

# The Healing Vitamin

Even with a healthy diet, you may be D-ficient

BY DIANE PETERS



Samar Elhamalawy didn't know what was wrong with her little son. But when Mahmood was nine months old, he suddenly lost interest in walking. He reverted back to crawling, from standing and cruising along the couch. "He just started to deteriorate," the Hamilton mother of two recalls. A few months later, she worriedly asked her family doctor why he had so few teeth. Then, at 14 months old, the little boy took two steps, fell down and broke his arm.

Within a month, Hamilton bone specialists diagnosed Mahmood with rickets, a bone-weakening disease caused by vitamin D deficiency.

Looking back a century, the slums of New York and London teemed with children whose weak, spindly limbs and bowed legs testified to their D deficiency. (Tiny Tim, the character in Charles Dickens's *A Christmas Carol*, was a likely case.) The disease all but disappeared after the 1920s, when doctors realized it could be cured by sun exposure and farmers began fortifying milk with vitamin D.

But lately the malady has been making a comeback. That's bad news, and not just for kids: Nowadays scientists are linking low levels of D to cancer, hypertension, diabetes, multiple sclerosis, osteoporosis and inflammatory bowel disease.

"More and more evidence is mounting that vitamin D plays an absolutely pivotal role in all aspects of human health," says Michael Holick, a Boston University medical-school professor who has spent the past 30 years researching the subject. He believes we're living amid an unrecognized epidemic of vitamin D

deficiency. One of Canada's leading vitamin D researchers, Reinhold Vieth, a clinical biochemist at Mount Sinai Hospital in Toronto, speculates, "In the next ten years, vitamin D will knock C and E off the shelves."

Researchers used to think D's main value was in building strong bones. But new research shows that this humble nutrient is far more versatile. Unlike other vitamins, D isn't found in much we eat—aside from fortified milk and cold-water fish such as cod. Instead, most is supplied by the sun. The process begins when a molecule in the skin called 7-Dehydrocholesterol reacts to ultraviolet light and turns into vitamin D. It then travels to the liver, where it picks up extra molecules of oxygen and hydrogen. This process transforms the skin molecule into a potent prehormone called calcidiol.

Scientists now think many tissues in the body—not just the liver—can convert the calcidiol to make their own calcitriol, the active disease-fighting compound of vitamin D.

Let the sun bake your unprotected arms and face for a few minutes a day and you'll make all the D you need—it sounds simple. But combine Canada's short summers, indoor lifestyle, sun-blocking pollution and the fact that even sunscreen with an SPF of 8 reduces D absorption to virtually nil, and many of us end up falling short. A study conducted by Vieth of 435 young women found that one third of them had low enough levels of vitamin D in their blood over the winter to reduce the amount of calcium in their bones. While you can get some D in the spring and fall, summer in Canada is the best time to stock up (your body can store D for several months). Forget about winter. "From early October until late March, the ultraviolet light you get in a city such as Edmonton is not enough to generate vitamin D," says Vieth.

People who live in the northern reaches of Canada, where the sun barely makes an appearance all winter, run the highest risk of vitamin D deficiency because they have short, cool summers. (You'll absorb more D wearing a swimsuit than

you will sporting long pants and long sleeves.) Native people living at high latitudes are even worse off. The vitamin is absorbed through the skin, and people with darker skin types tend to be more deficient. Dr. Leanne Ward, an Ottawa pediatrician with an interest in rickets, is surveying pediatricians across Canada to find out how prevalent the condition is. Her preliminary results suggest it's more common in dark-skinned babies. Meanwhile, the elderly tend to be at higher risk for D deficiency because they tend to avoid sunshine.

One result of the growing D deficiency is more and more rickets cases each year. Doting parents are doing exactly what they should: breast-feeding their infants and keeping them out of the sun. But experts recommend that breast-feeding mothers should consult their pediatricians about D supplements. "Mahmood was born in January and wasn't exposed to a lot of sunlight," says his mother, Samar. His dark skin probably didn't help. But after a month on vitamin therapy, the little boy bounced back and started walking. By 22 months of age, seven months after starting treatment, tests showed no trace of bone problems.

What really worries D experts, though, is what Mahmood's deficiency may represent: huge chunks of the world's population living with a chronic lack of D, which boosts the risk of serious illnesses. At the top of the list?

## **Cancer**

The cancer theory got its legs in 1980 after Frank and Cedric Garland, epidemiologists and brothers, were struck by maps showing that the rate of colon cancer was about twice as high in the cloudy northeast United States as in the south. The pattern could not have been clearer, recalls Cedric Garland, now a professor at the University of California, San Diego. The Garlands and their colleague Edward Gorham were the first to suggest that differing D levels might account for the phenomenon. Later studies supported their hunch: People who consumed the most vitamin D or had the highest levels of D in their blood had a lower risk of colon cancer.

Researchers are also probing links between prostate, breast and ovarian cancer and a lack of sunshine and vitamin D. Julia Knight, an epidemiologist at Mount Sinai Hospital in Toronto, is currently working on a survey asking women with breast cancer about their diet and sun-exposure history. "We know sunnier places have lower breast-cancer rates compared with more northern countries," she says. "But we want to see if dietary sources, particularly vitamin D supplements, have a protective effect."

