

## **Rickets/Vitamin D Background Information and Resources 6/2007**

### **Background**

Vitamin D deficiency is a significant pediatric health issue, with complications including rickets, hypocalcemic seizures, limb pain and fracture. For older infants and children, risk factors include dark skin color, prolonged exclusive breastfeeding without a vitamin D supplement, restricted sun exposure including use of sunscreen and certain medical conditions. Rickets is a bone disease that results from the inability of the body to form the structure for normal bones, resulting in malformation and loss of function. It is usually caused by inadequate vitamin D synthesis from sunlight and a lack of dietary vitamin D. The discussion in the US focuses on vitamin D deficiency as the cause for rickets, as the majority of infants are almost universally fed breastmilk or formula and as a result calcium intake is adequate. However, children may be deficient in both vitamin D and calcium. New research is developing and expanding the role of vitamin D supplementation in child health. Rickets is an extreme and a late outcome. If we use the presence of rickets as an indicator, we are, in effect, waiting until the child has sustained a chronic condition. It is better to monitor indicators for risk, such as adequacy of vitamin D intake in high risk groups; some high risk groups include individuals with dark skin, limited or no exposure to direct sunlight, and breastfed infants not receiving a vitamin D supplement.

The sources of vitamin D in breastfed infants are human milk and sun exposure, though the American Academy of Pediatrics (AAP) recommends no direct sunlight exposure for infants under 6 months of age. A major risk factor for breastfed infants is maternal vitamin D deficiency, though vitamin D from maternal milk is insignificant. Breastmilk naturally contains low levels of vitamin D and supplementing the mother with the tolerable upper limit of vitamin D does not substantially increase the concentration in breastmilk. To increase the vitamin D concentration of breastmilk to a level adequate to prevent vitamin D deficiency in the infant, breastfeeding mothers would need to be supplemented with a level of vitamin D that is above the level currently considered safe (per Dietary Recommended Intake for vitamin D). To prevent vitamin D deficiency in newborn infants, pregnant women at risk for vitamin D deficiency (especially those who are dark-skinned or veiled) should be screened and treated. Breastfed infants should be supplemented with vitamin D, even if the mother is vitamin D-sufficient.

The most common dietary source of vitamin D is from vitamin D fortified foods such as cow milk and vitamin D fortified formula. Soy milk, cheeses and yogurts may not be fortified with vitamin D. Sixteen ounces per day of vitamin D fortified milk or infant formula will supply 200 IU of vitamin D, the level currently considered to be adequate by the Institute of Medicine. Regular sunlight exposure can prevent vitamin D deficiency, but the safe exposure time for children is unknown. Persons with darker skin, including Africa Americans, are at increased risk of vitamin D insufficiency because melanin in skin interferes with

vitamin D synthesis from sunlight. Therefore, persons with darker skin need to spend more time in sunlight to synthesize the same amount of vitamin D as a person with lighter skin.

### **Resources**

The AAP published the report, "Prevention of Rickets and Vitamin D Deficiency: New Guidelines for Vitamin D Intake," in April, 2003<sup>1</sup>. The report is not a policy but provides guidance for the clinician. It does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, must be considered. A copy of the report can be found at: [www.pediatrics.org/cgi/content/full/111/4/908](http://www.pediatrics.org/cgi/content/full/111/4/908). The American Academy of Pediatrics (AAP) also published further information in "Optimizing Bone Health and Calcium Intake of Infants, Children, and Adolescents," in February, 2006<sup>2</sup> which can be found at:

<http://pediatrics.aappublications.org/cgi/content/full/117/2/578>

The Children's Health and Disability Program (CHDP) Provider Notice No. 05-04, entitled Childhood Bone Health Educational Resources for CHDP Program Providers and CHDP Provider Resources for Child Bone Health Education on the Internet provides additional information and resources on childhood bone mineralization. The CHDP Provider Notice No. 05-04 and internet resource can be accessed from the CHDP webpage at:

<http://www.dhs.ca.gov/pcfh/cms/onlinearchive/pdf/chdp/providerinformationnotice/2005/chdppin0504.pdf> and

<http://www.dhs.ca.gov/pcfh/cms/onlinearchive/pdf/chdp/programletters/2005/chdpl0504a1.pdf> .

### **References:**

- 1) Gartner, L., et. al. "Prevention of Rickets and Vitamin D Deficiency: New Guidelines for Vitamin D Intake" Pediatrics, April 2003, Vol. 111(4).
- 2) Greer, F, Krebs, N, and Committee on Nutrition. "Optimizing Bone Health and Calcium Intakes of Infants, Children, and Adolescents" Pediatrics, February 2006, Vol. 117.