

# Smart Life Forum

SmartLifeForum.org

presents

*William B. Grant, Ph.D.*

on

## The Latest Results from Vitamin D Studies

Thursday, Nov. 15, 2007  
7:00 PM

Cubberly Center, Rm H-1  
4000 Middlefield Road  
Palo Alto, CA

### FUTURE SPEAKERS\_

December 20, Keith Scott-Mumby, MD  
Nutrigenics, How Food Can Hurt You

January 17, Elson Haas, MD

The Impact of Toxins on Your  
Health

March 20, Karl Knopf, EdD,  
Fitness for Seniors

**FMBR meeting October 26:** William Gough, co-founder of FMBR will present an exciting possibility on how society can achieve an ecologically sustainable future. It will be based upon concepts that Dr. Bernard Eastlund and Bill developed in the late 1960s and have now updated using subsequent scientific advances. There will *not* be a November meeting. [fmbbr.org](http://fmbbr.org)

### Meet Bill Grant

William Grant has a Ph.D. in physics from UC Berkeley. He spent 30 years in a professional career devoted to developing and using laser systems for the remote measurement of atmospheric constituents. During the last 15 years of his career he worked in Atmospheric Sciences at NASA Langley Research Center in Hampton, VA where he participated in many field programs to study the remote atmosphere.

During his stay in Virginia, he began his study of diet and solar ultraviolet-B (UVB) links to chronic diseases. He retired in 2004 and moved to San Francisco where he established Sunlight, Nutrition, and Health Research Center (SUNARC) to extend his health studies: [SunArc.org](http://SunArc.org)

### Main Presentation

Vitamin D is more recently found to be associated with disease risk reduction and optimal health. Originally discovered to prevent rickets in the early twentieth century, and later found to promote bone health in general, vitamin D has also been found to have many non-calcemic benefits.

The most commonly associated non-calcemic benefit is cancer risk reduction. Since then, many studies have supported these reductions. There are 28 types of cancer for which UVB and/or vitamin D has been found inversely correlated with risk. A recent paper reported that 1,100 International Units (IU) of vitamin D3 per day with calcium reduced the all-cancer risk for post-menopausal women by 77% [Lappe et al., 2007] (abstracts of papers can be found at [PubMed.gov](http://PubMed.gov)). Vitamin D appears to be more beneficial once one develops cancer since there are many risk-modifying factors for cancer incidence but few factors that fight cancer in the advanced stages—Vitamin D being one of them.

Vitamin D has also been found to reduce the risk of bacterial infections such as TB

and viral infections including the common cold, epidemic influenza, and bronchitis, which are more common in winter. *Calcitriol*, the hormonal form of vitamin D, induces the production of *cathelicidin*, a polypeptide with antimicrobial properties. Cold temperature and low relative humidity also contribute to wintertime increases in disease rates.

Vitamin D has also been found to reduce the risk of autoimmune diseases such as multiple sclerosis (MS) and Type 1 Diabetes Mellitus. Prevalence of MS has a striking increase in latitude on three continents and is linked more to wintertime UVB and vitamin D than summertime levels. The reason for this linkage now seems to be associated with the role of vitamin D in combating viral infections. The Epstein Barr virus is an important risk factor for MS.

This anti-infectious agent benefit also very likely extends to the sequelae of infectious diseases, including: asthma, chronic obstructive pulmonary disease (COPD), other autoimmune diseases, and sepsis (infection of the blood).

Vitamin D also plays a role in reducing the risk of metabolic diseases including atherosclerosis or arteriosclerosis, cerebrovascular disease (stroke), coronary heart disease, hypertension, and Type 2 Diabetes Mellitus. The mechanisms appear to include regulation of insulin resistance and arterial calcification. When vitamin D levels are low, parathyroid hormone (PTH) levels increase and draw calcium from the bones and may place some in the arteries and heart valve.

Vitamin D likely plays a role in reducing the risk of autism, another autoimmune disease. One way, which actually applies to several types of birth defects, is by reducing the risk of systemic infectious diseases such as influenza. An important adverse effect of infectious disease on the

fetus is that the mother's body temperature is raised, and higher body temperature is a risk factor for birth defects.

