

The vitamin D controversy and the sun

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Dr Michael Holick, a professor of dermatology, was fired from his post because of a book he wrote entitled *The UV Advantage*, which suggests that some sunlight may be healthy for all of us. As he only suggested a 'reasonable amount of sunlight' one would have to believe that the good doctor, who has over 200 papers on vitamin D and sunlight to his credit, may not know what is reasonable. Most of us have a pretty good idea of what we would regard as reasonable, but over the last few years we have been frightened into believing that reasonable means no sunlight exposure if possible, and if not possible then gobs of protective cream on the body.

Department Chair Barbara Gilchrest told the *Boston Globe* that the book 'is an embarrassment for this institution and an embarrassment for him'. Holick is a professor of medicine and physiology, formerly of dermatology, at Boston University School of Medicine and until 2000 was chief of endocrinology, metabolism and nutrition. Since 1987 he has also been the programme director of the University's General Clinical Research Center.

What is the big fuss about? By now everyone is aware of the dangers of sunlight exposure. Many avoid sunbathing, and even walking too long in the sun without covering up body parts is regarded as unwise. We have to distinguish between intelligent sun exposure and foolish behaviour. Sunbathing is the foolish practice of lying in the sun and willfully exposing ourselves to the sun for prolonged periods of time and damaging the skin. We are told that sunlight, or more specifically ultraviolet (UV) light, is dangerous and causes cancer. The American Cancer Association has stated that 'The best way to lower the risk of melanoma is to avoid too much exposure to the sun and other sources of UV light'. Everyone is encouraged to use sun block and to apply it frequently.

By throwing a spanner into the conventionally accepted viewpoint Dr Holick has become a rogue and a dissident. This is a good way to sell your book, but often a very uncomfortable place to be in. Colleagues avoid you and grants disappear very quickly.

What did Dr Holick say that was so controversial? 'Your overall wellbeing depends in part on developing an appropriate relationship with the sun'. My mother said the same thing whenever I went to the beach – nothing very exciting there. 'The notion that we have to protect ourselves from the sun all the time is misguided and unhealthy'. Now he's talking, but remember he is moderating exposure. This would begin to make any dermatologist feel really uneasy, especially when Holick claims that creating irrational fear of the sun is causing thousands upon thousands of premature deaths each year. The deaths from osteoporosis, and cancer of the breast, bowel and prostate due to vitamin D deficiency far exceed the deaths from skin cancer. These are powerful words, especially when backed up with the kind of research expected from such a scientist.

Three years before Dr Holick's book, Dr Naylor, a member of the American Academy of Dermatology, made the following statement: 'However, regardless of the outcome of definitive studies on this point, encouraging people to try and boost vitamin D by intentionally exposing themselves to the sun's carcinogenic ultraviolet rays is scientifically indefensible in my view'.¹ Here is the crux of the controversy. An entrenched viewpoint written down in stone that no one likes to change. People speak about the sun as though it only has carcinogenic effects. It also has beneficial effects. Some people in Norway commit suicide because they don't get enough sun.

Is sunlight dangerous and why do we need it? Is it okay to spend most of the day indoors and covered up? Have human beings not spent more time evolving outdoors and is the fact that sunlight and vitamin D production go hand in hand not important?

Rickets was the first recognised disease of vitamin D deficiency. It can arise either from lack of sunshine or deficient amounts of vitamin D in the diet. A textbook of medicine published in 1930 states: 'So prevalent is rickets that it has now become customary to administer the oil (cod liver oil) as a routine in all infants, beginning at about 3 to 4 weeks of age'. Some of us probably still remember receiving the terrible-tasting cod liver oil from our mothers on a regular basis. Cod liver oil is rich in vitamin D. When vitamin D was discovered and synthesised, many foods were fortified with this vitamin and rickets became rare. However, as vitamin D is a fat-soluble vitamin it began to accumulate in the body leading after many years to problems of overdose (weakness, fatigue, headache, nausea, vomiting and diarrhoea). Manufacturers panicked and removed vitamin D from foods.

At the same time more and more people have left the countryside and spend an increasing amount of time indoors working or in front of TVs. Vitamin D becomes an important nutritional factor in the absence

of sunlight. There is much evidence to support the view that a substantial proportion of the US population is exposed to quite suboptimal levels of sunlight, especially during the winter months. There are no UVB rays at that time of year, so we cannot make vitamin D. In addition, in some areas of the world UV light from the sun may be blocked by air pollution, tall buildings and of course the use of sunblock. Dark skin requires longer exposure to sunlight.

