

VITAMIN BOOST

From muscle strength to immunity, scientists find new vitamin D benefits

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First in a two-part series

The story of Vitamin D would appear simple. Take in enough sun or drink enough fortified milk to get the recommended daily amount, and you'll have strong bones. Take a supplement, if you want insurance. But recent studies from around the world have revealed that the sunshine vitamin's role in health is far more complex.

More than just protecting bone, vitamin D is proving to preserve muscle strength and to give people some protection against deadly diseases including multiple sclerosis (MS), diabetes, and even cancer.

What's now clear is that vitamin D is a potent force in regulating cell growth, immunity, and energy metabolism, observes David Feldman of Stanford University School of Medicine. He's the editor of a new 1,300-page compilation of research findings from more than 100 labs working on this substance (2004, *Vitamin D*, Academic Press). Not only is the vitamin gaining increasing respect as a governor of health, he notes, but it's also serving as the model for drugs that might tame a range of recalcitrant diseases.

Ironically, observes bone-metabolism specialist Robert P. Heaney of Creighton University Medical Center in Omaha, Neb., vitamin D is a misnomer. "A vitamin is an essential food constituent that the body can't make," he explains, but people have the capacity, right in their skin, to produce all the vitamin D they need from a cholesterol-like precursor.

Once vitamin D is available, the body converts it first into 25-hydroxy vitamin D and then into 1,25-dihydroxy vitamin D (1,25-D). This final form, which is actually a hormone, is the only active variety. Researchers loosely refer to all three substances in this biochemical cascade as "vitamin D."

The human body can generate 10,000 to 12,000 international units (IU) of vitamin D from a half-hour of summer-sun exposure. The National Academies recommend that adults, depending on their age, get from 200 to 600 IU of the vitamin each day.

In practice, however, most people in the United States get a daily intake from food and sun exposure well below that recommended intake, especially during winter. People living in the United States and Europe or farther from the equator have trouble getting enough sun to maintain adequate blood concentrations of the vitamin. When people heed dermatologists' warnings about preventing skin cancer by limiting sun exposure and using sunscreen, they also reduce their vitamin D production.

By studying the subtle effects of vitamin D deficiency and boosting animals' exposure to it in laboratory tests, researchers have been slowly teasing out the vitamin's myriad benefits.

MUSCLING IN Leg weakness is a common symptom of severe vitamin D deficiency. Five years ago, nutritional epidemiologist Heike A. Bischoff-Ferrari began wondering whether vitamin D

affects muscle function in apparently healthy people as well. She was particularly concerned about senior citizens, who typically suffer from an inexorable muscle wasting that begins by age 40 (*SN*: 8/10/96, p. 90). So, she measured vitamin D blood concentrations in elderly men and women and found that individuals who had higher readings also had greater thigh strength.

Bischoff-Ferrari and her team at the University of Basel in Switzerland then launched an intervention trial with 122 women in their mid-80s. The researchers administered 1,200 milligrams of calcium to all the participants, and another 800 IU of vitamin D per day to half of them. At the end of 3 months, each woman was tested for leg strength and rated on how easily she could get up from a chair, walk around an object, and sit back down.

Not only did vitamin D-supplemented women perform dramatically better on these tests, but they sustained only about half as many falls during the trial, according to the researchers' report in the February 2003 *Journal of Bone and Mineral Research*.

Bischoff-Ferrari, now at the Harvard Medical School in Boston,

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teamed with other Boston researchers to analyze past studies of falls in elderly people. Falls are a leading cause of fracture and disability in that population and account for U.S. medical bills exceeding \$20 billion a year.

The researchers reevaluated five previously published vitamin D-supplementation trials that together included more than 1,200 elderly people. Overall, a daily vitamin D intake of at least 400 IU cut a woman's risk of being injured in a fall by more than 20 percent, and higher doses had an even greater effect. Bischoff-Ferrari notes, "We showed that to get the best protection from falling, you likely have to get 800 units or more [daily]." She and her colleagues reported the findings in the April 28 *Journal of the American Medical Association*.

More recently, the team combed through a national diet-and-health survey of some 4,100 men and women 60 years and older. The researchers report in the September *American Journal of Clinical Nutrition* that blood concentration of vitamin D directly correlated with leg strength and function in these people.

ATTACK MODE Other correlations between vitamin D and health have captured researchers' attention. Kassandra L. Munger of the Harvard School of Public Health in Boston recently presented evidence of what appears to be a protective effect of vitamin D against MS. In two ongoing studies of 187,500 U.S. nurses, women getting at least 400 IU of vitamin D per day showed only 60 percent the risk of developing MS compared with women getting less of the vitamin, Munger and her colleagues reported in the Jan. 13 *Neurology*.

These findings not only confirmed a link seen earlier in animals but also fit with several long-standing geographic observations.