AUSTRALIAN Clinicallabs

GP

Vitamin D Testing

Providing insight into identifying and managing vitamin D deficiency

Vitamin D deficiency and health implications

Epidemiology

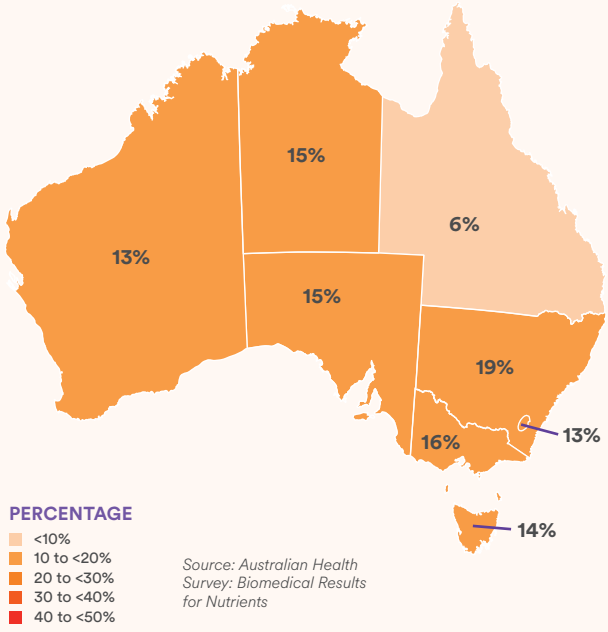
Due to reduced sunlight exposure, at the end of winter, approximately 36 percent of Australians are vitamin D deficient (see figure 1 and figure 2). This issue is more pronounced in the southern parts of the country, where nearly half the population is insufficient. Therefore, testing for serum vitamin D levels during winter has the highest yield for identifying such individuals.

Risk of vitamin D deficiency

Vitamin D deficiency, defined as a serum level below 50 nmol/L[1,2,] is associated with elevated parathyroid hormone (PTH) levels and predisposes patients to a number of adverse effects. These include loss of bone density, osteoporosis, and fractures. Additionally, vitamin D deficiency is associated with cardiovascular disease, diabetes, immune system diseases, microbial and respiratory diseases, cognitive impairment, mental health disorders, and cancer.

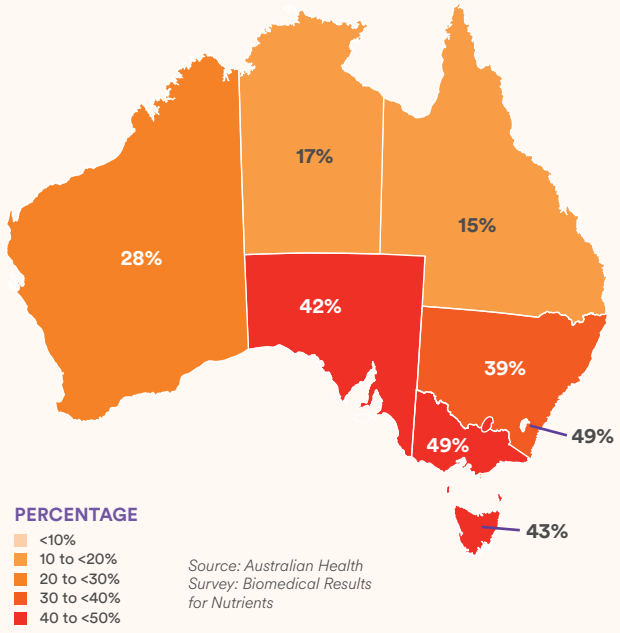
The best time to test vitamin D levels is at the end of winter, or in early spring, when patient vitamin D levels are at their lowest.

