

FAQs About Vitamin D

By Reed Mangels, PhD, RD

VITAMIN D HAS BEEN IN THE NEWS A LOT LATELY. Researchers are looking at whether it plays a role in a multitude of diseases ranging from multiple sclerosis to depression to cancer. Vitamin D has long been known to be important for bone health and is being added to foods like orange juice and to many brands of calcium supplements. Vitamin D has always been looked on as an unusual vitamin because, unlike any other nutrient, our bodies can actually make a substantial amount of vitamin D. Add in the fact that it acts more like a hormone than a vitamin, and you can see why there's a lot to know about vitamin D.

We've recently heard from several readers who have had their blood checked for vitamin D and were surprised to learn that they were considered vitamin D deficient. They wrote asking us about vegan sources of vitamin D, the role of sunlight exposure, and what kind of supplements to use. We realized that it's a good time to answer some questions about vitamin D.

WHAT DOES VITAMIN D DO?

Vitamin D is best known for its role in bone health—it helps our body absorb calcium. When vitamin D is deficient, we absorb very little calcium. That's the main reason that calcium supplements often also contain vitamin D. If calcium is not absorbed due to a vitamin D deficiency, the result is weaker bones that are more likely to fracture.

More recent studies also suggest that older people with lower blood levels of vitamin D are more likely to lose their balance and fall, possibly because of vitamin D's role in promoting muscle function.¹ Higher blood levels of vitamin D have been associated with a lower risk of colon and breast cancer in some age groups.²

In addition, lower rates of heart attacks, strokes, multiple sclerosis, arthritis, and depression have also been reported in people with higher blood levels of vitamin D.^{2,3}

WHERE DO WE GET VITAMIN D?

Vitamin D comes from two places—we take it into our bodies in foods and supplements, and our bodies produce it after sunlight exposure. Vitamin D is found

naturally in only a few foods like fatty fish (for example, cod liver oil) and egg yolks. Because there are so few natural dietary sources, vitamin D is added to foods such as fortified soymilk, fortified juice, fortified breakfast cereals, cow's milk, and margarine. (Vegan spreads like Earth Balance do not have vitamin D added.) Typically, soymilk is fortified with vitamin D₂, the vegan form of vitamin D, while cereals, juice, and margarine are fortified with vitamin D₃ derived from sheep's wool. If the label on a fortified food doesn't say what form of vitamin D is used to fortify the food, you can contact the company.

Recently, United States Department of Agriculture (USDA) scientists reported that mushrooms that had been exposed to ultraviolet B light for 5 minutes had very high levels of vitamin D, close to 3,500 International Units (IU) in a 1-cup serving.⁴ These vitamin D-containing mushrooms are expected to be commercially available in the next few years and will be a plant-based source of vitamin D.

Besides vitamin D from food and supplements, our bodies are able to make vitamin D when our skin is exposed to ultraviolet B rays from sunlight under certain conditions. It doesn't take much sun to stimulate vitamin D production, just 5 to 30 minutes on arms and legs twice a week. However, this sunlight exposure only works at certain times of day and in certain seasons above certain latitudes (or below certain latitudes if you're in the Southern Hemisphere). Vitamin D production is highest when the sun's rays are most intense—between 10 a.m. and 3 p.m. during the summer months. In locations above 42 degrees north latitude (Chicago, Boston, and Portland, Oregon, for instance), vitamin D production does not occur from late October through early March. Even as far south as Atlanta (about 35 degrees north latitude), vitamin D production doesn't occur from November to February.²

Factors like sunscreen use, darker skin pigmentation, clothing, pollution, and aging can reduce the amount of vitamin D we produce. Because of this and because of concerns about sun exposure leading to skin cancer, many people feel safer relying primarily on foods or supplements for vitamin D.

HOW MUCH VITAMIN D DO WE NEED?

