Vitamin D Deficiency: Diagnosis and Treatment

by Margaret A. Fitzgerald, DNP, FNP-BC, NP-C, FAANP, CSP, FAAN, DCC

The first article in this two-part series on vitamin D deficiency reviewed the risk factors, epidemiology, and clinical effects of vitamin D deficiency and was published in the June 2013 edition of FHEA News. Here, steps in detecting and treating this common problem are discussed.

The preferred test for assessment of vitamin D status is measurement of serum 25-hydroxyvitamin D (25(OH)D). The results of this test are minimally influenced by recent dietary intake or recent sun exposure, and it is considered the most accurate functional indicator of vitamin D stores. The serum level of the biologically active form of vitamin D, 1,25-dihydroxyvitamin D (1,25(OH)2D), is not an accurate indicator of nutritional vitamin D status because levels of 1,25(OH)2D typically are not altered until vitamin D deficiency is well advanced. The

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The cost of testing ranges from $50 to $200.

Opinions differ on what constitutes deficiency. Physiologic deficiency is defined as a level of serum 25(OH)D that is sufficiently low to cause an increase in parathyroid hormone (PTH) levels. Production and secretion of PTH increases to correct low calcium levels via increased bone turnover and accelerated bone loss, effects that clearly occur later in the disease process. Clinical studies have revealed that increased PTH levels occur with 25(OH)D levels of 20 ng/mL (50 nmol/L). As a result, most laboratories report the normal range to be 20 to 100 ng/mL (50 to 250 nmol/L); however, the preferred minimum level is likely 35 to 40 ng/mL (87.5 to 100 nmol/L).

**Vitamin D3 is the preferred form of the micronutrient for the treatment of vitamin D deficiency and for maintenance of vitamin D levels.**

For treatment of vitamin D deficiency in adults, a dose of 50,000 IU of vitamin D3 by mouth once per week for at least 8 weeks is advised, with extension of this course to 16 weeks if the initial 25(OH)D level was below 30 ng/mL. For long-term prevention, patients should be given 50,000 IU of vitamin D3 once or twice per month plus 1,000 to 2,000 IU of vitamin D3 daily. Consuming a diet rich in vitamin D–containing foods and exposing the skin to a sensible and safe level of sunlight can aid in preventing the condition. A confirmation of vitamin D correction should be obtained after the recommended length of high-dose repletion therapy.

**Vitamin D Toxicity: An Uncommon Problem**

Excessive supplementation, though not excessive sun exposure, can cause vitamin D toxicity, leading to a variety of problems, including calcium deposition into solid organs. This is rarely seen and is usually a consequence of chronic use of ≥10,000 IU/d vitamin D3.

On a personal note, I have treated numerous patients for vitamin D deficiency, with many achieving great health benefits. Maintaining a high index of suspicion for this common clinical problem is the first step in successful diagnosis and treatment.

**Resources**


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**Question and Answer With Dr. Margaret A. Fitzgerald**

**Information about NPH Insulin Pharmacokinetics**

**Question:** As I study for my NP certification examination, I have found that, depending on the source, the time to peak effect for NPH insulin (Humulin N, Novolin N) ranges from 4 to 9 hours after it is given to as much as 6 to 10 hours after the injection. What numbers should I use if there is a question on the test about time to peak effect for NPH insulin?

**Dr. Fitzgerald:** Depending on the brand of insulin and a number of other factors, the time to peak effect for NPH insulin can vary, and this is why the peak ranges listed in various references can be different. These differences can make studying for the test challenging and confusing. At the same time, remember to focus on the clinical significance of NPH pharmacokinetics.

**Insulin-induced hypoglycemia is most likely to occur during the drug’s peak concentration, roughly 6 to 9 hours after administration.**

With the remaining one-third provided in an injection later in the day. Insulin-induced hypoglycemia is most likely to occur during the drug’s peak concentration, roughly 6 to 9 hours after administration. Hypoglycemia induced by an early morning (7-8 AM) NPH insulin dose will most likely occur in the afternoon.

While I appreciate that the minor differences you have pointed out can be rather off-putting, remember to think about concepts of care. Consider the overlap of the differing ranges: in both, 6 to 9 hours is included. This will help a great deal as you prepare for the test and in your practice.

**Resource**


**Important System Update Information**

Routine maintenance is scheduled for August 17, 2013. FHEA is committed to providing our customers maximum uptime, reliability and security for our Online Testing and Learning Site, www.fhea.com/npexpert. Regular system maintenance is critical to achieving this goal and is normally performed the third Saturday of each month.
New guidelines from the American College of Chest Physicians (ACCP) recommend that patients at significant risk for lung cancer be offered annual screening with low-dose computed tomography (LDCT). According to the ACCP, patients considered at high risk are current smokers aged 55 to 74 years with a smoking history of at least 30 pack-years and former smokers of the same age who have quit within the past 15 years but have the same smoking history.

**Current Guidelines**
With these updated guidelines, the ACCP joins the American Cancer Society (ACS), American Society of Clinical Oncology (ASCO), and National Comprehensive Cancer Network (NCCN) in endorsing consideration of lung cancer screening in certain high-risk patients. However, the ACCP, ACS, and ASCO differ from the NCCN in terms of which patients should be considered for screening. The NCCN recommends annual CT screening for younger patients (50 or older, versus 55) with a less extensive smoking history (at least 20 pack-years, versus 30 pack-years), who have one additional risk factor, such as a history of cancer or lung disease, family history of lung cancer, radon exposure, or occupational exposure.

