



# VITAMIN D 1,000 IU

Beyond bone health

Surprising new research reveals that vitamin D is not just for bone health. It plays a critical role in the health of the brain and nervous systems, and the cardiovascular and immune systems, as well as in pregnancy and child development. One recent study found that people who took vitamin D supplements had a 7% lower risk of death than those who did not, and many ailments are now being linked to vitamin D deficiency.

Called the sunshine vitamin, vitamin D is formed naturally in the skin by exposure to sunlight. But when a person does not get enough sun exposure, their body cannot make sufficient vitamin D.

## WHY IS VITAMIN D DEFICIENCY INCREASING?

We are experiencing an unprecedented epidemic of vitamin D deficiency, with resulting health problems, because so many people are now avoiding exposure to sunshine due to the risk of skin damage and skin cancer from UV rays.

People living in places like Canada, where the sun is not strong enough from mid-September to mid-May to stimulate vitamin D production in the skin, are at risk of developing a vitamin D deficiency. Vitamin D has a half-life of about two weeks. After mid-September, a rapid drop in vitamin D levels leaves most people susceptible to increased incidence and severity of colds, flus, and infections, and increased risk of degenerative diseases.

## THE RIGHT FORM OF VITAMIN D FOR THE HUMAN BODY

What is vitamin D1? It is an outdated term referring to any fat-soluble alcohol called sterols (such as cholesterol) important in calcium metabolism. When ultraviolet radiation (sunlight) strikes ergosterol in plant oils or 7-dehydrocholesterol on animal skin, vitamin D2 or D3 is formed respectively.

Vitamin D2 (also called ergocalciferol), the form synthetically derived from vegetable oils, is often used in milk and commonly selected by vegetarians or vegans.

Vitamin D3 is in the preferred form and is available as: tablet, softgel, or liquid. The 400 IU is available in liquid only. The softgel contains organic flaxseed oil, which increases the bioavailability of vitamin D. The convenient liquid, which can be taken alone or added to smoothies, is in a base of organic olive oil. Olive oil is an excellent natural preservative and also enhances the bioavailability of vitamin D.

## HOW MUCH VITAMIN D IS NEEDED?

A person with fair skin with full body exposure to sunlight can produce up to 20,000 IU of vitamin D3 in just 20 minutes. New research shows that the medical profession has vastly underestimated the amount of vitamin D required to maintain good health. While Health Canada currently recommends a maximum dose of only 1,000 IU daily, experts now suggest adults take up to 5,000 IU daily in winter or whenever exposure to sunlight is limited. Published scientific research has confirmed that there is no risk of toxicity from vitamin D3 supplements in doses below 10,000 IU per day.

## HOW DOES VITAMIN D WORK?

Vitamin D is produced when sunlight converts cholesterol in your skin into a form of vitamin D3 called calcidiol. Then the liver hydroxylates calcidiol into a form called calcidiol (25-hydroxyvitamin D3). The kidneys then hydroxylate calcidiol into the active form of vitamin D called calcitriol (1,25-dihydroxyvitamin D3).

Calcidiol, the inactive form of vitamin D3, is circulated and stored in the body. This is the form that should be measured during a blood test of vitamin D3 levels. Researchers now recommend that blood levels of calcidiol be maintained at 50 ng/mL or 125 nmol/L, the level at which vitamin D actually has broader health benefits.

Virtually every cell in the human body has receptors for vitamin D3 because it is not just a vitamin, it is also a hormone. As a hormone, it regulates cellular production of important proteins and peptides. Vitamin D3 also affects the expression of many genes, including ones that are key factors in the development of cancer.

## THE MANY BENEFITS OF VITAMIN D3

- Maintains bone, joint, and muscle health
- Supports the brain and nervous system
- Reduces the risk of cardiovascular disease
- Supports the health of mother and child during pregnancy and lactation
- Strengthens the immune system, reducing the incidence and severity of bacterial infections
- Improves lung function, especially in former smokers
- Reduces the risk of cancer
- Inhibits skin cell growth associated with psoriasis and other skin conditions
- Helps maintain adequate insulin levels for people with type 2 diabetes

## BONE, JOINT, AND MUSCLE HEALTH

All the body's structural components – the bones, joints, and muscles – require vitamin D3 to remain strong and healthy. Ailments arise when vitamin D3 levels are insufficient. Vitamin D deficiency is prevalent among the elderly, as is osteoporosis, a condition where the bones fracture easily because they have become thin, porous, and brittle.

