



Menzies
Research
Institute

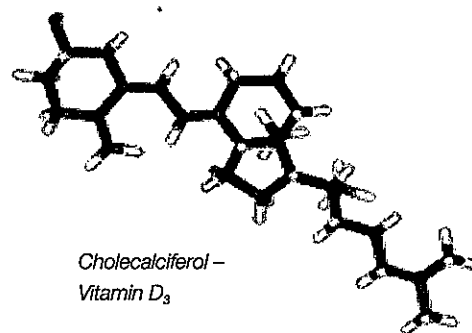
Information on Vitamin D levels for People with Multiple Sclerosis

In brief

- **Vitamin D is required for optimal bone and muscle health. Low vitamin D also appears to be associated with other diseases including MS, indicating that vitamin D has a range of important functions.**
- **Generally, the risk of becoming vitamin D deficient is particularly high in winter and spring. For people with MS, those with a higher level of disability are more often vitamin D deficient all year round compared to those with a lower level of disability.**
- **A simple blood test can determine your current vitamin D levels.**
- **If levels are low, the best ways to increase your body's vitamin D levels are to:**
 - **Take a vitamin D supplement of at least 1000 IU per day.**
 - **Increase your exposure to the sun safely - see tables 1 and 2.**

Introduction

Vitamin D is a steroid hormone that is predominantly produced in the body when the skin is exposed to the ultraviolet (UV) rays in sunlight. Vitamin D is required for optimal bone health, and vitamin D deficiency can lead to osteoporosis and influence neuromuscular function (strength and balance).



This can result in falls and ultimately fractures. Interestingly, recent literature has suggested that vitamin D deficiency might also be associated with the onset of diseases such as multiple sclerosis (MS), colorectal cancer, breast cancer, prostate cancer, type 1 diabetes, cardiovascular diseases and tuberculosis, indicating that ultraviolet radiation and/or vitamin D does much more in the body than maintain optimal bone health.

Because sunshine and vitamin D have the potential to dampen an over-active immune system, it is conceivable that sunshine and/or vitamin D might slow the progression of MS, but this is not proven. We are currently analysing the data of the Longitudinal Study of Multiple Sclerosis in Southern Tasmania to examine this issue. Groups particularly at risk of vitamin D deficiency include those who spend less time outside, such as the elderly, or those who are institutionalised.

Findings of the Menzies Research Institute

We examined the vitamin D levels of people with and without MS who were living in Tasmania and were under the age of 60 years. Figure 1 shows the occurrence of moderate to severe vitamin D deficiency (black blocks) and mild vitamin D deficiency (grey blocks) for people with MS categorized by level of disability. In the low disability group, people had no disability or could walk an unlimited distance without rest but not run. As vitamin D levels are higher in summer/autumn and lower in winter/spring, a separate graph is provided for the two seasons.

