

SHINE ON: Vitamin D and Calcium Highlights

Nutritionists have long focused on the need for calcium to prevent osteoporosis. As early as 1919, a need for Vitamin D was identified. Sir Edward Mellanby, discovered that rickets (lack of bone mineralization that results in bowed limbs in children) and osteomalacia (weakened or soft bones in adults) was directly correlated with poor Vitamin D status. Alarm in recent years has risen over the possible connection between the increased incidences of several additional diseases and the identification of inadequate serum Vitamin D levels in a surprising majority of the population. Vitamin D is now being hailed as a silent defender against diseases. There are numerous links being made and studied between Vitamin D and health-related concerns. They include:

- Fractures
- Autoimmune diseases, including muscular dystrophy, rheumatoid arthritis and lupus
- Cancers
- Cardiovascular diseases, including strokes
- Depression
- Inflammatory Diseases
- Diabetes and neuro-muscular problems
- Hypertension, high blood pressure
- Duration of respiratory infections

Where Do We Obtain Our Vitamin D?

There are relatively few natural foods that are excellent Vitamin D sources. You may have read that mackerel and sardines are two excellent Vitamin D sources. How many of us today, unless we live in a fishing village, consume either of these foods... ever? Cod liver oil packs 1360 international units, or I.U., of Vitamin D per tablespoon, but again, this is not a common part of the diet. Salmon and tuna, which are eaten more frequently in the U.S., also provide natural sources of Vitamin D. Beyond that, we depend upon Vitamin D fortification in milk, margarine, cheese, yogurt, ready-to-eat cereals, and some breads to meet our minimum needs of 200-600 I.U. of Vitamin D daily.

Reported Vitamin D Content

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| • Salmon, cooked, 3 1/2 oz: | 360 I.U. |
| • Mackerel, cooked, 3 1/2 oz: | 345 I.U. |
| • Sardines, canned in oil, drained, 3 1/2 oz: | 270 I.U. |
| • Tuna, oil packed, drained, 3 oz: | 200 I.U. |
| • Milk, nonfat, reduced fat, and whole, vitamin D fortified, 1 c: | 98 I.U. |
| • Soy milk fortified with Vitamin D, 1 c.: | 100 I.U. |
| • Orange Juice fortified with Vitamin D, 1 c.: | 100 I.U. |
| • Margarine, fortified, 1 Tbsp: | 60 I.U. |
| • Dry cereal, Vitamin D fortified w/10% of the RDI, 3/4 c
(Other cereals may be fortified with more or less Vitamin D) | 40-50 I.U. |
| • Egg, 1 whole (vitamin D is present in the yolk): | 25 I.U. |

In addition to food sources, Vitamin D can be produced by the skin from sunlight. UVB radiation from the sun helps pre-vitamin D-3 to form under the skin. This pre-vitamin can then be converted to active Vitamin D, the form your body needs, through a process involving your liver and kidneys. Interesting to note, is that overexposure to sunlight does not apparently result in Vitamin D overdose; however, the use of sunscreens with UVB blocking factor of 8 or more effectively blocks most Vitamin D production via the sun. Wearing long-sleeved clothing also blocks Vitamin D production. While overexposure of the skin to sun for prolonged time periods creates health concerns, it may be wise to seek sun exposure for 10-15 minutes at least three times weekly without sunscreen in order to allow for the body's production of Vitamin D.

Functions of Vitamin D

Long known:

- Maintains normal blood levels of calcium and phosphorus; allows for the efficient use of calcium by the body.
- Aids in the absorption of calcium, regulating bone mineralization & thereby promoting the health of bones and teeth.

Being Studied:

- May reduce the risk of breast, colon and prostate cancers.
- Adequate levels of Vitamin D may lessen the risk of type II diabetes.
- Adequate levels may reduce blood pressure and stroke risk.

As you can see, there is understandably a flurry of research taking place concerning the role of Vitamin D in our health. Research There may be a need for updating the recommended daily intake of this vitamin. The 2005 Dietary Guidelines for Americans now state a recommended intake of 1000 I.U. for individuals most at risk of Vitamin D deficiency.

Populations at Risk of Vitamin D Deficiency

- **Exclusively Breast Fed Babies.** Breast milk is known to be low in this vitamin.
- **People with Darker Skin Pigmentation.** Darker skin pigmentation absorbs more UV light, reducing Vitamin D production.
- **People with Limited Sun Exposure.** Casual sun exposure to extremities without UVB sunblock for approximately 10-15 minutes three days weekly is advised to obtain adequate Vitamin D from the environment
- **Senior Adults.** Age is related to less efficient synthesis of Vitamin D. A 70 year old man may produce only ¼ of the Vitamin D made by a 20 year old male.
- **Individuals with Fat Malabsorption** such as occurs with cystic fibrosis, celiac sprue (gluten intolerance accompanies this), pancreatic insufficiency, liver disease and Crohn's disease.
- **Individuals with Higher BMIs (body mass index).** Leaner individuals have higher circulating concentrations of Vitamin D and also are found to take supplements more than heavier individuals.

Current Recommendations for Vitamin D and Supplementation

Since the intake amount for this nutrient is currently being debated, it is tricky to advise an optimal level of supplementation that would best protect the average adult. The current mood among health professionals seems to be that we are recommending too little Vitamin D and most scientists currently agree that obtaining a total of 2000 I.U. daily between one's diet and supplementation is safe. In fact, recommendations are made for near-universal supplementation with calcium and Vitamin D for certain at-risk populations. One must also keep in mind that toxicity is possible with Vitamin D supplementation because it is fat soluble. This means that the body stores any excess and is not able to excrete unneeded

stores in the urine. Speaking with a registered dietitian and/or your physician can help to determine whether you may benefit from taking a Vitamin D supplement.

