



# Sunlight, Nutrition And Health Research Center

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3/30/04

### Vitamin D Supplementation in the Fight Against Multiple Sclerosis

- by Ashton Embry, Ph.D.

**Abstract** Multiple Sclerosis (MS) is an autoimmune disease in which the immune-mediated destruction of nerve axons and their protective myelin coating in the central nervous system results in a myriad of serious disabilities. One aspect of MS is the failure of the suppressor side of the immune system to contain autoimmune reactions. Vitamin D is an established immune suppressant and thus persons with MS want to ensure they have an adequate supply of vitamin D. This suggestion is underscored by abundant scientific data that link vitamin D deficiency to MS onset and progression. Such data include epidemiology, animal experiments, immunological studies and small clinical trials.

Recent literature reviews indicate that an average daily intake of 4000 IU of vitamin D from all sources, including sun exposure, oral intake and internal stores is required for optimal health. This result is similar to that deduced from an evolutionary biology perspective. The human genome evolved in a sunny, low latitude environment and is thus most compatible with a tropical supply of vitamin D that is in the range of 4000-5000 IU/d. For those living in latitudes above 40 degrees, a daily supplement of up to 4000 IU is likely necessary in the late fall and winter months to ensure optimal levels of circulating vitamin D are maintained all year around. To determine an appropriate vitamin D supplement level for their unique combination of genetics, latitude and lifestyle, one should determine their blood level of circulating vitamin D each year in the early fall.

Published 2004, Journal of Orthomolecular Medicine, v.19, p. 27-38.

[HTML](#) [PDF](#)

## BOOKS

### "Sunlight, Vitamin D, and Prostate Cancer Risk"

Peter J. Hyde

Summary

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-Vitamin D, Calcium and  
Prevention of Breast Cancer: **Summary**  
A Review

-D-vitamin: gamle paradokser  
og nye perspektiver

Vitamin D and the Elderly

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Position of health  
organizations and agencies in  
Australia, Canada, New  
Zealand, the United Kingdom,  
and the United States, and  
the World Health  
Organization, on UV radiation  
and vitamin D

This science-based book is the first to demonstrate that insufficient access to the sun's ultraviolet-B (UV-B) irradiance, necessary for photosynthesis of vitamin D, increases the risk of progression in prostate cancer.

At least 80 per cent of our major circulating reservoir of the vitamin, 25-hydroxyvitamin D, is produced by casual exposure of unprotected skin to solar UV-B. The remainder is obtained from foods and supplements.

The author looks at five of the many populations characterized by elevated death rates from prostate cancer: *African-North Americans, Norwegians, Swedes, Swiss and Danes*. He shows that insufficient photosynthesis is common to them all and describes the causative circumstances in each instance.

An in-depth review of the literature revealed that a substantial increase in the daily supply of vitamin D recommended for adult North Americans is urgently needed. Importantly, it showed that an increase of the magnitude envisaged would fall well within the range of values necessary for combining safety and efficacy.

The following examples illustrate the scope and tenor of the book:

- Evidence that *calcitriol*, a steroid hormone metabolized from 25-hydroxyvitamin D, inhibits proliferation of prostate cancer cells as well as regulating the supply of calcium to bones and other organs.
- The capacity of calcitriol to induce cell cycle arrest (apoptosis) and decrease the harmful activity of insulin-like growth factors (IGF), known to be implicated in cancers of the prostate, the breast, and the colon.
- The significance of the term "gene-expression switch," considered in the light of the ability of calcitriol and its receptor to modulate the transcription of numerous genes within the nuclei of cells.
- Provided that two prerequisites are met, the ability of the prostate to produce calcitriol within its cells.
- Details of an actual case of vitamin D toxicity after long-term mega-dosing with an over-the-counter supplement, described in a letter to the *New England Journal of Medicine*.

## Conclusions

Maintaining year-round sufficiency in vitamin D lowers the risk of progression in prostate cancer, to say nothing of its important contribution to bone health, in women as well as men, and a range of other health benefits.

