

VITAMIN D3

Human skin cells can synthesize adequate vitamin D after exposure to UV-B rays from sunlight. However, because of geographical location and various health and environmental factors, many people fail to maintain optimal vitamin D levels.

Integrative Therapeutics™ Vitamin D3 nutritional supplements are a source of vitamin D in the cholecalciferol (D3) form, which has been shown to raise serum levels.* Available in 1,000 IU tablets or 2,000 IU and 5,000 IU chocolate-flavored chewable tablets, these products offer a range of dosages for support of bone health and immune function.*

Recommended Dosages for Vitamin D

While the current daily Recommended Dietary Alliance (RDA) is set at 600 IU of vitamin D per day for people aged 1-70 years, many nutrition scientists have advocated that the minimum recommended intake needs to be raised. The body of available clinical research on vitamin D suggests the most generally effective doses appear to be in the range of 800 to 1,200 IU per day. However, many practitioners are now recommending much higher amounts. Because there are circumstances in which high-dose vitamin D is indicated, Integrative Therapeutics offers several dosing options.

- 1,000 IU tablets
- 2,000 IU chocolate-flavored chewable tablets
- 5,000 IU chocolate-flavored chewable tablets





VITAMIN D3

Description

Integrative Therapeutics™ offers three vitamin D3 supplements—1,000 IU tablets and 2,000 IU or 5,000 IU chocolate-flavored chewable tablets. These nutritional supplements are in the form of cholecalciferol (D3), which has been shown to raise serum levels.*

Background

Although it is referred to as a vitamin, vitamin D is more accurately described as a prohormone. Cholecalciferol (vitamin D3) is produced naturally in human skin exposed to ultraviolet B light.¹ It occurs in some animal products and is added to various dietary supplements (such as multivitamins) and fortified foods (such as milk).²

How It Works

The most well-known benefit of vitamin D is its role in supporting bone health.* Vitamin D helps regulate calcium and phosphorus absorption through the intestines, reduces kidney excretion of calcium, and regulates the amount of calcium in bones.*³ It is critical for healthy skeletal development and bone mineralization.*⁴ Vitamin D also enhances healthy cell replication and division and supports healthy glucose metabolism.*^{5,6} Humans' primary source of vitamin D is through exposure to sunlight. However, many individuals, particularly the elderly, lack sufficient vitamin D. From 38-60% of elderly institutionalized adults have been found to have inadequate vitamin D (depending on time of year tested).^{7,8} This may be due to inadequate exposure to sunlight or because vitamin D synthesis becomes less efficient as we age.¹ Supplemental vitamin D intake may, therefore, be especially important in older adults.*¹

Vitamin D and immune health*

Vitamin D is required for immune function.* It participates in the regulation of cellular proliferation, differentiation, apoptosis, and angiogenesis.*^{9,10} Many cells—including those in the breast, brain, prostate, colon, and immune system—have receptors that can be activated by 1,25-hydroxyvitamin D.*¹¹ In vitro studies have shown that vitamin D, in the form of cholecalciferol, supports normal prostate cell replication and division.*¹² Vitamin D is a potent immunomodulator, and has been shown to stimulate human macrophage activity.*¹³

Vitamin D and bone health*

Vitamin D influences bone density both through its regulation of calcium absorption by the intestines

and by its effect on bone deposition and bone resorption.* In women with low serum levels of vitamin D, increasing vitamin D intake has shown to increase intestinal calcium absorption by up to 65%.^{*14} Vitamin D stimulates bone turnover, while exerting a protective effect on osteoblasts.^{*15}

Many clinical trials have demonstrated that vitamin D supports bone strength and density.* Supplementation with vitamin D at doses over 700 IU daily has been associated with a 23-26% improvement in bone health,^{*16} although these benefits appear to be primarily for older adults.¹⁷

Dosing Vitamin D

The safest, most effective dose of vitamin D is a matter of controversy. In the early decades of supplementation, recommended doses were usually quite low, commonly 400 IU per day. However, research does not support the efficacy of doses this low, and the RDA has since been raised to 600 IU/day for ages 1 to 70 and 800 IU/day for people over 71.

