

# Vitamin D Deficiency

**V**itamin D deficiency has been associated with the development of rickets (a disease leading to soft bones and skeletal deformities), but research is revealing the potential importance of vitamin D in reducing the risk of a host of health problems, including cancer, heart disease, stroke, diabetes, and autoimmune diseases. Vitamin D also helps the body use calcium. Due to vitamin D not being abundant in food sources and the sun not being a reliable vitamin D source for everyone, an estimated 40% to 75% of people are deficient in vitamin D. Older adults can use vitamin D in conjunction with calcium to help prevent osteoporosis (oss-tee-oh-puh-roe-sus).

## How do I know if I'm at risk?

Some reasons for vitamin D deficiency include:

- **Lack of consumption.** If you follow a strict vegetarian diet, getting enough vitamin D may be a challenge, because most of the natural sources are animal-based, including fish and fish oils, egg yolks, cheese, fortified milk, and beef liver.
- **Limited sun exposure.** Your body makes vitamin D when your skin is exposed to sunlight. If you are homebound, live in northern latitudes, wear long robes or head coverings for religious reasons, or have a job that prevents sun exposure, you may be at risk for vitamin D deficiency.
- **Dark skin.** According to some studies, older adults with darker skin are at high risk of vitamin D deficiency.
- **Older age.** As you age, your kidneys are less able to convert vitamin D to its active form, which increases your risk of vitamin D deficiency.
- **Medical conditions.** Crohn disease, cystic fibrosis, and celiac disease are among certain conditions that can affect your intestine's

ability to absorb vitamin D from the food you eat.

- **Obesity.** If you have a body mass index of 30 or greater, you likely have low levels of vitamin D.

## What are the warning signs?

Some individuals with vitamin D deficiency report bone pain or muscle weakness. In the majority of cases, however, the condition produces no early warning signs.

## What tests do I need?

Your doctor may perform a 25-hydroxy vitamin D blood test. A level of 20 ng/mL is considered adequate for healthy people, and vitamin D deficiency is indicated by a level less than 12 ng/mL.

## How can I avoid the problem?

Supplementation and diet are ways to address vitamin D deficiency. Almost all cow's milk in the U.S. has been fortified with 100 IU of vitamin D per cup. Other fortified foods include yogurt, cereal, and orange juice. The Institute of Medicine recommends the following amounts of vitamin D from diet or supplements:

- People aged 9 years to 70 years: adequate intake, 600 IU/day, maximum safe upper level of intake, 4,000 IU/day
- People aged 71 years and older: adequate intake, 600 IU/day, maximum safe upper level of intake, 4,000 IU/day

Vitamin D3 (or cholecalciferol) is the recommended form of vitamin D for supplementation. While there are benefits to vitamin D supplementation, it is possible to take too much. Too much vitamin D may be associated with an abnormally high blood calcium level, which may result in nausea, constipation, confusion, abnormal heart rhythm, and kidney stones. It's hard

to overdose on vitamin D from sunlight or from foods (unless you ingest high amounts of cod liver oil). Almost all vitamin D overdoses come from supplements.

**How is it treated?**

Three vitamin D super foods are salmon (especially wild-caught), mackerel (especially wild-caught), and mushrooms exposed to ultraviolet light to increase vitamin D.

You can also obtain vitamin D from these foods:

- Cod liver oil (rich in vitamin A; too much may be bad for you)
- Tuna canned in water
- Sardines canned in oil
- Milk or yogurt fortified with vitamin D
- Beef or calf liver
- Egg yolks
- Cheese

The following conditions have been associated with low levels of vitamin D:

- Increased risk of death from cardiovascular disease
- Cognitive impairment in older adults
- Severe asthma in children
- Cancer

If complications of vitamin D deficiency have developed, such as bone or muscle damage, you may require other treatments to address these problems. For instance, people with osteoporosis usually need to take calcium supplements and, in some cases, other medications. Serious bone deformities—as from rickets or osteomalacia—may require surgery.

For more information about vitamin D, visit the vitamin D page of the National Institutes of Health website (<http://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/>).

**Notes:**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