**National Lung Screening Trial**
The ACCP’s new recommendation to screen high-risk individuals is based on findings from the National Lung Screening Trial (NLST), a randomized clinical trial begun in 2002 that studied more than 53,000 current and former heavy smokers (defined as a smoking history of ≥30 pack-years) between the ages of 55 and 74 years. Patients were assigned to receive annual screening for 3 years with either LDCT or standard chest radiography. The NLST Investigators concluded in 2011 that LDCT scanning reduced deaths from lung cancer in these high-risk patients by 20% compared with chest radiography. In addition, the NLST found that for every 320 high-risk smokers screened with LDCT, one death from lung cancer was prevented. In comparison, the number of women who need to be screened with mammograms to prevent one death from breast cancer is 780.

**Impact on Survival Rates**
In the United States, lung cancer accounts for more deaths than any other cancer. Nearly 160,000 deaths are expected to occur because of lung cancer in 2013, more than the expected number of deaths from breast, colon, prostate, and pancreatic cancer combined. Early detection is important, since early-stage lung cancers are more likely to respond to treatment, such as surgery. The 5-year survival rate for localized stage lung cancer is 52% versus 16% for all stages combined. Currently, however, only 15% of lung cancers are diagnosed at the localized stage.

Although screening certain high-risk patients offers the potential to reduce lung cancer mortality, as demon-

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strated in the NLST, the decision-making process concerning whether to offer screening must take into consideration its associated risks. These include high false-positive rates, radiation exposure from multiple CT scans, patient anxiety, and unnecessary invasive procedures. Clinicians can mitigate these risks by offering screening only to those patients who fall within the parameters outlined in the ACCP guidelines, notes NLST investigator Dr. Peter Mazzone.

References


The 2014 expansion of healthcare coverage mandated by the Affordable Care Act (ACA) is expected to cause a marked rise in patient demand for healthcare services and a consequential shortage in primary care physicians available to treat an expected 35 million newly insured patients by 2016. In the May 16 issue of the New England Journal of Medicine, national correspondent John K. Iglehart discusses the important issue of finding common ground among the different groups of primary care providers so that the potentially critical shortage of providers can be addressed and potentially averted. The NEJM Health Policy Report advocates cooperation among all primary care providers, with the goal of promoting team-based care that is focused on fulfilling the expanded need for healthcare. In order to facilitate this recommendation, the Report notes that changes must be made in restrictive scope-of-practice laws in many states.

John Iglehart, who is also Founding Editor of Health Affairs, points out that in 2010 the Institute of Medicine (IOM) report in which the organization recommended that APRNs should “practice to the full extent of their education” and that nurses should achieve higher levels of education, so that they can expand their clinical reach in order to address the increased need for more primary care practitioners.

However, the American Medical Association (AMA) opposes autonomous practice by APRNs and is critical of studies that support the clinical performance of APRNs. The organization points to the greater educational level of physicians, highlighting the success only of integrated systems that incorporate APRNs into physician-led teams.

Furthermore, the AMA suggests that a recent law passed in Virginia should serve as a model for other states to consider. The Virginia law states that NPs must be managed by a single physician and expands the number of NPs who can be supervised by a single physician from 4 to 6. Telemedicine is a legal form of supervision under this law. The American Association of Nurse Practitioners believes the Virginia legislation is out of step with national trends.

Another important limitation on NPs’ autonomous practice is promulgated by state scope-of-practice laws. These laws vary considerably by state, with a minority of states allowing APRNs to see patients and prescribe medications autonomously, while the majority of states do not allow this practice. John Iglehart notes that the US Federal Trade Commission (FTC) has issued many actions since 2010 to try to combat these state restrictions on NP practice. For example, the FTC recently wrote a letter to the Connecticut House of Representatives stating that physician supervision of APRNs was unnecessary, that these providers are as
Commentary by Dr. Margaret A. Fitzgerald

In this NEJM article, Iglehart begins by defining the major problem to be an upcoming shortage of primary care physicians—the major impediment to accommodating the increasing number of currently uninsured people who will be seeking healthcare in the next stage of the ACA enactment. Nurse practitioners and other “nonphysician providers” are mentioned as a possible way of filling this implied gap in primary care. The inference is that medical physicians are the “gold standard” in providing primary care; other providers are therefore a “good enough” fill-in. This inaccurate portrayal of primary care practice is often promulgated in comments about the primary care provider (PCP) shortage in professional and popular literature. NPs and PAs have demonstrated a long and well-documented history of providing high-quality care. We do not “fill in the gap” created by a physician shortage, but rather care for people who need and benefit from the service we can provide. While it is not surprising to see language such as this in a medical journal, this school of thought is often found in the NP, PA, and popular press as well. Reflecting on the NEJM article’s title, there is great risk to the NP and PA professions in allowing a physician shortage to create the rationale for our professional existence, and there is great reward in continuing to promote ourselves as the highly qualified healthcare providers we are.

but this was not the case. The document was leaked to the AMA before it was approved, and the AMA’s House of Delegates expressed concern with it. Likewise, the AAFP, American Osteopathic Association, and the American Academy of Pediatrics withdrew their support for these meetings. John Iglehart notes, “The collapse of this dialogue offered a snapshot of the unsettled states of discussions between national physician and nursing organizations over defining roles in an emerging model of team-based care that relies on interprofessional collaboration as one of its touchstones.”

A Look to the Future
The NEJM Health Policy Report concludes that given the differing opinions among physician and nursing organizations and the partisanship that halts policymaking on both a federal and state level, progress in restructuring delivery systems may come more rapidly at the practice level, where physicians, nurses [nurse practitioners], and other caregivers are freer to innovate and to assign tasks to persons on the basis of the full extent of their training and what makes organizational sense.

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