Vitamin D Deficiency: A 2008 Update
By Dr. Margaret A. Fitzgerald, DNP, FNP-BC, NP-C, FAANP, CSP

Vitamin D has long been recognized as essential for the efficient utilization of dietary calcium and bone and muscle health. Recent studies have highlighted the importance of the multiple roles of this micronutrient. As an inhibitor of abnormal cellular growth, vitamin D is needed to help with cell differentiation thereby minimizing abnormal cell proliferation, a key step in cancer development. A stimulator of insulin secretion in response to increased insulin demands, vitamin D plays a role in the maintenance of normoglycemia. Since vitamin D receptors (VDR) are expressed by most cells of the immune system, the micronutrient plays an important role as an immunomodulator. When vitamin D is available in physiologic amount, this micronutrient acts as a renin production, therefore contributing to blood pressure control.

Vitamin D deficiency: A common problem
Dietary intake of foods rich in vitamin D, along with regular periods of skin exposure to the sun should provide the body with an adequate supply of this important micronutrient; however, vitamin D deficiency is a common problem. Studies find this problem in different populations. In Boston 36% of healthy adults aged 18-29 have vitamin D deficiency by winter’s end, and in the United Kingdom 27% of otherwise healthy Asian children share this problem as well. Studies also found this micronutrient deficiency in 57% of patients on a hospital medical ward, and in 93% patients with non-specific musculoskeletal pain at a Minneapolis pain clinic. Considering this, vitamin D deficiency is a common problem in the well and the sick.

Vitamin D sources
Fatty fish and vitamin-D enriched dairy products can supply a small amount of the estimated (continued on page 3)
Supporting Breastfeeding in the Workplace

By Marie L. Bosco, BSN, RNC, IBCLC

Mothers are an integral part of the U.S. work force; almost 70% of employed mothers with children younger than three years of age work full-time. One-third of these women return to working within three months of delivery, and two-thirds return within six months. However, working outside the home is related to a decreased duration of breastfeeding, and intention to work full-time negatively affects that duration even more. This has elevated the need for breastfeeding support in the workplace. This may seem like an easy task; however, many employers do not have breastfeeding support programs available for their employed mothers, and this makes maintaining breastfeeding difficult.

There are identified barriers to breastfeeding when women do return to work. These include lack of time and/or flexibility for milk expression, lack of accommodation to pump and/or store milk, lack of support from employers and colleagues, and real or perceived low milk supply. Workplace lactation programs are needed to support women not only in their own health, but also that of their children. These programs should include a nursing mother’s room in a centrally located area with adequate space for pumping and storage of expressed milk. Employers should implement strategies to ensure time for breastfeeding or breast expression, including flexible work schedules and locations, adequate time for expressing and job sharing. Workplace programs are desperately needed to support breastfeeding duration after women return to work. The benefits from this advocacy will provide health benefits to both mothers and children, along with improved employee satisfaction, and lower health care costs. The benefits breastfeeding provides will far outweigh the time and financial burden of providing breastfeeding support programs in the workplace.

References


(Vitamin D Deficiency Update: continued from page 1)

3000 to 5000 IU/d of vitamin D per day the body needs; the average US dietary intake is typically less than 5% of the body’s requirement. Skin exposure to the sun’s rays should supply =>95% of the daily requirements by triggering the body’s natural ability to synthesize this vitamin. The ability of the body’s sun-induced vitamin D synthesis is determined by a number of factors including the skin’s melanin pigmentation. For example, a person with a darker skin tone will synthesize less vitamin D with sun exposure when compared to a person with lighter skin tone.

The use of sunscreen, while helpful in limiting the risk of certain skin cancers, likely increases the risk of vitamin D deficiency because the application of a sunscreen with sun protection factor 8 reduces the capacity of the skin to produce vitamin D by as much as 95%. Obviously, individuals who spend little time outdoors have significant vitamin D deficiency risk. Time of year and place of residence also influence sun-induced vitamin D synthesis, with winter sun and northern latitudes providing the weakest effect. Even people who are regularly involved in outdoor activities that facilitate exposure to sunshine can have vitamin D deficiency if little skin is left sun exposed. Exposing the hands, face, and arms or legs to about 5-15 minutes of sun at a strength found in northern latitude between the hours of 11 AM and 2 PM will help provide an adequate amount of vitamin D synthesis. This level of sun exposure is unlikely to induce sunburn or increase skin cancer risk.

Considering this, risk factors for vitamin D deficiency include poor diet and limited sun exposure, a common problem given indoor oriented lifestyles as well as the use of sunscreen when outdoors. The use of certain medications, including phenytoin (Dilantin) and Phenobarbital, is potentially vitamin D depleting; as a result, patients on these medications require two to five times the recommended daily amount of vitamin D. Vitamin D deficiency is also common in the presence of hepatic or renal disease as well as post gastric bypass. Current recommendations for vitamin D intake likely underestimate physiologic needs. Indeed, recently released American Academy of Pediatrics (AAP) clinical report, “Prevention of Rickets and Vitamin D Deficiency in Infants, Children, and Adolescents,” recommends all children receive 400 IU a day of vitamin D, beginning within the first few days of life; this represents a doubling of the former daily recommendations of 200 IU.

