



Risks and benefits of sun exposure

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POSITION STATEMENT

Summary statement

A balance is required between avoiding an increase in the risk of skin cancer by excessive sun exposure and achieving enough sun exposure to maintain adequate vitamin D levels.

Sun exposure is the cause of around 99% of non-melanoma skin cancers and 95% of melanomas in Australia¹, however, exposure to small amounts of sunlight is also essential to good health. Ultraviolet radiation B (UVB) is the component of sunlight that is most likely to be responsible for both its beneficial and its harmful health effects. In Australia, where UVB levels are in the high to extreme range for much of the year, sun protective measures to reduce the incidence of skin cancer must continue to be a high public health priority.

The majority of Australians are thought to have sufficient UVB exposure from sunlight to ensure adequate vitamin D production — serum 25-hydroxy vitamin D levels >50 nanomoles/Litre (nmol/L) — to form and maintain healthy, strong bones.

Vitamin D forms in the skin as a result of UVB exposure, but few studies have investigated the amount of UVB that people require to make enough vitamin D₂. There is evidence to suggest that prolonged sun exposure does not cause Vitamin D levels to continue to increase³. Therefore, people should continue to protect themselves from overexposure, especially during peak ultraviolet radiation periods (10 am to 3 pm). Further scientific investigation of the amount of ultraviolet radiation exposure required to ensure adequate vitamin D levels for people of different skin types in Australia is needed.

People who are at risk of vitamin D deficiency may need vitamin D supplementation if their exposure to ultraviolet radiation is not adequate. People living in the southern regions of Australia have a higher risk of vitamin D deficiency, particularly during the winter months.

Recommendations

1. For most people, sun protection to prevent skin cancer is required when the UV index is moderate or above (i.e. UV index is 3 or higher). At such times sensible sun protection behaviour is warranted and is unlikely to put people at risk of vitamin D deficiency.
2. Most people probably achieve adequate vitamin D levels through the UVB exposure they receive during typical day-to-day outdoor activities. For example, it has been estimated that fair skinned people can achieve adequate vitamin D levels (>50 nmol/L) in summer by exposing the face, arms and hands or the equivalent area of skin to a few minutes of sunlight on either side of the peak UV periods on most days of the week. In winter, in the southern regions of Australia where UV radiation levels are less intense, maintenance of vitamin D levels may require 2-3 hours of sunlight exposure to the face, arms and hands or equivalent area of skin over a week.
3. Some people are at high risk of skin cancer. They include people who have had skin cancer, have received an organ transplant or are highly sun sensitive. These people need to have more sun protection and therefore should discuss their vitamin D requirements with their medical practitioner to determine whether dietary supplementation with vitamin D would be preferable to sun exposure.
4. Some groups in the community are at increased risk of vitamin D deficiency. They include naturally dark skinned people, those who cover their skin for religious or cultural reasons, the elderly, babies of vitamin D deficient mothers, and people who are housebound or are in institutional care. Naturally dark skinned people (Fitzpatrick skin type 5 & 6 - rarely or never burns) are relatively protected from skin cancer by the pigment in their skin; they could safely increase their sun exposure. Others on this list should discuss their vitamin D status with their medical practitioner as some might benefit from dietary supplementation with vitamin D.

Vitamin D

Most vitamin D is produced in the skin by exposure to UVB (wavelength 290- 320 nm) from sunlight. It can also be obtained from foods where it occurs naturally such as oily fish, eggs, and meat or fortified foods such as margarine and some milks. However food sources make a relatively small contribution to total vitamin D status. Vitamin D supplements are also readily available without medical prescription over the counter in pharmacies.

Vitamin D production decreases during winter when the intensity of ultraviolet radiation is lower. The body can rely on tissue stores of vitamin D for between 30 and 60 days assuming vitamin D levels are adequate prior to winter³. In most cases, any vitamin D reduction during winter is corrected in summer when more sunlight is received with more time spent outdoors. While this correction may occur, it is still advisable to prevent deficiency during winter as fracture rates increase with deficiency, particularly in older adults. For those over 40 years of age, it is conceivable that annually recurring cycles of low vitamin D during the winter months contributes, at least in part and over many years, to age-related bone loss¹.