A recent paper also reported that vitamin D3 supplements also reduce the mortality rate by 7%, based on a meta-analysis of prospective studies of people mostly over the age of 50 years [Autier and Gandini, 2007]. This finding strongly supports an overall health benefit of vitamin D. However, greater benefits are expected for high levels of vitamin D throughout life since many chronic diseases have their origins early in life.

There are several ways that calcidiol levels can be raised. One way is with vitamin D3 supplements. This could be in the form of high-dose tablets that could be taken infrequently, or low-dose tablets that could be taken daily [<http://bio-tech-pharm.com/products/d35.html>]. The half life of vitamin D in the body is four-six weeks, since it is fat soluble, so high-dose tablets might be easier to swallow. Vitamin D3 supplementation is considered safe for long-term supplementation at 10,000–20,000 IU per day over an extended period, which is the physiological dose with high solar UVB irradiance. A person can produce 10,000 IU or more of vitamin D3 per day from solar UVB providing that the sun elevation angle is high enough.

A second way to raise calcidiol levels is to increase fortification of foods commonly consumed. In the United States, the average person obtains 250–300 IU of vitamin D3 per day from food. However, many studies have found that 400 IU of vitamin D3 per day has very little health benefit if it is the sole source of vitamin D.

A third way to obtain vitamin D3 is from solar UVB. In the San Francisco Bay Area, the solar elevation angle is high enough to produce vitamin D3 for about 10–11

months of the year. When making vitamin D3 from solar UVB, it is important to be in the sun as near to solar noon as possible, expose as much skin as possible, and not using any sunscreen. In San Francisco in summer, a young person with pale skin can make about 65 IU per minute with 10% of the body exposed to the sun. Time in the sun should be increased gradually at the start of the sunny season, and if any erythema (reddening) develops, stop for awhile, then resume at shorter periods. The efficiency of vitamin D3 production decreases by about a factor of five between youth and the senior years.

## Terminology and Physiology

Vitamin D3 (*cholecalciferol*) is made from UVB-irradiated 7-dehydrocholesterol, or UVB-irradiated lanolin for supplements. It can also be obtained from fish oil. However, fish oil often has a ratio of vitamin A to vitamin D that is too high for optimal health. One should take no more than 1500 IU of vitamin A per day, since vitamin A competes with vitamin D and increases the risk of hip fracture at higher doses. Vitamin D2 (*ergocalciferol*) is made from vegetable sources and it thought to be 1/3<sup>rd</sup> to 1/5<sup>th</sup> as effective as vitamin D3. Vitamin D is converted in the liver to 25-hydroxyvitamin D (*calcidiol*). Calcidiol is converted in the kidney and other organs as needed to 1,25-dihydroxyvitamin D (*calcitriol*). Many organs have vitamin D receptors, whose function is to capture calcitriol and let it do its function in the particular organ of interest.

## Key Issues

- Solar UVB irradiance is the major source of Vitamin D3 for most people

- Solar UVB and vitamin D3 have been reported to reduce the risk of over 16 types of cancer
- The evidence for UVB and vitamin D3 reducing the risk of cancer generally satisfies the criteria for causality in biological systems for several types of cancer
- Recent studies have provided evidence that solar UVB and vitamin D3 reduce the risk of respiratory diseases linked to infection, explaining in part why such diseases are more common in winter
- Solar UVB and vitamin D3 reduce the risk of autoimmune diseases such as multiple sclerosis
- Emerging scientific evidence suggests that humans require 1,000–4,000 IU per day for optimal health
- Although nonmelanoma skin cancer is not desirable, it is generally not life threatening, and several recent studies found that development of nonmelanoma skin cancer is associated with reduced risk of numerous internal cancers, as long as the effects of smoking are considered, as well as multiple sclerosis
- At latitudes greater than approximately 45°, it is difficult to obtain sufficient Vitamin D3 year round from casual solar UVB irradiance to reduce the risk of cancer
- Human epidemiological studies suggest that solar UVA is a more important risk factor for melanoma than UVB.

## Useful URLs:

[PubMed.gov](http://PubMed.gov)

[SunArc.org](http://SunArc.org)

[VitaminDCouncil.org](http://VitaminDCouncil.org)

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