When considering a supplement, Cholecalciferol, or Vitamin D-3, is regarded as the best form of Vitamin D to take.

Calcium and Osteoporosis

The high rate of osteoporosis among Americans has brought attention to the need for both adequate calcium and Vitamin D in the diet. Most people have heard of osteoporosis, but may not know what causes weakened bones. In general, bones lose mass, and consequently strength, from inadequate calcium and Vitamin D intake, as well as some diseases and conditions. The body stops accumulating bone mass after the teen years and can progressively lose mass after this time if certain factors are present. When loss of mass occurs, bones take on a structure similar to that of swiss cheese- full of holes. Once bone mass is lost, they are not as structurally sound and are far more likely to suffer fracture. Women and men alike are susceptible to osteoporosis, but women are afflicted with this disease almost four times as frequently!

The National Osteoporosis Foundation cites several risk factors for osteoporosis. Knowing what risk factors you may have can help to shed light on achievable lifestyle changes you can make to lessen your risk of getting osteoporosis.

1. **Age.** As a college student this risk factor is not pertinent to most. Osteoporosis is more prevalent in the aging population, but prevention, by establishing good habits while you are young, can help to avoid problems later in life.
2. **Sex.** Osteoporosis occurs with much greater frequency in females. Approximately 80% of all cases reported are seen in women.
3. **Family History.** There appears to be a potential genetic link to osteoporosis.
4. **Low Body Weight/Being Small and Thin.** This may put you at a higher risk for osteoporosis.
5. **Race and Ethnicity.** Caucasian, Asian and Latino races and ethnicities appear to have a higher rate of osteoporosis than others.
6. **History of Broken Bones.** This applies to those who have experienced a broken bone during adulthood. It may be helpful to speak with your physician to see if you are already experiencing decreased bone mass.
7. **Menopause.** Changes in hormone levels may contribute to bone loss. See risk factor number eight.
8. **Low Sex Hormones.**
 - ✓ **Estrogen** (women) may have a protective effect on bone mass and early menopause or hysterectomies affect your body's ability to produce this hormone. Low estrogen production may also be present if you do not have regular periods. Missed periods can be caused by many factors (pregnancy, inadequate caloric intake, exercising too frequently), so it is important to discuss missed periods with your physician.
 - ✓ **Testosterone** (men) levels can also affect bone loss. Alcohol consumption and inadequate caloric intake may cause testosterone levels to decrease.
9. **Diet.** The list of dietary factors that can increase risk of osteoporosis seems to be never ending, however, the main things to keep in mind to avoid increased risk are:
 - ✓ **Get enough calcium and Vitamin D each day!**
 - ✓ 1000 mg calcium daily for men and women ages 19-50
 - ✓ 200-600 I.U. Vitamin D daily for men and women ages 19-50
 - ✓ **Eat a balanced diet.**
 - ✓ **Limit caffeine, soft drinks and sodium.**

10. **Other Factors.** Inactive lifestyle, smoking and alcohol abuse can all increase your risk for osteoporosis. Try to increase your level of physical activity, abstain from using tobacco products and limit alcohol consumption.

- ✓ **30 minutes of weight bearing activity on most days during the week** can help to build bone mass. Examples from the National Osteoporosis Foundation include:
 - ✓ Dancing
 - ✓ High-impact aerobics
 - ✓ Hiking
 - ✓ Jogging/running
 - ✓ Climbing stairs
 - ✓ Tennis
 - ✓ Elliptical training machines
 - ✓ Stair-step machines
 - ✓ Walking
- ✓ Strength training and balance exercises can also help to improve muscle and bone strength. Try to add these activities into your weekly routine as well.

Sources of Calcium, Both Dairy and Non-Dairy

• Yogurt, fruit, 8 oz	345 mg
• Sardines, 3 oz	325 mg
• Cheese, mozzarella, 1.5 oz	311 mg
• Cheese, cheddar, 1.5 oz	307 mg
• Milk, fat-free (skim), 8 oz	306 mg
• Milk, 1%, 8 oz	290 mg
• Soy milk, 8oz	290 mg
• Tofu, firm, ½ cup	253 mg
• Collard greens, cooked, ½ cup	178 mg
• Spinach, cooked, ½ cup	146 mg
• Turnip greens, cooked, ½ cup	124 mg
• Kale, cooked, ½ cup	90 mg
• Okra, cooked, ½ cup	88 mg
• Soybeans, mature, cooked, ½ cup	88 mg
• Ready-to-eat cereal, fortified, 1 cup / 1 oz	Varies, check nutrition fact label

*adapted from U.S. Department of Health and Human Services, & USDA (2005). *Dietary Guidelines for Americans, 2005 (6th ed)*. Retrieved from <http://www.health.gov/dietaryguidelines/dga2005/document/pdf/DGA2005.pdf>

Additional Reading & Resources

- *Linus Pauling Institute: Oregon State University*
 - <http://lpi.oregonstate.edu/infocenter/vitamins/vitaminD/>
- *National Osteoporosis Foundation*
 - <http://www.nof.org>
- *Office of Dietary Supplements*
 - <http://dietary-supplements.info.nih.gov/>
- *The Post and Courier*
 - http://www.charleston.net/news/2008/aug/18/shedding_sunlight_on_vitamin_d_needs51043/