Vitamin D: Fountain of Youth, or Panacea?

Few therapies recently have been received with the enthusiasm of Vitamin D. As recently as February 1, an article in the New York Times touted the possibility that Vitamin D could "build bones, strengthen the immune system and lower the risks of illnesses like heart and kidney disease, high blood pressure and cancer." Who wouldn't be interested?

Combined with the fact that a 2008 report in the American Journal of Clinical Nutrition, along with other studies, indicated that as many as half of all adults and children have less than optimal levels, and as many as 10% of all children are highly deficient, there is growing interest in measuring levels of Vitamin D.

Humans can get Vitamin D from exposure to sunlight, diet and dietary supplements. The D in Vitamin D can represent two forms, D2 or D3, but for practical purposes these can be considered together. Vitamin D from the sources above is metabolized in the liver to 25-hydroxyvitamin D. It is this form (as the sum of the D2 and D3 components) that is the major circulating form of Vitamin D and is used to assess a patient's Vitamin D status. Subsequently, 25-hydroxyvitamin D is metabolized in the kidney and other tissues to its active form: 1,25-dihydroxyvitamin D. Although this is the active form of the vitamin, there is little clinical utility to the measurement of 1,25-dihydroxyvitamin D.

There is little consensus over the optimal level of 25-hydroxyvitamin D. Generally, however, a serum level of less than 20 ng/mL is regarded as indicating Vitamin D deficiency, while a level of 21 to 29 ng/mL suggests vitamin D insufficiency and a level greater than 30 ng/mL suggests sufficiency. A number of experts suggest, however, that 30 ng/mL should only be considered to be at the lower end of the "normal" range. Using these levels, it has been estimated that 1 billion people worldwide have either Vitamin D deficiency or insufficiency.

Certain populations are at higher risk for Vitamin D deficiency, including Hispanics, blacks and those with higher body mass index. The elderly, housebound persons, and nursing home residents are particularly vulnerable to deficiency. Since maternal Vitamin D status chiefly determines the Vitamin D status of the fetus and the vitamin is so important for formation of tooth enamel, fetal skeletal development and possibly other systems, it has been suggested that pregnant women receive additional supplementation and that consideration be given to assessing their Vitamin D levels.

There are basically two methods for measuring 25-hydroxyvitamin D levels: immunoassays (CIA, RIA, ELISA) and chromatographic assays (HPLC and LC-MS/MS). The majority of the labs in the CAP Surveys use the DiaSorin Liaison®, a chemiluminescence immunoassay. DiaSorin also makes a radioimmunoassay that was used for many of the early epidemiologic studies. These systems report a total value that combines 25-hydroxyvitamin D2 and D3. At Fletcher Allen we utilize the DiaSorin Liaison® 25-OH Vitamin D chemiluminescence immunoassay and report a total value (combined D2 and D3).

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Although Vitamin D is the “sunshine vitamin”, exposure of the skin to sunlight may not be the optimal method to curtail Vitamin D deficiency. Fifty one percent of adults in Hawaii receiving at least 3 hours of sun daily for a minimum of 5 days per week had serum 25-hydoxyvitamin D levels less than 30 ng/mL. Similar results have been found in ambulatory adults in south Florida.

Oral supplementation has been found to effectively and reliably increase Vitamin D levels to recommended levels (except in the setting of gastric malabsorption), which may obviate the necessity for the increased risk of skin aging and cancer from sun exposure. The level of supplementation is the subject of great debate: national recommendations are expected this year. At present, however, an intake of 800-1000 IU of Vitamin D3 per day would probably guarantee vitamin D sufficiency for most adults.

In summary, Vitamin D insufficiency is not uncommon, and there is epidemiologic and other evidence to suggest that Vitamin D is important for bones, to prevent falls, pain, autoimmune and infectious diseases, and heart disease, and to preserve cognitive function. Total 25-hydroxyvitamin D is an indicator of Vitamin D status. As long as the total is 30 ng/mL or more, the patient likely has sufficient Vitamin D levels.

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In alliance with the University of Vermont

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