



POSITION STATEMENT

The Risks and Benefits of Sun Exposure in New Zealand

Introduction

In June 2005 the SunSmart Partnership (Cancer Society of New Zealand and the Health Sponsorship Council) convened a meeting of experts and key stakeholders to discuss the risks and benefits of sun exposure in New Zealand. This position statement was developed as a result of discussions at the meeting. The position statement is supported by the Cancer Society of New Zealand, the Health Sponsorship Council, Osteoporosis New Zealand, the New Zealand Dermatological Society, the National Institute of Water and Atmospheric Research (NIWA), the Ministry of Health and the New Zealand Food Safety Authority.

The position statement draws heavily on work from Australia, particularly, the *Position Statement on the Risks and Benefits of Sun Exposure* approved by the Australian and New Zealand Bone and Mineral Society, Osteoporosis Australia, the Australasian College of Dermatologists and the Cancer Council Australia and the *Position Statement of the Australian and New Zealand Bone and Mineral Society, Osteoporosis Australia and the Endocrine Society of Australia on Vitamin D and Bone Health in Australia and New Zealand*.

The SunSmart Partnership wishes to thank Australian colleagues in the organisations listed above for their guidance and also the members of the New Zealand Expert Advisory Group who developed the New Zealand Position Statement (listed in Appendix 1).

There are both beneficial and detrimental effects of ultraviolet radiation (UVR). Excessive UVR exposure can be damaging to health. Exposure to UVR is the cause of over 90% of all skin cancer cases^{1,2}. Skin cancer is the most common cancer in New Zealand with an estimated 50,000 or more new cases and around 250 deaths each year^{3,4}.

Adequate vitamin D status is essential for general health. Vitamin D is necessary for bone, joint, muscle and neurological function. The link between sunlight exposure, vitamin D levels and osteoporosis is well established⁵.

The main source of vitamin D in Australia and NZ is exposure to sunlight. Some UVR exposure is important for vitamin D production. Because of this, a balance is required between avoiding an increased risk of skin cancer and maintaining adequate vitamin D levels. Sensible sun protection behaviour should not put people at risk of vitamin D deficiency.

Summary of Position Statement

- 1. In most situations, sun protection to prevent skin cancer and sun damage to the skin is required during times when the ultraviolet index (UVI)^A is raised. At such times when the UVI is higher than or equal to 3, sensible sun protection behaviour is warranted and is unlikely to put people at risk of vitamin D deficiency.*

When the UVI is low (1 or 2) no sun protection is required.

- 2. During the summer months most people should be able to achieve adequate vitamin D (blood 25-hydroxyvitamin D) levels through incidental outdoor UV exposure outside peak UV times^B.*

As an example, someone who burns easily in the sun (skin type 1 or 2)^C may only need 5 minutes of daily summer sun exposure before 11am and after 4pm (to the face, hands and forearms) to achieve adequate vitamin D levels whereas someone who tans more easily or has darker skin (skin type 5 or 6) will need more time e.g., up to 20 minutes.

Deliberate exposure at peak UV times is not recommended as this increases the risk of skin cancer, eye damage, and photo aging.

During winter, particularly in southern New Zealand, where UV radiation levels are dramatically lower, 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. Summer levels of vitamin D influence winter levels of vitamin D because body stores decline in winter.

- 3. 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 (photosensitive)^D.*

People at high risk 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 recommended.

^A The UV Index is a measure of the intensity of UV radiation. The larger the number, the more intense the UV. In New Zealand, its maximum summer value is generally about 12, but it can exceed 13 in the far North. In winter it reaches peak values of 1 or 2. Values of 10 or more should be considered as "extreme". At high altitude tropical sites (e.g. Mauna Loa Observatory, Hawaii), the UV Index can exceed 20. (From www.niwa.cri.nz)

^B Peak UV times in NZ are 11.00AM – 4.00PM during daylight savings months.

^C See Appendix 2 for definition of skin types.

^D See Appendix 2 for definition of photosensitivity.

4. *Some groups in the community are at increased risk of vitamin D deficiency. These include the elderly, babies of vitamin D deficient mothers, people who are housebound or are in institutional care, people with darker skin types and those who cover their skin for religious or cultural reasons.*

For people with a higher risk of vitamin D deficiency, status should be discussed with their medical practitioner.

There needs to be an appropriate response from the health sector – including policy, research, and primary care to respond to this increased risk.

5. *People who have darker skin (skin types 5 and 6) are at higher risk of vitamin D insufficiency and at lower risk of skin cancer.*

This may have implications for the health of Maori, Asian and Pacific communities, especially those living further south.

