



Vitamin D position statement – Reviewed October 2013

The following position statement is based on ‘Vitamin D and health in adults in Australia and New Zealand: a position statement’, published in 2012 by a working group of the Australian and New Zealand Bone and Mineral Society, Endocrine Society of Australia and Osteoporosis Australia¹. Please refer to this statement for more detailed information.

A growing number of medical conditions are associated with vitamin D deficiency, including the well-established link with reduced bone mineral density and increased risk of fracture. There is evidence that 31% of Australians are vitamin D deficient (serum 25-hydroxyvitamin D (25-OHD) <50nmol/L), rising to 50% of women in winter/spring and in people residing in southern states². This has important implications for the bone health of a significant proportion of the Australian population. Severe deficiency in adults leads to osteomalacia throughout the skeleton, and rickets in children, where mineralisation of the growth plate is impaired. It is also associated with loss of lower extremity muscle mass and strength and impaired balance in the elderly. Vitamin D deficiency is an independent predictor of falls; improving vitamin D status reduces the risk of falls and fracture in the elderly^{3,4}.

Sources of vitamin D

Australians receive most of their vitamin D from exposure of the skin to the sun. For people with moderately fair skin, exposure of the arms (or equivalent area) of 6-7 minutes mid morning or mid afternoon outdoors on most days during the Australian summer will maintain adequate vitamin D levels. Up to 30 minutes exposure will be required in winter, depending on latitude. In southern latitudes of Australia, sufficient UVB radiation will only be produced around noon. Darker skinned people will require 3-6 times longer exposure. Window glass, covering clothing and sunscreens, when properly applied, inhibit transmission of UVB and thus synthesis of vitamin D in the skin. Although small amounts of vitamin D are found naturally in some foods, such as fatty fish, liver and eggs, as well as in some fortified dairy products, most adults are unlikely to obtain more than 5%-10% of their vitamin D requirement from dietary sources.

Target levels of circulating vitamin D

The major circulating form and the metabolite routinely used to assess overall vitamin D status is 25-hydroxyvitamin D (25-OHD). Optimal mineral metabolism, bone density and muscle function is achieved at a serum concentration of greater than 50 nmol/L 25-OHD, measured at the end of winter/early spring. If testing is carried out at the end of summer, levels should be 10-20nmol/L higher, to compensate for a reduction in levels during winter.

Groups at risk of vitamin D deficiency

Adult groups at high risk of vitamin D deficiency are shown below:

- Older or disabled people in low-level and high-level residential care, particularly housebound, community-dwelling geriatric patients admitted to hospital
- Those who are not exposed to UVB in sunlight (lifestyle or work-related factors, chronic illness/hospitalization, complex disability, covering clothing for religious or cultural reasons, southerly latitude)
- People with dark skin
- People with medical conditions or medications affecting vitamin D metabolism (obesity, end-stage liver disease, renal disease, drugs that increase degradation of vitamin D such as rifampicin/anticonvulsants, fat mal-absorption syndromes e.g. cystic fibrosis, coeliac disease, inflammatory bowel disease)

Assessment of vitamin D deficiency

Screening blood tests for serum 25-OHD level for those in high-risk groups should be performed by a reputable laboratory participating in the Vitamin D External Quality Assessment Scheme (DEQAS) proficiency program. Clinicians should be aware of the imprecision of many of the automated methods of vitamin D assay, particularly at the lower, clinically important end of the range (<50nmol/L)⁵. The test is best performed at the end of winter/early spring, when serum 25-OHD levels are lowest.

Adequate vitamin D is considered to be >50nmol/L (at the end of winter/early spring). Vitamin D deficiency can be defined according to the following levels of serum 25-OHD:

- Mild deficiency: 30-49nmol/L
- Moderate deficiency: 12.5-29 nmol/L
- Severe deficiency: <12.5nmol/L

Prevention and treatment of vitamin D deficiency

To prevent vitamin D deficiency in people who receive less than optimal sun exposure, vitamin D supplementation is recommended:

- at least 600 IU per day for people under 70
- at least 800 IU per day for people over 70
- sun avoiders or those at high risk of deficiency may require 1000-2000 IU per day

As vitamin D and calcium deficiencies are more common in older people who are housebound or in residential care, vitamin D supplementation of 1000 IU per day in combination with adequate calcium (a total of 1,000-1,300 mg per day, preferably from diet, but may also come from a combination of diet and supplementation) is recommended to reduce the risk of falls and fractures in this group⁶.

For people who are shown by a screening blood test to have inadequate serum vitamin D status, recommended supplementation levels are shown below:

Vitamin D Status	25-OHD level (end of winter)	Recommended vitamin D supplementation
Mild deficiency	30 – 49 nmol/L	1,000 – 2,000 IU per day
Moderate deficiency	12.5 – 29 nmol/L	3,000 – 5,000 IU per day (for 6 – 12 weeks) followed by maintenance dose of 1,000 – 2,000 IU per day
Severe deficiency	<12.5 nmol/L	

For all individuals taking a vitamin D supplement, a daily intake of 1000 – 1,300mg calcium, preferably from food, should be encouraged.

Vitamin D status should be assessed in deficient patients 3 months after commencing treatment. It may take 3-5 months from commencing supplementation before the full increase in serum 25-OHD levels is seen. After this initial reassessment, vitamin D status should not be checked more than annually.

References

1. Nowson CA, McGrath JJ, Ebeling PR, Haikerwal A, Daly RM, Sanders KM, Seibel MJ, Mason RS. Working Group of the Australian and New Zealand Bone and Mineral Society, Endocrine Society of Australia and Osteoporosis Australia. Vitamin D and health in adults in Australia and New Zealand: a position statement. *Med J Australia* 2012;196:686-687
2. Daly RM, Gagnon C, Lu ZX, et al. Prevalence of vitamin D deficiency and its determinants in Australian adults aged 25 years and older: a national, population-based study. *Clin Endocrinol (Oxf)* 2011; Dec 15 [Epub ahead of print]. doi: 10.1111/j.1365-2265.2011.04320.x.
3. Bischoff- Ferrari HA, Dietrich T, Orav EJ, et al. Higher 25-hydroxyvitamin D concentrations are associated with better lower-extremity function in both active and inactive persons aged > or =60 y. *Am J Clin Nutr* 2004; 80:752-758
4. Visser M, Deeg DJ, Lips P. Low vitamin D and high parathyroid hormone levels as determinants of loss of muscle strength and muscle mass (sarcopenia): the Longitudinal Aging Study Amsterdam. *J Clin Endocrinol Metab* 2003;88:5766-5772
5. Wallace AM, Gibson S, de la Hunty A, et al. Measurement of 25-hydroxyvitamin D in the clinical laboratory: current procedures, performance characteristics and limitations. *Steroids* 2010; 75: 477-488.
6. Avenell A, Gillespie WJ, Gillespie LD, et al. Vitamin D and vitamin analogues for preventing fractures associated with involutional and post-menopausal osteoporosis. *Cochrane DB Syst Rev* 2009; Issue 2. Art. No.: CD000227. <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000227.pub3/abstract>



Text