The idea that cancer and D are linked makes sense biologically, explains Gary Schwartz, an epidemiologist at Wake Forest University School of Medicine in North Carolina who has studied the role of D in prostate cancer. Prostate cells, he has shown, produce the hormone calcitriol, which can act as a brake on cell growth. When the cells can't get enough calcidiol to make calcitriol, it's as if the brake lines are cut, he reasons. The cells can multiply uncontrollably, and cancer results.

Other experts are not convinced. "If there's a mechanism that retards cell division, you could see that might stop the division of some early cancer cells," says Michael Archer, chair of the Department of Nutritional Sciences at the University of Toronto. "But I believe we need more studies to verify the link between cancer and vitamin D."

Still, Schwartz is convinced enough by the data that he is not only administering but also participating in a study in which healthy men are taking high doses of vitamin D to see if it prevents prostate cancer.

### **Diabetes**

People in Finland, where the sun shows its face for only a few hours a day during winter, have the world's highest incidence of Type 1 diabetes. But Scandinavian researchers there have found that giving infants, or even pregnant women, vitamin D reduces their risk for the disease. In one study tracking 10,000 children, researchers found that those who got regular doses of vitamin D as

infants were about 80 percent less likely to later develop Type 1 diabetes than those who did not get enough.

Animal studies offer support: Mice bred to develop diabetes are far less likely to get it if they are given vitamin D from birth. It's not clear how D does the job. But Type 1 diabetes is an autoimmune disease, and in research, D can suppress certain immune cells. So the vitamin may help by preventing destruction of the cells that produce insulin.

### **Hypertension**

It's long been known that a population's average blood pressure rises the farther the country is from the equator. That's not just a matter of the laid-back tropics versus the urban grind, according to Boston University's Holick. He recruited 18 volunteers with mild hypertension and put them under ultraviolet lights for at least six minutes, three times a week. After six weeks, the amount of D in their systems had more than doubled and their blood pressure had dropped significantly—to normal for some. The lights may work, says Holick, because they boost calcitriol production by the kidneys, and calcitriol tamps down enzymes that cause blood vessels to constrict, a major cause of high blood pressure.

### **Osteoporosis**

In the intricate ballet of calcium regulation that goes on in our bodies, when D goes missing, another hormone, parathyroid hormone, builds up and starts pulling calcium out of the skeleton.

One result is the bone-brittling disease osteoporosis. If people don't get the right balance of both calcium and D throughout their lives to help build up bone strength, their bones can weaken and easily fracture in their senior years.

"Something that's probable, but not proven, is that there's an inverse relationship between your need for calcium and your need for D," says Mount Sinai's Vieth.

“We need calcium because we’re really deprived of vitamin D. If we had enough D, we wouldn’t need so much calcium.”

Eventually, prevention of osteoporosis—which should start in childhood—may involve people taking vitamin D supplements and basking in the sun.

### **Multiple Sclerosis**

Getting lots of vitamin D from sun exposure might also reduce your risk of developing multiple sclerosis, a degenerative neurological disease. One Australian study found that people who had more sun exposure as children were much less likely to develop the disease. It’s been suggested that taking high doses of D might both prevent the disease and aid in its treatment.

### **Inflammatory Bowel Disease**

Experts have already noted that Crohn’s disease and ulcerative colitis—both of which fall under the category inflammatory bowel disease (IBD)—are both more common in northern nations and are associated with vitamin D deficiency.

However, a recent study at Pennsylvania State University suggests that low D could be a contributing factor to IBD. Margherita Cantorna, associate professor of nutrition and immunology at Penn State, recently studied vitamin-D-deficient mice with IBD. Those she left alone started to die in a few weeks, while those she treated with calcitriol had dramatically fewer symptoms and didn’t die.

“Of course, it’s not clear what would happen in humans,” says Cantorna. “But our results were pretty striking.” Anyone with IBD, she adds, should get their D levels checked and consider a supplement for their overall health.

### **How Much D?**

The dangers of not getting enough vitamin D are so great that experts say people should take a blood test for D levels once a year—just as they check their cholesterol regularly. Your doctor can order this test for you at any time.

Current Health Canada recommendations for vitamin D suggest people under 50 get 200 international units (IU) a day; people age 51 to 70 should get 400 IU a day; and those over 70 should aim for 600 IU. But Vieth doesn't think that's enough. In his study of young Canadian women, he found that those who took 400 IU a day had the same deficiency rate as those who didn't. "These women were taking double what the government said they should and it had zero consequence on their blood-vitamin-D levels."

Studies suggest it takes about 800 IU daily to impact bones, but Vieth and other top experts recommend buying a 1,000 IU supplement to get real health benefits. (It is possible to get a toxic buildup of calcium in the bloodstream, but only if you take megadoses of vitamin D. Some recommendations suggest that 4,000 IU a day could be toxic. However, the new data Vieth has collected suggest you'd have to take 40,000 IU a day for long stretches for the vitamin to be dangerous.)

You can also combine a supplement with getting D elsewhere. A 250-millilitre cup of milk contains almost 100 IU. For those who are lactose intolerant or who don't like dairy products, look for D-fortified brands of soy beverages. Better still, soak up the rays on warm, sunny days or when you're on a winter vacation. "Fill up your vitamin D bank with ten minutes a day," says Vieth, "without sunscreen."