

Harvard School of Public Health

The Nutrition Source

Ask the Expert: Vitamin D and Chronic Disease

1. There's been a lot of news lately about vitamin D's role in prevention of cancer, heart disease, and other chronic diseases. What do we know today—and what questions remain?

Vitamin D has a well-established role in maintaining calcium levels in the body and in building strong bones. That's why vitamin D deficiency could increase the risk of osteoporosis. In addition, elderly who don't get enough vitamin D have weaker muscles and are more prone to falls, which could further increase the risk of fractures.

Research over the past few decades has uncovered several new potential roles of vitamin D. Many types of cells in the body can use vitamin D to help regulate critical cellular functions. Vitamin D deficiency could thus lead to several potential problems, such as a weakened immune system and an increased risk of colon and other cancers. Immune dysfunctions may lead to an increased risk of autoimmune diseases including type 1 diabetes and multiple sclerosis, and perhaps to some infectious diseases such as tuberculosis.

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suggests that vitamin D deficiency may also be linked to heart disease. We checked the vitamin D blood levels in men who were healthy, and then followed them for 10 years. Men who were deficient in vitamin D were twice as likely to have a heart attack as men who had adequate levels of vitamin D. Other scientists have found evidence that vitamin D plays a role in controlling blood pressure and preventing artery damage, and this may explain our findings.

Vitamin D's role in many of these diseases has not been definitively proven through a randomized trial. Nonetheless, an increasing body of human metabolic studies, epidemiologic investigations, and animal studies support an important role of vitamin D that goes far beyond bone health. Vitamin D's complex role is currently the focus of intense scientific scrutiny, and more definitive answers should become available over time.

2. How much vitamin D do I need to get a day to help prevent osteoporosis and perhaps prevent other chronic diseases? How much is too much?

Several randomized trials found that individuals who received vitamin D supplements of 800 IU per day lowered their risk of osteoporosis; trials that provided only 400 IU per day did not show this benefit. It is reasonable to postulate that more than 800 IU per day would provide even more benefit, but this is not proven. A promising analysis of multiple studies suggests that taking 400 to 800 IU of vitamin D each day may lower mortality rates by 7 percent; there are some limitations to this analysis, however, and more research needs to be done before any broad claims can be made about vitamin D supplements and mortality.

Vitamin D intakes greater than 2,000 IU per day have generally not been recommended, and this is

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probably a conservative upper limit for safety. In fact, recent evidence suggests that doses up to 10,000 IU a day do not cause toxicity—but this does not mean that people should start taking 10,000 IU of vitamin D every day.

A complicating factor in determining how much vitamin D we need to get from diet or supplements is that exposure to sunlight produces vitamin D in the skin, which is then rapidly absorbed in the blood. Thus, a vitamin D intake of 800 IU per day may be too low for a person who rarely gets sun exposure (or for someone living in the north, where vitamin D cannot be made in the late-autumn and winter months). Yet that level of intake may not even be necessary for a person who receives ample sun exposure.

3. Since milk is fortified with vitamin D, should I drink lots of milk to get the benefits of vitamin D? If not, what other foods are good sources of vitamin D? Or can I just get enough vitamin D from the sun?

Milk alone is unlikely to be an adequate source of vitamin D. True, milk is fortified in the U.S. (it is not fortified in most countries). Each glass of fortified milk should contain about 100 IU of vitamin D (but on average, it may contain only 50 IU). So someone would have to drink at least 8 glasses of milk per day to get 800 IU of vitamin D. Moreover, most experts now conclude that 1,000 to 2,000 IU per day of vitamin D may be what we need for optimum health.

Fatty fish is the only good natural source of vitamin D. A 3.5 oz serving of cooked salmon, for example, has 360 IU of vitamin D; 3 oz of canned tuna has 200 IU; and 1 3/4 oz of canned sardines has 250 IU.

Sun exposure can be a good source of vitamin D for some people: For example, in a light-skinned person, one, 30-minute, full body exposure to summer sun at noon triggers the release of about 20,000 IU of vitamin D into the circulation; in a dark-skinned person, that amount of summer sun would create about half as much vitamin D. But one must be very cautious about making recommendations to increase sun exposure solely to increase vitamin D intake. There are downsides to receiving excessive sun exposure, such as skin cancer and premature skin aging.

4. Should people consider taking vitamin D supplements? If so, who might benefit most from supplements?

Because we may need more vitamin D than most people get in typical diets, and because of the potential downsides of excessive sun exposure, supplementation may be warranted. It may turn out that most people may benefit from supplements.

Several groups are at risk for vitamin D deficiency or less-than-adequate intakes—in particular, the elderly, dark-skinned individuals, obese individuals, and those who avoid the sun. People who live in more northern latitudes (such as Boston, Mass., Milwaukee, Wis., or Portland, Ore.) can only make vitamin D from March through September; supplies stored from summer sun exposure must last for many months, and by late winter, most of these individuals may be deficient.

Although definitive evidence is not available currently, supplements of at least 1,000 to 2,000 IU per day of vitamin D may be warranted; look for supplements that contain vitamin D3 (cholecalciferol), rather than vitamin D2 (ergocalciferol), since vitamin D3 is three to four times more potent than vitamin D2. As always, it is important to discuss use of supplements with your personal health care provider. I suggest not taking more than 2,000 IU per day of vitamin D in supplement form without specific medical reasons until more definitive data are available concerning the benefits and risks. If you fall into one of the groups that are at a higher risk of vitamin D deficiency, ask your doctor to order a blood test for vitamin D, since your doctor may find that you need a larger daily supplement dose, on the order of 3,000–4,000 IU, to achieve adequate blood levels.

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