Position Statement
The Risks and Benefits of Sun Exposure in New Zealand

Introduction

In July 2007, the Cancer Society of New Zealand convened a meeting of experts and key stakeholders to:

1) review recent evidence on ultraviolet radiation (UVR) exposure, vitamin D and cancer;
2) revise *The Risks and Benefits of Sun Exposure in New Zealand* Position Statement 2005.

This position statement is supported by the Cancer Society of New Zealand, Health Sponsorship Council, Ministry of Health, New Zealand Dermatological Society, Osteoporosis New Zealand, and the National Institute of Water and Atmospheric Research (NIWA).

This position statement draws extensively on work from Australia, particularly *The Position Statement on the Risks and Benefits of Sun Exposure 2007* approved by the Australian and New Zealand Bone and Mineral Society, Osteoporosis Australia, the Australasian College of Dermatologists, and the Cancer Council Australia. This work is also informed by the *Position Statement on Vitamin D and Bone Health in Australia and New Zealand* of the Australian and New Zealand Bone and Mineral Society, Osteoporosis Australia, and the Endocrine Society of Australia.

The Cancer Society wishes to thank colleagues from The Cancer Council Australia for their guidance and also thank the members of the New Zealand Expert Advisory Group who developed the New Zealand Position Statement (listed in Appendix 1).

Summary statement

This Position Statement is intended to highlight both the risks and benefits of sun exposure in New Zealand. Current research suggests that there are *both* beneficial and detrimental effects of human exposure to ultraviolet radiation (UVR). 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. Sensible sun protection behaviour between the start of September and the end of March should not put people at risk of vitamin D deficiency.

Excessive UVR exposure can be damaging to health. Exposure to UVR is the probable cause of over 90% of all skin cancer cases in countries with high summer UVR levels, such as Australia and New Zealand.[1] [2] Skin cancer is the most common cancer in New Zealand with an estimated 50,000 or more new cases and over 300 deaths each year,[3] [4] with little indication of any reduction in recent years. New Zealand has one of the highest reported melanoma incidence rates in the world.[5] Note that, as well as skin cancers, there are other proven risks of excess sun exposure, including eye diseases, such as some types of cataract; premature aging of skin; and immune suppression.[6]

There are also benefits of sun exposure, most notably Vitamin D absorption. Vitamin D is a hormone which is needed for general health and bone, joint, muscle and neurological function. Further possible benefits of vitamin D include protective effects against various cancers, heart disease and some auto-immune disorders.[7] [8] [9] Other benefits of solar exposure that are independent of vitamin D include melatonin production, reduced risk of seasonal affective disorder (SAD), depression and sleep disorders.[10]

Because sunlight is the main source of vitamin D in New Zealand, moderate exposure to sunlight is also critically important to safeguard vitamin D status in the population. However, in winter, there may not be sufficient UVR to maintain optimal levels of vitamin D, particularly in the south of the country and among older people and / or those with dark coloured skin, or a predominantly indoor lifestyle.

Links between sunlight exposure, vitamin D levels, and osteomalacia are well established[11]; on the other hand, the optimal blood levels required to satisfy other functions of vitamin D are not yet defined. Currently, there is also a high level of uncertainty regarding the precise amounts of UVR required by different groups within the population to maintain adequate vitamin D status, and further research is required. However, various studies have shown that many New Zealanders have insufficient levels of vitamin D.[12] [13] Vitamin D levels also tend to be lower among Pacific peoples and Maori.[14] Individuals who are at risk of vitamin D deficiency need to obtain vitamin D from dietary or supplementary sources if their exposure to UVR is not adequate.[15] [16] The need to purchase special foods and / or supplements may exacerbate potential inequalities in vitamin D status among low income groups, older people and people with dark skin.

Although prolonged sun exposure does not cause vitamin D levels to rise to toxic levels[17] [18], people outdoors should be prepared to protect themselves from overexposure to sunlight during periods when the Ultraviolet Index (UVI), which measures the intensity of UVR in the environment, is 3 or higher (see Table 1). These periods vary greatly with latitude and season.