Figure 1 - Vitamin D deficiency in summer by state (2011-2012)



Source: Australian Health Survey: Biomedical Results for Nutrients

Figure 2 - Vitamin D deficiency in winter by state (2011-2012)



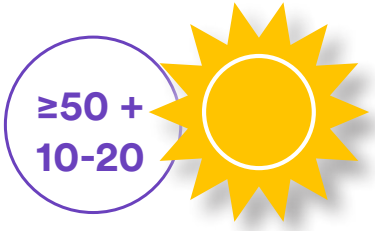
Source: Australian Health Survey: Biomedical Results for Nutrients

Target vitamin D levels

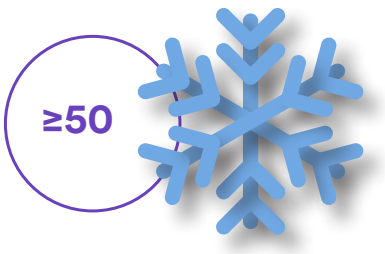
The international recommendations for adequate vitamin D levels vary, but based on a review of current literature and recently published recommendations[1,2] experts suggest that adequate vitamin D status is a serum level equal to or greater than 50 nmol/L at the end of winter. This level should be 10-20 nmol/L higher at the end of summer to allow for seasonal decrease.

Patients with marginally adequate vitamin D levels (≥50 + 10-20) during summer are also at risk. These individuals should be reviewed during winter, as decreased sunlight exposure could lead to deficiency in these patients.

Marginally adequate vitamin D levels during summer may become deficient during winter

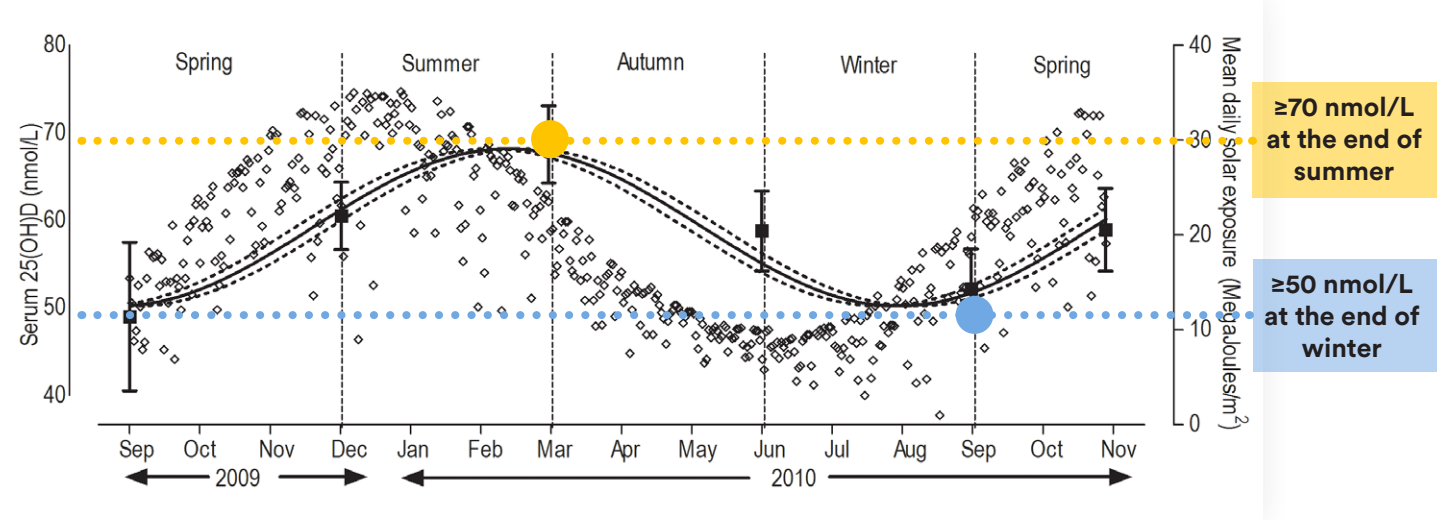


Adequate vitamin D levels in nmol/L at the end of winter



Vitamin D levels throughout the year

The below graph (graph 1) shows how the vitamin D levels in older Tasmanians vary throughout the year and where our target vitamin D levels sit within this. The number of people that sit below the target levels can clearly be seen.



Graph 1 - Relationship between mean daily solar exposure and serum 25(OH)D concentrations[3].

