

## Vitamin D3 Versus D2

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### STORY AT-A-GLANCE

- › Contrary to popular belief, vitamin D2, derived from plants, and D3, from animal products, do not have equal nutritional value, and deficiency is gaining ground, so study authors are asking governments to consider updating current guidelines
- › Researchers found vitamin D3 to be twice as effective in raising levels in the body in comparison to D2
- › More than 1 in 5 people in the U.K. have low levels of vitamin D; as an essential nutrient, it's not a vitamin your body produces, so it must be attained from an outside source: via sunlight, food or supplementation
- › Told by officials that D2 and D3 were basically the same, retail outlets led to believe one was just as viable as the other added vitamin D2 to their products, which did nothing to help people increase their levels

***Editor's Note: This article is a reprint. It was originally published July 17, 2017.***

It's something I've been encouraging for several years now – making sure you're getting adequate levels of vitamin D, not only because it's a crucial nutrient, but because so many people are deficient and don't realize it.

But a study has emerged dispelling the idea many scientists and health care providers have had for many years, the upshot being that there is a vast difference between vitamin D2, which is plant-based (notably from mushrooms), and vitamin D3, which is derived from animal products.

The two do not, as some have believed, have a similar nutritional value. Health authorities are calling for official recommendations for vitamin D intake to be changed in accordance with this information, which is not actually new, as we've related this important distinction for some time. The "groundbreaking" study from the University of Surrey was conducted to determine, between vitamins D2 and D3, which was more effective in raising levels in the body.

The trial was funded by the Biotechnology and Biological Sciences Research Council (BBSRC) – "the largest U.K. public funder of nonmedical bioscience" – and the Diet and Health Research Industry Club (DRINC). Susan Lanham-New, principal investigator of the trial, called the results a "very exciting discovery which will revolutionize how the health and retail sector views vitamin D," EurekAlert! reported.<sup>1</sup>

She added, "Vitamin D deficiency is a serious matter, but this will help people make a more informed choice about what they can eat or drink to raise their levels through their diet." Serious is right: One study shows that more than 40% of the American population is deficient in vitamin D,<sup>2</sup> and some experts say the problem is serious enough to call it a pandemic.<sup>3</sup>

## **Vitamin D2 and D3: Not Interchangeable**

Vitamin D is produced by your body after exposure to the sun, and because winter is the period during which sunshine is least available, vitamin D levels are typically at their lowest during this time.

The 335 South Asian and white European women who participated in the study over two winters were divided into five groups and given either juice containing vitamin D2 or D3, a biscuit with the same or a placebo. At the conclusion of the study, researchers found vitamin D3 to be twice as effective in raising levels in the body in comparison to D2. EurekAlert! reported:<sup>4</sup>

*"Vitamin D levels in women who received vitamin D3 via juice or a biscuit increased by 75 percent and 74 percent respectively compared to those who*

*were given D2 through the same methods. Those given D2 saw an increase of 33 percent and 34 percent over the course of the 12-week intervention.*

*The research also found that nutrient levels of both vitamin D2 and D3 rose as a result of both food and acidic beverages such as juice, which were found to be equally as effective. Those who received the placebo experienced a 25 percent reduction in the vitamin over the same period."*

What's interesting, as mentioned, is that the information from this study is not new news. A similar study published in 2011 is one of several instances where vitamin D3 has been shown to have a much greater significance for your health compared to D2. One study<sup>5</sup> shows D3 to:

- Convert to its active form 500% faster
- Be 87% better at raising and maintaining vitamin D levels
- Produce two to three times greater storage of the vitamin than D2

## **Recommendations for Vitamin D Outdated and Unsafe**

Here's where it gets problematic: Several governments around the world, including the U.S. National Institutes of Health, assert there's no difference between vitamins D2 and D3 and that interchanging the two makes no difference whatsoever in your body's levels.

However, information from Public Health England reveals that more than 1 in 5 people in the U.K. have low levels of vitamin D, so the intake they recommend is 10 micrograms per day, all year long, for everyone beginning at age 4.

EurekaAlert! notes that daily intake of vitamin D3 – but not vitamin D2 – will allow the population to avoid such health problems as rickets, osteoporosis and a higher risk of developing heart disease, all associated with individuals with insufficient levels of vitamin D in their bodies.

What the scientists found influences public health but also retail markets in that many have added vitamin D2 to their products because they were led to believe it was just as viable in the body to increase people's "D" levels as taking D3. Lead study author and dietitian Laura Tripkovic explained:<sup>6</sup>

*"The importance of vitamin D in our bodies is not to be underestimated, but living in the U.K. it is very difficult to get sufficient levels of it from its natural source, the sun, so we know it has to be supplemented through our diet. However, our findings show that vitamin D3 is twice as effective as D2 in raising vitamin D levels in the body, which turns current thinking about the two types of vitamin D on its head."*

Tripkovic explained that people who eat vitamin D3-rich foods or take supplements are two times more likely to raise their vitamin D profile than when consuming the equivalent in vitamin D2 foods such as mushrooms, D2-fortified bread or taking D2 supplements.

