Vitamin D Deficiency

A PATIENT'S GUIDE

Vitamin D helps the body absorb calcium. Along with calcium, it is vital for strong, healthy bones. We normally get vitamin D through exposure to sunlight, which triggers the skin to make this vitamin. Very few foods naturally contain vitamin D. Milk and a few other foods such as margarine, are "fortified" with added vitamin D in some countries, such as Australia, the United States and Canada. You can also get vitamin D in supplements.

However, many people still do not get enough of this important vitamin. For instance, the skin makes less vitamin D as we age. Use of sunscreen or sun avoidance also lowers the skin's production of vitamin D.

There has been much confusion about how much vitamin D we should get and what defines a deficiency, or lack, of this vitamin. This guide is based on The Endocrine Society's practice guidelines for physicians about testing for, treating, and preventing vitamin D deficiency.

These guidelines do not apply to people who want to take vitamin D for reasons other than bone health. The guidelines do not recommend a high dose of vitamin D to try to prevent disease, improve quality of life, or extend life.

What health problems does low vitamin D cause?

Vitamin D that is too low often causes no symptoms at first. However, vitamin D deficiency can lead to a loss of bone density (size and strength), broken bones (fractures), muscle weakness, and the bone-thinning disease osteoporosis. Severe vitamin D deficiency can cause rickets in children and osteomalacia in adults. Both problems cause soft, weak bones, as well as pain in the bones and muscles.

Some studies show that a lack of vitamin D may raise the risk of some cancers and certain other health problems. However, there is not strong scientific proof of this yet.

What are the risk factors for vitamin D deficiency?

Some health problems raise the risk of vitamin D deficiency and suggest the need for vitamin D testing. They include:

- Osteoporosis
- Chronic (long-term) kidney or liver disease
- Malabsorption (inability to absorb nutrients in the intestines) due to
  - Cystic fibrosis
  - Crohn's disease or other inflammatory bowel disease
  - Bariatric weight-loss surgery
  - Radiation treatment
- Hyperparathyroidism (too much of a hormone that controls the body's calcium level)
- Sarcoidosis, tuberculosis, histoplasmosis, or other granulomatous disease (disease with granulomas, collections of cells caused by chronic inflammation)
- Some lymphomas, a type of cancer

Other risk factors for vitamin D deficiency are:

- Dark skin and people who cover their skin for cultural or religious reasons
- Pregnancy and breast-feeding
- Use of certain medicines that affect vitamin D metabolism
  - Cholestyramine (cholesterol drug)
  - Antiseizure drugs
  - Glucocorticoids
  - Antifungal drugs
  - AIDS medications
- Frequent falls in older adults, or a non-traumatic fracture (bone break without a major injury) in any age group
- Obesity (vitamin D can get "trapped" in body fat)

How is vitamin D deficiency found?

The best way for doctors to measure how much vitamin D is in your body is with a blood test called the serum 25-hydroxyvitamin D test. Not everyone should get this screening test. Experts recommend it for people at risk of vitamin D deficiency. Your doctor will tell you if you need this test.

A low test result below 50 nmol/L at end of winter or early spring shows you do not have enough vitamin D.

You may need to repeat the 25-hydroxyvitamin D blood test during treatment of vitamin D deficiency. This is best done after at least three months of treatment and will show your response to treatment.

The Hormone Health Network offers more than 100 free, online patient education resources, based on the most advanced clinical and scientific knowledge from the Endocrine Society. This patient guide was created in collaboration with the Endocrine Society of Australia.

How is vitamin D deficiency treated and prevented?

Treatment and prevention of vitamin D deficiency includes increasing your intake of vitamin D. The goal is to get your blood level of vitamin D to an appropriate level. You likely will need supplements to raise your vitamin D level. That is because it is hard to get enough vitamin D solely from your diet, and excess sun exposure can cause skin cancer.

In supplements and fortified foods, vitamin D comes in two forms: D2 and D3. While some research studies suggest that vitamin D2 may be less potent, either form can be effective at recommended doses.