There is very little research available to determine exactly how much sun exposure is necessary to maintain adequate vitamin D levels. Variations in age, skin colour, latitude, time of day and time of year makes it impractical to provide prescriptive advice to the population as a whole. Based on available research, it has been estimated that fair skinned people can achieve adequate vitamin D

levels (>50 nmol/L) in summer by exposing the face, arms and hands or the equivalent surface area to sunlight for only a few minutes on either side of the peak UV periods on most days of the week". In winter, in the southern regions of Australia where UV radiation levels are less intense, vitamin D levels may be maintained by approximately 2-3 hours of sunlight exposure accumulated over a week to the face, arms and hands or equivalent surface area. For naturally dark skinned individuals, the required amount of time in the sun will be significantly more than this.

In northern states, the amount of sunlight exposure required to receive adequate vitamin D levels will be significantly less than for southern states because UV radiation levels are higher.

While vitamin D levels of at least 50 nmol/L are recommended, there is emerging evidence that the optimal level to maintain bone health may be as high as 75 nmol/L¹⁰. For the Australian population to achieve this level without putting themselves at greater risk of skin cancer through increased sun exposure, there would be an increased requirement for dietary sources of vitamin D. Given foods with naturally occurring vitamin D currently contribute very little to daily intake for Australians, the fortification of core foods should be considered.

Vitamin D status in Australia has not been widely studied in the general population, however some studies have shown that up to 80% of people in 'at-risk' populations display evidence of deficiencies. Mild vitamin D deficiency (25-50 nmol/L) was noted in 43% of females and moderate or severe vitamin D deficiency (<25 nmol/L) in 11% of females during winter in the Victorian population of Geelong (latitude 38°S)¹³.

Certain groups within the community are at higher risk of vitamin D deficiency because their level of sun exposure is inadequate. These include naturally dark skinned people (who need more sun to make vitamin D), those who cover their skin for religious or cultural reasons, the elderly and people who are housebound or are in institutional care.

Bone and musculoskeletal health

There is good evidence that vitamin D is beneficial for maintaining musculoskeletal health and reducing the risk of bone fracture^{14,15}. The human body needs vitamin D to regulate calcium levels in the blood and to make and maintain healthy, strong bones and for this reason it is important to maintain adequate vitamin D levels all year round¹.

Vitamin D deficiency in infants and children can cause rickets, characterised by muscle and bone weakness and bone deformities. Adults with low vitamin D are at risk of bone and joint pain, muscle and bone weakness, osteoporotic fractures and falls.

Other health conditions

Recently, some studies have been published that suggest possible beneficial effects of sun exposure in the prevention or improvement in outcome of treatment for a number of other diseases including breast, prostate, and colorectal cancer, non-Hodgkin lymphoma, diabetes and multiple sclerosis^{7,16,17,18,19,20,21}. The biological pathways underlying these observed associations are not clear. While vitamin D is likely to be a contributing factor to disease risk reduction, it is not yet clearly known whether there are factors other than vitamin D that is derived from sun exposure that may play a role. There is insufficient evidence to assume that vitamin D supplementation and sun

exposure are equivalent in their beneficial effects. Therefore at this stage, there is insufficient evidence for any definitive action to be taken on these findings or any recommendations to be made, as more research is needed.

Risk Factors for Vitamin D Deficiency

a). Individuals who are at high risk of skin cancer

Certain people are at high risk of skin cancer. They include individuals who have had skin cancer, have received an organ transplant or are highly sun sensitive. These people need to have more rigorous sun protection practices and therefore should discuss their vitamin D requirements with their medical practitioner to determine if dietary supplementation rather than sun exposure is appropriate.

b). People with dark skin

People with naturally very dark skin require more ultraviolet radiation exposure to produce adequate levels of vitamin D as the pigment in their skin reduces ultraviolet radiation absorption²². When people with dark skin cover themselves for religious or cultural reasons, this further reduces the ultraviolet radiation available for vitamin D production. Vitamin D supplementation is likely to be required for this population group. During early pregnancy is an important time to screen for vitamin D deficiency in this group and if necessary provide supplements.