Over the years, the public has been seriously misinformed with respect to the intakes of vitamin D supplements that can cause toxicity.

The scarcity of foods containing appreciable amounts of the vitamin; the daytime indoor confinement of workers in many occupations; protracted seasonal interruptions in the accessibility of solar UV-B; and the

demonstrated link between skin cancer and excessive exposure to UV radiation in Australia and New Zealand, all reflect a need for higher intakes of supplemental vitamin D.

## Recommendations

It is recommended that public health initiatives be undertaken to emphasize the importance of ensuring adequate year-round vitamin D nutrition, obtainable from brief periods of sun exposure where practicable and from appropriately higher intakes of supplemental D and foods. The initiatives would include the following:

- The federal governments of both Canada and the U.S.A., to direct the Food and Nutrition Board's *Standing Committee on the Scientific Evaluation of Dietary Reference Intakes* to signify approval of medically endorsed, appropriately increased total intakes of vitamin D (from sunlight, food and supplements) for Caucasians and African-North Americans residing in Canada and the U.S.A., after completion of necessary research.
- Many additional foods to be fortified with vitamin D.
- Supplements containing the appropriate amounts of vitamin D to be made generally available.
- Scandinavians, Swiss and other alpine residents to be regularly briefed on the need to maintain adequate circulating levels of 25-hydroxyvitamin D, and on how they can expect to achieve this.
- Resident Australians, New Zealanders and others adversely affected by depletion of stratospheric ozone to receive regular public health advisories that would emphasize the benefits of achieving realistic goals in vitamin D nutrition.

Bibliographic references are supplied for all of the findings that are cited. There is a glossary of specialized terms and abbreviations.

Websites for book and author: [www.xlibris.com/SunlightVitaminDandProstateCancerRisk.html](http://www.xlibris.com/SunlightVitaminDandProstateCancerRisk.html)

[www.xlibris.com/PJHyde.html](http://www.xlibris.com/PJHyde.html)

Availability is in hardback (\$31.99), paperback (\$21.99), and e-book from the Xlibris Corporation, 436 Walnut Street, Philadelphia, PA 19106-3703. Tel: 888-795-4274 x276 or 215-923-4686; Fax: 215-599-0114; e-mail: [Info@Xlibris.com](mailto:Info@Xlibris.com) and [Orders@Xlibris.com](mailto:Orders@Xlibris.com). Customer sales directly through Xlibris qualify for a discount from the book's retail price - 15% for paperbacks, and 10% for hardbacks.

August 16, 2005

## Melanoma; Prevention, Detection, and Treatment, 2nd Edit., 2005

By Catherine M. Poole\* with DuPont Guerry IV, M.D.  
Yale University Press, New Haven, ISBN 0-300-10725-0  
187 pages, paperback, \$16.95

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Reviewed by William B. Grant, Ph.D., President, SUNARC ([www.sunarc.org](http://www.sunarc.org))

I received a review copy of this book after promising to post my review at [sunarc.org](http://sunarc.org). While the book appears to be an excellent source of information on how to recognize and treat melanoma, it falls way down regarding melanoma prevention and pretty much ignores the health benefits of ultraviolet-B (UV-B) irradiance. In this review, I will point out the errors and misstatements I've identified and provide the facts or my opinions. Papers supporting the facts or my opinions can be found at PubMed, <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?>, which has 16 million health and medical papers listed back to about 1960, most with abstracts and author contact information.

### **Ch. 3 – Who Gets Melanoma and Why?**

p. 23 - “While UV-B is thought to be the major carcinogenic agent in the formation of melanoma and non-melanoma cancers, UV-A also makes a contribution.”

My opinion: UV-B (290-315 nm), which is the spectral region that produces vitamin D, has generally been implicated in the etiology of melanoma; however, most of the human studies did not examine whether UV-A (315-400 nm) could explain the data. From the data of melanoma incidence, which changes more slowly with latitude for pale Caucasians than for squamous cell carcinoma (SCC), it seems that UV-A, not UV-B, is the primary risk factor for development of melanoma, which is a combination of initiation and promotion. UV-A is thought to act through production of free radicals. UV-A also plays an important role in the etiology of basal cell carcinoma (BCC).