Who to test

Vitamin D testing should be requested for patients at risk of vitamin D deficiency, including:

- Housebound individuals: such as the sick, disabled, elderly in high care, and indoor workers
- Those with less effective sunlight exposure: including people with darker skin tones, individuals who avoid sunlight, or those who cover their skin for various reasons

Additionally, testing should be considered for patients with:

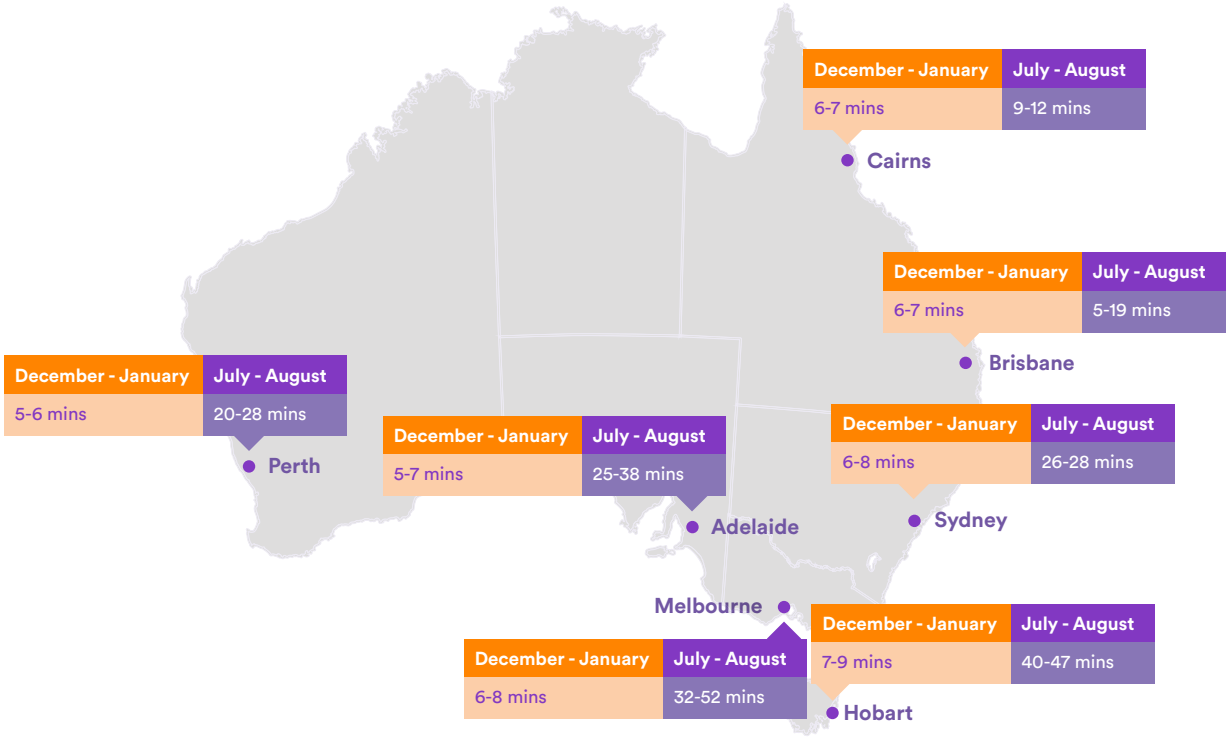
- Osteoporosis or osteomalacia
- Elevated ALP levels with otherwise normal liver functions tests (LFTs)
- Hyperparathyroidism, calcium abnormalities, or hypophosphataemia
- Malabsorption syndromes
- Medications that may interfere with vitamin D levels (e.g., anticonvulsants)
- Chronic renal failure (CRF) and transplant recipients

Treatment

Sun exposure

Achieving adequate sunlight exposure to generate sufficient endogenous vitamin D production without exposing an individual to excessive risk of skin cancer is a delicate balance. This balance is complicated by a number of variables, notably the season of the year, latitude, and skin colour.[4]

As a guideline, the following sun exposure times (in minutes per day) are recommended for individuals with moderately fair skin.[5]



Vitamin D supplement

If adequate sun exposure cannot be achieved, vitamin D supplementation may be required.

A maintenance dose of up to 1000 IU/day is a general guide. Higher dosage may be required for individual cases. Adequate calcium intake of 1 – 1.3g/day through dietary intake or supplementation is advisable.

