

Ultraviolet (UV) radiation and vitamin D – A special note for people with dark skin



What is vitamin D?

Vitamin D is needed to regulate calcium levels in the blood. It is also necessary for the development of healthy bones, muscles and teeth. Other possible benefits include protective effects against various cancers, heart disease and some auto-immune disorders.¹ Vitamin D is stored in fat and muscle and slowly released. The body can rely on tissue stores of vitamin D for anywhere between 30 and 90 days.² It is important to maintain adequate vitamin D levels all year round.

Vitamin D is formed in the skin when it is exposed to UVB radiation from the sun. Vitamin D can also be obtained from foods in which it occurs naturally, such as oily fish, eggs and meat, or fortified foods, such as margarine and some milk products. However, food sources make a relatively small contribution to total vitamin D status. Low concentration vitamin D supplements are also readily available, without medical prescription, over the counter in pharmacies.

How much sun exposure is healthy?

Very little research is available to determine exactly how much sun exposure is necessary to maintain adequate vitamin D levels.³ Vitamin D levels are influenced by variations in age, skin colour, latitude, time of day and time of year. This makes it impractical to provide prescriptive advice to the population as a whole or to people with dark skin, in particular.⁴

The level of melanin in the skin determines skin colour / pigmentation. Although all skin types can be damaged by too much UV radiation, skin colour appears to be an important factor in influencing both susceptibility to skin cancer and vitamin D status. People with fair skin are most at risk of skin cancer (including melanoma). Those with naturally dark skin require more ultraviolet radiation exposure to produce adequate levels of vitamin D.

Skin colour classification

The Fitzpatrick skin type scale is an international skin type classification, which ranges from very fair (skin type I) to very dark (skin type VI).⁵

Fitzpatrick Skin Type Classification

Skin type I	Always burns, never tans; sensitive to sun exposure; redheaded, freckles
Skin type II	Burns easily, tans minimally; fair-skinned, blue, green or gray eyes
Skin type III	Burns moderately, tans gradually to light brown
Skin type IV	Burns minimally, always tans well to moderately brown; olive skin
Skin type V	Rarely burns, tans profusely to dark; brown skin
Skin type VI	Rarely burns, least sensitive; deeply pigmented skin

Skin Type/Colour and Ethnicity - Considerations for New Zealand

Currently no objective measures of skin colour, or its relationship to ethnicity are used in the New Zealand population⁶. Although there will be some correlation between skin colour and ethnicity at a group or population level, no direct relationship can be assumed at an individual level. A small study found that “self-defined Maori include a full range of skin types and a sizable proportion with a tendency to sunburn. This is justification for concern about excessive sun exposure and potential skin cancer risk among Maori.”⁷

People with naturally very dark skin (i.e. Fitzpatrick skin type 5 & 6) who rarely or never burn as a result of sun exposure are relatively protected against skin cancer by the large amount of melanin (dark pigment) in their skin. People with this type of skin often come from or can trace ancestry back to countries around central and northern Africa. In New Zealand, an increasing proportion of the population has Maori, Pacific and Asian ancestry. Many in these groups are likely to have only moderately dark skin (i.e. Fitzpatrick skin types 3 & 4) that burns moderately or minimally, and they may still be susceptible to skin cancer.

If you have dark skin and cover yourself for religious or cultural reasons, this further reduces the UV radiation available for vitamin D production. In such situations, it is advisable to have vitamin D levels checked by your GP, as vitamin D supplementation is likely to be required.

During winter, particularly in southern New Zealand where UV radiation levels are very low, vitamin D status may drop below adequate levels. Additional measures to achieve adequate vitamin D status may be required, particularly

for those at risk of vitamin D deficiency. Although summer levels of vitamin D influence winter levels, body stores decline through winter.

What about babies and infants of vitamin deficient mothers?

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

What about children at school?

Children at school may spend more than 60 minutes outdoors during recess times. However, given that greater sun exposure time is needed for people with dark skin to produce adequate vitamin D levels, it is important for such children to receive some sun on their skin during these periods. Although all children need to take care when out in the sun, children with very dark skin (i.e. Fitzpatrick skin types 5 & 6) do not normally need to apply sunscreen because of their high level of melanin. For short periods, such as during lunchtime, children with moderately dark skin (Fitzpatrick skin type 4) may not need to apply sunscreen. This is a decision for their families to make. However, we recommend that all children should wear a hat to protect their eyes and face. As is the case with babies and infants, where there is vitamin D deficiency, talk to your medical practitioner about whether there is need for vitamin D supplementation.

Do we need to worry about sun exposure?

Yes - care still needs to be taken in the sun. Even though the incidence of skin cancers is lower among people with dark skin, the skin cancers that do occur may more often be detected at a later, more dangerous, stage in development. Excessive, harmful sun exposure can also cause damage to the eyes, such as contributing to the development of cataracts.

High levels of UV radiation have also been linked to harmful effects on the immune system.

Summing Up.

- Further scientific investigation of the amount of UV radiation exposure required to ensure adequate vitamin D levels for people of different skin types in New Zealand is needed.⁸
- If you have very dark skin, it may not be necessary for you to apply sunscreen.
- If you are at risk of vitamin D deficiency, and not able to increase your sun exposure, visit your family doctor for a blood test and ensure you have regular follow-ups. Take vitamin D supplements if advised by your family doctor, ensure you have a well balanced diet, and exercise moderately each day to maintain healthy bones.
- The risk of other health effects related to sun exposure, such as eye damage, skin damage, and immunosuppression are independent of skin colour.
- It is still beneficial for you to wear a broad brimmed hat to protect your eyes and other sensitive areas of your face.

References

1. Scragg, R. *Vitamin D, Sun exposure and Cancer*. A review prepared for the Cancer Society of New Zealand. School of Population Health, University of Auckland, September 2007.
2. Norman, A.W. Sunlight, season, skin pigmentation, vitamin D, and 25-hydroxyvitamin D: integral components of the vitamin D endocrine system *Am J Clin Nutr* 1998; 67: 1108-1110.
3. Cancer Society of New Zealand., [The Risks and Benefits of Sun Exposure in New Zealand.](http://www.cancernz.org.nz/Uploads/CSNZ_PS_VitaminD_Risks_Benefits_SunExposure_final.pdf) http://www.cancernz.org.nz/Uploads/CSNZ_PS_VitaminD_Risks_Benefits_SunExposure_final.pdf
4. Lucas R.M., Repacholi, M.H., McMichael, A.J. Is the current public health message on UV exposure correct? *Bulletin of the World Health Organization* 2006; 84(6): 485– 491.
5. Fitzpatrick, T.B. The validity and practicality of sun-reactive skin types 1 through IV. (Editorial). *Archives Dermatology* 1988; 124.
6. Callister, P. *Skin colour: Does it matter in New Zealand? New Zealand Policy Quarterly*, forthcoming.
7. Reeder, A.I. *Results from the Maori respondents included in the national survey of awareness, understanding & response to sun protection messages in media weather reports*. Social & Behavioural Research in Cancer Group, Otago University, 2001.
8. Scragg, R, McKenzie, R & Reeder, A.I. *Quantifying the association between sun exposure and vitamin D status in New Zealanders*. Health Research Council 2007 funded project ongoing.