Suboptimal levels of vitamin D intake have been documented, especially among older adults. In a study of women living in Michigan, 67% had low serum 25 (OH)D levels (less than 20 ng/mL).¹⁸ Non-Caucasian individuals were 3 times more likely than Caucasians to have low vitamin D levels. Participants with total vitamin D intake < 400 IU/day from diet and supplements were 10 times more likely to have low vitamin D levels than others. A study of pregnant women living in the northern United States found that 83% of African American mothers were either deficient or had insufficient levels of vitamin D, while 47% of Caucasian mothers were either deficient or had insufficient levels.¹⁹

The current RDA (people 1-70 years old) recommended by the Institute of Medicine (IOM) is 600 IU per day. The IOM has also set the tolerable upper intake levels (UL) at 4,000 IU daily.²⁰ Some nutrition scientists have challenged these recommendations and feel that the tolerable upper limits could be raised to as high as 10,000 IU/day,²¹ though not all experts agree with this assessment.²²

Caution with high doses is warranted, and they should be reserved for short-term use only. To date, high-dose supplementation safety studies have been of comparatively short duration.

Conclusion

While the RDAs for vitamin D may prevent outright deficiency, it is clear that they are not sufficient to promote optimal health. Doses in 800–1,200 IU/day of Vitamin D3 are more effective than 400 IU/day in virtually all studies. They can be considered for preventing vitamin D deficiency, and for persons with higher body mass index (BMI), who are of advanced age, who have absorption issues, dark skin, lack of sun exposure, or live a large distance from the equator. It is not known whether 2,000 IU/day is more effective than 800–1,200 IU/day for the average person, but it represents a more reasonable upper level dose for daily repletion over limited

periods of time. The safety and efficacy of using high doses (> 2,000 IU/day) for the sole purpose of achieving a target 25(OH)D level have not been established.

Doses in excess of the UL of 4,000 IU per day are sometimes indicated, but should be reserved for special cases and only used under the supervision of a qualified healthcare practitioner.

There is strong evidence that vitamin D supplementation supports bone density and immune function, and emerging research suggests a role of vitamin D supplementation for several other clinical applications.* Vitamin D3 provides a convenient way to increase intake of cholecalciferol to support these vital functions in the body.*

References

- Vitamins A, D, E and K. In: Wardlaw GM, Insel PM. *Perspectives in Nutrition*. 2nd ed. St. Louis, Missouri: Mosby;1993:358.
- Holick MF. Vitamin D. In: Shiels ME, ed. *Modern Nutrition in Health and Disease*. 9th ed. Baltimore, Maryland: Williams and Wilkins;1999:332.
- Grant WB, Holick MF. Benefits and requirement of vitamin D for optimal health: a review. *Altern Med Rev* 2005;10:94-111.
- Vitamin D. In: *PDR for Nutritional Supplements*. Montvale, New Jersey: Medical Economics Company; 2001:498-503.
- Masuda S. Promise of vitamin D analogues in the treatment of hyperproliferative conditions. *Mol Cancer Ther* 2006;5(4):797-808.
- Pittas AG, Dawson-Hughes B, Li T, et al. Vitamin D and calcium intake in relation to type 2 diabetes in women. *Diabetes Care* 2006;29:650-6.
- Liu BA, Gordon M, Labranche JM, Murray TM, Vieth R, Shear NH. Seasonal prevalence of vitamin D deficiency in institutionalized older adults. *J Am Geriatr Soc* 1997;45:598-603.
- Gloth FM, Gundberg CM, Hollis BW, Haddad JG, Tobin JD. Vitamin D deficiency in homebound elderly persons. *JAMA* 1995;274:1683-6.
- Li H, Stampfer MJ, Hollis JB, et al. Prospective Study of Plasma Vitamin D Metabolites, Vitamin Receptor Polymorphisms, and Prostate Cancer. *PLoS Med* 2007;4:e103.
- Murillo G, Matusiak D, Benya RV, Mehta RG. Chemopreventive efficacy of 25-hydroxyvitamin D3 in colon cancer. *J Steroid Biochem Mol Biol* 2007;103:763-7.
- Pendás-Franco N, González-Sancho JM, Suárez Y, et al. Vitamin D regulates the phenotype of human breast cancer cells. *Differentiation* 2007;75:193-207.
- Tokar EJ, Webber MM. Cholecalciferol (vitamin D3) inhibits growth and invasion by upregulating nuclear receptors and 25-hydroxylase (CYP27A1) in human prostate cancer cells. *Clin Exp Metastasis* 2005;22:275-84.
- Chandra G, Selvaraj P, Jawahar MS, Banurekha VV, Narayanan PR. Effect of vitamin D3 on phagocytic potential of macrophages with live Mycobacterium tuberculosis and lymphoproliferative response in pulmonary tuberculosis. *J Clin Immunol* 2004;24:249-57.
- Heaney RP, Dowell MS, Hale CA, Bendich A. Calcium absorption varies within the reference range for serum 25-hydroxyvitamin D. *J Am Coll Nutr* 2003;22:142-6.
- Montero-Odasso M, Duque G. Vitamin D in the aging musculoskeletal system: an authentic strength pre serving hormone. *Mol Aspects Med* 2005;26:203-19.
- Bischoff-Ferrari HA, Willett WC, Wong JB, et al. Fracture prevention with vitamin D supplementation: a meta-analysis of randomized controlled trials. *JAMA*. 2005;293:2257-2264. doi: 10.1001/jama.293.18.2257.
- Izaks GJ. Fracture prevention with vitamin D supplementation: considering the inconsistent results. *BMC Musculoskelet Disord*. 2007;8:26..
- Kakarala RR, Chandana SR, Harris SS, Kocharla LP, Dvorin E. Prevalence of vitamin D deficiency in uninsured women. *J Gen Intern Med* 2007;22:1180-3.
- Bodnar LM, Simhan HN, Powers RW, et al. High prevalence of vitamin D insufficiency in black and white pregnant women residing in the northern United States and their neonates. *J Nutr* 2007;137:447-52.
- Food and Nutrition Board (FNB) at the Institute of Medicine of The National Academies. Dietary Supplement Fact Sheet: Vitamin D. <http://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/> [Accessed June 16, 2014].
- Hathcock JN, Shao A, Vieth R, Heaney R. Risk assessment for vitamin D. *Am J Clin Nutr* 2007;85:6-18.
- Gaby AR. Vitamin D. In: *Nutritional Medicine*. Concord, NH: Fritz Perilberg Publishing;2011:108-17.