## **Downsides of Low Vitamin D Versus Benefits of Optimal Levels**

Vitamin D is involved in the biology of all cells in your body, including your immune cells. A large number of studies have shown raising your vitamin D level can significantly reduce your risk of **cancer** and many other chronic diseases. So, what happens when someone isn't getting the amount of vitamin D that they should? Daily Mail<sup>7</sup> notes that lack of vitamin D:

- Can cause your bones to become thin, brittle or misshapen
- Is linked to an increased risk of **multiple sclerosis**
- Is linked to a growing prevalence for children to develop rickets, shown in many cases to cause malformed and/or broken bones
- Appears to play a role in insulin resistance, **high blood pressure** and immune function, related to heart disease and cancer

People who are obese, older than age 65 and/or housebound may have lower levels of vitamin D due to their diets, little sun exposure and other factors, and among dark-skinned individuals in the U.S, only 3% among thousands have enough vitamin D.<sup>8</sup> Beyond cancer prevention, a Swiss study<sup>9</sup> from 2013 lists several of the more dramatic benefits of getting the right amount of vitamin D:

- The development, function and maintenance of healthy bones and regulation of calcium homeostasis throughout life
- The basis for the prevention and management of osteoporosis, a disease producing brittle bones that are prone to fractures
- The regulation of neuromuscular function, reducing the risk of falls, a major cause of bone fractures
- Possibly a central component of musculoskeletal health through vitamin D's beneficial effects on muscle function and bone stability
- May show favorable effects in many organs and play a significant role in the maintenance of general health

## **The Significance of Getting Adequate Sunlight**

Another reason vitamin D levels are so important is that hepatic mitochondria and their associated microsomal enzymes metabolize vitamin D, whatever the source, Pharmacy Times noted, adding:<sup>10</sup>

*"When patients consume too much vitamin D2 or vitamin D3, this process is completely unregulated and patients' vitamin D levels will rise proportionally to their intake. On the other hand, cutaneous synthesis from sun exposure allows patients levels to reach a preset point, and after that, additional sun exposure will not increase vitamin D levels."*

This means the best way to make sure you're getting enough vitamin D is to get regular sensible exposure to direct sunlight on your body each day. Depending on your locale, in the winter when the sun hides behind clouds and temperatures are often so chilly you're

forced to wear long sleeves and galoshes, this may be difficult if not impossible, however.

Alternatively, adding vitamin D3 supplements to your regimen can help you achieve optimal vitamin D levels. The foods you eat can also make a difference in helping to make or break your health (if not your bones). The best foods for **increasing your vitamin D intake** via your diet are animal-based and quite limited:

- Raw milk
- Eggs, particularly the yolk from **organic, pastured eggs**
- Wild-caught Alaskan salmon and other healthy fish such as mackerel and sardines, preferably from cold waters, and not farmed

## **Get Your Vitamin D Levels Tested**

If you decide your vitamin D3 should be taken in supplement form, it's your serum level, or how much D3 your blood contains, that determines how much you should take until your levels are optimized to between 60 and 80 nanograms per milliliter, or ng/ml.

Studies done by Grassroots Health<sup>11</sup> recommend an upper limit of about 8,000 IUs (the International Unit by which fat-soluble vitamins are measured) daily of vitamin D3. Children need a minimum of 2,000 IUs per day;<sup>12</sup> however, getting your blood tested is the only way to know for sure whether your vitamin D levels are within the optimal range and, consequently, how much oral vitamin D3 you may need. Also be sure the vitamin D you take is correctly balanced with vitamin K2.

An Atlanta-based Emory University School of Medicine study published in the Journal of the American College of Cardiology outlined vitamin D's association with cardiovascular disease prevention.<sup>13</sup>

The upshot is that levels below 20 ng/ml are simply not enough to maintain bone health, let alone provide the other disease-prevention benefits that vitamin D has to offer. As mentioned, I recommend you achieve 60 to 80 ng/ml of vitamin D in your blood.

## Sources and References

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- <sup>2</sup> Nutr Res. 2011 Jan;31(1):48-54
- <sup>3</sup> Science Direct Vol. 52, Issue 24, December 9, 2008, pp. 1949-1956
- <sup>5</sup> JCEM March 2011
- <sup>7</sup> Daily Mail July 4, 2017
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- <sup>9</sup> Int J Vitam Nutr Res. 2013;83(2):92-100
- <sup>10</sup> Pharmacy Times July 6, 2017
- <sup>11</sup> Grassroots Health 2017
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