



Vitamin D

Consumer Fact Sheet

Office of Dietary Supplements • National Institutes of Health

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What is vitamin D and what does it do?

[Vitamin D](#) is a [nutrient](#) found in some foods that is needed for health and to maintain strong bones. It does so by helping the body [absorb calcium](#) (one of bone's main building blocks) from food and [supplements](#). People who get too little [vitamin D](#) may develop soft, thin, and brittle bones, a condition known as [rickets](#) in children and [osteomalacia](#) in adults.

Vitamin D is important to the body in many other ways as well. Muscles need it to move, for example, [nerves](#) need it to carry messages between the brain and every body part, and the [immune system](#) needs vitamin D to fight off invading [bacteria](#) and [viruses](#). Together with calcium, vitamin D also helps protect older adults from [osteoporosis](#). Vitamin D is found in [cells](#) throughout the body.

How much vitamin D do I need?

The amount of vitamin D you need each day depends on your age. Average daily recommended amounts from the Food and Nutrition Board (a national group of experts) for different ages are listed below in [International Units](#) (IU):

| | |
|----------------------------------|--------|
| Birth to 12 months | 200 IU |
| Children 1-13 years | 200 IU |
| Teens 14-18 years | 200 IU |
| Adults 19-50 years | 200 IU |
| Adults 51-70 years | 400 IU |
| Adults 71 years and older | 600 IU |
| Pregnant and breastfeeding women | 200 IU |

For [infants](#), children, and adolescents, the [American Academy of Pediatrics](#) advises daily intakes of 400 IU, twice the official recommendation of 200 IU.

What foods provide vitamin D?

Very few foods naturally have vitamin D. [Fortified](#) foods provide most of the vitamin D in American diets.

- Fatty fish such as salmon, tuna, and mackerel are among the best sources.

- Beef liver, cheese, and egg yolks provide small amounts.
- Mushrooms provide some vitamin D. In some mushrooms that are newly available in stores, the vitamin D content is being boosted by exposing these mushrooms to [ultraviolet light](#).
- Almost all of the U.S. milk supply is fortified with 400 IU of vitamin D per quart. But foods made from milk, like cheese and ice cream, are usually not fortified.
- Vitamin D is added to many breakfast cereals and to some brands of orange juice, yogurt, margarine, and [soy](#) beverages; check the [labels](#).

One can get recommended amounts of vitamin D by eating a variety of foods with plenty of fortified milk and fatty fish.

Can I get vitamin D from the sun?

The body makes vitamin D when skin is directly exposed to the sun, and most people meet some or all of their vitamin D needs this way. Skin exposed to sunshine indoors through a window will not produce vitamin D.

Not much sun is needed to make enough vitamin D. During the warmest months, for example, as little as 5-30 minutes of exposure between 10 AM and 3 PM, several times a week to the face, arms, legs, or back without [sunscreen](#) may be enough.

However, despite the importance of the sun to vitamin D [synthesis](#), it is [prudent](#) to limit exposure of skin to sunlight in order to lower the [risk](#) for [skin cancer](#). When out in the sun, wear protective clothing and apply sunscreen with an [SPF](#) (sun protection factor) of 8 or more. Tanning beds also cause the skin to make vitamin D, but pose similar risks for skin cancer.

The energy from the sun is not enough for the skin to make vitamin D during the coldest months in the northern half of the United States—above a line drawn between Boston and the northern border of California. Cloudy days, shade, and having dark-colored skin also cut down on the amount of vitamin D the skin makes.

People who avoid the sun, who cover their bodies with sunscreen or clothing, or who live in the northern half of the United States during the winter months should include good sources of vitamin D in their diets or take a supplement.

What kinds of vitamin D dietary supplements are available?

Vitamin D is found in supplements (and fortified foods) in two different forms: D2 (ergocalciferol) and D3 (cholecalciferol). Both increase vitamin D in the blood, but the D3 form may do it better and keep levels raised for a longer time. Many supplements now provide vitamin D3 instead of D2.

Am I getting enough vitamin D?

Because vitamin D can come from sun, food, and supplements, the best measure of one's vitamin D [status](#) is blood levels of a form known as 25-hydroxyvitamin D. Levels are described in either nanograms per milliliter (ng/mL) or nanomoles per liter (nmol/L), where 1 ng/mL = 2.5 nmol/L.

In general, levels below 15 ng/mL (37.5 nmol/L) are too low for bone or overall health, and levels above 200 ng/mL (500 nmol/L) are too high. It's not yet clear, but some [nutrition](#) experts think a blood level of at least 30 ng/mL (75 nmol/L) is best for overall good health.

By these measures, some Americans are vitamin D deficient and almost no one has levels that are too high. In general, young people have higher blood levels of 25-hydroxyvitamin D than older people and males have higher levels than females. By race, non-Hispanic blacks tend to have the lowest levels and non-Hispanic whites the highest. The majority of Americans have blood levels lower than 30 ng/mL (75 nmol/L).