In the New Zealand context, sun protection is advisable during the peak UVR period, which is between the start of September and the end of March, especially between 11am and 4pm (see Tables 1 & 2). At the peak of summer, the daily period of high UVR exposure is extended, especially in the north of the country (see Table 2). In Auckland and the Far North, some protection when outdoors may be required throughout the period between the beginning of August and the end of April.

Recommendations

1. Sunburn should always be avoided.

Deliberate exposure at peak UVR times is not recommended because this increases the risk of skin cancer, eye damage, and photo aging. According to the World Health Organization, sun protection is required when the UVI is moderate or above (3 or higher) to prevent skin cancer.[19] However, as more evidence becomes available, sun protection messages will increasingly need to take account of variations between groups and their susceptibility to the dangers and benefits of sun exposure.[20]

2. Some sun exposure is recommended for vitamin D synthesis.

During the summer months, people are potentially able to achieve adequate vitamin D levels through the sun exposure they receive during typical outdoor activities outside peak UVR times. It has been estimated that people with fair skin who burn easily *(*Fitzpatrick skin types I or II, see Table 3, Appendix 2) can achieve 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 UVR periods on most days of the week, whereas people who tan more easily or have darker skin (Fitzpatrick skin types V or VI) will need a longer exposure time to achieve the same effect.[21] [22] To achieve sufficient vitamin D without sunburn, it is preferable to expose larger areas of skin for shorter periods rather than exposing smaller areas of skin for longer periods.[1]

During winter, especially in the southern regions of New Zealand where UVR radiation levels are dramatically lower than in summer, maintenance of optimal vitamin D levels may not be achievable through sun exposure alone. This is particularly relevant to older people and those with darker coloured skin or a predominantly indoor lifestyle.

Wintertime exposure when the UVI is below 3 may nevertheless help to increase vitamin D status without increasing the risk of skin damage. Summer stores of vitamin D can also be used in winter when skin production of vitamin D is unavailable. [23] However, the body can rely on tissue stores of vitamin D for between 30 and 60 days, assuming that the vitamin D level is adequate prior to winter.[24] Autumn is an important time to boost vitamin D stores as the sunburn risk at that time is generally lower than in summer.

3. Additional measures to achieve adequate vitamin D status may be required for those at increased risk of vitamin D deficiency.

Some groups in the community have a substantially higher risk of vitamin D deficiency. These include exclusively breastfed babies, particularly those of vitamin D deficient mothers; the elderly; people who are housebound or in institutional care (e.g. hospitals, elderly residential care, prisons); and those who cover most of their skin, for example, for religious or cultural reasons. Such individuals should discuss their vitamin D status with

[1] Note that areas that are not habitually exposed to the sun may also be more vulnerable to sunburn so exposure periods should never be long enough to induce sunburn.

their medical practitioner as they are likely to benefit from supplementation with vitamin D.

People with naturally dark skin (Fitzpatrick skin types V & VI) have high melanin levels in the skin. Although they rarely or never burn and are better protected from skin cancer, they are at greater risk of vitamin D deficiency. This may have implications for the health of Māori, Pacific, Asian and African peoples, especially those living in the south of the country.

4. Individuals at high risk of skin cancer should discuss their vitamin D requirements with their health practitioner to determine whether dietary supplementation with vitamin D would be a preferable alternative to sun exposure.

Groups at high risk of skin cancer include people who have already had skin cancer, have received an organ transplant, are on medications that increase photosensitivity, or are highly sun sensitive. These individuals need greater sun protection, including covering up with appropriate clothing, hats and sunscreen when outdoors.

5. There is a need for further research to inform advice regarding the amount of sun exposure required to avoid sunburn and/or synthesize vitamin D.

Note that at this point in time, there is insufficient evidence to make specific recommendations about the duration and quantity of sun exposure for specific skin types. This area requires further research, some of which is ongoing.[25]

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 UVI is less than 3, such as in the early morning or late afternoon between September and the end of March or most times during winter. As a result, people spending time outdoors in southern regions do not generally need to be concerned about sun protection from the start of April to the end of August unless they are at high altitudes, near highly reflective surfaces (such as snow or water), taking medicines which affect photosensitivity or have a high risk of skin cancer (such as organ transplant recipients).

