

## Vitamin D: The Sunshine Vitamin

Vitamin D has long been known to work with calcium to produce healthy bones. When it was added to the American milk supply starting in the 1930s, rickets in children was decreased by 85%. Rickets is a disease in which bones fail to mineralize properly, resulting in bone deformity and soft bones. The comparable disease in adults is called osteomalacia. Osteomalacia is often a slowly progressing disease characterized by bone pain and muscle weakness. In the 1980s, Vitamin D was found to have a role in reducing the risk of some cancers, in the processes of the parathyroid hormone and in insulin secretion. In the last 10 years, studies have linked an adequate Vitamin D status with a multitude of benefits and scientists learned how to measure Vitamin D status accurately through blood tests. Adequate Vitamin D status has been linked to decreased risks for hyperparathyroidism, hypocalcemia, osteomalacia, osteoporosis, rickets, psoriasis, muscle weakness/pain, cancer (specifically breast, prostate and colorectal), Type 1/Type 2 diabetes, high blood pressure, multiple sclerosis, mortality, post menopausal weight gain, tooth decay, asthma, and arthritis. Last year a group of scientists called to raise the recommended intake of Vitamin D. Since that time, the awareness of Vitamin D status has soared--scientists are testing theories, physicians are testing their patients, the media is reporting the onslaught of studies, and hopefully people are taking responsibility in maintaining a healthy Vitamin D status.

### Research

Below is a summary of some of the most recent findings by scientists:

July 2008: The University of Manitoba found that in a study of 206 pregnant women, only 10.5% had adequate Vitamin D levels in their third trimester. Those with inadequate levels were more likely to have babies with early tooth decay.

July 2008: An observational study presented at the 50<sup>th</sup> Annual Meeting of the American Headache Society showed 42% of patients with chronic migraines were deficient in Vitamin D.

June 2008: A study conducted in Austria linked a Vitamin D deficiency with an increased risk of death. Most of those in the study who died had cardiovascular problems.

June 2008: Children's Hospital in Boston measured the Vitamin D levels in 380 healthy toddlers. Forty percent of those had suboptimal levels of Vitamin D; twelve percent had a Vitamin D deficiency. One third of the toddlers with a Vitamin D deficiency already had signs of thinner bones.

June 2008: Researchers with the Dana-Farber Cancer Institute and the Harvard School of Public Health found that people with low levels of Vitamin D were most likely to die from colon cancer and those with the highest levels upon

diagnosis were most likely to survive. Those with the highest levels of Vitamin D were 48% less likely to die.

June 2008: A study from the Harvard School of Public Health and the Brigham Women's Hospital looked at the records of men who had heart disease. They found that men who had low levels of Vitamin D (15 ng/ml or less) had twice the risk of heart attack compared to those who had a Vitamin D level that was considered sufficient (30 ng/ml).

June 2008: A study by the Moores Cancer Center at the University of California examined the rate of Type 1 diabetes (the body does not produce adequate insulin) throughout regions of the world. They found the incidence of Type 1 diabetes generally highest in the regions with the highest latitudes. Those in the low latitude regions are most likely exposed to more sun rays--converting Vitamin D to its active form. Vitamin D supplementation during infancy was associated with a 29% decrease in Type 1 diabetes.

May 2008: The *Archives of General Psychology* reported a study linking Vitamin D deficiency and depression in older adults.

May 2008 – A study found that Vitamin D deficiency is common among women diagnosed with breast cancer and that Vitamin D deficiency may increase the risk of the cancer spreading and of death. The study found that women with a Vitamin D deficiency at the time of diagnosis were 94% more likely to experience the spreading of cancer and 73% more likely to die over the next 10 years compared to those with adequate Vitamin D levels. In the study group, more than 1 in 3 were deficient in Vitamin D.

January 2008 – A long-term study reported in *Circulation* found that people with high blood pressure are more likely to have a cardiovascular event (heart attack, stroke, chest pain, heart failure and peripheral claudication) if they also have a Vitamin D deficiency. Twenty-eight percent of those in the study had a Vitamin D deficiency.

September 2007: An analysis of 18 Vitamin D studies was published in the *Archives of Internal Medicine*. More than 57,000 adults participated in the studies. Many of them were older. Those taking a Vitamin D supplement were 7% less likely to die of any cause during the 5.7 years of the studies.

May 2007: A seven year study of more than 36,000 women found that women who took a supplement of 1000 mg of calcium and 400 IU of Vitamin D slowed post-menopause weight gain.

August 2004: A study published in the July issue of Nutrition Journal found that a supplement of 1000 IU of Vitamin D improved symptoms of seasonal affective disorder.