Vitamin D metabolism

In New Zealand the main source of vitamin D is exposure to sunlight. It is well established that Vitamin D forms in the skin as a result of exposure to UVB in sunlight. However there are very few studies currently available that have investigated the amount of UVB that people require to synthesise adequate vitamin D₃. It has been experimentally observed that exposure of the whole of the body surface to 10-15 minutes of noonday sun in summer at mid-latitudes (approximately 1 minimal erythemal dose for untanned skin) is comparable to 375ug (15,000 IU) of vitamin D taken orally⁶. These data have been scaled to infer that exposure of hands, face and arms to around one-third of a minimal erythemal dose should produce around 25ug (1,000 IU) of vitamin D. The amount of vitamin D synthesised from sunlight decreases with age and with increasing skin pigmentation. People who have darker skin (skin types 5 and 6) are at higher risk of vitamin D insufficiency and at lower risk of skin cancer because the pigment in their skin reduces UV absorption⁷.

Vitamin D₃ and D₂ made in the skin and/or ingested are transported to the liver and metabolised to 25-hydroxyvitamin D.

Vitamin D function

Several recently published studies suggest beneficial effects of sun exposure in the prevention or improvement of outcome of a number of diseases including breast, prostate and colorectal cancer, non-Hodgkin lymphoma, cardiovascular disease, diabetes and autoimmune diseases such as multiple sclerosis^{8,9,10,11}.

The mechanism for vitamin D health-related benefits has been linked to the regulatory role of 25-hydroxyvitamin D on cellular growth both in normal and cancer cells¹².

A number of New Zealand studies have shown that low vitamin D status is associated with cardiovascular disease and diabetes^{13,14}. Although these studies found no direct association between 25-hydroxyvitamin D and obesity assessed by Body Mass Index (BMI)^{15,16}, recent unpublished work found both abdominal obesity, as measured by waist circumference and BMI were associated with low serum vitamin D levels¹⁷.

There is insufficient evidence at present to make any recommendations related to vitamin D and cardiovascular disease, diabetes or obesity. However, recommendations should be reviewed when new evidence becomes available.

Vitamin D insufficiency and deficiency

It has been documented that vitamin D levels are lower in the obese^{18,19} and those with metabolic and insulin resistance syndromes^{20,21}.

Some groups in the community are at increased risk of vitamin D deficiency. These include the elderly, babies of vitamin D deficient mothers, people who are housebound or

are in institutional care, people with darker skin types and those who cover their skin for religious or cultural reasons.

Vitamin D deficiency in children can result in rickets, characterised by bone and muscle weakness and bone deformities. For adults with low vitamin D status problems may include osteoporotic fractures, bone and joint pain, falls, muscle and bone weakness and difficulty walking²².

Vitamin D status in New Zealand

There is debate about appropriate cut-off levels for vitamin D status. For analysis of the National Nutrition Survey (NNS) data 17.5 nmol/L serum 25-hydroxyvitamin D was used as the cut-off for deficiency and 50 nmol/L serum 25-hydroxyvitamin D was used as the cut-off for insufficiency. Originally the analysis was done using 37 nmol/L serum 25-hydroxyvitamin D, but, 50 nmol/L is more consistent with overseas estimates of insufficiency.

Analysis of the NNS shows that 52% of females and 45% of males had insufficient vitamin D levels and 4% of females and 2% of males had vitamin D deficiency. There are large seasonal variations in mean vitamin D levels, ranging from 36 nmol/L in spring to 69 nmol/L in summer. For New Zealand females there is an increase in vitamin D insufficiency with age, but, the same trend is not seen in New Zealand males. Vitamin D insufficiency and deficiency were highest amongst Pacific adults (females and males) followed by Maori and New Zealand European and Other²³. Ethnic differences in 25-hydroxyvitamin D were also seen in an earlier New Zealand Workforce Study, where Pacific adults had the lowest levels, followed by Maori, with Europeans levels highest²⁰.

Very little information exists on optimal vitamin D levels in children. Analysis of the Children's Nutrition Survey (CNS) shows that approximately one third of New Zealand children have levels of 25-hydroxyvitamin D of less than 37.5 nmol/L. Pacific children have the highest levels of insufficiency followed by Maori and New Zealand European²⁴.

Vitamin D is important for bone development in infants^{25,26} and deficiency can lead to the development of rickets²⁷. Vitamin D deficiency is not usually dietary in origin but due to insufficient sunlight exposure. There is a lack of data on the vitamin status of exclusively breastfed babies in New Zealand, but, most babies in New Zealand are likely to receive enough UVR exposure to maintain healthy vitamin D levels.

Mothers of breastfed infants should receive adequate advice about the need to ensure their baby has appropriate exposure to sunlight (outside of the peak UVR times). There is no evidence at present to support the routine use of vitamin D supplements for breastfed babies in New Zealand²⁸. Babies of vitamin D deficient mothers, darker skinned babies and babies that are covered up for cultural or religious reasons may be at increased risk of vitamin D deficiency.