Table 1 provides guidance as to the monthly average peak UVR levels for five New Zealand sites with extensive UV measurements so that people can identify the months of the year by region when sun protection may not be required (see shaded areas).

For other months, by region, sun protection will be required except when the UVI is less than 3, such as early morning and late afternoon.

Table 1. Monthly peak UVI levels (cloudless, at solar noon) throughout the year in five New Zealand areas.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Auckland	13	11	7	4	2	2	3	5	7	8	11	13
Wellington	13	9	6	3	2	1	2	4	5	8	11	12
Christchurch	12	8	5	3	1	1	2	3	4	8	10	11
Central Otago	10	8	5	2	1	1	1	3	4	7	10	11
Invercargill	8	7	4	2	1	1	1	2	3	5	9	10

The Ultraviolet Index is a measure of the amount of UVR from the sun received at the earth's surface at solar noon on a particular day.

Table 2. Peak UVI (cloudless) throughout the year at two New Zealand centres.

Auckland

Hour\Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7	0	0	0	0	0	0	0	0	1	1	1	1
8	1	1	0	1	0	0	0	1	2	2	2	2
9	3	2	1	2	1	1	1	2	4	3	4	5
10	6	4	2	3	1	1	2	3	5	6	6	7
11	9	7	4	4	2	2	2	4	6	8	9	10
12	12	10	6	4	2	2	2	5	7	8	10	12
13	13	11	7	4	2	2	3	4	6	8	11	13
14	13	10	6	3	1	1	2	3	4	7	10	13
15	10	8	5	1	1	1	1	2	3	4	8	11
16	7	5	3	1	0	0	0	1	1	3	5	8
17	4	3	2	0	0	0	0	0	0	1	3	4
18	2	1	1	0	0	0	0	0	0	1	1	2
19	1	0	0	0	0	0	0	0	0	0	0	1

Invercargill

Hour\Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7	0	0	0	0	0	0	0	0	0	0	0	0
8	1	0	0	0	0	0	0	0	0	0	1	1
9	2	0	0	0	0	0	0	1	1	1	2	2
10	4	1	1	1	0	0	0	1	2	3	4	3
11	6	3	1	1	1	0	1	2	3	4	6	6
12	8	5	3	2	1	1	1	2	3	4	8	10
13	8	7	4	2	1	1	1	2	3	5	9	8
14	8	7	4	1	1	1	1	2	2	5	8	9
15	8	7	4	1	0	0	1	1	2	5	7	9
16	8	5	2	0	0	0	0	1	1	3	6	7
17	5	4	1	0	0	0	0	0	0	2	3	4
18	3	2	1	0	0	0	0	0	0	1	1	2
19	1	1	0	0	0	0	0	0	0	0	1	1

UVR in New Zealand

Issues associated with high summer UVR and low winter UVR are of particular relevance in New Zealand. Over the New Zealand latitude range, there are large variations in daily peak UVR, ranging from UVI values of 14 in the summer in the north of the North Island to less than 1 in winter in the south of the South Island. In mid summer, the peak midday UVI in the north of New Zealand is somewhat higher than at the comparable time in the south. However, in mid winter, although the levels of beneficial UVR are reduced in the north (only 10% of mid summer levels), they are considerably reduced in the south (only 5% of mid summer levels). This variation is due to seasonal differences in the sun elevation angles (affecting the path length of sunlight through the atmosphere, ozone levels, Sun-Earth separation, as well as variation in day length.[26] The longer day length in summer (compared with in winter) also contributes significantly to seasonal variations in the daily dose of UV radiation.

