimmune encephalomyelitis (EAE), which is an animal model of MS. Vitamin D deficiency accelerated the onset of EAE in animals. The researchers concluded that vitamin D supplementation, at levels higher than are currently recommended by the Institute of Medicine, may help to reduce the risk of MS. Other environmental factors that may also increase the risk of MS include infection with the Epstein-Barr virus and cigarette smoking.

Review on Vitamin D **American Journal of Clinical Nutrition March, 2004;79(3):362-371**

Findings from a review on vitamin D showed the various health benefits provided by vitamin D and the consequences of vitamin D deficiency. Without vitamin D, the small intestine would only be able to absorb 10 percent to 15 percent of our dietary calcium intake, which could lead to osteoporosis. Other health consequences of vitamin D deficiency include: common cancers, multiple sclerosis, high blood pressure, psoriasis, type I diabetes and rheumatoid arthritis.

Vitamin D and Mental Illneses

Here is an abstract from "Vitamin D and Mental Illness," John Jacob Cannell, MD, September 7, 2003, Executive Director, Vitamin D Council, 9100 San Gregorio Road, Atascadero, CA 93422, Phone: 805 462-8129, Fax: 805 462-8836, E-mail: jcannell@charter.net, Web: cholecalciferol-council.com

We propose vitamin D plays a role in mental illness based on the following five reasons: a) epidemiological evidence shows an association between reduced sun exposure and mental illness, b) mental illness is associated with low 25-hydroxyvitamin D (25(OH)D) levels, c) mental illness shows a significant comorbidity with illnesses thought to be associated with vitamin D deficiency, d) theoretical models (in-vitro or animal evidence) exist to explain how vitamin D deficiency may play a causative role in mental illness and e) two small studies indicate vitamin D improves mental illness.

Epidemiological evidence that mental illness has increased as humans have migrated out of the sun followed by additional epidemiological evidence that associates vitamin D deficiency with mental illness.

Vitamin D has a significant biochemistry in the brain. Nuclear receptors for vitamin D exist in the brain and vitamin D is involved in the biosynthesis of neurotrophic factors, synthesis of nitric oxide synthase and increased glutathione levels, all suggesting an important role for vitamin D in brain function. Animal data indicates that tyrosine hydroxylase, the rate-limiting enzyme for all the brain's monamines, is increased by vitamin D. Rats born to severely vitamin D deficient dams (mothers) have profound brain abnormalities.

Fear of vitamin D toxicity is unwarranted but rampant in the medical profession. Because vitamin D deficiencies are so widespread in the western world, psychiatrists should suspect the deficiency, especially in people of color, the aged and those who avoid the sun. Serum 25(OH)D levels should be obtained when deficiency is suspected. Judicial exposure to sunlight, oral vitamin D, or both, aimed at restoring circulating levels of 25(OH)D between 35 and 55 ng/ml is the treatment of choice for vitamin D deficiency in mentally ill patients. Cholecalciferol (Vitamin D3) is the preferred oral preparation of vitamin D.

Supplemental Vitamin D3 – how much is safe? (www.Mercola.com)

Adequate vitamin D levels can be sustained by getting sensible sun exposure or ingesting at least 1000 – 4000 IU of vitamin D3 daily. For those with sensitive intestines (from allergens in vitamin)), Dr. Ray Peat recommends using 6000 iu on the skin. If you aren't sure of how much Vitamin D you need, it's best to have your blood checked for optimum Vitamin D levels. It is important to understand that most of us get 10,000 units on a sunny summer day if we have significant exposure.

The requirements for vitamin D are far closer to 10 times the current RDA of 400 units, or 4,000 units. If you only took the RDA of 400 units of vitamin D and avoided the sun you can be virtually guaranteed you would be vitamin D deficient, just like over 85 percent of the country currently is.

Most people have far too little vitamin D in their blood. Over 85 percent of people have levels below 32, which is considered deficient, but it is possible to overdose on vitamin D. In my practice we don't like to see patient levels go much above 50, but 55 is probably a perfect level and anything above 60 is likely to be toxic. If you wish to take high doses (over 4000 iu) of vitamin D, it is important to have your blood levels tested. Patients routinely take 10,000 units a day or more of vitamin D safely as long as their blood levels are monitored.

Recommended reading: Dr. John Cannell's excellent Vitamin D Newsletter at
http://www.vitamindcouncil.org/

Vitamin D blood tests

http://articles.mercola.com/sites/articles/archive/2002/02/23/vitamin-d-deficiency-part-one.aspx

There are two vitamin D tests -- 1,25(OH)D and 25(OH)D. 25(OH)D is the better marker of overall D status. It is this marker that is most strongly associated with overall health. The correct test is 25(OH)D, also called 25-hydroxyvitamin D.

There is a big difference between normal and optimal. The goal is to be optimally healthy. Some experts may disagree with the following healthy ranges, but they are taken from healthy people from the tropical or subtropical parts of the world where they are receiving healthy sun exposures. It seems more than reasonable to assume that these values are in fact reflective of an optimal human requirement.

Dr. Michael Hollick is one of the top vitamin D researchers in the world and he has been advocating higher reference ranges, though not as high as the ones suggested here. (Holick MF. Calcium and Vitamin D. Diagnostics and Therapeutics. Clin Lab Med. 2000 Sept, 20(3):569-90)

Optimal **25-hydroxyvitamin D values are:**	**Normal 25-hydroxyvitamin D lab values are:**
45-50 ng/ml or 115-128 nmol/l	**20-56 ng/ml 50-140 nmol/l**
Your vitamin D level should NEVER be below 32 ng/ml. Any levels below 20 ng/ml are considered serious deficiency states and will increase your risk of breast and prostate cancer and autoimmune diseases like MS and rheumatoid arthritis.	

Many commercial labs are using the older dated reference ranges. The above values are the newest ones from the clinical research. There are a number of different companies that have FDA approval to perform vitamin D testing. Quest Labs is the largest commercial lab in the US and they use DiaSorin to measure 25 hydroxy D levels. However, many other commercial labs don't. Your test results will not be accurate and you can not use the values in the table above unless the D is measured with a DiaSorin assay.

Sources of Vitamin D3

Supplements: A daily multivitamin has about 400 units of vitamin D, but Dr. Dowd says you still need to take a straight vitamin D 3 supplement on top of the multivitamin to reach normal levels. "Your average [100- to 200-] pound person is going to require probably between 2,000 and 4,000 units of vitamin D a day," he says. My favorite brand of Vitamin D3 is from Carlson and I have available a 2000 i.u. capsule from Lanolin (Sheep Wool). Carlson also has Vitamin D3 derived from fish oil.

Sun exposure: Eating lunch outdoors when possible or going for walk during a break to get sun exposure will help you achieve normal vitamin D levels, Dr. Dowd says. "Increase your sun exposure at midday between spring blossoms and fall colors," he says.

Eat vitamin D-rich foods: Very few foods in nature contain vitamin D. Fish, such as salmon and tuna are among the best sources. Small amounts of vitamin D are found in beef liver, cheese, and egg yolks. Vitamin D in these foods is primarily in the form of vitamin D_3 (cholecalciferol) and its metabolite $25(OH)D_3$. Dr. Dowd says that green, leafy vegetables and sun-dried produce such as peppers and tomatoes are excellent sources of vitamin D.