Certain other groups may not get enough vitamin D:

- Breastfed infants, since human milk is a poor source of the nutrient. The American Academy of Pediatrics advises that exclusively and partially breastfed infants be given a supplement of 400 IU of vitamin D each day.
- Older adults, since their skin doesn't make vitamin D when exposed to sunlight as efficiently as when they were young, and their [kidneys](#) are less able to convert vitamin D to its active form.
- People with dark skin, because their skin has less ability to produce vitamin D from the sun.
- People with [disorders](#) such as [Crohn's disease](#) or [celiac disease](#) who don't handle fat properly, because vitamin D needs fat to be absorbed.
- [Obese](#) people, because their body fat binds to some vitamin D and [prevents](#) it from getting into the blood.

What happens if I don't get enough vitamin D?

People can become [deficient](#) in vitamin D because they don't [consume](#) enough or absorb enough from food, their exposure to sunlight is limited, or their kidneys cannot convert vitamin D to its active form in the body. In children, vitamin D deficiency causes rickets, where the bones become soft and bend. It's a rare disease but still occurs, especially among African American infants and children. In adults, vitamin D deficiency leads to osteomalacia, causing bone pain and muscle weakness.

What are some effects of vitamin D on health?

Vitamin D is being studied for its possible connections to several diseases and medical problems, including [diabetes](#), [hypertension](#), and [autoimmune conditions](#) such as [multiple sclerosis](#). Two of them discussed below are bone disorders and some types of [cancer](#).

Bone disorders

As they get older, millions of people (mostly women, but men too) develop, or are at risk of, osteoporosis, where bones become [fragile](#) and may [fracture](#) if one falls. It is one consequence of not getting enough calcium and vitamin D over the long term. Supplements of both vitamin D3 (at 700-800 IU/day) and calcium (500-1,200 [mg](#)/day) have been shown to reduce the risk of bone loss and fractures in elderly people aged 62-85 years. Men and women should talk with their [health care providers](#) about their needs for vitamin D (and calcium) as part of an overall plan to prevent or [treat](#) osteoporosis.

Cancer

Some studies suggest that vitamin D may protect against [colon cancer](#) and perhaps even cancers of the [prostate](#) and [breast](#). But higher levels of vitamin D in the blood have also been linked to higher rates of [pancreatic cancer](#). At this time, it's too early to say whether low vitamin D status increases cancer risk and whether higher levels protect or even increase risk in some people.

Can vitamin D be harmful?

Yes, when amounts in the blood become too high. [Signs](#) of [toxicity](#) include nausea, vomiting, poor appetite, [constipation](#), weakness, and weight loss. And by raising blood levels of calcium, too much vitamin D can cause confusion, [disorientation](#), and problems with [heart rhythm](#). Excess vitamin D can also damage the kidneys.

The safe upper limit for vitamin D is 1,000 IU/day for infants and 2,000 IU for children and adults. Vitamin D [toxicity](#) almost always occurs from overuse of supplements. Excessive sun exposure doesn't cause vitamin D poisoning because the body limits the amount of this vitamin it produces.

Are there any interactions with vitamin D that I should know about?

Like most [dietary supplements](#), vitamin D may [interact](#) or interfere with other medicines or

supplements you might be taking. Here are several examples:

- Prednisone and other corticosteroid medicines to reduce [inflammation](#) impair how the body handles vitamin D, which leads to lower calcium absorption and loss of bone over time.
- Both the weight-loss [drug](#) orlistat (brand names Xenical® and Alli®) and the [cholesterol-lowering drug](#) cholestyramine (brand names Questran®, LoCholest®, and Prevalite®) can reduce the absorption of vitamin D and other [fat-soluble](#) vitamins ([A](#), [E](#), and [K](#)).
- Both phenobarbital and phenytoin (brand name Dilantin®), used to prevent and control [epileptic seizures](#), increase the breakdown of vitamin D and reduce calcium absorption.

Tell your doctor, [pharmacist](#), and other health care providers about any dietary supplements and medicines you take. They can tell you if those dietary supplements might interact or interfere with your [prescription](#) or over-the-counter medicines, or if the medicines might interfere with how your body absorbs, uses, or breaks down nutrients.

Where can I find out more about vitamin D?

- For general information on vitamin D:
 - [Office of Dietary Supplements Health Professional Fact Sheet on Vitamin D.](#)
 - [Office of Dietary Supplements Vitamin D QuickFacts.](#)
 - [Vitamins, MedLinePlus®](#)
- For more information on food sources of vitamin E:
 - [U.S. Department of Agriculture \(USDA\) National Nutrient Database Web site](#)
 - [Vitamin D Content of Selected Foods, USDA.](#)
- For more advice on buying dietary supplements:
 - [Office of Dietary Supplements Frequently Asked Questions: Which brand\(s\) of dietary supplements should I purchase?](#)
- For information on the government's food guidance system:
 - [MyPyramid](#)
 - [Dietary Guidelines for Americans](#)

Disclaimer

This fact sheet by the Office of Dietary Supplements provides information that should not take the place of medical advice. We encourage you to talk to your healthcare providers (doctor, registered dietitian, pharmacist, etc.) about your interest in, questions about, or use of dietary supplements and what may be best for your overall health.

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