

Vitamin D and UV radiation



The sun's ultraviolet (UV) radiation is both a major cause of skin cancer and the best natural source of vitamin D.¹ In Victoria we need to balance the risk of skin cancer from too much sun exposure with maintaining adequate vitamin D levels.

What is vitamin D?

Vitamin D is a hormone that controls calcium levels in the blood. It is needed to develop and maintain healthy bones, muscles and teeth and is also important for general health.^{2,3}

Vitamin D is made through a series of biochemical processes starting when the skin is exposed to the sun's UV rays. Vitamin D also naturally occurs in fish and eggs, while margarine and some types of milk have added vitamin D. Food however only makes a small contribution to the body's overall vitamin D levels and it is difficult to get enough from diet alone.

How do I take a balanced approach to UV radiation exposure?

The body can only absorb a certain amount of vitamin D at a time. Prolonged sun exposure does not result in your vitamin D levels increasing further, but does increase your risk of skin cancer. Short periods of sun exposure may be more efficient at producing vitamin D.⁴ Daily exercise will also assist your body to produce vitamin D.⁵

In Victoria from **September to April** (when the UV Index is 3 and above) most people need sun protection. During these months, most Victorians with fair to olive skin will get enough vitamin D during their normal day-to-day activities by exposing their face, arms and hands for a few minutes a day. This should be done mid-morning or mid-afternoon. Be extra cautious in the middle of the day when UV levels are most intense. People with naturally very dark skin may need three to six times this exposure.⁶

From **May to August**, to help with vitamin D, most Victorians with fair to olive skin need two to three hours of midday winter sun exposure to the face, arms and hands (or an equivalent area of the skin), spread over a week. Sun protection is not required unless near highly reflective surfaces such as snow, outside for extended periods or when the UV reaches 3 and above. People with naturally very dark skin may need three to six times this exposure.⁶

The use of solariums is not recommended to boost vitamin D levels due to associated health risks.

Will sunscreen stop you from making enough vitamin D?

Sensible sun protection does not put people at risk of vitamin D deficiency. When sunscreen is tested in lab

conditions it has been shown to decrease vitamin D production, however regular use in real life has been shown to have little effect on vitamin D levels. This is probably because people who use more sunscreen spend more time in the sun, so naturally will have higher vitamin D levels.^{7,8,9}

Who is at risk of vitamin D deficiency?

- **People with naturally very dark skin.** The pigment in skin (melanin) acts as a filter to ultraviolet B (UVB) radiation and reduces synthesis of vitamin D.⁶
- **People with little or no sun exposure.** This group includes:
 - older adults, especially the frail, who are in medium to long-term residential care, aged care or housebound¹⁰
 - people who wear concealing clothing for religious or cultural purposes¹¹
 - people who deliberately avoid sun exposure for cosmetic or health reasons
 - people at high risk of skin cancers
 - people who are hospitalised long-term
 - people with a disability or chronic disease
 - people in occupations such as taxi drivers, factory workers, night-shift workers.
- **Breast fed babies who fall into the risk categories above or have mothers with low vitamin D.** Breast milk contains little vitamin D and infants depend on maternal stores initially (formula milk is fortified with vitamin D).¹²
- **People with conditions** (obesity, end stage liver disease, renal disease and fat malabsorption syndromes such as cystic fibrosis, coeliac disease, inflammatory bowel disease) **or medications affecting vitamin D metabolism.**



People in these groups, and others who are concerned about their vitamin D levels, should talk with their doctor. Vitamin D levels can be checked with a simple blood test. Sun exposure may not be enough for some people and a vitamin D supplement may need to be considered, especially in winter.

Low vitamin D may have no obvious symptoms, but without treatment, it can have significant health effects including bone and muscle pain, poor bone mineralisation (softer bones) leading to rickets (bone deformity) in children and osteomalacia in adults. There have also been links with an increased risk of bowel cancer, heart disease, infections and auto-immune diseases, although more research is needed to determine whether increasing vitamin D levels can prevent these conditions.

What is considered naturally very dark skin?

All skin types can be damaged by too much UV radiation. However, naturally very dark-skinned people (skin type 5 and 6 on Table 1) need three to six times the exposure time and supplementation may be required depending on their vitamin D levels.^{6,13}

Skin type chart

NATURAL SKIN COLOUR	Very fair, pale white, often freckled	Fair, white skin	Light brown	Moderate brown	Dark brown	Deeply pigmented dark brown to black
						
UV SENSITIVITY & TENDENCY TO BURN	Highly sensitive Always burns, never tans	Very sensitive Burns easily, tans minimally	Sensitive Burns moderately, usually tans	Less sensitive Burns minimally, tans well	Minimal sensitivity Rarely burns	Minimal sensitivity Never burns
SKIN CANCER RISK	Greatest risk of skin cancer	High risk of skin cancer	High risk of skin cancer	At risk of skin cancer	Skin cancers are relatively rare, but those that occur are often detected at later, more dangerous stage. Increased risk of low vitamin D levels.	Skin cancers are relatively rare, but those that occur are often detected at later, more dangerous stage. Increased risk of low vitamin D levels.

