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BODY:

Experts say we need more of the sunshine vitamin to counter an alarming surge of bone problems.

Although calcium gets most of the publicity, vitamin D is equally important in preventing bone loss and fractures. Without it, our bodies can't properly absorb and utilize the calcium we take in. Vitamin D also helps maintain normal blood levels of phosphorus, another bone-building mineral. Vitamin D would be essential if it did nothing else, but researchers have discovered that it's active in many tissues besides bone and may play a role in warding off a range of diseases, including cancer (see "In the news," HWHW, February 2004 and HWHW, November 2002), hypertension, and diabetes.

Physicians have known for years that vitamin D deficiencies often occur in people with liver and kidney disease, because these organs are involved in making the active form of vitamin D. Elderly and housebound people with poor diets and little exposure to the sun are also known to be at risk. But studies suggest that the problem isn't confined to these groups, and that many adults have inadequate levels of vitamin D in their blood. The shortfall may lead to fractures, osteoporosis, and other chronic conditions. Moreover, the incidence of nutritional rickets - a severe vitamin D-deficiency disease once thought to have been nearly eliminated - is on the rise in North America. And researchers at Boston's Children's Hospital reported that 24% of Boston-area adolescents, especially African Americans, are vitamin D deficient.

As a result, some experts are beginning to question the adequacy of current recommendations for vitamin D. They're also speculating that the campaign to protect our skin from the sun has had a deleterious effect on our ability to get enough of the sunshine vitamin.

The skinny on D

Vitamin D is actually a hormone that our bodies begin to manufacture when the skin is exposed to the sun's ultraviolet B (UVB) light waves, the same ones that cause

sunburn. With enough access to the sun, we wouldn't need dietary vitamin D. But few of us work outdoors on a regular basis. And public health messages about skin cancer have prompted people either to stay out of the sun altogether or to coat themselves with sunscreen, which curtails the synthesis of vitamin D.

Studies by **Michael Holick**, Ph.D., director of Boston University School of Medicine's Vitamin D, Skin, and Bone Research Laboratory, have shown that an SPF 8 sunscreen can reduce skin-related vitamin D production by 97.5%, and one with SPF 15 may nearly eliminate it. Moreover, people who live above 40 degrees north latitude - as far north as Denver or Philadelphia - can't make vitamin D in winter (in Florida, you can do so year-round).

Other factors influence how much vitamin D the skin can make from sunlight. The darker your skin, the more sun exposure it needs to manufacture the vitamin. And our skin's ability to trigger vitamin D synthesis gradually becomes less efficient. People age 65 and over generate only one-fourth as much as people in their 20s do. So it's important to get more of the vitamin from food and supplements.

Food sources: Slim pickings

Vitamin D is available naturally in very few foods - oily fish such as salmon, mackerel, and sardines, and (in much smaller amounts) eggs. For some people, fortified foods may be an easier route. Some breakfast cereals are fortified with vitamin D, and so is milk, although not all cheese, yogurt, and ice cream have added D.

Every quart of milk is supposed to contain 400 IU of vitamin D. But even if you drink one quart per day - not the most efficient way to ingest vitamin D, and not an option for the lactose-intolerant - it's uncertain whether you'll receive the full 400 IU. Studies undertaken by Holick and others in the 1990s found that fortified milk didn't always contain the stated amount of vitamin D. Nearly two-thirds of the whole milk samples tested in one study had less than 80%, and several skim milk samples had none. Another study found that 47% of skim milk samples had 0%-50% of the amount claimed.

The reasons for this are hard to pin down. Vitamin D levels are affected by the season, the breed of cow, the animal's diet, its exposure to sunlight, and the procedures used in fortification. According to Holick, there's no evidence that the underfortification problem has gone away.

How much more do we need?

The original dietary recommendations for vitamin D were based on the amount needed to prevent deficiency disorders - 400 IU was about the dose in a teaspoon of cod-liver oil, the time-honored prescription for preventing rickets. It was presumed that we had less need for vitamin D once our bones had formed, so 200 IU/day became the adult dose. That recommendation was revised upward in 1997, to 400 IU/day for adults ages 51-70 and 600 IU/day for those over 70. These revised levels reflected a new understanding of vitamin D's role in preventing osteoporosis. But many experts believe the recommendations are still inadequate for preventing osteoporosis and other conditions associated with low vitamin D.