Vitamin D supplementation can reduce osteoporosis and hip fractures (Murray). One study found that supplementation with 700 IU daily reduced the annual rate of hip fracture from 1.3% to 0.5%, nearly a 60% reduction.

Human muscle tissue has receptor sites for vitamin D3. Studies involving elderly people show that those with higher vitamin D3 serum levels have greater muscle strength and fewer falls. Some nursing homes have drastically reduced the number of broken hips from falls by supplementing with vitamin D3.

Intense bone and muscle pain (osteomalacia) results from vitamin D deficiency. Out of 150 children and adults who went to a Minnesota hospital in the winter-time complaining of bone and muscle pain, 93% were found to be deficient in vitamin D. A clinical study in Switzerland found chronic pain was eliminated in two-thirds of patients within three months of supplementing with adequate doses of vitamin D (de Torrenté de la Jara, *et al.*).

## BRAIN HEALTH

Several studies have found that high circulating levels of vitamin D3 were linked with a lower risk of multiple sclerosis (Munger, *et al.*). Vitamin D3 supplementation has been shown to reverse the inflammation associated with Parkinson's disease, multiple sclerosis and age-related dementia.

Vitamin D3 has profound effects on the brain, including the neurotransmitters involved in depression. Both depression and suicide peak from January to April, when vitamin D3 levels are lowest. A University of Toronto study found that the incidence of depression was reduced for people taking 4,000 IU of D3 daily (Vieth, *et al.*).

Vitamin D3 can help with Seasonal Affective Disorder (SAD), also known as "the winter blues". A small placebo-controlled trial found that everyone who

received the vitamin D3 supplement showed an improvement in mood, as measured using several standard psychological tests (Gloth, *et al.*).

## CARDIOVASCULAR HEALTH

A recent study, which tracked 1,354 men for 10 years, found that low vitamin D3 levels were associated with a doubling of the risk of a fatal heart attack. This suggests that supplementing with vitamin D3 could reduce that risk. One of the researchers estimated that to move from deficiency to sufficiency would require about 3,000 IU of vitamin D3 daily. He said Health Canada's "upper tolerable limit" of 2,000 IU "may be too conservative" (Mittelstaedt).

Scientists have found that women over the age of 65 who took vitamin D supplements had nearly one-third less risk of dying from heart disease. Because vitamin D is an important calcium absorption regulator, high levels reduce the risk of calcification of the arteries, while low levels accelerate calcium build up in the arteries (Varosy, *et al.*).

## PREGNANCY AND CHILD DEVELOPMENT

Adequate levels of vitamin D are critical for pregnant and lactating women and their babies. One study examined 400 infant/mother pairs, of various races, at birth and found that 48% of the mothers and 52% of the infants had insufficient levels of vitamin D (Bodnar, *et al.*).

Vitamin D is essential for the development of the child's brain, nerves, and skeleton. It has been observed that children born in the winter, when the mother's vitamin D levels are lowest, have a greatly increased risk of eventually developing diabetes, rheumatoid arthritis, multiple sclerosis, and many common cancers. Vitamin D is also essential for the mother, to prevent bone loss and preeclampsia, a serious complication of pregnancy.

## DOSAGE

1,000 IU tablet, softgel, or liquid (0.03 mL drop) formats. Take 1 tablet, softgel, or drop daily, or as directed by a health care practitioner.

400 IU liquid (0.03 mL drop) format. Infants, children, and adolescents 0 and up, take 1 drop 1–2 times daily or as directed by a health care practitioner.

## SAFETY

*Pregnancy and lactation:* Suitable for pregnant and lactating women.

*Children:* Health Canada recommends 200 IU daily for children of all ages. Emerging research indicates that much higher doses are safe and support optimal health for children.

*Drug interactions:* Many drugs cause vitamin D deficiencies because they interfere with the absorption and/or metabolism of vitamin D, including cholestyramine (Questran), colestipol (Colestid), phenytoin (Dilantin), phenobarbital, orlistat (Xenical), and mineral oil. Also, corticosteroids, such as prednisone, increase the need for vitamin D.

*Contraindications:* People using digoxin (Lanoxin) and thiazide diuretics should consult a health care practitioner before supplementing with vitamin D. People with liver or kidney disease, primary hyperthyroidism, lymphoma, tuberculosis and granulomatous diseases should consult a health care practitioner before supplementing with vitamin D.

Most people experience some degree of vitamin D3 deficiency, but an explosion of research is showing that taking a vitamin D3 supplement can improve physical and mental health, and reduce the risk of infections and degenerative diseases.

## KEY REFERENCES

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