Skin Type Table adapted by SunSmart Victoria (2011) using Fitzpatrick Scale (1975). Images courtesy Cancer Research UK.

Do people with naturally very dark skin need to worry about sun exposure?

Yes – care still needs to be taken in the sun. Even though skin cancer is less common for people with naturally very dark skin, those skin cancers that do occur are often detected at a later, more dangerous stage. People with this skin type do not normally need to apply sunscreen and can safely tolerate relatively high levels of UV radiation without getting burnt.¹⁴

However, regardless of skin colour, the risk of eye damage remains. Cataracts have blinded around 16 million people worldwide. According to the World Health Organization, sun exposure may be a factor in up to 20% of cataracts, especially in countries close to the equator, such as India, Pakistan and parts of Africa.¹⁴ High levels of UV radiation have also been linked to harmful effects on the immune system.¹⁴

It is recommended that all people, regardless of skin type, wear a hat and/or sunglasses to protect their eyes.

What about children with naturally very dark skin at school and in care?

Children at school and in care usually spend at least 60 minutes a day outdoors. It is important for children with naturally very dark skin to have some sun exposure during these periods. These children do not normally need to apply sunscreen because of the high level of melanin in their skin. This is a decision for their families to make. It is recommended that all children wear a hat (and sunglasses if appropriate) to protect their eyes and face.

Further information and resources

More information is available at sunsmart.com.au or contact the Cancer Council Helpline on 13 11 20.

The *Risks and Benefits of Sun Exposure* position statement is available at www.cancer.org.au/File/PolicyPublications/PSRisksBenefitsSunExposure03May07.pdf

The SunSmart app with vitamin D tracker is a handy, free tool that allows users to find out if they are getting enough sun to help with vitamin D and alerts the user of their daily sun protection needs. Download free from Apple and Android stores.

References

- 1 Calvo MS, Whiting SJ, Barton CN. Vitamin D fortification in the United States and Canada: current status and data needs. *American Journal of Clinical Nutrition* 2004; 80(suppl) 1710S–16S.
- 2 Papadimitropoulos E, Wells G, Shea B, Gillespie W, Weaver B, Zytaruk N, Cranney A, Adachi J, Tugwell P, Josse R, Greenwood C, Guyatt G. VIII: Meta-analysis of the efficacy of Vitamin D treatment in preventing osteoporosis in postmenopausal women. *Endocrine Reviews* 2002; 23(4): 560–9.
- 3 Trivedi DP, Doll R, Khaw KT. Effect of four monthly oral vitamin D3 (cholecalciferol) supplementation on fractures and mortality in men and women living in the community: randomised double blind controlled trial. *British Medical Journal* 2003; 326(7387): 469–75.
- 4 Norman AW. Sunlight, season, skin pigmentation, vitamin D, and 25-hydroxyvitamin D: integral components of the vitamin D endocrine system. *American Journal of Clinical Nutrition* 1998; 67: 1108–10.
- 5 Scragg R, Holdaway I, Jackson R, Lim T. Plasma 25-hydroxyvitamin D3 and its relation to physical activity and other heart disease risk factors in the general population. *Annals of Epidemiology* 1992; 2(5): 697–703.
- 6 Clemens TL, Adams JS, Henderson SL, Holick MF. Increased skin pigment reduces the capacity of skin to synthesise vitamin D3. *Lancet* 1982; 1(8263): 74–6.
- 7 Marks R, Foley PA, Jolley D, Knight KR, Harrison J, Thompson SC. The effect of regular sunscreen use on vitamin D levels in an Australian population. Results of a randomized controlled trial. *Archives of Dermatology* 1995; 131(4): 415–21.
- 8 Farrerons J, Barnadas M, Rodriguez J, Renau A, Yoldi B, Lopez-Navidad A, Moragas J. Clinically prescribed sunscreen (sun protection factor 15) does not decrease serum vitamin D concentration sufficiently either to induce changes in parathyroid function or in metabolic markers. *British Journal of Dermatology* 1998; 139(3): 422–7.
- 9 Norval M, Wulf HC. Does chronic sunscreen use reduce vitamin D production to insufficient levels? *British Journal of Dermatology* 2009; 161(4): 732–6.
- 10 Riggs BL. Role of the vitamin D-endocrine system in the pathophysiology of postmenopausal osteoporosis. *Journal of Cellular Biochemistry* 2003; 88(2): 209–15.
- 11 Thomson K, Morley R, Grover SR, Zacharin MR. Postnatal evaluation of vitamin D and bone health in women who were vitamin D-deficient in pregnancy, and in their infants. *Medical Journal of Australia* 2004; 181(9): 486–8.
- 12 Nozza J, Rodda C. Vitamin D deficiency in mothers of infants with rickets. *Medical Journal of Australia* 2001; 175(5): 253–5.
- 13 Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. *Archives of Dermatology* 1988; 124(6): 869–71.
- 14 World Health Organization. *The known health effects of UV*. World Health Organization 2008. Retrieved from www.who.int/uv/faq/uvhealthfac/en/index.html on 15 December 2008.

This information is based on current available evidence at the time of review. It can be photocopied for distribution. Vitamin D information also available in other languages.

Latest update: November 2011



Cancer Council
Victoria

