

# Vitamin D Fact Sheet for Consumers



Very few foods naturally have vitamin D. Fatty fish such as salmon, tuna, and mackerel are among the best sources. Fortified foods like milk provide most of the vitamin D in American diets.

## What is vitamin D and what does it do?

Vitamin D is a nutrient you need for good health. It helps your body absorb calcium, one of the main building blocks for strong bones. Together with calcium, vitamin D helps protect you from developing osteoporosis, a disease that thins and weakens the bones and makes them more likely to break. Your body needs vitamin D for other functions too. Your muscles need it to move, and your nerves need it to carry messages between your brain and your body. Your immune system needs vitamin D to fight off invading bacteria and viruses.

## How much vitamin D do I need?

The amount of vitamin D you need each day depends on your age. Average daily recommended amounts are listed below in micrograms (mcg) and International Units (IU):

Life Stage	Recommended Amount
Birth to 12 months	10 mcg (400 IU)
Children 1–13 years	15 mcg (600 IU)
Teens 14–18 years	15 mcg (600 IU)
Adults 19–70 years	15 mcg (600 IU)
Adults 71 years and older	20 mcg (800 IU)
Pregnant and breastfeeding teens and women	15 mcg (600 IU)

## What foods provide vitamin D?

Very few foods naturally contain vitamin D. Fortified foods provide most of the vitamin D in the diets of people in the United States. Check the Nutrition Facts label for the amount of vitamin D in a food or beverage.

- Almost all of the U.S. milk supply is fortified with about 3 mcg (120 IU) vitamin D per cup. Many plant-based alternatives such as soy milk, almond milk, and oat milk are similarly fortified. 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 other food products.
- Fatty fish (like trout, salmon, tuna, and mackerel) and fish liver oils are among the best natural sources of vitamin D.
- Beef liver, egg yolks, and cheese have small amounts of vitamin D.
- Mushrooms provide a little vitamin D. Some mushrooms have been exposed to ultraviolet light to increase their vitamin D content.

## Can I get vitamin D from the sun?

Your body makes vitamin D when your bare skin is exposed to the sun. Most people get at least some vitamin D this way. However, clouds, smog, old age, and having dark-colored skin reduce the amount of vitamin D your skin makes. Also, your skin does not make vitamin D from sunlight through a window.

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Ultraviolet radiation from sunshine can cause skin cancer, so it's important to limit how much time you spend in the sun. Although sunscreen limits vitamin D production, health experts recommend using sunscreen with a sun protection factor (SPF) of 15 or more when you're out in the sun for more than a few minutes.

### What kinds of vitamin D dietary supplements are available?

Vitamin D is found in multivitamin/multimineral supplements. It is also available in dietary supplements containing only vitamin D or vitamin D combined with a few other nutrients. The two forms of vitamin D in supplements are D2 (ergocalciferol) and D3 (cholecalciferol). Both forms increase vitamin D in your blood, but D3 might raise it higher and for longer than D2. Because vitamin D is fat-soluble, it is best absorbed when taken with a meal or snack that includes some fat.

### Am I getting enough vitamin D?

Because you get vitamin D from food, sunshine, and dietary supplements, one way to know if you're getting enough is a blood test that measures the amount of vitamin D in your blood. In the blood, a form of vitamin D known as 25-hydroxyvitamin D is measured in either nanomoles per liter (nmol/L) or nanograms per milliliter (ng/mL). One nmol/L is the same as 0.4 ng/mL.

- Levels of 50 nmol/L (20 ng/mL) or above are adequate for most people for bone and overall health.
- Levels below 30 nmol/L (12 ng/mL) are too low and might weaken your bones and affect your health.
- Levels above 125 nmol/L (50 ng/mL) are too high and might cause health problems.

In the United States, most people have adequate blood levels of vitamin D. However, almost one out of four people have vitamin D blood levels that are too low or inadequate for bone and overall health.

Some people are more likely than others to have trouble getting enough vitamin D:

- *Breastfed infants.* Breast milk alone does not provide infants with an adequate amount of vitamin D. Breastfed infants should be given a supplement of 10 mcg (400 IU) of vitamin D each day.
- *Older adults.* As you age, your skin's ability to make vitamin D when exposed to sunlight declines.
- *People who seldom expose their skin to sunshine* because they do not go outside or because they keep their body and head covered. Sunscreen also limits the amount of vitamin D your skin produces.

- *People with dark skin.* The darker your skin, the less vitamin D you make from sunlight exposure.
- *People with conditions that limit fat absorption*, such as Crohn's disease, celiac disease, or ulcerative colitis. This is because the vitamin D you consume is absorbed in the gut along with fat, so if your body has trouble absorbing fat, it will also have trouble absorbing vitamin D.
- *People who are obese or have undergone gastric bypass surgery.* They may need more vitamin D than other people.

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

In children, vitamin D deficiency causes rickets, a disease in which the bones become soft, weak, deformed, and painful. In teens and adults, vitamin D deficiency causes osteomalacia, a disorder that causes bone pain and muscle weakness.

### What are some effects of vitamin D on health?

Scientists are studying vitamin D to better understand how it affects health. Here are several examples of what this research has shown:

#### **Bone health and osteoporosis**

Long-term shortages of vitamin D and calcium cause your bones to become fragile and break more easily. This condition is called osteoporosis. Millions of older women and men have osteoporosis or are at risk of developing this condition. Muscles are also important for healthy bones because they help maintain balance and prevent falls. A shortage of vitamin D may lead to weak, painful muscles.

Getting recommended amounts of vitamin D and calcium from foods (and supplements, if needed) will help maintain healthy bones and prevent osteoporosis. Taking vitamin D and calcium supplements slightly increases bone strength in older adults, but it's not clear whether they reduce the risk of falling or breaking a bone.