Some UVR is necessary to maintain vitamin D in the body. When the UVI is less than 1, as for some of the winter months in the South Island, it is unlikely that there will be sufficient UVR for synthesis of adequate vitamin D. This threshold and the amount of UVR exposure required to ensure adequate vitamin D levels for people of different skin types in New Zealand is the subject of ongoing research.[27]

Vitamin D

In New Zealand, the main source of vitamin D is exposure to UVB (wavelength 290–315nm) from sunlight. Vitamin D supplements are also available over the counter in pharmacies without prescription. Some vitamin D can also be obtained from foods in which it occurs naturally, particularly oily fish, but also, though to a far lesser extent, in eggs and meats, such as liver. However, these food sources make a relatively small contribution to total vitamin D status among New Zealanders.[28] Foods that are currently permitted to be fortified with vitamin D include yoghurts, skim milks and reduced-fat milks, dairy desserts, butter and margarines and food drinks.[29]

Skin production of vitamin D decreases during winter when the intensity of solar ultraviolet radiation is lower**.**[30] However, there is uncertainty about optimal vitamin D levels at different times of the year, including whether levels should remain constant throughout the year. Vitamin D reduction during winter is generally likely to be corrected in summer when more sunlight is available and more time spent outdoors. While this correction may occur, it is still advisable to prevent deficiency during winter as, for example, fracture rates increase with deficiency, particularly in older adults.[31] For those over 40 years of age, it is possible that annually recurring cycles of low vitamin D during the winter months contribute, at least in part and over many years, to age-related bone loss.[32] Moreover, various studies show that large sections of the population have low levels of vitamin D, especially in the south during winter.[33] [34]

Relatively little research has been undertaken to determine exactly how much sun exposure is necessary to maintain adequate vitamin D levels. However, the amount of vitamin D synthesised from sunlight decreases with age and with increasing skin pigmentation. Compared with people who have lighter coloured skin, those who have darker skin are at higher risk of vitamin D insufficiency and at lower risk of skin cancer because the pigment in their skin reduces UVR absorption.[35]

Variations in age, skin colour, latitude, time of day, time of year, adiposity and outdoor physical activity make it impractical to provide prescriptive advice to the population as a whole.[36] [37]

Vitamin D status in New Zealand

There is debate about appropriate cut-off levels for vitamin D status.[38] [39] People who are overweight or obese tend to have lower vitamin D levels.[40] Although vitamin D levels of at least 50 nmol/L are widely recommended, definitions of vitamin D deficiency are variable (see Table 4, Appendix 3), and, there is emerging evidence that the optimal level to maintain bone health may be as high as 75 to 80 nmol/L.[41] [42] For the New Zealand population to achieve this level without greater risk of skin cancer, it is likely there would need to be an increase in vitamin D supplement use or consumption of vitamin D fortified foods. Given that foods with naturally occurring vitamin D currently contribute very little to daily intake for most New Zealanders, broadening the range of foods permitted to be fortified may need to be considered.[43]

There is increasing evidence that many New Zealanders may have less than optimal vitamin D status,[44] [45] [46] particularly in winter, and there is also concern about the vitamin D status of pregnant and breastfeeding women,[47] infants and toddlers in New Zealand.

A study which assessed the seasonal variation of vitamin D levels in adults (n=201) in Canterbury, found over one-third (35%) of the subjects were vitamin D deficient (defined in the study as <25nmol/L) in the winter months of July and August of 2004. Furthermore, the majority (89%) were vitamin D insufficient (<50 nmol/L) in the same winter months.[48]

An analysis of data taken from the National Nutrition Survey of New Zealanders (15 years and older), showed 48% with vitamin D insufficiency (<50 nmol/L) and 3% deficiency (defined in the study as <17.5 nmol/L), with apparent differences associated with age, ethnicity, gender, latitude and season.[49] Seasonal variations in mean vitamin D levels were large, ranging from 36 nmol/L in spring to 69 nmol/L in summer. Vitamin D insufficiency and deficiency were highest amongst Pacific adults (females and males) followed by Māori and then New Zealand European and Other.

