

Sunny Dispositions



VITAMIN D DEFICIENCY MAY BE THE MOST COMMON MEDICAL PROBLEM IN THE WORLD

BY CYNTHIA K. BUCCINI

RESEARCHERS HAVE KNOWN for decades that vitamin D is crucial for healthy bones, but recent studies have shown that the vitamin has an important role in myriad functions in the human body. It regulates insulin production in the pancreas as well as the genes that control cell growth, according to Michael F. Holick, a School of Medicine professor of medicine, physiology, and biophysics. It has a marked effect on vascular smooth muscle, and therefore is important in regulating blood pressure and preventing type 2 diabetes, cardiovascular disease, and stroke. It also



VERNON DOUCETTE



SCHOOL OF MEDICINE PROFESSOR MICHAEL F. HOLICK does not encourage tanning, but he does advocate for sensible sun exposure.

impacts the immune system, helping it to fight infectious diseases like tuberculosis and influenza and reducing the risk of autoimmune diseases, including Crohn's disease, multiple sclerosis, rheumatoid arthritis, and type 1 diabetes.

"Every tissue and cell in your body has a vitamin D receptor," says Holick, who has been studying how our skin makes vitamin D for more than thirty years. "We estimate that as many as 2,000 genes — up to one-sixth of the total human genome — are either directly or indirectly regulated by vitamin D."

And yet, says Holick, half

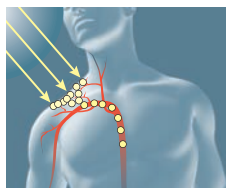
of all people in the United States don't get enough of the vitamin. "It's estimated that about a billion and a half to two billion people worldwide are vitamin D-deficient," he says. "It's certainly the most common nutritional deficiency and likely the most common medical problem in the world."

We get vitamin D from our diet and from supplements, but the principal source is the sun. When sunlight penetrates the skin, says Holick, it converts the prohormone 7-dehydrocholesterol to vitamin D-3, which enters the bloodstream. When it reaches the liver, it becomes 25-hydroxyvitamin D – the circulating form of the vitamin, which is what doctors measure to determine whether a patient is deficient. Next, it goes to the kidneys, where it is converted to the biologically active form, called 1,25-dihydroxyvitamin D.

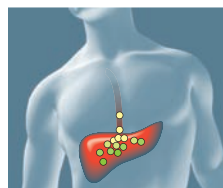
From there, it moves into the small intestine, interacts with a vitamin D receptor, and stimulates the absorption of calcium. "If you're vitamin D-deficient, you absorb only 10 to 15 percent of the calcium in your diet," says Holick. "If you're vitamin D-sufficient, 30 to 40 percent."

Vitamin D also goes to your bones, where it stimulates bone cells to remove calcium if you are not getting enough from your diet. "It does that," says Holick, "because the ultimate function of vitamin D is to

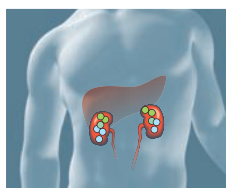
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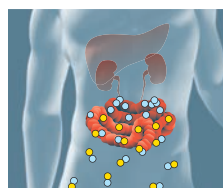
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maintain blood calcium in a normal range in order to maintain brain, heart, and neuromuscular function. Only when you have enough calcium and phosphorus

will you mineralize the skeleton. That's why vitamin D has always been thought of as important for bone health."

Holick says low levels of vitamin D can exacerbate osteoporosis and cause osteomalacia, a painful softening of the bones (called rickets in children), increasing risk of fracture. It can also put us at risk for a host of other problems, including autoimmune diseases

such as multiple sclerosis and rheumatoid arthritis, high blood pressure, diabetes, and colon, prostate, breast, and other cancers.

Adults, he says, need 2,000 IUs (international units) of vitamin D a day, a level we just can't get from the foods we eat and from most supplements. A glass of milk or vitamin D-fortified orange juice, for example, has 100 IUs. A common multivitamin might have only 400 IUs. "We did a study last year in a healthy adult population," he says. "We gave them 1,000 units of vitamin D-2 or vitamin D-3 through the wintertime. Not one person became vitamin D-sufficient."

Holick argues that another reason we are deficient is that we don't get enough sun; we spend too much time indoors or slathered

with sunblock. It's especially a problem for residents of northern latitudes. "We showed that in Boston you can't make any vitamin D in your skin from November through March no matter how long you stay outside," he says. "In the summertime, you can't make any vitamin D at eight in the morning or at five in the afternoon."

He recommends that adults take a supplement with 2,000 units of vitamin D every day and that teenagers and children over a year take 1,000 units per day. He also recommends spending some time in the sun, which has him at odds with dermatologists. The American Academy of Dermatology recommends getting your vitamin D through a healthy diet, which may include vitamin supplements, rather than spending time in the sun unprotected.

"I don't advocate tanning," Holick says. "But I do advocate sensible sun exposure. I tell people to wear some protection on your face. But arms and legs – ten to fifteen minutes of sun a couple of times a week between 10 and 3, depending on the season, latitude, and skin pigmentation, is usually adequate."

Holick, whose book *The Vitamin D Solution* is to be published in April, says he's begun doing studies on varying amounts of vitamin D in the body and its impact on health outcomes.

The bottom line, he says, is that there is no downside to increasing our intake of vitamin D. "If you think of it evolutionarily, it's the oldest hormone on this Earth," he says. "I don't think that this is going to be a flash in the pan."

WEB EXTRAS
Through March, MED's Michael Holick will take your questions about vitamin D and your health at bu.edu/bostonia.

Watch MED's Barbara Gilchrest and Michael Holick debate the impact of vitamin D and sun exposure on our health at bu.edu/bostonia.