

Understanding Vitamin D Deficiency

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Second of a three-part series on the sunshine vitamin

Our skin evolved to create vitamin D when it's exposed to the sun's ultraviolet (UV) rays. So, when most of the world's population lived in or near equatorial regions, people had no shortfall of the nutrient, with their bodies making from 10,000 to 20,000 international units (IUs) of this vitamin each day.

However, over the millennia, more and more people moved to high latitudes, where up to half the year, solar-UV exposure isn't enough to fuel vitamin D production in skin. More recently, justifiable concerns about sunburns and skin cancer have prompted increasing shares of people—even at high latitudes—to don sun-blocking clothing. Unfortunately, what's good for skin protection is bad for natural vitamin D production.

It also can be bad for health, a host of studies has recently indicated. For decades, vitamin D was appreciated largely for its role in boosting the absorption of calcium, important for bone health. However, over the past decade and especially the past 5 years, research has linked a broad range of additional benefits to having ample vitamin D. It's shown that the nutrient fights cancers and diabetes, is the pivotal feedstock for a hormone that protects muscle, and inhibits autoimmune disorders from multiple sclerosis and lupus to inflammatory bowel disease ([SN: 10/9/04, p. 232](#)).

Moreover, many of these newly recognized benefits of vitamin D rely on blood concentrations of the nutrient far higher than those needed to protect bone.

Although high by dietary standards, these aren't really megadoses, explains Bruce W. Hollis of the Medical University of South Carolina. Rather, they reflect amounts typical of what people can naturally generate within their skin if they spend a lot of time outdoors in a low latitude.

However, with modern habits and work routines, few of us create these higher doses of vitamin D in our bodies throughout the year. So, we rely on our diets for most of this essential nutrient, even though few foods are naturally rich sources of vitamin D and only a few, such as milk, are supplemented with anything more than meager amounts (see [Should Foods Be Fortified Even More?](#)).

Although vitamin pills can provide much or all of the U.S. recommended daily intake (RDI) of D for children and adults—200 to 600 IU, depending on age—bone and mineral researchers have lately been recommending that people get much, much more ([SN: 10/16/04, p. 248](#)). In fact, some scientists have advised the federal government to boost the vitamin D RDI up to at least 1,000 IU and to bump up the certified-safe limit beyond the current 2,000 IU.

Within this context, several research teams have been exploring whether U.S. residents are meeting the current RDI. The answer, based on some data presented earlier this month at the Experimental Biology (EB) meeting in San Diego, is disappointing: Huge numbers of us are falling well short of even the current, conservative RDIs.

Seniors: Not leading by example

Michael F. Holick of the Boston University School of Medicine and his colleagues analyzed the diets of some 16,500 people selected as a cross-section of the entire U.S. population. The researchers used data that had been collected as part of a federal National Health and Nutrition Examination Survey between 1999 and 2000.

At the EB meeting, they reported that children 1 to 8 years old were most likely to get the RDI for vitamin D. Some 60 percent obtained it from diet alone—largely because milk is fortified with vitamin D and this is an age group that downs lots of milk. If one accounts for additional inputs from vitamin supplements, roughly 80 percent of children meet the current RDI—unless they're black. Fewer than 50 percent of those youngsters meet the RDI for vitamin D via the diet, and even vitamin pills bumps up the total only to 65 percent.

People from 9 to 50 years old managed, as a rule, to get almost as much vitamin D as the young children, although a far higher proportion of their vitamin-D came from supplements. Especially in young women, only 20 to 40 percent typically got the RDI for vitamin D from diet alone.

Vitamin D deficiency reaches epidemic proportions among people over 50. Only about 5 percent of these men and 1 to 3 percent of the women get their RDI for this nutrient from diet alone. Supplement use bumps up the share of older adults getting the RDI to about 35 percent of whites, 17 percent of Hispanics, and roughly 10 percent blacks.

These values are especially troubling since people of color have a harder time making vitamin D naturally. The reason? Their skin's dark pigment filters out much of the sun's ultraviolet light.

Heavy observation

Because rural Americans tend to spend considerably more time outdoors than their urban counterparts do, they traditionally have had higher sun exposure and vitamin D blood concentrations.

However, Hollis and his coworkers found that today, even rural populations don't always get the vitamin D they may need. The researchers suggest that widespread obesity may be a contributing factor.

This team analyzed blood concentrations of vitamin D for about 30 rural adults and 13 urban counterparts. In winter, the mean concentration of the vitamin in blood was low for both groups, says team member Brittany Gorres of South Dakota State. Her team found mean vitamin D values of 14 nanograms per milliliter (ng/ml) in the city folks and 20 ng/ml in the rural group. She adds that hormone data from these recruits indicated that blood values below about 27 to 30 ng/ml might compromise bone health.

Summer blood concentrations of vitamin D were higher for both groups: 27 ng/ml in rural individuals and 39 ng/ml in the urban dwellers. However, Gorres notes, many individuals within each population remained low, with some never having more than 10 ng/ml in their blood, summer or winter. Moreover, she adds, a trend emerged: Lean people tended to fall at the higher end of the vitamin range in each group, overweight people at the bottom.

"It's been shown, over and over, that being obese is a risk factor for vitamin D deficiency," notes Hollis. "The mechanism? That, no one really understands," he adds. "Once vitamin D goes into fat, it doesn't come out well," he observes, so "[body] fat appears to act like a sponge."

But the problem can be remedied with a vitamin D supplement, he adds. Hollis gives the example of a student who worked in his lab last fall. Owing to her heavily pigmented skin and obesity, he worried she might be vitamin D deficient and recommended she have her blood tested for the vitamin. She did, and the analysis showed that her blood had only about 7 ng/ml, which is "profoundly deficient," says Hollis. However, after the student took 4,000 IU of vitamin D per day for 3 months, Hollis says, "we finally got her blood levels into the mid-30s."

Although 4,000 IU per day—10 times a young woman's RDI—might sound high, Hollis acknowledges, "we've found that lactating women need about 6,000 IU a day to transfer enough vitamin D into their milk to supply adequate amounts to a nursing infant." He's currently administering 2,000 IU a day to women throughout their pregnancies as part of a 5-year National Institutes of Health-funded study. The participants in each of these trials live in South Carolina, he notes, so they should have had access to plenty of vitamin-generating UV rays throughout the year.

The emerging picture, Hollis says, is that people aren't getting even the current RDI of vitamin D for a variety of reasons—where they live, how much time they typically spend outdoors, their skin pigmentation, and, perhaps, their weight. Yet, it appears that many people need even higher amounts than the RDI to build strong muscles and ward off disease.

Last week: [Season Affects Cancer-Surgery Survival](#)

Next week: [Bread And Chocolate: No Longer D-Minimus](#)

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Further Readings:

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