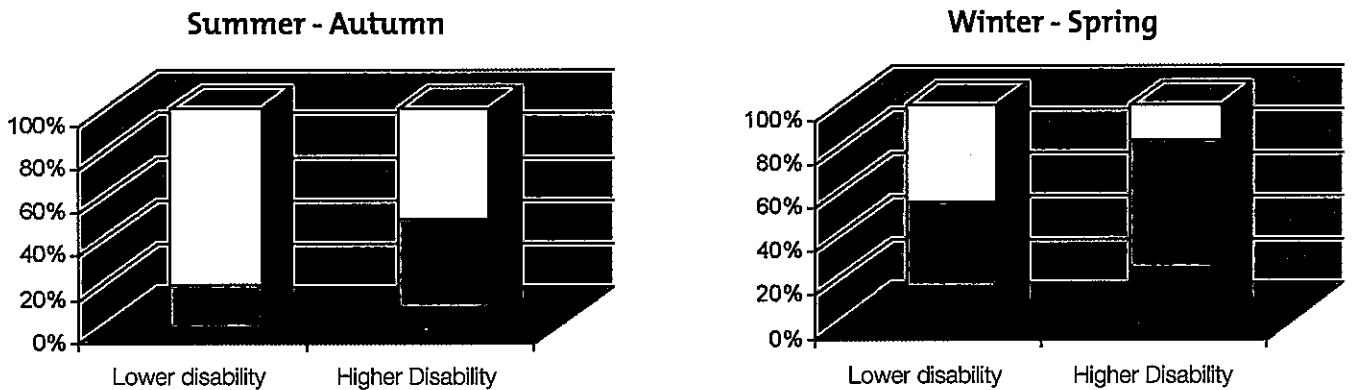
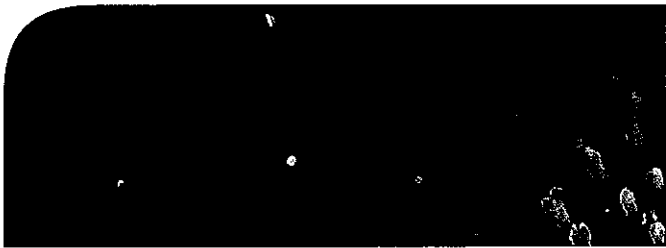
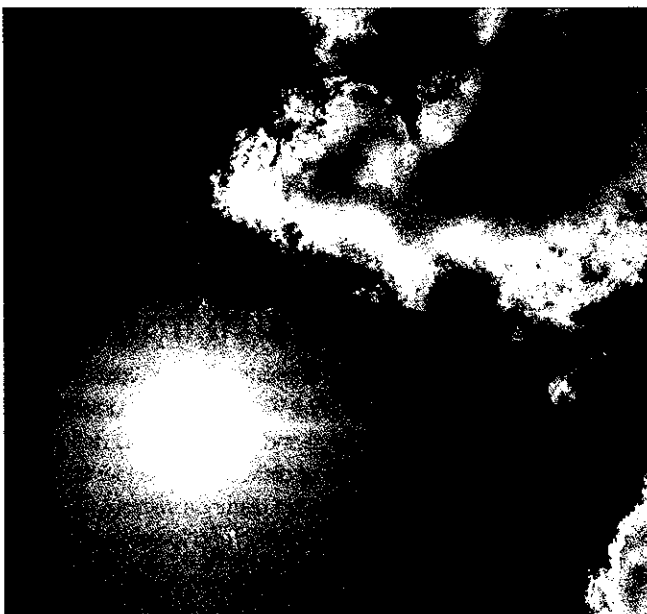


Figure 1. Prevalence of moderate/severe vitamin D deficiency (≤ 25 nmol/L, black), mild vitamin D deficiency (26 - 50 nmol/L, grey) and vitamin D sufficiency (>50 nmol/L, white) for people with Multiple Sclerosis, who are living in Tasmania and are under the age of 60 years, by disability (lower disability are those with EDSS ≤ 3) and season.

The figure shows two things. Firstly, vitamin D deficiency is much higher in winter/spring compared to summer/autumn. Secondly, people with a higher disability are more likely to have moderate to severe vitamin D deficiency. Indeed, those with a higher disability were three times more likely to have low vitamin D levels (<40 nmol/L) compared to a healthy control group. Level of disability was strongly associated with lower vitamin D levels and with lower levels of sun exposure. Thus, it seems that people with a higher disability may spend less time outside and therefore have lower vitamin D levels.

Importantly, those with no or a low disability were as likely as the control group to have low vitamin D levels, indicating that vitamin D deficiency is also a concern among the general Tasmanian population. Thus, even among healthy individuals; mild vitamin D deficiency is concerning high.



Ways to increase Vitamin D levels

We recommend to achieve a minimum vitamin D level of 50 nmol/L, but additional benefit is achieved by increasing vitamin D levels to 75 nmol/L and higher.

Individuals vary in their vitamin D levels and in their response to efforts to increase levels. To ensure vitamin D sufficiency for you personally, please ask your treating doctor for a blood test.

Theoretically, there are three ways to increase vitamin D levels. These are:

1. Vitamin D supplements;
2. increasing exposure to sunlight, and;
3. increasing the intake of foods containing vitamin D.

1. Vitamin D supplementation

Vitamin D dose required to prevent deficiency

The current recommendation in Australia is to use a vitamin D supplement, depending on age, of at least 400 IU per day.¹ However, there is general consensus among scientists that this should be much higher, at least 1000 IU per day,² a level now also recommended by the Canadian Cancer Society. Vitamin D sufficiency is currently defined as a blood test level above 50 nmol/L, but some measures of health may improve at higher levels. For example, bone metabolism continues to improve up to 100 nmol/L.² Taking 1000 IU per day seems to increase vitamin D levels on average to about 70 nmol/L, and 4000 IU per day seems to increase vitamin D levels on average to around 100 nmol/L.³ No adverse effects have been reported at these doses.³ It is important to realise that some people require more vitamin D than others to reach a given level of vitamin D in their blood. In addition, the level of vitamin D in the blood also depends on the amount of exposure to the sun.