### **Lab Testing**

Despite all of this research, we still don't fully understand the complex roles of Vitamin D in our bodies or the optimal intake level. It does seem clear that people should be tested for Vitamin D status routinely and take measures to reach and maintain an adequate Vitamin D status. The 25(OH)D or calcidiol test can tell your doctor if your Vitamin D level is optimal. The Vitamin D Council recommends a 25(OH)D level between 40 and 65 ng/ml. The U.S. National Institutes of Health recommends 25(OH)D levels over 30 ng/ml noting that there is "insufficient data" to support recommendations for higher levels.

### **Recommended Intake**

To reach an optimal Vitamin D status, the US Institute of Medicine of the National Academy of Sciences currently recommends an adequate intake of 200 IU for all individuals under age 50; 400 IU for those 50-70 years of age; and 600 IU for those over 70 years of age. A safe upper limit for Vitamin D is currently set at 2,000 IU for children, adults, and pregnant and lactating women. Many scientists and health professionals do not believe that those levels are adequate to provide some of the potential health benefits that Vitamin D may offer. Studies indicate that 1000 IU can safely be taken without any toxicity. In fact toxicity would probably not occur unless 10 x that amount was taken for a long period of time. Vitamin D is a fat soluble vitamin/hormone so it is stored in the body, unlike most water soluble vitamins that are easily discarded by the body if taken in excess.

### **Vitamin D Sources**

There are three ways to get Vitamin D:

You can obtain it through the foods/beverages that you choose. Vitamin D is not widespread throughout typical food choices (see table). A few selected foods are naturally high in the vitamin and fortified foods are the best sources.

Your body has the ability to convert cholesterol to Vitamin D via exposure to UV rays. You may be able to get it from 15 minutes of exposure on the arms and face 3-4 times a week without sunscreen. It is estimated that 10 to 15 minutes in the sun on a sunny day without sunscreen can produce 2,000 to 5,000 IU of Vitamin D if 40% of the body is exposed. The amount of Vitamin D that can be activated from sun exposure is much greater than that from food intake and the short exposure should not increase the risk of skin cancer. Obtaining adequate Vitamin D from the sun may be difficult in colder climates, for people with darker skin tones (they may require 5 to 10 times the sun exposure), for older people (their

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skin is not effective at converting Vitamin D to its active form), or for those who are mostly indoors. Sun lamps are effective at converting Vitamin D to its active form; sunlight through glass is not.

Supplements are the third source of Vitamin D. Most multi-vitamin/mineral supplements contain 400 IU. The source of Vitamin D comes from one of two sources, Vitamin D<sub>2</sub> (ergocalciferol) or Vitamin D<sub>3</sub> (cholecalciferol) The two forms have been regarded as equally effective at curing rickets, but new evidence suggests that Vitamin D<sub>3</sub> could be three times more effective at raising 25(OH)D levels in the blood. Again, the evidence is not definitive, but many many supplements have been converted to Vitamin D<sub>3</sub>. Look for D<sub>3</sub> or cholecalciferol in the ingredient listing when you choose your multi vitamin/mineral supplement, calcium/Vitamin D supplement or Vitamin D supplement.

Food	IU per serving*
Cod liver oil, 1 tablespoon	1,360
Salmon, cooked, 3.5 ounces	360
Mackerel, cooked, 3.5 ounces	345
Tuna fish, canned in oil, 3 ounces	200
Sardines, canned in oil, drained, 1.75 ounces	250
Milk, nonfat, reduced fat, and whole, Vitamin D-fortified, 1 cup	98
Margarine, fortified, 1 tablespoon	60
Ready-to-eat cereal, fortified with 10% of the DV for Vitamin D, 0.75-1 cup (more heavily fortified cereals might provide more of the DV)	40
Egg, 1 whole (Vitamin D is found in yolk)	20
Liver, beef, cooked, 3.5 ounces	15
Swiss cheese, 1 ounce	12

Bariatric surgery patients are not different from the general population in regard to the potential for a Vitamin D deficiency. In fact, they may be at greater risk both before and after surgery. Obesity may be a risk factor for Vitamin D deficiency because Vitamin D may be *caught* in fat cells, not able to circulate and function. After surgery, limited intake of food and malabsorption (gastric bypass procedure) may decrease Vitamin D levels. Vitamin D status could improve in individuals having bariatric surgery if they begin taking a multi vitamin and mineral supplement with 400 IU of Vitamin D, drink 3

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servings of milk (100 IU Vitamin D each) or take a calcium/Vitamin D supplement (400 IU). They also may find that they are more able to be active outdoors, increasing their sun exposure.

We haven't heard the end of Vitamin D. Keep an eye out for more studies and recommendations. In the meantime, find out your Vitamin D status and take measures to reach an optimal level.

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