#### **Cancer**

Vitamin D does not seem to reduce the risk of developing cancer of the breast, colon, rectum, or lung. It is not clear whether vitamin D affects the risk of prostate cancer or chance of surviving this cancer. Very high blood levels of vitamin D may even increase the risk of pancreatic cancer.

Clinical trials suggest that while vitamin D supplements (with or without calcium) may not affect your risk of getting cancer, they might slightly reduce your risk of dying from this disease. More research is needed to better understand the role that vitamin D plays in cancer prevention and cancer-related death.

**Heart disease**

Vitamin D is important for a healthy heart and blood vessels and for normal blood pressure. Some studies show that vitamin D supplements might help reduce blood cholesterol levels and high blood pressure—two of the main risk factors for heart disease. Other studies show no benefits. If you are overweight or obese, taking vitamin D at doses above 20 mcg (800 IU) per day plus calcium might actually raise your blood pressure. Overall, clinical trials find that vitamin D supplements do not reduce the risk of developing heart disease or dying from it, even if you have low blood levels of the vitamin.

**Depression**

Vitamin D is needed for your brain to function properly. Some studies have found links between low blood levels of vitamin D and an increased risk of depression. However, clinical trials show that taking vitamin D supplements does not prevent or ease symptoms of depression.

**Multiple sclerosis**

People who live near the equator have more sun exposure and higher vitamin D levels. They also rarely develop multiple sclerosis (MS), a disease that affects the nerves that carry messages from the brain to the rest of the body. Many studies find a link between low blood vitamin D levels and the risk of developing MS. However, scientists have not actually studied whether vitamin D supplements can prevent MS. In people who have MS, clinical trials show that taking vitamin D supplements does not keep symptoms from getting worse or coming back.

**Type 2 diabetes**

Vitamin D helps your body regulate blood sugar levels. However, clinical trials in people with and without diabetes show that supplemental vitamin D does not improve blood sugar levels, insulin resistance, or hemoglobin A1c levels (the average level of blood sugar over the past 3 months). Other studies show that vitamin D supplements don't stop most people with prediabetes from developing diabetes.

**Weight loss**

Taking vitamin D supplements or eating foods that are rich in vitamin D does not help you lose weight.

**Can vitamin D be harmful?**

Yes, getting too much vitamin D can be harmful. Very high levels of vitamin D in your blood (greater than 375 nmol/L or 150 ng/mL) can cause nausea, vomiting, muscle weakness, confusion, pain, loss of appetite, dehydration, excessive urination and thirst, and kidney stones. Extremely high levels of vitamin D can cause kidney failure, irregular heartbeat, and even death. High levels of vitamin D are almost always caused by consuming excessive amounts of vitamin D from dietary

supplements. You cannot get too much vitamin D from sunshine because your skin limits the amount of vitamin D it makes.

The daily upper limits for vitamin D are listed below in micrograms (mcg) and international units (IU):

Ages	Upper Limit
Birth to 6 months	25 mcg (1,000 IU)
Infants 7–12 months	38 mcg (1,500 IU)
Children 1–3 years	63 mcg (2,500 IU)
Children 4–8 years	75 mcg (3,000 IU)
Children 9–18 years	100 mcg (4,000 IU)
Adults 19 years and older	100 mcg (4,000 IU)
Pregnant and breastfeeding teens and women	100 mcg (4,000 IU)

**Does vitamin D interact with medications or other dietary supplements?**

Yes, vitamin D supplements may interact with some medicines. Here are several examples:

- Orlistat (Xenical® and alli®) is a weight-loss drug. It can reduce the amount of vitamin D your body absorbs from food and supplements.
- Cholesterol-lowering statins might not work as well if you take high-dose vitamin D supplements. This includes atorvastatin (Lipitor®), lovastatin (Altoprev® and Mevacor®), and simvastatin (FloLipid™ and Zocor®)
- Steroids such as prednisone (Deltasone®, Rayos®, and Sterapred®) can lower your blood levels of vitamin D.
- Thiazide diuretics (such as Hygroton®, Lozol®, and Microzide®) could raise your blood calcium level too high if you take vitamin D supplements.

Tell your doctor, pharmacist, and other healthcare providers about any dietary supplements and prescription or over-the-counter medicines you take. They can tell you if the dietary supplements might interact with your medicines. They can also explain whether the medicines you take might interfere with how your body absorbs or uses other nutrients.

**Vitamin D and healthful eating**

People should get most of their nutrients from food and beverages, according to the federal government's *Dietary Guidelines for Americans*. Foods contain vitamins, minerals, dietary fiber and other components that benefit health. In some cases, fortified foods and dietary supplements are useful when it is not possible otherwise to meet needs for one or more nutrients (e.g., during specific life stages such as pregnancy). For more information about building a healthy dietary pattern, see the *Dietary Guidelines for Americans* and the U.S. Department of Agriculture's MyPlate.

## Where can I find out more about vitamin D?

### For more information on vitamin D:

- Office of Dietary Supplements, Health Professional Fact Sheet on Vitamin D
- MedlinePlus®, Vitamin D

### For more information on food sources of vitamin D:

- Office of Dietary Supplements, Health Professional Fact Sheet on Vitamin D
- U.S. Department of Agriculture (USDA), FoodData Central
- Nutrient List for vitamin D (listed by food or by vitamin D content), 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 about building a healthy diet:

- *Dietary Guidelines for Americans*
- MyPlate

## Disclaimer

This fact sheet by the Office of Dietary Supplements (ODS) provides information that should not take the place of medical advice. We encourage you to talk to your health care 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. Any mention in this publication of a specific product or service, or recommendation from an organization or professional society, does not represent an endorsement by ODS of that product, service, or expert advice.



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