The facts: UV-B plays the most important role in the etiology of SCC and actinic keratosis (AK). Lifetime UV exposure is an important risk factor for SCC and AK, while intermittent UV exposure and sunburning appear to be more important for BCC and melanoma. 8,000 Americans die annually from melanoma while about 2000 die from non-melanoma skin cancer, primarily SCC.

### **pp. 25-27 – What About Tanning Salons?**

“The light tubes in tanning salons produce UV-A.”

The facts: In fact, more than 90% of tanning beds in use in the U.S. have lamps that produce 3.5-5% UV-B of the total UV, with the rest as UV-A, which is similar to solar radiation reaching the Earth's surface in mid-latitude near solar noon in summer. Unfortunately, tanning beds in use in Nordic countries and France are prevented by law from emitting more than 1.5% of the UV as UV-B. These laws should be changed to permit more UV-B. It was thought that UV-B was the unsafe spectral region, probably based on studies with mice, where it was shown that it could induce DNA damage.

“According to James M. Spencer, director of dermatologic surgery at Mount Sinai Medical Center, “the tanning industry makes two misleading arguments: first, that their lamps make the skin produce vitamin D, producing breast cancer and other diseases, and second that their ‘controlled’ tanning helps build up the pigment melanin.””

The facts: both of the tanning industry arguments are correct. Michael Holick's group published a paper in December 2004 reporting that men who used sunbeds 2-3 times per week had much higher serum 25-hydroxyvitamin D (25(OH)D) levels than non users, and denser bones as well. My work, and that of many others, indicates that solar UV-B irradiance, through production of vitamin D reduces the risk of over a dozen types of cancer, multiple sclerosis, bone and muscle diseases and conditions, etc. My research also indicates that 50,000 Americans die from cancer prematurely annually due to insufficient UV-B and/or vitamin D.

See: Grant WB, Holick MF. Benefits and requirements of vitamin D for optimal health: a review. *Altern Med Rev.* 2005;10:94-111. [www.thorne.com/altmedrev/fulltext/10/2/94.pdf](http://www.thorne.com/altmedrev/fulltext/10/2/94.pdf)

As for melanin, careful studies indicate that for those who can tan, tanning can produce an induced protection factor of 2-3, which is similar to the protection factor in the UV-A spectral region for sunscreens in use in the U.S. Other studies indicate that for those who live poleward of about 48 degrees, occupational

exposure to solar UV irradiance is associated with reduced risk of melanoma. This is probably due to the melanin developed during occupational exposure, which is sufficient protection for the solar UV levels at the higher latitudes.

“Experts maintain that our diet can easily supplement vitamin D and that twenty minutes in the “real” sun a few days a week will replenish those who are at risk of being vitamin-D deficient, often the elderly.”  
 The facts: Diet and supplements supply about 300 I.U. of vitamin D per day in the U.S. but much less in most European countries since they don’t fortify food as much as in the U.S. and don’t encourage supplement use except in Nordic countries. Cedric Garland and I reviewed the epidemiologic literature on vitamin D and colorectal cancer and found that nearly all studies considering only dietary sources of vitamin D did not find a statistically-significant cancer risk reduction; only when all sources were considered could vitamin D provide adequate protection – at daily amounts of over 600 I.U. As for solar UV-B irradiance production of vitamin D, it strongly depends on season, geographic location, time of day, skin type, amount of clothing worn, etc., and cannot be relied on for adequate levels of vitamin D by casual exposure. It is now thought that 1000-2000 I.U. of vitamin D3 per day in the absence of UV-B irradiance is required for optimal health. As for who is at risk, it ranges from babies to the elderly; no age group is immune.

