Vitamin D2 or D3: Which is D Best?

A host of epidemiological and clinical studies have underscored the importance of vitamin D in preventing and treating a wide range of chronic diseases. But which form of this crucial vitamin is best?

This is a debate that has been raging on for some time, but it is an important question for us to answer because vitamin D deficiency is a very common problem, especially among the aged population.

Aging lowers the amount of 7-dehydro-cholesterol in the skin and thus lowers the ability to produce vitamin D, as well as lowers absorption.\(^1\) Most of our vitamin D comes from sun exposure; only a small amount typically comes from food or supplements. But with most of us spending so much time indoors, wearing clothing and/or sunscreen, the majority of us just don't get enough vitamin D anymore, whether we live in Alaska or Arizona.

Vitamin D deficiency is associated with increased parathyroid secretion, increased bone turnover, osteoporosis, and increase risk of hip and other fractures.\(^2\) Lower serum levels of vitamin D, are also associated with risks of cancers of the colon, breast and ovary in several observational studies.\(^3\) Vitamin D deficiency has other serious implications and has been associated with multiple sclerosis, type 1 diabetes, Crohn's disease\(^4\) and even increases in the risk of hypertension and cardiovascular disease.\(^5\)

Causes of vitamin D deficiency include hereditary disorders, reduced skin synthesis and absorption of vitamin D, and acquired disorders of vitamin D absorption, metabolism and responsiveness.

We get our vitamin D from exposure to sunlight, from our diet and from supplementation. Vitamin D3 is produced in the skin on exposure to ultraviolet radiation, and vitamin D2 is derived from plants and enters our body only through the diet or supplementation. There are two major supplemental forms of vitamin D; vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol).

For commercial uses, vitamin D2 is manufactured through the ultraviolet irradiation of ergosterol from yeast, while D3 is made through the ultraviolet irradiation of 7-dehydrocholesterol from lanolin. In other words vitamin D2 is considered to be vegetarian suitable, and vitamin D3, because it is animal-derived is not acceptable to many vegetarians and vegans. Both forms are often added to foods such as milk, orange juices, infant formulas, cheeses and breakfast cereals.

Natural food sources of vitamin D3 include salmon, sardines, mackerel, tuna, shiitake mushrooms, egg yolks, cod liver oil and, of course, sunlight. Both vitamin D2 and vitamin D3 are available in over the counter supplements, at low to moderately high doses, typically not more than 5,000 IU. Higher doses of vitamin D2 are available by prescription.

The back story on whether or not vitamin D2 and vitamin D3 are equally effective, goes back to studies in the 1930s where they were assumed to be equally effective in humans. Over time, however, human studies comparing the increase in blood levels following the supplementation of vitamin D2 or D3 have been few and inconsistent.

They have also been wrought with problems such as small sample sizes; lack of vitamin D stability of the products used; wide seasonal variations in which the blood samples were drawn (serum levels of vitamin D are naturally higher in the sunnier months); variable intestinal absorption amongst individuals; variable baseline serum levels; previous history of vitamin D supplementation and variations in age (older people have less vitamin D absorption).
The prevailing thought these days is that dose-for-dose, vitamin D2 is about 30% the potency of vitamin D3. But the variability in the studies makes it extremely difficult to make comparisons and draw accurate conclusions.

One small study done in 1998 did demonstrate that vitamin D3 yielded a slightly greater increase in serum 25-hydroxyvitamin D compared with D2. A 2004 study of 30 men, between the ages of 20 and 61, demonstrated that the rise in blood levels within the first few days of receiving a single high dose was the same for both forms, suggesting equivalent absorption. However, the D3-treated individuals had a continued rise over two weeks and peaked at 2 weeks, while the D2-treated men, had a decline to baseline levels by Day 14.

One might conclude from these two well-designed studies that Vitamin D3’s advantage, in terms of raising serum vitamin D levels might be very small, as in the first study. While the Armas study suggests that following a single large dose, there is a D3 advantage at the two-week point, we need to think about how people really take vitamins. In most cases, it is via relatively small daily doses. Armas also showed that within the first 3 days following dosing with either form, the rise in blood levels, was the same. This suggests that daily doses of either form of vitamin D would be equivalent.

The newest study addressing this question definitely challenges the long held belief that vitamin D2 is less potent or less effective than vitamin D3 in raising and maintaining blood levels.

Holick and colleagues conducted a randomized, placebo-controlled, double-blind study of 68 healthy individuals, aged 18–84 years, who took either placebo, 1,000 IU of vitamin D3, 1,000 IU of vitamin D2, or 500 IU of each form, daily for 11 weeks at the end of the winter. Sixty percent of the study subjects were vitamin D deficient at the start of the study (<20 ng/ml).

After three months of daily supplementation, both forms produced similar results. Neither 1,000 IU of vitamin D2 or vitamin D3 raised 25-hydroxyvitamin D levels in vitamin D deficient subjects to a level above 30 ng/ml. The authors concluded that vitamin D2 is equally effective as vitamin D3 in maintaining 25-hydroxyvitamin D status.

This is not definitive proof that vitamin D2, the "vegetarian" form, is as potent as the non-vegetarian D3 form. At the same time, we cannot state with certainty that D3 is much more potent, as is generally thought. Vegetarians may find some comfort in these findings.

REFERENCES

Source: Holistic Primary Care, By Tori Hudson, ND | Contributing Writer - Vol. 9, No. 2. Summer, 2008
www.holisticprimarycare.net