Very little information exists on optimal vitamin D levels in children. Rickets does occur in young dark-skinned children living in New Zealand.[50] Analysis of blood samples collected during the 2002 National Children's Nutrition Survey (CNS) showed that approximately one-third (31%) of New Zealand children (5-14 years) were vitamin D insufficient (defined as <37 nmol/L) and four percent were vitamin D deficient (<17.5 nmol/L). Children of Pacific ethnicity had the highest levels of vitamin D insufficiency followed by children of Māori and New Zealand European ethnicity.[51] These results suggest that dark skin may be a driver of inequalities in vitamin D status.

Current recommendations for vitamin D intake are provided (see Table 5, Appendix 3)

Bone and musculoskeletal health

There is good evidence that vitamin D is beneficial for maintaining musculoskeletal health, reducing the risk of bone fractures[52] [53] and helping to avoid falls.[54] As part of the endocrine system, vitamin D is an important component in the interaction between the kidney, bone, parathyroid hormone, and the intestine, which regulates calcium levels in the blood and makes and maintains healthy, strong bones. For this reason, it is important to maintain adequate vitamin D levels all year round.[55]

Severe vitamin D deficiency (<12.5 nmol/L), results in rickets in children[56], and osteomalacia, bone and muscle pains, and weakness in adults.[57] Recent studies have highlighted an association of vitamin D deficiency in pregnant women and reduced bone mass in their children both at birth (relative to body weight) and later childhood.[58] [59]

Other health conditions

Vitamin D is a hormone with receptors located in organ tissues throughout the body. Recent research suggests possible beneficial effects of exposure to solar UVR 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, autoimmune disease (e.g. multiple sclerosis) and hypertension. [60] [61] [62] [63] [64] [65] [66] Although vitamin D may be a contributing factor to disease risk reduction for these conditions, it is not clearly known whether there are factors, other than vitamin D, which may play an important role. There is insufficient evidence to assume that vitamin D supplementation and sun exposure are equivalent in their beneficial effects. Therefore, at this time, no definitive action can be taken on these findings nor any recommendations made, as further research is required.

Groups at Risk for Vitamin D Deficiency

a. People with dark skin

People with naturally dark skin require more sun exposure to produce adequate levels of vitamin D as the pigment in their skin reduces UVR absorption.[67] This has potential implications for lowered vitamin D status for Māori, Asian, Pacific peoples and others with dark skin. 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.

b. Older adults

Elderly people in New Zealand are at increased risk of low vitamin D status, particularly those who are housebound or in institutionalised care.[68] [69] Vitamin D deficiency is related to increasing age and low levels of exposure to sunlight. As the human body ages, it becomes less efficient at synthesising new bone and making vitamin D, thereby adding to the problem.[70] For this reason, older adults who are vitamin D deficient have an increased risk of osteomalacia, falls, and fractures.[71] [72]

Older adults who are mobile and are not at high risk of skin cancer should spend a short period outdoors each day without sun protection.[73] This is especially important if vitamin D supplementation is not available or impractical.

In New Zealand it is recommended that for institutionalized or bed-bound elderly who have restricted exposure to sunlight often accompanied by reduced food intake, supplementation with vitamin D in the order of 10-25 µg/day (400-1,000 IU) may be necessary.[74]

c. People who wear full body coverage

Some people, especially women who wear full body clothing for religious or cultural reasons, are at increased risk of vitamin D deficiency because very little skin is exposed to sunlight. Vitamin D supplementation is likely to be required for this population group if culturally acceptable spaces are not available where more of the skin could be exposed to sunlight. Pregnancy is an important time to screen for vitamin D deficiency and, if necessary, provide supplements.

d. Babies and infants of vitamin D deficient mothers

The most important factor for the development of vitamin D deficiency in infants is maternal vitamin D status.[75] Babies and infants of mothers with inadequate vitamin D levels are likely to be vitamin D deficient.[76] [77]

The main source of vitamin D for small babies is milk. However, there is a lack of data on the vitamin D status of exclusively breastfed babies in New Zealand. Babies most at risk of deficiency are those who are either exclusively or partially breastfed by mothers who are vitamin D deficient. Mothers of breastfed babies can improve the concentration of vitamin D in milk by optimising their own vitamin D levels. This can be done either by safe sun exposure or by supplementation or treatment if deficient.