Vitamin D3 1,000 IU - Supplement Facts

Serving Size 1 tablet		
Amount per tablet		%DV
Vitamin D (as cholecalciferol)	1,000 IU	250%
Daily Value (DV).		

Other ingredients: Cellulose, magnesium stearate, modified cellulose, silicon dioxide, and vegetable glycerin.

Contains No: Sugar, salt, yeast, wheat, gluten, corn, soy, dairy products, artificial coloring, artificial flavoring, or preservatives. This product contains natural ingredients; color variations are normal.

Recommendations: Take 1 tablet daily. May increase to 1 tablet twice daily, or as recommended by your healthcare professional. Best if taken with meals.

Caution: Consult your healthcare professional if you have a kidney disorder, hypercalcemia, hypercalciuria, are taking medications, or are pregnant/lactating. Keep out of reach of children.

Vitamin D3 2,000 IU - Supplement Facts

Serving Size 1 chewable tablet		
Amount per chewable tablet		%DV*
Vitamin D (as cholecalciferol)	2,000 IU	500%
Daily Value (DV).		

Other ingredients: Organic inulin, sorbitol, mannitol, natural chocolate flavor, cocoa powder, organic maltodextrin, erythritol, natural vanilla flavor, magnesium stearate, carnauba wax, and silicon dioxide.

Contains No: Sugar, salt, yeast, wheat, gluten, soy, dairy products, artificial coloring, artificial flavoring, or preservatives.

Recommendations: Take 1 tablet per day with a meal, or as recommended by your healthcare professional. Do not exceed recommended dose.

Caution: Consult your healthcare professional if you have a kidney disorder, hypercalcemia, hypercalciuria, are taking medications, or are pregnant/lactating. Keep out of reach of children.

Vitamin D3 5,000 IU - Supplement Facts

Serving Size 1 chewable tablet		
Amount per chewable tablet		%DV*
Total Carbohydrate	<1 g	<1%*
Vitamin D (as cholecalciferol)	5,000 IU	1,250%

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Other ingredients: Organic inulin, sorbitol, mannitol, natural chocolate flavor, cocoa powder, organic maltodextrin, erythritol, natural vanilla flavor, magnesium stearate, carnauba wax, and silicon dioxide.

Contains No: Sugar, salt, yeast, wheat, gluten, soy, dairy products, artificial coloring, artificial flavoring, or preservatives.

Recommendations: Take 1 tablet per day with a meal, or as recommended by your healthcare professional. Do not exceed recommended dose.

Caution: Consult your healthcare professional if you have a kidney disorder, hypercalcemia, hypercalciuria, are taking medications, or are pregnant/lactating. Keep out of reach of children.

Integrative Therapeutics	Natural Partners	Emerson Ecologics
1,000 IU - 76939	1,000 IU - IT0033	1,000 IU - VID1
2,000 IU - 76912	2,000 IU - IT0066	2,000 IU - VITD3
5,000 IU - 70654	5,000 IU - IT0074	5,000 IU - VID26

*THIS STATEMENT HAS NOT BEEN EVALUATED BY THE FOOD AND DRUG ADMINISTRATION. THIS PRODUCT IS NOT INTENDED TO DIAGNOSE, TREAT, CURE, OR PREVENT ANY DISEASE.