According to Dr Holick 'Today we face what is in fact a "medically significant" epidemic of vitamin D deficient people. Forty to 60% of Americans are seasonally or chronically vitamin D deficient. Many who practice dermatology and their supporters in the sunscreen industry have scared the public right out of the sun, the best way to produce the vitamin D the body needs. These "naysayers" have ignored the mountain of peer-reviewed science that demonstrates moderate exposure to natural or artificial sunlight has a powerful beneficial impact on health. Simply put the American Academy of Dermatology and the sunscreen industry have their heads buried in the sand'. Strong stuff!

Does the sun cause more problems than it cures? No doubt excess exposure and repeated sunburn can cause skin cancer, but Dr Holick is talking about reasonable exposure and suggests that it is important for all of us to get our dose of sunshine regularly. What are the risks? According to Holick about 1 200 people die from non-melanoma skin cancer, which is only half of the 1% who develop this type of cancer, but 150 000 people die of diseases that can be prevented by sensible sun exposure without sunscreen. The benefits of sensible sun exposure are worth the risks.

Benefits of vitamin D

An increasing body of evidence^{2,3} suggests that vitamin D has numerous important functions besides its role in bone metabolism. The Vitamin D Council has coined the term vitamin D deficiency syndrome (VDDS) to characterise a group of conditions that seem to be associated with vitamin D deficiency.

- Osteoporosis, osteomalacia and rickets
- Heart disease and hypertension
- Autoimmune disease including multiple sclerosis, rheumatoid disease and type 1 diabetes
- Certain cancers (vitamin D may be the best way for the body to control abnormal cell growth.)
- Seasonal affective disorders, depression and premenstrual syndromes.

Clearly all these conditions are multifactorial in origin but vitamin D deficiency appears to be an important risk factor. By avoiding sunlight and not replacing vitamin D one is adding a risk factor to the background risk factors for a whole range of medical conditions.

Vitamin D and hypertension

Dr Jonathan Wright refers to a substantial proportion of hypertension as 'high-latitude hypertension' and treats it with vitamin D. Vitamin D is able to lower hypertension by addressing one of the major causes of high blood pressure – an excess of angiotensin II in the blood which causes constriction of the blood vessels.⁴ Angiotensin II has other negative effects on the heart and circulation. An enzyme called angiotensin-converting enzyme (ACE) is responsible for these levels. ACE-blocking drugs decrease the levels of angiotensin II and thus cause a lowering of hypertension.

Vitamin D blocks another hormone called rennin which converts angiotensinogen into angiotensin I, which is converted into angiotensin II by ACE.⁵ It seems that vitamin D persuades the rennin-producing gene to slow down. The end result is less angiotensin II and lower blood pressure. Vitamin D can lower blood pressure without the side-effects of ACE-blocking drugs.

Vitamin D analogues, which can be patented, are starting to appear on the market. They will clearly be more expensive and probably have side-effects. Consult your doctor if you plan to use vitamin D to treat hypertension.

Melanoma and sunlight

It is commonly believed that exposure to sunlight leads to skin cancer, including the deadly melanoma. There is the view among dermatologists that exposure without sunscreen will lead to millions of cases of skin cancer in the next decade, but the evidence for this is not clear-cut, and is often contradictory. Sunlight as indicated above is good for one's health, and going on holiday and spending time outside have always felt very healthful. In one often-quoted study⁶ of US navy personnel in San Diego, researchers found that more melanoma occurred among desk workers than among sailors who worked outdoors, and it was more commonly present on the trunk of the body than on the more frequently exposed head and arms.

According to Dr Holick's calculations, 55 American women die prematurely from breast cancer caused by underexposure to sunlight for every one woman who dies prematurely from overexposure to sunlight (non-melanoma skin cancer). Fifty-five to 60 men may die prematurely from underexposure to sunlight for every one who dies prematurely due to overexposure.

How much sunlight?

While excessive exposure and especially sunburn do cause skin cancers, Dr Holick is clearly stating that reasonable exposure is appropriate and good. One needs to take into account the type of skin, time of

day and age of the person. Reasonable exposure will prevent cancers and many other diseases. The benefits far outweigh the risks.

Reasonable exposure means getting out the sun when the skin is slightly pink. According to William B Grant, a top vitamin researcher, 80 - 90% of Americans are vitamin D-deficient and they are all being asked to stay out of the sun or use sun block. He recommends a 15 - 30 minute exposure per day, with at least the hands and face exposed during summer. This applies to young fair-skinned individuals. Darker-skinned people require more exposure time. It is important to go carefully, to build up a tan slowly, and never to burn the skin. The tan is nature's way of protecting the skin. One should also stay away from full sunlight during the heat of the day, i.e. between 10h00 and 14h00, and increase the exposure slowly.

Suntanning booths

While these are regarded as a good source of UVA they may involve risks such as electromagnetic field (EMF) radiation and possibly X-ray radiation emitted from the ends of the bulbs.

