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Vitamin D In Obesity and Pregnancy

Vitamin D promotes bone health by increasing absorption of calcium and phosphorus in the intestine. It also plays a role in neuromuscular, immune, and other cellular functions. Although exposure to sunlight is a ready source of vitamin D, deficiency in the U.S. is common. This newsletter focuses on three groups of people at increased risk. These are obese individuals, pregnant women, and infants.

Vitamin D and Obesity

Obesity is generally defined as a body mass index (BMI) of 30 or higher. About a third of Americans are obese.¹ A number of studies have found that obese people have lower vitamin D levels than do nonobese people.

An Elegant Experiment

Scientists measured the effect of obesity on levels of vitamin D. They found that²:

- UVB irradiation caused an increase in serum vitamin D₃ levels in both obese and nonobese people. But the increase was 57% less in the obese group.
- An oral dose of vitamin D₂ caused a marked increase in serum vitamin D₂ concentrations in both obese and nonobese people. But heavier people reached a lower peak concentration.

Obese people were found to have lower blood levels of vitamin D. This was true for both the D₃ and D₂ forms coming from light and diet, respectively.

Why Obesity Leads to Vitamin D Deficiency

Scientists believe that fat-soluble vitamin D is efficiently stored in body fat, where it is not available for the body to use. Since obese people have more fat tissue, more of their vitamin D is stored in fat. So there is less available for use.

Endocrine Society Recommendation

Obese people need 2 to 3 times more vitamin D than others in their age group. So adults should get about 3,000 to 6,000 IU/day.³ When deficient, they should receive at least 6,000 to 10,000 IU/day.²

Vitamin D and Pregnancy

Many pregnant women don't have sufficient levels of vitamin D. This is true even for those who take a prenatal vitamin. A number of studies have linked low levels of vitamin D with impaired bone development in the fetus. Some, but not all, studies have linked low levels to:



Sufficiency vs Insufficiency vs Deficiency

25-Hydroxyvitamin D [25(OH)D] measurements are used to find out if people have enough vitamin D. Here's a good guide³:

- Sufficiency: 30-100 ng/mL
- Insufficiency: 21-29 ng/mL
- Deficiency: <20 ng/mL

People at Risk of Deficiency

These conditions may put people at risk for vitamin D deficiency:

- Being pregnant
- Lactating
- Having dark skin
- Being elderly
- Being obese
- Being housebound
- Taking certain medications
- Having a malabsorption syndrome

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- Preeclampsia: One study found that levels <20 ng/mL were associated with a 5-fold increased risk of severe preeclampsia.⁴
- Gestational diabetes: An association between glucose intolerance and low vitamin D levels has been seen. And some studies have found a link between low vitamin D levels and risk for gestational diabetes.
- Low birthweight: One study found that pregnant women who were vitamin D deficient (≤ 12 ng/mL) had a 2.4-fold higher risk of having a low birthweight baby.⁵
- Primary Cesarean section: One study found that women who were vitamin D deficient (<15 ng/mL) had a 4-fold increase in the rate of this procedure.⁶
- Fetal lung development: Insufficient lung development may increase risk of lung infections in the newborn. In one study, vitamin D-deficient (<20 ng/mL) newborns had a 6-fold increased risk of viral lower respiratory tract infections in their first year of life.⁷

Endocrine Society Recommendation

The Endocrine Society says that pregnant and nursing women need at least 600 IU/day of vitamin D.³ But it recognizes that they may need more. They may need 1,500 to 2,000 IU/day to maintain a blood level above 30 ng/mL.³

Vitamin D in Infants

During pregnancy, vitamin D crosses the placenta and is stored in the fetus. These stores are depleted by about 8 weeks of age in breastfed infants who don't get vitamin D supplementation.⁸ After that, babies must rely on vitamin D from diet, sunlight, and supplements. Babies who get formula usually get enough vitamin D because it's added to all formulas in the U.S. But babies who are only breastfed are at higher risk for deficiency. This is because human milk contains a very low concentration of vitamin D (approximately 20–60 IU/L). Babies need more vitamin D than that to maintain an optimal level. The American Academy of Pediatrics recommends that all infants receive 400 IU/day beginning soon after birth.⁹

Laboratory Testing for Vitamin D

Quest Diagnostics offers two methods for measuring 25(OH)D. Both have passed rigorous internal and external validations. Both are considered accurate and reliable. One is a chemiluminescent immunoassay. It provides high quality quantitative results that are tied back to standards from the National Institute of Standards and Technology. It was recently certified by the Centers for Disease Control Vitamin D Standardization Certification Program and is suitable for most individuals.

The other is an LC/MS/MS method. This method is appropriate for people who have been prescribed vitamin D₂ or when separate measurement of vitamin D₂ and D₃, in addition to total vitamin D, is required.

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