Vitamin D required to treat moderate to severe deficiency

A medical doctor such as a general practitioner can request a blood test to have your vitamin D levels assessed and can assist you in your treatment. To treat moderate to severe vitamin D deficiency, supplementation with 3000-5000 IU (3-5 capsules) is recommended for 6-12 weeks, after which e.g. 1000 IU per day can be used.¹ Alternatively, higher single doses can be taken up to 500,000 IU (50,000 IU capsules), or 1 capsule of 50,000 IU once a month for 3-6 months, after which e.g. 1000 IU per day can be used.¹

Vitamin D supplements currently available in Australia

There are three over-the-counter pure vitamin D preparations available in Australia, OsteVit-D, Ostelin Vitamin D and Blackmores Vitamin D₃. Each capsule contains 1000 international units (IU). OsteVit-D and Blackmores both contain vitamin D₃ (cholecalciferol), while Ostelin contains vitamin D₂ (ergocalciferol). People do not produce vitamin D₂ naturally in the body and vitamin D₂ seems a little less effective in raising vitamin D levels than vitamin D₃. OsteVit-D is the least expensive, retailing for around \$32 for 250 capsules. Alternatively, a high dose preparation of vitamin D₃ (50,000 IU per capsule, taken monthly, around \$60 for 12 capsules) can be ordered at Chemist Warehouse (144 Murray St, Hobart) with a prescription from a specialist physician, geriatrician, endocrinologist or rheumatologist.

If you decide to take a vitamin D supplement, we suggest that you inform your health professional.

2. Increase exposure to the sun safely

Exposure to the sun is the cheapest way to increase vitamin D levels, but could come at a cost because it increases the risk of skin cancer and eye disease.

Sun exposure required to prevent deficiency

Table 1 provides an overview of recommendations to prevent vitamin D deficiency based on data of Menzies Research Institute studies that include people with MS.

The data suggests that:

- In **summer**, those with a **low** disability seem generally able to maintain vitamin D levels above 50 nmol/L, irrespective of the level of sun exposure, and are generally able to maintain levels above 75 nmol/L if they go outside 1-2 hours a day during weekends and holidays, using WHO sun protection recommendations (Table 2).
- In **summer**, for those with a **higher** level of disability, having 1-2 hrs a day of sun exposure during weekends and holidays (using WHO sun protection recommendations, Table 2) seems sufficient for most to maintain levels at 50 nmol/L. The combination of sun exposure and a vitamin D supplement could further increase vitamin D levels.
- In **winter**, irrespective of level of disability or amount of sun exposure, it is difficult to maintain vitamin D levels above 50 nmol/L in Tasmania. Therefore, a vitamin D supplement might be required to ensure vitamin D adequacy.

Table 1. Recommendations for people with Multiple Sclerosis to prevent vitamin D deficiency

	Low disability*	Higher disability
In summer	<ul style="list-style-type: none"> • 3 hrs of sun exposure per week, but apply WHO sun protection recommendations (see Table 2) 	<ul style="list-style-type: none"> • 3 hrs of sun exposure per week, but apply WHO sun protection recommendations (see Table 2) • Consider a vitamin D supplement • Ask GP to check vitamin D status
In winter	<ul style="list-style-type: none"> • At least 3 hrs of sun exposure per week • Consider a vitamin D supplement • Ask GP to check vitamin D status 	<ul style="list-style-type: none"> • At least 3 hrs of sun exposure per week • Consider a vitamin D supplement • Ask GP to check vitamin D status

* In the low disability group, people had no disability or could walk an unlimited distance without rest but not run.