The current recommendation for vitamin D is 200 IU per day for children and adults up to 50 years old, 400 IU for 51-70 year olds, and 600 IU for those age 71 years and older.⁵ These recommendations are more than 10 years old. Because of more recent research on the role of vitamin D, experts are suggesting intakes of 800 IU or more per day for the average adult and 400 IU for children, with higher intakes recommended to treat deficiency.^{2,6}

CAN WE GET TOO MUCH VITAMIN D FROM FOOD OR FROM SUPPLEMENTS? WILL OUR BODIES MAKE TOO MUCH VITAMIN D?

It is possible to get too much vitamin D, especially by overdoing supplements. Excess vitamin D can cause the body to absorb too much calcium and can lead to kidney damage. The highest safe level of vitamin D for people to take is controversial, with some researchers using up to 10,000 IU per day without seeing problems.² A conservative recommendation is to stay below 2,000 IU per day.⁷ If you have had kidney stones, check with your health care provider before going above 1,000 IU per day.⁷

Don't worry about producing too much vitamin D following sun exposure because your skin stops producing it once you've had enough. It's still a good idea to limit sun exposure, however, because of the link between sun exposure and skin cancer.

IS VITAMIN D A SPECIAL CONCERN FOR VEGANS?

A vegan diet can be planned to provide adequate amounts of vitamin D through use of fortified foods like fortified soymilk. Any person, whether vegan or not, who does not include good sources of vitamin D in his or her diet or take vitamin D supplements can be at risk for not getting adequate vitamin D, especially if sunlight exposure is limited. Some studies have found that vegans have lower vitamin D intakes than do lacto-ovo vegetarians or meat-eaters.⁸ This may be because cow's milk (a source of vitamin D) is a more common part of the daily menu for non-vegans than vitamin D-fortified foods are for vegans.

WHAT HAPPENS IF SOMEONE DOESN'T GET ENOUGH VITAMIN D?

A vitamin D deficiency leads to nutritional rickets, a condition that causes weak and deformed bones in

babies and children. Symptoms can include a delay in learning to walk, low height-for-age, and bowing of the legs and arms. Rickets rarely occurs in the U.S., but a recent outbreak of cases has raised concerns that children are not getting enough vitamin D.

In adults, not getting enough vitamin D can increase risk of osteoporosis and other diseases.

WHAT'S THE DIFFERENCE BETWEEN VITAMIN D₂ AND VITAMIN D₃?

Two different forms of vitamin D are used in supplements and fortified foods. Vitamin D₂, also called ergocalciferol, is manufactured through the ultraviolet irradiation of a substance called ergosterol that comes from yeast. Vitamin D₂ is vegan.

Vitamin D₃, also called cholecalciferol, is made by the ultraviolet irradiation of a substance derived from sheep's wool. Some research suggests that vitamin D₂ and vitamin D₃ are absorbed equally well,⁹ although other studies suggest that vitamin D₃ is better absorbed.¹⁰ If you are treated for a vitamin D deficiency, you may find that your health care provider recommends taking a higher dose of vitamin D₂ than of vitamin D₃ to compensate for possible differences in absorption.² This is an area of active research that we will continue to follow.

WHAT ABOUT VITAMIN D FOR BREASTFED BABIES?

Breast milk is the ideal food for infants. Human milk, however, contains little vitamin D. If a nursing mother is vitamin D-deficient, her breast milk will be even lower in vitamin D than usual. To prevent vitamin D deficiency in breast-fed babies, the American Academy of Pediatrics recommends that breast-fed babies be given a 400 IU/day vitamin D supplement beginning within the first few days after birth.⁶

Another possible way to prevent vitamin D deficiency in a breast-fed infant is for the mother to take a vitamin D supplement daily containing up to 4,000 IU of vitamin D.¹¹ High-dose vitamin D supplements, used by the lactating mother, have been shown to markedly increase breast milk vitamin D content.^{11,12} While there is some possibility that a baby will be able to make adequate vitamin D following sunlight exposure, there are many factors that interfere with vitamin D production (skin pigmentation, pollution, season, amount of clothing, location, and sunscreen). This is why supplemental vitamin D is recommended.