Sunblock

Dr Mercola describes sunscreen as a toxic chemical that should never be put on the body. The Food and Drug Administration (FDA) in America regulates sunscreen as an over-the-counter (OTC) drug because it contains active ingredients. There is active penetration of some of these ingredients into the body and not enough information as yet regarding the safety of these products. While there may not be evidence of any carcinogenicity for these chemicals, they add to the load of toxins in the body and should be avoided. This is especially true because of the long exposure combined with conditions of excessive heat. In addition, of course, sunblock reflects UV rays and decreases production of the valuable vitamin D. Dennis *et al.*⁷ reviewed the topic in the *Annals of Internal Medicine* and found that sunblock offered no protection. 'No association was seen between melanoma and sunscreen use'. If one has no choice and needs to be in the sun for prolonged periods then protect the exposed skin using a broad-spectrum sunscreen that absorbs both UVA and UVB and that has a skin protection factor (SPF) of at least 15. Use a cream from a reputable company, taking care with the chemicals it contains. Ensure that your sunscreen contains a good dose of antioxidants (e.g. vitamins C, E and carotenoids).

Recommended doses

It is always a good idea to check blood vitamin D status and levels of calcium before and during the course of treatment. However, calcium status is usually enough and will give an indication whether one is taking too much vitamin D. Excess vitamin D causes an elevation of serum calcium.

The recommended daily allowance (RDA) for vitamin D is 200 IU/day (5 mcg) for people up to the age of 50 years. For people between 51 and 70 the dose is 400 IU/day (10 mcg), and over 70 years of age the dose is 600 IU/day (15 mcg).

These RDA levels are regarded as insufficient by Dr Holick and other experts. Dr John Cannell, a member of the Vitamin D Council, believes that 1 000 IU per day (25 mcg) of vitamin D should be the RDA level for healthy adults who have some sun exposure. Higher levels, even up to 3 000 IU per day may be necessary in ill persons not exposed to much sunlight. These doses are safe and will promote optimal health and reduce the risks of many serious diseases. If the higher doses are used vitamin D blood levels must be checked. The normal level is between 35 and 55 ng/ml.

If exposure to the sun is adequate and the diet is good then probably no supplements are necessary, but in winter, when food is not fortified and where sunlight is often limited, then vitamin D supplements are essential. Salt water fish such as herring, salmon, and sardines, and fish liver oils such as cod liver oil are good sources of vitamin D. Small quantities of vitamin D are also present in eggs, veal, beef, butter and vegetable oils.

Toxicity of vitamin D

In a literature review Veith⁸ stated 'Throughout my preparation of this review, I was amazed at the lack of evidence supporting statements about the toxicity of moderate doses of vitamin D'. He reported that human toxicity probably begins to occur after chronic daily consumption of approximately 40 000 IU/day (1 000 mcg). It seems that humans make at least 10 000 units of vitamin D within 30 minutes of full body exposure to the sun (minimal redness dose).

End note

Cancer and other illnesses are not the end result of a single supplement deficiency, but the end point of a range of factors. In 2001 the National Academy of Sciences published a comprehensive review⁹ showing that the omega 6:3 ratio was the key to preventing skin cancer development. The incidence of malignant melanoma continues to increase dramatically even though people have been avoiding the sun for years.

So enjoy the sun, but in moderation, and know your skin type. Start slowly and increase the time interval. Avoid burning the skin, and take vitamin D, especially in winter. Always add vitamin A and

antioxidant creams to your skin after sun exposure or take them orally.

Vitamin D and sunlight exposure recommendations from the Linus Pauling Institute

- Healthy adults should take a multivitamin supplement that supplies 400 IU (10 mcg) of vitamin D daily.
- In addition, at least 10 - 15 minutes of sun exposure on the arms and legs three times per week.
- Persons over 65 years of age who get minimum sun exposure throughout the year should take an additional 400 IU of vitamin D to provide a total of 800 IU/day.
- The Vitamin D Council recommends at least 1 000 IU/day (25 mcg/day) for healthy adults with a total of about 3 000 IU/day from all sources (sunlight, food and supplements).

A South African plastic surgeon, Dr Des Fernandes, has the following to say about sunlight:

Twenty minutes of sun exposure is usually sufficient to produce the recommended amount of vitamin D. After this the UVA rays begin to destroy the vitamin D formed. We should then go into the shade and at a later time make some more vitamin D. He also believes that skin, which is well dosed with vitamin A will not develop skin cancers as frequently as skin that is deficient in vitamin A. Vitamin A is destroyed by UVA rays so that sun exposure causes vitamin A deficiency allowing conditions to develop that favour the development of skin cancer. Dr Fernandes recommends appropriate sun exposure with good doses of vitamin D and to apply vitamin A plus antioxidant creams for optimum health.

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