Vitamin D comes in pills, gelatin capsules, or a liquid, alone or in a multivitamin. The oral dose is once daily or weekly. Children with rickets or at risk of this disease may get vitamin D injections a few times a year.

The treatment dose of vitamin D depends on your age, how low your blood vitamin D level is, and what is causing the level to be low. Most often your doctor will lower the vitamin D dose after six to eight weeks of treatment. You will then stay on this lower "maintenance" dose for as long as you need.

Vitamin D treatment can improve bone, body composition (how much lean muscle mass an individual has), and quality of life in patients with vitamin D deficiency.

Vitamin D treatment is very safe. Patients with a chronic granuloma-forming disease and some patients with lymphoma who receive vitamin D treatment may get too much calcium in their blood or urine. Careful monitoring of blood vitamin D levels will help check for this possible problem.

How much vitamin D do you need?

In 2010, the Institute of Medicine set new Recommended Daily Allowances, or RDAs, of vitamin D for most children and adults. However, individuals at risk of low vitamin D may need more than the RDA. Therefore, The Endocrine Society guidelines suggest intakes (the amounts of vitamin D an individual should consume) for at-risk people. The table shows both sets of advice and the upper limit (highest intake) thought to be safe.

Can you get too much vitamin D?

For most people, there is no downside to taking vitamin D supplements. Getting too much vitamin D is uncommon at the recommended intake. An overdose of vitamin D is possible, though, when daily supplements exceed the suggested upper limits. It is therefore important that you take the dose of vitamin D that your doctor recommends.

Excess vitamin D can cause calcium deposits, nausea, vomiting, itching, increased thirst and urination, weakness, and kidney failure.

SUGGESTED VITAMIN D INTAKE

	General Population (Institute of Medicine Recommendations)		**At Risk of Vitamin D Deficiency** (The Endocrine Society Suggestions)	
Age	**RDA (IU/day)**	**Upper Limit (IU/day)**	**Daily Recommendation (IU/day)**	**Upper Limit (IU/day)**
Infants and children				
0–6 months	—	1,000	400–1,000	2,000
6–12 months	—	1,500	400–1,000	2,000
1–3 years	600	2,500	600–1,000	4,000
4–8 years	600	3,000	600–1,000	4,000
9–18 years	600	4,000	600–1,000	4,000
Adults				
19–70 years	600	4,000	1,500–2,000	10,000
>70 years	800	4,000	1,500–2,000	10,000
Pregnant or breast-feeding				
14–18 years	600	4,000	600–1,000	4,000
19–50 years	600	4,000	1,500–2,000	10,000

IU = International Units

What can you do to help prevent and treat vitamin D deficiency?

To prevent vitamin D deficiency, make sure you get at least the recommended daily intake (RDA) through supplements and the foods you eat. Foods with natural vitamin D include:

- Certain fish: salmon, sardines, mackerel, tuna
- Cod liver oil
- Shiitake mushrooms and any mushrooms irradiated with ultraviolet light
- Egg yolks

Foods that often have added vitamin D include:

- Dairy products
- Infant formula

Ask your doctor if you should undergo a vitamin D blood test if you think you are at risk of low vitamin D. Also discuss whether you should increase your daily vitamin D intake.

You can reverse vitamin D deficiency over time by getting enough vitamin D. Take your prescribed dose of vitamin D and keep appointments with your doctor, to ensure the success of your treatment and healthy bones.

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Note to health care professionals: This patient guide is based on, and is intended to be used in conjunction with, the Endocrine Society's clinical practice guidelines (available at www.endocrine.org/guidelines/index.cfm), and the Endocrine Society of Australia position statement on Vitamin D published in the MJA (Nowson CA, McGrath JJ, Ebeling PR, Haikerwal A, Daly RM, Sanders KM, Seibel MJ, Mason RS; Working Group of 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 Aust. 2012 Jun 18;196(11):686-7).