Clinical effects of vitamin D deficiency:
A musculoskeletal focus

In infants and children, severe vitamin D deficiency results in the failure of growing bone to mineralize; thus resulting in the condition rickets. In contrast, even though adult bones are no longer growing they are in a state of constant cell renewal and therefore susceptible to problems related to vitamin D deficiency including persistent, nonspecific musculoskeletal pain. To appreciate this, consider some of the clinical effects of vitamin D deficiency. Without sufficient amounts of vitamin D, intestinal calcium absorption is inadequate. The resulting calcium deficiency prompts an increase in production and secretion of parathyroid hormone (PTH). PTH acts at the level of the kidney by facilitating an increase in tubular calcium re-absorption and stimulating renal production of 1, 25-dihydroxyvitamin D, the hormonally active form of vitamin D. With a continued deficiency, unusually high levels of PTU allow osteoclast activation so that bone can serve as a calcium source. In addition, the continued presence of high levels of circulating PTH causes phosphate to be wasted via the kidney. The calcium phosphate product in the circulation decreases and becomes inadequate to mineralize the bone properly, potentially leading to osteopenia and osteoporosis. At the same time, osteoblasts deposit a rubbery collagen matrix layer on the skeleton. This surface cannot provide sufficient structural support; the clinical effect is osteomalacia. This abnormal collagen matrix can absorb fluids and expand. With expansion, pressure builds under the richly innervated periosteal covering.

This process likely explains in part the origin of the constant dull bone ache often reported in patients with

(Continued on page 5)

Customer Comment

To Dr. Fitzgerald and your staff,

I wanted to thank you so much for your review course and materials. I recently took the ANCC test and passed!! I attended your review course in Atlanta in April of this year. I really found your manual and review book incredibly helpful. I especially appreciate your constant teaching of fundamental principles and not just memorizing meds, formulas, etc. That alone was so helpful.

I can’t thank you enough!

Sincerely, Cathi Roberts
Team to End Stroke

A letter from Margaret Fitzgerald

My Family, Friends, and Colleagues:

I have taken on the challenge of completing the Disney Half Marathon (13.1 miles) on January 10, 2009 as part of the American Stroke Association’s Boston Train to End Stroke team. I do this in honor of many people who I love, some who I miss, who have had strokes. My grandmothers both had strokes. My Nana Fitz’s first stroke, when she was in her early 60s, took away her ability to speak; as a young child, I never heard her voice. She died from a subsequent stroke a few years later. My Nana Laffey died from her first stroke. I also do this to honor my dear friend, David Tibbetts, who had a stroke 2 ½ years ago. My patients who have had strokes, particularly Mrs. O. and Mrs. R., will also be with me on race day.

To train for an event such as this is a life changing and life affirming experience. I give thanks for my good health (and curse a bit at my aging left knee and right ankle while I am at it!) I have the luxury of preparing for this event. People who have a stroke are seldom afforded this luxury, as this disease strikes suddenly, often in a devastating manner.

This is where I need your help. My commitment is to raise $1,500 to support the Team to End Stroke. In these economically challenging times, asking for financial support for a fundraiser is not an easy task. I am picking up the tab for my travel and accommodations expenses as well as race fees, so every dollar I raise will go to fund stroke research and education. Any gift will be greatly appreciated. If you have a loved one who has had a stroke, please include his or her name on the response form and I’ll be glad to complete this race in their name as well.

I thank you in advance for your support in this challenge. I will be contacting everyone after the race to let you know how I did! With your tax-deductible contribution to the American Stroke Association, you are supporting an incredible cause, helping to make a positive difference in my life and the lives of many others, especially all those who have had a stroke who we honor with our participation in this event.

Thanks again,
Margaret A. (Peg) Fitzgerald
Peg@fhea.com

To make a donation please visit:
http://ttes.disney2009.kintera.org/fitzgerald

Simply select the amount you would like to contribute and click donate.
osteomalacia. In these patients, minimal pressure applied with a fingertip on the sternum, anterio tibia, radius or ulna elicits a painful response. Since vitamin D deficiency symptoms overlap considerably with those of fibromyalgia, one condition is often mistaken for the other.

Vitamin D deficiency has also been long recognized as a cause of muscle weakness and muscle aches and pain in all ages. Aside from osteomalacia and localized bone pain, antigravity muscle weakness, difficulty rising from a chair or walking, and pseudofractures are also noted in the person with vitamin D deficiency. These findings resolve with appropriate treatment.

Vitamin D deficiency also contributes to the development of hypocalcemia and hypophosphatemia. In this situation, unless the vitamin D deficiency is addressed, replacing calcium or phosphate alone does not restore the body to homeostasis.