Vitamin D Sources for Vegans

FORTIFIED PLANT MILKS	VITAMIN D (% DAILY VALUE)
Living Harvest Hemp Milk	160
Silk Soymilk	120
Pacific UltraSoy	100
Soy Dream Enriched	100
Westsoy Plus Soymilk	100
Almond Breeze	100
Pacific Almond Milk	100
Pacific Hazelnut Milk	100
Pacific Oat Milk	100
Rice Dream Enriched	100
Pacific Rice Milk	100
VitaSoy Enriched Soymilk	80
Eden Soy Extra Soymilk	40

These products are examples of foods and supplements that contain vitamin D. Because product formulations change, check labels to get the most recent information. Vitamin D on a label is expressed as a percent of the Daily Value for vitamin D. The Daily Value is 400 IU, so a product that contains 25 percent of the Daily Value for vitamin D would contain 100 IU of vitamin D.

VEGAN SUPPLEMENTS	VITAMIN D (U PER TABLETS/CHW CAPSULES)
Veg Life Supreme Vegan D	2,000
Deva Vegan Vitamin D ₂	800
Freeda Vitamin D ₂	400
Now Liquid Multivitamin	400 (per Tbsp.)
Pure Vegan Vitamin D ₂ Spray	400
Veg Life Vegan D	400
Freeda Joint Boost Formula	200
Deva Vegan Cal-Mag-Plus	133
Vegan Life Multivitamin	133
Nutrition Now Vegan Calcium Soft Chews	100
Prescription 2000 Bone Support Formula	100
Rhino Soft Calcium Chews for Kids	100
Veg Life Vegan Cal-Mag Citrate + D	67

References:

- Dawson-Hughes B. 2008. Serum 25-hydroxyvitamin D and functional outcomes in the elderly. *Am J Clin Nutr* 88:537S-40S.
- Holick MF. 2007. Vitamin D deficiency. *N Engl J Med* 357:266-81.
- Peterlik M, Cross HS. 2005. Vitamin D and calcium deficits predispose for multiple chronic diseases. *Eur J Clin Invest* 35:290-304.
- Calvo MS, Garthoff LH, Feeney MJ, et al. "Light exposed mushrooms: From development to market of naturally enhanced plant sources of vitamin D." *Proceedings of the 5th International Congress on Vegetarian Nutrition*. Loma Linda, CA; March, 2008.
- Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*. Washington: National Academy Press, 1997.
- Wagner CL, Greer FR, and the Section on Breastfeeding and Committee on Nutrition. 2008. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. *Pediatrics* 122:1142-52.
- Liebman B. Are you Deficient? *Nutrition Action Healthletter* Nov. 2006; 23:1, 3-7.
- Davey GK, Spencer EA, Appleby PN, et al. 2003. EPIC-Oxford: lifestyle characteristics and nutrient intakes in a cohort of 33,883 meat-eaters and 31,546 non meat-eaters in the UK. *Public Health Nutr* 6:259-68.
- Holick MF, Biancuzzo RM, Chen TC, et al. 2008. Vitamin D₂ is as effective as vitamin D₃ in maintaining circulating concentrations of 25-hydroxyvitamin D. *J Clin Endocrinol Metab* 93:677-81.
- Armas LAG, Hollis BW, Heaney RP. 2004. Vitamin D₂ is much less effective than vitamin D₃ in humans. *J Clin Endocrinol Metab* 89:5387-91.
- Kovacs CS. 2008. Vitamin D in pregnancy and lactation: maternal, fetal, and neonatal outcomes from human and animal studies. *Am J Clin Nutr* 88(suppl):520S-8S.
- Basile LA, Taylor SN, Wagner CL, et al. 2006. The effect of high-dose vitamin D supplementation on serum vitamin D levels and milk calcium concentration in lactating women and their infants. *Breastfeed Med* 1(1):27-35.

Reed Mangels, PhD, RD, is one of The Vegetarian Resource Group's Nutrition Advisors. She is the co-author of *Simply Vegan* and has written many articles for dietetic and health journals.

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