Several studies have concluded that a large percentage of adults of all ages have

inadequate vitamin D in their blood. Research conducted at Boston's Massachusetts General Hospital found that 57% of people hospitalized for a variety of reasons were vitamin D deficient. Of those, 37% had consumed the recommended daily amount of vitamin D (New England Journal of Medicine, March 19, 1998). A study from Boston's Brigham and Women's Hospital found that 50% of women admitted for hip fracture had low vitamin D (Journal of the American Medical Association, April 28, 1999). Canadian researchers who collected blood samples for a year from randomly selected men and women, ages 27-89, found insufficient vitamin D in 34% of them (Journal of the Canadian Medical Association, June 11, 2002). And in an intriguing study that's more suggestive than conclusive, Creighton University investigators found that healthy postmenopausal women with sufficient vitamin D in their blood could boost calcium absorption by 65% if they took supplements to raise their vitamin D levels even more (Journal of the American College of Nutrition, April 2003).

Some experts believe that adults should take 800-1,000 IU daily of supplemental vitamin D to adequately prevent bone loss and possibly protect against some cancers and other chronic disorders. Another possibility might be to take a single weekly dose of 5,000 IU or a single 100,000-IU dose every few months. In a randomized trial in the United Kingdom, the latter strategy helped reduce fracture rates in elderly women and men. Subjects taking a single 100,000 IU vitamin D capsule every four months for five years had a 40% greater blood concentration of vitamin D than those taking a placebo. Their rate of first fracture was 22% lower, and they had a 33% lower fracture rate at the hip, wrist, and vertebrae (British Medical Journal, March 1, 2003).

What does this mean?

For some people, the sun is a convenient and economical way to get vitamin D. Under the right circumstances, a few minutes of direct sun exposure on the arms and the legs or face, two or three times a week may be enough. (After that, it's important to apply sunscreen or cover up to avoid burning.) However, even this small amount is at odds with current skin cancer prevention efforts. And the level of radiation that reaches you - and thus, the amount of vitamin D you can produce through sun exposure - varies with factors such as skin color, latitude, altitude, and weather.

Given the limitations of sun exposure and dietary vitamin D, the best strategy may be to simply take a vitamin D supplement. Until we know more about the optimal level for bone health, it may make sense to increase your daily intake to 800 IU, especially in northern latitudes. (Be sure you also get 1,000-1,200 mg/day of calcium.) The government has set the safe upper limit at 2,000 IU/day. You can't overdose on the vitamin D your skin makes, and it's unlikely you'll eat enough of it in food to get you into trouble.

In the news...Vitamin D and colon cancer

Colorectal cancer is the third leading cause of cancer death in women in the United States. More than 20 years ago, scientists linked vitamin D to colon cancer risk after observing a higher death rate from colon cancer in people exposed to the least amount of sunlight (the skin uses sunlight to make vitamin D). Since then, studies that have assessed blood levels of vitamin D, dietary intakes, and the relationship between calcium and vitamin D strongly suggest that adequate vitamin D can help lower colorectal cancer risk. Here are two items:

* A study of more than 3,100 veterans ages 50-75 who underwent screening colonoscopies found that subjects who consumed more than 645 IU/day of vitamin D were 40% less likely to have precancerous colon polyps than those who got little or no vitamin D (Journal of the American Medical Association, Dec. 10, 2003).

The results were based mostly on data from men, so further study in women is needed.

* Dartmouth Medical School researchers found that vitamin D and calcium work together, not separately, to reduce colorectal cancer risk. In a study of 800 people participating in a polyp prevention study, only people with higher-than-average vitamin D levels in their blood benefited from calcium supplements. Likewise, vitamin D levels were protective only among subjects using calcium supplements (Journal of the National Cancer Institute, Dec. 3, 2003).