**Diagnosing vitamin D deficiency**

Obtaining a serum 25-hydroxyvitamin D is the most commonly accepted measure of vitamin D status. Opinions do differ on what constitutes deficiency. A physiologic deficiency is defined at a level of serum 25-hydroxyvitamin D sufficiently low to cause in increase in the parathyroid hormone levels rise to correct calcium levels via increased bone turnover and accelerated bone loss, clearly a point later in the disease process. Expert opinion informs the clinician to consider a biologically based reference, with a level of serum 25-hydroxyvitamin D concentration below which parathyroid hormone (PTH) serum levels increase and calcium homeostasis is preserved. A measure of 25-hydroxyvitamin D <8 ng/ml is sometimes reported as deficient per lab norms. In reality, clinical studies have revealed increased PTH levels with 25-hydroxyvitamin D levels of 20 ng/mL (50 nmol/L). According to information found in the Mayo Clinic Proceedings, serum 25-hydroxyvitamin D level of at least 20 ng/mL is necessary to minimally satisfy the body’s vitamin D requirement and maintenance of a serum level of 30 to 50 ng/mL is preferred.

**Vitamin D deficiency- Treatment and prevention**

Due to its ability to be stored in fat and long T ½, low dose (400-800 IU) vitamin D supplementation is not sufficient to correct a deficiency. According to Holick’s recommendations a dose of 50,000 IU of vitamin D once a week for 8 weeks will likely be needed, with follow up for long-term prevention accomplished by giving 50,000 IU of vitamin D once or twice per month. Increasing sun exposure is also helpful. Eating 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. Excessive supplementation, though not excessive sun exposure, can lead to vitamin D toxicity, leading to a variety of problems including calcium deposition into solid organs.

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.

**References**


Certification Question and Answer
With Margaret A. Fitzgerald,
DNP, FNP-BC, NP-C, FAANP, CSP

**Question**- Can you provide examples of the type of questions that are likely to be encountered on the NP certification examination?

**Answer**- Here are two examples of questions typically found on the NP certification examinations.

**Question**- Which of the following best describes asthma?
A. Intermittent airway inflammation with occasional bronchospasm
B. A disease of bronchospasm leading to airway inflammation
C. Chronic airway inflammation with superimposed bronchospasm
D. Relatively fixed airway constriction

**Correct response= Option C**

**Answer**- Asthma is a chronic airway inflammatory disease involving an increase in bronchial hyperresponsiveness with superimposed bronchospasm and a resulting decrease in FEV1 to FVC ratio. While the condition ranks as the second after allergic rhinitis as the most common chronic respiratory disease in North America, many with asthma continue to be undiagnosed and therefore untreated.

**Question**- Pica during pregnancy is usually considered:
A. A harmless practice common in certain ethnic groups
B. Only problematic if more nutritious food sources are left out of the diet and replaced by the nonfood
C. A way of providing select micronutrients not usually found in food products
D. Potentially dangerous due in part to contaminants in the nonfood substance

**Correct response = Option D**

**Answer**- Pica is the ingestion of nonfood substances such as clay, cornstarch, laundry starch, dry milk of magnesia, paraffin, coffee grounds or ice. While usually noted to be more common in select ethnic groups, pica is noted in all socioeconomic groups. Certain pica habits are likely harmless, such as sucking on ice chips and likely do little to replace more nutrition substance. Most other pica forms contain potential risk, as nonfood substances are taken in preferably over more nutritious food sources. With the ingestion of clay, starches and paraffin, there is risk of constipation, bowel obstruction, and nutritional deficiency. In particular, many common pica substances can be contaminated with heavy metals such as lead or mercury and other industrial pollutants that are particularly toxic to the mother and the developing fetus.

The issue of pica should be raised with all pregnant women. Some women believe that pica is normal, or are encouraged to eat substances like clay by well-meaning friends and family members as a way of relieving tension. Advice should be given recognizing this but informing the woman about the potential risks of pica.

**Reference**
3 Day Symposium for Primary Care Providers

January 17-19, 2009  North Andover, MA  
Contact hours: 18

Schedule
8:30AM - 11:50AM class
11:50AM - 1:00PM Lunch on your own
1:00PM - 4:20PM class

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Instructor: Shawn M. Stewart, PhD, ABS, HSP
Recognizing Childhood Disorders & Counseling Parents
• Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder
• Learning Disabilities
• Oppositional Defiant Disorder
• Conduct Disorder

Day 2
Instructor: Victor Czerkasij, MA, MS, FNP-BC
• A Primer on Dermatology: The basics to increase your competence
• Is This a Skin Cancer? Identifying & treating malignant cutaneous neoplasms
• The Golden Years: Understanding & treating skin in older Americans
• Help My Child: Topics, diagnosis & treatment of pediatric conditions

Day 3
Instructor: Bruce D. Askey, MS, ANP-BC
• Inflammatory Bowel Disease: A primer for the primary care provider
• Irritable Bowel Syndrome: A primer for the primary care provider
• Differential Diagnosis of Abdominal Pain

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