C). Older adults

Vitamin D deficiency is a problem in frail, housebound or institutionalised older Australians. It is related to increasing age, and low levels of exposure to sunlight⁴. As the human body ages, it becomes less efficient at synthesising new bone and making vitamin D, adding to the problem²³. For this reason, older adults who are vitamin D deficient increase their risk of osteoporosis, falls, and fractures²⁴.

The National Health and Medical Research Council recommends that older adults boost their vitamin D intake by taking a daily supplement at the recommended dose or as advised by a medical practitioner²⁵.

Older adults who are not at high risk of skin cancer and who are mobile should ensure they have incidental exposure to sunlight if vitamin D supplementation is not available or impractical, especially at times when ultraviolet radiation is less likely to cause other health problems.

d). People who wear concealing clothing

Some people, especially women who wear concealing clothing for religious or cultural reasons, are at increased risk of vitamin D deficiency because of very low skin exposure to sunlight²⁶. Vitamin D supplementation is likely to be required for this population group if culturally acceptable spaces are not available where they can expose more of their skin to sunlight. Again pregnancy is an important time to screen for vitamin D deficiency and if necessary provide supplements.

e). Babies and infants of vitamin D deficient mothers

Babies and infants of mothers with inadequate vitamin D levels are also likely to be vitamin D deficient²⁷. Babies most at risk are those who are exclusively or partially breastfed by mothers who are vitamin D deficient.

Sun protection and your risk of vitamin D deficiency

There are times during the day or year when it is safe to go outside without the need for sun protection. This would normally be when the UV index is less than 3, such as in the early morning or late afternoon or during winter in the southern regions of Australia. As a result, people in southern regions may not need to be concerned about sun protection from May to August unless they are at high altitudes, near highly reflective surfaces such as snow or water or unless they have a high risk of skin cancer.

Table 1 provides guidance as to the monthly average peak UV levels by month for selected Australian capital cities that can identify (see shaded areas) the months of the year by region when sun protection may not be required. For other months by region, sun protection will be required except for when the UV Index is less than 3, such as early morning and late afternoon. The UV (Ultraviolet Radiation) Index is a measure of the amount of UV from the sun at the earth's surface at solar noon on a particular day. Table is from Gies et al²⁸. Hobart data is supplied from personal communication from the Australian Radiation Protection and Nuclear Safety Agency# .

While sun exposure is important for the production of vitamin D, it is important to keep in mind that unprotected sun exposure in Australia carries a significant risk of skin and eye damage and skin cancer. Consistent and deliberate sun exposure without any form of sun protection when the UV index is 3 or above is not recommended, even for those diagnosed with vitamin D deficiency.

For fair skinned people, the small amount of sunlight received on the face, hands, arms or legs during normal outdoor daily activities is usually all that is required to absorb appropriate levels of ultraviolet radiation at these times. Therefore sensible sun protection behaviour should not put people at risk of vitamin D deficiency.

What are the alternatives?

Where there is vitamin D deficiency, oral vitamin D supplementation - rather than relying on sun exposure - may be necessary. A medical practitioner should be consulted about whether there is need for vitamin D supplementation. Given the health risks associated with the use of solariums, it is not recommended that they be used to boost vitamin D levels²⁹.

Table 1. UV Index in selected Australian cities averaged over the days in each month.

Location	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Darwin	11	12	11	6	8	7	7	9	11	11	11	10
Brisbane	11	10	9	6	4	3	3	5	7	8	10	11
Perth	11	10	8	5	3	2	2	4	6	8	9	10
Sydney	10	9	7	5	3	2	2	3	5	7	8	8
Adelaide	11	10	7	5	2	2	2	2	5	7	9	10
Melbourne	9	9	6	4	2	1	1	2	4	6	8	9
Hobart#	8	7	4	3	1	1	1	2	3	4	6	7

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