

Guideline for Vitamin D Testing and Supplementation in Adults

Adapted from: Ontario Health Technology Assessment Series 2010¹ and the BC Vitamin D Testing Protocol, 2010²

Scope: This guideline describes the appropriate use of vitamin D testing within the general adult (≥ 18 years) population in Alberta. Recommended vitamin D supplementation and the absence of the need for testing in association with supplementation are discussed.

Exclusions: Children

- Vitamin D levels in infants (<1 year) could be misleading due to the presence of relatively high levels of biologically less active C-3 epimers of vitamin D.
- Serum 25-hydroxy vitamin D is the test of choice for determining vitamin D level on the infrequent occasions when clinically indicated such as possible cases of rickets.

Pregnant or lactating women

Consequences of Vitamin D Deficiency:

Vitamin D deficiency has been shown to play a role in many major diseases including:

- Osteoporosis
- Osteomalacia

RECOMMENDATIONS

ROUTINE VITAMIN D TESTING

- Routine vitamin D testing is **not** warranted in the general population i.e., not at high risk of deficiency.

SUPPLEMENTATION IN THE GENERAL POPULATION

- Because vitamin D supplementation in the general adult population is safe and probably necessary, it is reasonable to advise supplementation without testing. Routine testing of vitamin D levels [25-hydroxyvitamin D or 25(OH)D] is **not** medically necessary prior to or after starting vitamin D supplementation.
- Osteoporosis Canada recommends supplementing with vitamin D3 over vitamin D2. (Most over the counter supplements available in Canada contain vitamin D3 whereas high-dose Vitamin D2 is available only by prescription).

- There is good evidence that supplementation with at least 800 international units (IU) of vitamin D3 per day, combined with calcium, is required to reduce the risk of fragility fractures, therefore 800 – 2000 IU daily is recommended (although the optimum daily requirement of vitamin D3 is not known). The upper limit of intake suggested to be safe for most individuals is at 4,000 units per day (though toxic levels of Vitamin D usually require much higher consumption than this).⁴
- Weekly dosing (one week's adult dose of vitamin D3 taken as a single weekly dose, i.e., 7000 IU) or monthly dosing (one month's adult dose of vitamin D3 taken once a month, i.e., 50,000 IU) may be more convenient for some patients and has been shown to be safe.
- Note: Vitamin D supplements are nearly always contraindicated in people with hypercalcemia and should be used with caution in people with hyperphosphatemia.

VITAMIN D TESTING IN SPECIAL POPULATIONS

- Serum 25-hydroxy vitamin D is the test of choice for determining vitamin D levels on the **infrequent** occasions when clinically indicated such as:
 - Significant renal or liver disease
 - Osteomalacia, osteopenia or osteoporosis
 - Malabsorption syndromes
 - Hypo or hypercalcemia/hyperphosphatemia
 - Hypo or hyperparathyroidism
 - Patients on medications that affect vitamin D metabolism such as phenobarbital, carbamazepine, phenytoin and valproate
 - Patients taking medications that might interfere with Vitamin D absorption such as cholestyramine, colestipol and orlistat
 - Unexplained increased levels of serum alkaline phosphatase
 - Patients taking high doses of vitamin D (> 2000 IU daily) for extended periods of time (>6 months), and who are exhibiting symptoms suggestive of vitamin D toxicosis (hypervitaminosis D)
- Measurement of serum 1,25-dihydroxy vitamin D levels is rarely of value and **should be limited** to patients suspected of having abnormalities of 1 α -hydroxylase activity, e.g., deficiency in renal tubule disorders; excessive (ectopic) 1 α -hydroxylase, e.g., sarcoidosis.
 - This is most often seen in cases of significant chronic renal failure (i.e., stage 4 or 5 chronic kidney disease) and genetic renal tubule disorders like X-linked hypophosphatemic rickets.
 - The test may also be useful in resolving unexplained hyperparathyroidism in patients with seemingly adequate serum levels of 25-hydroxy vitamin D, lymphoma, sarcoidosis, or in cases of suspected vitamin D receptor defects.
- Other than in very complex cases (e.g., hypercalcemia with reportedly low endogenous levels of 25-hydroxy vitamin D), there are rarely indications for ordering both 25-hydroxy vitamin D and 1,25-dihydroxy vitamin D on the same specimen at the same time.
- People who are obese or who have undergone gastric bypass surgery - a body mass index ≥ 30 is associated with lower serum 25(OH)D levels compared with non-obese individuals; people who are obese may need larger than usual intakes of vitamin D to achieve 25(OH)D levels comparable to those of normal weight. Obese individuals who have undergone gastric bypass surgery may become vitamin D deficient over time without a sufficient intake of this nutrient from food or supplements, since part of the upper small intestine where vitamin D is absorbed is bypassed and vitamin D mobilized into the serum from fat stores may not compensate over time.

- Consultation with a specialist should be considered for patients with unexplained bone pain, unusual fractures, hypercalcemia of unexplained origin or other evidence suggestive of metabolic bone disease.
- A 4-month interval to determine the impact of a dosage supplement change is suggested.³⁻⁵

SUPPLEMENTATION FOR GROUPS AT RISK OF VITAMIN D INADEQUACY

- Obtaining sufficient vitamin D from natural food sources alone is difficult. For many people, consuming vitamin D-fortified foods and being exposed to some sunlight are essential for maintaining a healthy vitamin D status. In some groups, even higher quantities of dietary supplements might be required to meet the daily need for vitamin D:
 - Older adults are at increased risk of developing vitamin D insufficiency in part because, as they age, skin cannot synthesize vitamin D as efficiently, they are likely to spend more time indoors, and they may have inadequate intakes of the vitamin.
 - People with limited sun exposure are unlikely to obtain adequate vitamin D. Because the extent and frequency of use of sunscreen are unknown, the significance of the role that sunscreen may play in reducing vitamin D synthesis is unclear. Ingesting RDA levels of vitamin D from foods and/or supplements will provide these individuals with adequate amounts of this nutrient.
 - People with dark skin - various reports consistently show lower serum 25(OH)D levels in persons identified as black compared with those identified as white.
 - People with fat malabsorption - as it is fat-soluble, vitamin D requires some dietary fat in the gut for absorption. Individuals who have a reduced ability to absorb dietary fat might require vitamin D supplements. Fat malabsorption is associated with a variety of medical conditions including Celiac disease, some forms of liver disease, cystic fibrosis, and Crohn's disease.

VITAMIN D TOXICITY

- Vitamin D toxicity defined as a serum 25(OH)D concentration consistently >500 nmol/L (>200 ng/mL) can cause:
 - Non-specific symptoms such as anorexia, weight loss, polyuria, and heart arrhythmias
 - Elevated blood levels of calcium which leads to vascular and tissue calcification, with subsequent damage to the heart, blood vessels, and kidneys

REFERENCES

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To Provide Feedback

The TOP Program encourages your feedback. If you need further information or if you have difficulty applying this guideline, please contact:

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