Babies with darker skin and babies who are covered up, including for cultural or religious reasons, may also be at increased risk of vitamin D deficiency. Infants and children who are regularly exposed to sunlight are less dependent on dietary sources of vitamin D, but the safe exposure time for children is unknown.[78]

In New Zealand and Australia it is recommended breastfed infants and children with limited exposure to sunlight receive a 10ug (400 IU) vitamin D supplement daily. [79]

e. 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, are on medications that increase photo sensitivity, or are highly sun sensitive. These people need to follow more rigorous sun protection practices and, therefore, should discuss their vitamin D requirements with their health practitioner to determine if dietary supplementation rather than sun exposure is appropriate.

f. Other at risk groups

People with high levels of adiposity and those do not engage in outdoor physical activity are at increased risk of vitamin D deficiency.[80] [81]

Skin Colour, Ethnicity, and Vitamin D - Considerations for New Zealand

Skin colour is more relevant than ethnicity as a basis for messages related to UVR exposure. Currently, no objective measures of skin colour, or its relationship to ethnicity, are used in the New Zealand population.[82]

New Zealand residents who have naturally dark or very dark skin that seldom or never burns (Fitzpatrick skin types V and VI) are at high risk of vitamin D insufficiency and at low risk of skin cancer. New Zealand has high rates of ethnic intermarriage[83], and an increasing proportion of the population with Māori, Pacific and Asian ancestry. There is likely to be a range of skin colour among these groups. For instance, a small study found that "self-defined Māori include a full range of skin types and a sizable proportion with a tendency to sunburn."[84]

Māori, Pacific, Asian peoples and others with dark skin have not been the recipients of targeted messages regarding safe and healthy sun exposure. Further research is required to identify the risk related to vitamin D insufficiency and skin cancer for Māori, Pacific and Asian communities.

Consultation is also required with these communities to determine how best to communicate issues of risk related to skin cancer and vitamin D insufficiency. Due to their special relationship with the Crown via the Treaty of Waitangi, additional consultation is required with Māori before specific recommendations can be considered.

Consultation might also include other potentially at risk communities, such as the elderly, the institutionalised and those groups who cover up for cultural or religious reasons.

Public health messages and other strategies related to improving vitamin D status should take into account the goal of reducing health inequalities. There may be inequalities that affect vitamin D status, such as ethnicity, less leisure time, shift work, types of accommodation without access to outdoor space, imprisonment or less access to dietary sources of vitamin D.

What are the alternatives?

It is beyond the scope of this position statement to identify the best policy options for improving vitamin D status balanced against sun protection for skin cancer prevention among different population groups in New Zealand.

Where there is vitamin D deficiency, supplementation may be necessary. A health practitioner should be consulted about the need for vitamin D supplementation.

Given that foods with naturally occurring vitamin D currently contribute very little to daily intake for most New Zealanders, consideration should also be given to increasing the range of foods permitted to be fortified with vitamin D in New Zealand.

Given known health risks associated with the use of sunbeds, it is not recommended that they be used to boost vitamin D levels.[85]

Appendix 1

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Appendix 2

Table 3. 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

Appendix 3

Table 4. Definitions of vitamin D deficiency (Australian and New Zealand Bone and Mineral Society 2005).

Definition	Blood serum vitamin D (25-OHD)
Mild vitamin D deficiency*	25 - 50 nmol/L
Moderate vitamin D deficiency	12.5 - 25 nmol/L
Severe vitamin D deficiency	<12.5nmol/L

* or vitamin D insufficiency

Table 5. Recommendations for adequate intake (AI) and upper level of intake (UL) of vitamin D (NHMRC 2006).

Group	Adequate Intake (AI)	Upper Level of Intake (UL)
Age 0-12 months	5 µg/day	25 µg/day
Age 1-50 years, m/f	5 µg/day	80 µg/day
Age 51-70 years, m/f	10 µg/day	80 µg/day
Age > 70 years, m/f	15 µg/day	80 µg/day
Pregnancy and lactation	5 µg/day	80 µg/day

m = male, f = female

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