Vitamin D: Sunshine for My Spine

Vitamin D (calciferol), also known as the "sunshine vitamin", is necessary for maintaining proper bones by regulating calcium and phosphorus levels within the body. When calcium levels are low, vitamin D acts as a hormone, signaling for more calcium to be absorbed and less to be excreted. In fact by normal definition, vitamin D is really a hormone and not a "true" vitamin because it can be acquired naturally with sun exposure. When sun exposure is limited however, vitamin D is considered a vitamin because it must be met through food sources.

Sun Exposure: Sunlight is responsible for providing most people with some of their vitamin D requirements. UV light converts compounds found in the skin to a form of vitamin D that is absorbed into the body and sent to the liver and kidneys to become activated or stored in fat tissue. When sunlight exposure is limited and in certain disease conditions, vitamin D must be taken in through the diet.

Current Recommended Intakes

Currently there is not enough scientific evidence to establish an RDA for vitamin D. An Adequate Intake (AI), which is the amount that appears to meet or exceed nutritional adequacy in a given life stage or gender group, has been developed. The AI's are amounts needed from food sources and do not include what the sun provides. The tolerable Upper Limit (UL) has been set at 1000 IU/day. UL is the amount that is assumed to pose little to no risk if taken daily. Sometimes labels will have vitamin D in micrograms (ug) instead of IU's. To convert, 1 ug = 40 IU's. Example: 5 ug = 200 IU of vitamin D.

Adults	AI (IU/day)	UL (IU/day)
18-50	200	2000
50-70	400	2000
> 70	600	2000

Source: National Institute of Medicine, National Research Council

Dietary Sources: With the exception of fatty fish, very few food sources contain vitamin D. In the US, most people receive vitamin D through fortified food products such as milk and breakfast cereals.

Atlantic Herring (3.5 oz) = 1,600 IU
Cod Liver Oil (1 teaspoon) = 450 IU
Salmon, cooked (4 oz) = 411 IU
Mackerel, cooked (4 oz) = 394 IU
Light canned tuna in oil (3 oz) = 200 IU
Silk™ soymilk (1 cup) = 120 IU
Fortified Minute Maid™ OJ (1 cup) = 100 IU
Fortified milk (1 cup) = 100
Total™ cereal (3/4 cup) = 40 IU
Large egg (1 whole) = 20 IU
Swiss cheese (1 oz) = 13 IU
Butter (1 tablespoon) = 8 IU

Source: USDA Nutrient Database for Standard Reference and Manufacturers

Do Older Adults Need More Than 600 IU/day?

Evidence suggests that the current recommended intakes for individuals 65 and older are too low. Recent well controlled, randomized trials have shown that individuals with low vitamin D status who consumed 800 IU of vitamin D/day, with adequate calcium intakes, were 30%-50% less likely to suffer from fractures associated with osteoporosis. The benefits of reduced fracture risk have not been demonstrated with intakes below 800 IU. This recommendation of 800 IU/day has been supported by the Osteoporosis Society of Canada, and is being considered for revision by the Institute of Medicine in the US. It is not known if vitamin D intakes above 800 IU/day in older adults will provide additional benefits.

Do I Need A Supplement?

It is recommended that individuals 50 years or older should supplement with vitamin D. If you are going to supplement, it is best to consume a calcium supplement that contains vitamin D, which will enhance absorption of calcium. There are two forms of vitamin D used in supplements: Vitamin D_3 (cholecalciferol) found in animal sources such as cod liver oil and vitamin D_2 (ergocalciferol) from plant sources. D_3 has been shown to be more effective at raising vitamin D levels in the blood than D_2. D_2 is also more susceptible to degradation and may not be as readily absorbed. Although most supplements contain D_2, this may only be a concern for vegetarians who avoid the sun.

Factors Affecting Vitamin D Status

- Clothing, window glass, clouds, shade, smog decrease UV rays
- Sunscreen with SPF of 8 or more prevents vitamin D synthesis.
- Higher latitudes and time of day and year. In Boston, researchers found that UV rays are not strong enough to synthesize vitamin D from November to February. Vitamin D synthesis is highest during the summer months, with best exposure between 7 am-5 pm EST. Best exposure during spring and fall months occurs between 9 am-3 pm EST.
- Dark skin with high melanin content needs to be exposed to sun longer.
- Age (over 65) is associated with a fourfold decrease in vitamin D conversion compared to younger adults. Older people are also more apt to stay inside.
- Malabsorptive and kidney problems affect vitamin D status negatively.

Vitamin D Deficiency

- Children develop rickets
- Older people lose bone mineral content leading to osteomalacia and osteoporosis

Vitamin D Toxicity

- Not caused by sunlight or food intake. Mostly from supplements.
- Calcium deposits in soft tissue can occur with chronic intakes above the UL

How To Get Enough Vitamin D

- 10-15 minutes of sun exposure at least 2x/week on face, arms, back, and hands without sunscreen is adequate during summer months in Boston
- Older individuals and those who get little sun exposure need to include good food sources and a supplement in their diet

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