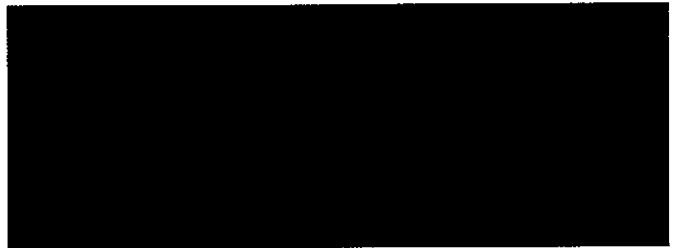
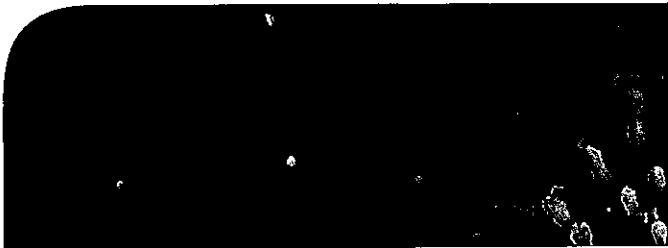


Table 2. WHO sun protection recommendations for skin cancer prevention.⁴

Exposure	UV index	Sun protection recommendations
Low	2 or less	You can safely stay outdoors with minimal protection
Moderate	3-5	Wear sun protective clothing, a hat, sunscreen, sunglasses and seek shady areas.
High	6-7	See above + stay indoors between 10am and 2pm (11-3 daylight saving time)
Very high	8-10	See above + stay indoors as much as possible
Extreme	11 or higher	See above

Things to consider when choosing to increase sun exposure:

- The heat of the sun might make your MS symptoms worse. If so, try to avoid the heat of the sun by, for example, being outside when there is a pleasant breeze.
- Avoid excessive sun exposure at all times, including getting sunburnt as this is a known risk factor for skin cancer, especially melanoma. The risk of sunburn is highest in summer. Also, see Table 2 for WHO sun protection recommendations for skin cancer prevention.⁴
- Vitamin D is produced in the body when the skin is exposed to sunlight. Therefore, wearing a lot of clothing, like we do in winter time, will limit the amount of vitamin D we produce.
- The amount of vitamin D produced under the influence of the sun depends on the strength of the sun. The strength of the sun varies throughout the year (highest in summer and lowest in winter) and varies during the day (lower in the morning and late afternoon, higher during the middle of the day). There is a certain threshold below which the body cannot produce any vitamin D. In Tasmania, we are still able to generate some vitamin D in winter time but it is less than in summer. Also, being outside early in the morning or late in the afternoon during the winter has little effect on your vitamin D levels.
- People of ethnic origin who have a darker skin colour require more sun to produce the same amount of vitamin D compared to Caucasian people.
- Glass filters nearly all ultraviolet radiation rays that are required to produce vitamin D in the body. Therefore, vitamin D levels do not increase if sitting behind a window.

3. Increase vitamin D through dietary intake of food

Less than 5% of the vitamin D in our body comes from dietary sources. The best source is fatty fish, such as mackerel, herring and salmon. Liver, eggs and fortified foods, such as margarine and some milks, also contain a very small amount of vitamin D. For most Australians, adequate vitamin D is unlikely to be achieved through diet alone.

Vitamin D levels of study participants of the Menzies Research Institute
 If you participated in the Longitudinal Study of Multiple Sclerosis in Southern Tasmania between 2002 and 2005 and would like to find out your 6-monthly vitamin D levels throughout your study participation, please contact Dr Ingrid van der Mei (6226 7700 or Ingrid.vanderMei@utas.edu.au).

References

1. Working Group of the Australian and New Zealand Bone and Mineral Society; Endocrine Society of Australia; Osteoporosis Australia. Vitamin D and adult bone health in Australia and New Zealand: a position statement. *Med J Aust* 2005;182(6):281-5. http://www.osteoporosis.org.au/files/research/Sunexposure_OA_2007.pdf, accessed Nov 2007
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3. Vieth R, Chan PC, MacFarlane GD. Efficacy and safety of vitamin D3 intake exceeding the lowest observed adverse effect level. *Am J Clin Nutr* 2001;73(2):288-94.
4. WHO website: <http://www.who.int/uv/en/>, accessed Nov 2007

Disclaimer

This is general information developed by Dr Ingrid van der Mei of the Menzies Research Institute. The information contained in this section should not be used for individual medical advice. Please see your doctor if you have concerns or specific questions relating to your health.

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