Note: Calcium supplements are best taken before sleep to ensure maximum absorption and suppression of peak bone turnover which usually occurs between approximately 2am and 3am.

Vitamin D testing at Clinical Labs

How to order: Note the reason for testing to meet Medicare eligibility criteria for bulk-billing in the 'Clinical Notes' section on a Clinical Labs General Pathology Request Form.

Information included in report:

- The concentration of total 25-hydroxyvitamin D (25-OHD) in the patient's serum.
- Previous test results for comparison (if applicable).
- Suggested cutoff points to define sufficient, deficient, and severely deficient vitamin D levels.

Repeat testing: Vitamin D levels should not be retested within 3 months of initiating vitamin D supplements or altering dosing.

Annual testing: For older individuals or when risk factors for vitamin D deficiency have changed since initial testing, annual assessment should be considered.

Additional tests to consider: When requesting a vitamin D test, concurrent serum calcium and parathyroid hormone assessments will provide an overall calcium homeostasis status. If osteoporosis is present, fasting blood crosslaps (CTX) can monitor bone turnover in response to therapy.

References

1. Vitamin D and health in adults in Australia and New Zealand: a position statement. *MJA* 196(11), 18 June 2012.
2. RCPA Position Statement: Use and Interpretation of Vitamin D testing. The Royal College of Pathologists of Australasia, May 2013.
3. Pittaway JK, Ahuja KDK, Beckett JM, Bird M-L, Robertson IK, *et al*. (2013) Make Vitamin D While the Sun Shines, Take Supplements When it Doesn't: A Longitudinal, Observational Study of Older Adults in Tasmania, Australia. *PLoS ONE* 8(3): e59063. doi:10.1371/journal.pone.0059063.
4. Review of sun exposure guidance documents in Australia and New Zealand. Public health research & practice. 2022; 32(1): e3212202.
5. Working Group of the Australian and New Zealand Bone and Mineral Society, Endocrine Society of Australia and Osteoporosis Australia. Vitamin D and adult bone health in Australia and New Zealand: a position statement. *MJA* 2005; 182: 281–28

Our Expert Pathologists

Dr David Deam

MBBS MAACB FRCPA

Lab: Clayton (Vic)
Speciality: Chemical Pathology
Areas of Interest: Endocrine function testing, protein abnormalities, laboratory automation
Phone: (03) 9538 6777
Email: david.deam@clinicallabs.com.au

Dr Eric Law

MBChB BMedSc (1st Hon) PhD FHKAM (Pathology) FHKCPath FRCPA FRCPath FAACB IFCAP

Lab: Bella Vista (NSW)
Speciality: Chemical Pathology
Areas of Interest: Chemical Pathology, Biochemical Genetics, Inherited Metabolic Disorders
Phone: 1300 134 111
Email: eric.law@clinicallabs.com.au

Dr Tony Mak

MBBS MBA FRCPA FRCPath

Lab: Osborne Park (WA)
Speciality: Chemical Pathology
Areas of Interest: Toxicology
Phone: (08) 9442 7663
Email: tony.mak@clinicallabs.com.au

Dr Candy Ng

MBChB FRCPA PhD

Lab: Clayton (Vic)
Speciality: Chemical Pathology
Areas of Interest: Chemical pathology, toxicology
Phone: (03) 9538 6777
Email: candy.ng@clinicallabs.com.au

Assoc. Prof. Mirette Saad

MBBS (Hons) MD (Hons) MAACB FRCPA PhD

Lab: Clayton (Vic)
Areas of Interest: Molecular genetics, precision medicine, cancer genetics, antenatal screening, NIPT, fertility testing and research, medical teaching
Speciality: Chemical Pathology
Phone: (03) 9538 6777
Email: mirette.saad@clinicallabs.com.au

Dr Phoebe Stanford

MBBS FRCPA FRACP

Lab: Bella Vista (NSW)
Speciality: Chemical Pathology
Areas of Interest: Endocrinology
Phone: (02) 8887 9999
Email: phoebe.stanford@clinicallabs.com.au

ACLZBCH0023 ACLMAR-BF-NAT-0010.16 02/25