Elderly people in New Zealand have been found to be at increased risk of low vitamin D status, particularly those who are house-bound or in institutionalised care^{29,30,31,32}.

UVR in New Zealand

The issues of high summer UVR and low winter UVR are of particular relevance to New Zealanders. Over our latitude range there are huge variations in daily peak UVR which in New Zealand ranges from peak UVI values of 14 in the summer in the North to less than one tenth that in the winter in the South. The main contributor to these differences is the smaller solar zenith angle (i.e. higher sun) in summer and the correspondingly shorter atmospheric path of the radiation. However, seasonal differences in Sun-Earth separation, ozone and our unpolluted air also contribute. The wide variations in day length between winter and summer, especially in the South of New Zealand contribute to even larger seasonal variations in daily dose of UVR³³.

Skin cancer prevention messages in New Zealand

The Cancer Society has been actively promoting skin cancer prevention for several decades in New Zealand. In the early 1990s the Health Sponsorship Council also began promoting sun protection messages with the brand *SunSmart*. The two agencies now work together to promote sun protection messages under the SunSmart Partnership. The sun protection messages promoted by the Partnership are:

During daylight savings months between 11am and 4pm when the ultraviolet rays are fierce.....

Slip into a shirt and **Slip** into some shade;
Slop on some sunscreen before going outdoors;
Slap on a hat with a brim or a cap with flaps and
Wrap on a pair of sunglasses.

In 2003 the SunSmart Partnership developed a new communications strategy to promote the UVI. The UVI is the internationally accepted measure of UVR intensity and is promoted by the World Health Organization as part of sun protection messages³⁴. Prior to this the Cancer Society and the Health Sponsorship Council had jointly sponsored the provision of both the Burn Time and the UVI to New Zealand media for use in communicating UVR intensity. Research by the Cancer Society showed that the Burn Time was misinterpreted by the public and as a result the behaviours adopted were adding to the risk of sun burning³⁵. Extensive qualitative research was funded by the Partnership to develop user friendly graphics and messages for the UVI³⁶.

The sun protection messages are specified for daylight savings months. There are no sun protection messages given relating to winter months. There is no evidence that the sun protection messages promoted in New Zealand have affected vitamin D levels.

There is no known health benefit from sun exposures that result in tanning or burning. The use of sun beds and sun lamps is not recommended as there is no evidence of any health benefits and there are risks. The hypothesis that sun bed use is associated with increased risk is supported by the epidemiological data for melanoma and non-melanoma skin cancers³⁷.

Ethnicity and Skin Type -Considerations for New Zealand

People who have darker skin (skin types 5 and 6) are at higher risk of vitamin D insufficiency and at lower risk of skin cancer. This may have implications for the health of Maori, Asian and Pacific communities. Further research is required to describe the risk related to skin cancer and vitamin D insufficiency for Maori, Pacific and Asian communities.

Skin type is more relevant than ethnicity as a basis for messages related to UV exposure. Pacific Peoples, Asian and Maori have not been targeted in sun protection messages in New Zealand. There is concern in some Maori and Pacific communities that the perception exists amongst Maori and Pacific People that they are not at risk of skin cancer (even though there is a range of skin colour for Maori and Pacific Peoples).

In New Zealand, Maori, as tangata whenua, have a special relationship with the Crown via the Treaty of Waitangi. Further consultation is required with Maori before specific recommendations can be considered.

Further consultation is also required with Pacific and Asian communities to determine how best to communicate issues of risk related to skin cancer and vitamin D insufficiency.

Alternative sources of vitamin D to sunlight

Vitamin D₃ is found in small quantities in a few foods such as fatty fish (salmon, sardines and mackerel), meat (particularly liver), eggs and foods fortified with vitamin D. Adequate vitamin D is unlikely to be achieved through dietary means alone.

The food supply could potentially be used to improve vitamin D status in New Zealand, by extending the current voluntary permissions for fortification with vitamin D or by introducing mandatory fortification with vitamin D.

Where there is vitamin D deficiency or risk of deficiency, oral vitamin D supplementation may be necessary. This should be discussed with a medical practitioner.

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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

Photosensitivity

Photosensitivity reactions are another problem caused by exposure to sunlight. These can be due to medicines taken internally and medicines or toiletries applied topically to the skin. They appear as abnormal reactions to normal exposure to sunlight. For example, they might involve someone burning much more quickly than usual, or developing itching, a rash or skin discolouration on skin exposed to sunlight.

The abnormal skin response can be:

- the development of a skin rash,
- an exacerbation of an existing rash,
- an exaggerated sunburn,
- symptoms such as pruritus (itchy skin)

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