My opinion: One of the biggest problems dermatologists have in trying to maintain their position that there is no such thing as a healthy tan is the mounting evidence that UV-B irradiance and vitamin D can play a very important role in reducing the risk of cancer (and other diseases). They try to deal with the cancer findings by dismissing them, rather than saying, ok, let’s agree that more people should get more UV-B, but try to get them without burning or tanning excessively. In Australia, the rising epidemic of vitamin D insufficiency has prompted several disease organizations to recommend limited solar UV-B irradiance. The problem with dermatologists is that 99% of their concern is for the skin, leaving only 1% for the rest of the body. If they were to expand their horizons, they would have to accept that more, but careful, mid-day solar UV-B irradiance should be recommended. The ratio of UV-B to UV-A is highest near solar noon, and UV-A does more harm than UV-B, including immunosuppression.

The other major problem confronting dermatologists is that melanoma rates have risen dramatically over the past few decades, a period when dermatologists have been warning people to stay out of the mid-day sun, cover up, and use sunscreen. Perhaps their message is flawed?

“the tanning industry, with current profits of \$5 billion a year.”

The facts: \$5 billion per year, if correct, is the gross revenue; the profit margins are thin and many of the salons are mom and pop operations.

## **Ch. 8. Future Promise: Prevention of Melanoma**

p. 129 – Weaning Teens from the Sun

My opinion: Good luck.

The facts: Solar UV-B is an important source of vitamin D for people of all ages. With teens drinking more soda pop and less milk, they often do not get minimally-adequate levels of vitamin D orally. Studies have shown that pre-adult solar UV-B irradiance can protect against multiple sclerosis as well as help build strong bones. The important thing to instill in teens is the importance of not sun burning or tanning excessively. Moderate UV-B irradiance in youth would lead to good health without undue risk of melanoma and skin cancer.

### **p. 134 – Do Sunscreens Really Protect You?**

“eight epidemiological studies published in the period from 1979 to 2000, which reported that sunscreen use was a statistically significant risk factor for melanoma, should give health care professionals pause,”

The facts: Further analysis of these 8 studies concluded that there were problems with the analyses in the papers; after consideration of methodological problems, it was concluded in 3 reviews that there was no evidence that sunscreen use affected risk of melanoma one way or another. Sunscreen use has been shown

to reduce the risk of SCC and actinic keratoses, both of which are linked to UV-B irradiance. However, there still is the possibility that sunscreens in use in the U.S. may be contributing to the rise of melanoma since they do not have adequate **UV-A blockage to protect against melanoma for prolonged solar UV irradiance. Sunscreens in use in Europe do now.**

#### **p. 136 The UV Index**

The facts: While the UV Index may be useful for those who want to avoid erythema, there is also a vitamin D production index now available on the web for those who want to make sure they stay in the sun long enough to produce sufficient vitamin D:

[http://www-med-physik.vu-wien.ac.at/uv/uv\\_online.htm](http://www-med-physik.vu-wien.ac.at/uv/uv_online.htm)

#### **p. 137 Chemoprevention**

The facts: The book ignored mention of diet and use of antioxidants as a way of reducing the risk of melanoma and other skin cancers. A recent paper found that fats and alcohol were important risk factors while fruits, vegetables, and antioxidant supplements were important risk reduction factors for melanoma. Smoking is also a risk factor for SCC. Consideration of such factors can permit increased UV irradiance with reduced risk of skin cancers and aging.

#### **pp. 138-9 Sensible Sun Tips**

“Apply a heavy, even coat of sunscreen lotion 45 minutes before you go out.”

My opinion: Best to apply sunscreen, if at all, 10-20 minutes after getting into the sun, depending on skin type and intensity of solar UV. This permits vitamin D production and moderate tanning, which sunscreen blocks, but is generally not long enough to produce erythema or reddening. The induced tanning also protects against UV damage.

Bottom line: If you have or think you have melanoma, I would recommend this book. However, if you want to know how to prevent melanoma or get the most health benefit from your solar UV irradiance or tanning program, I would suggest looking elsewhere.

Ratings: prevention – poor; detection – good; treatment – good.

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