



# Vitamin D

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Recently Vitamin D made headlines as low level supplementation of vitamin D averaging approximately 500 units per day leads to a 7% overall decrease in total mortality. This is the first case where vitamin supplementation, even at a low dosage, has proven to decrease the risk of death. So what is vitamin D?

Vitamin D is not actually a vitamin at all it is a steroid hormone produced when the skin is exposed to ultraviolet B radiation. After the formation of previtamin D in the skin, further metabolism occurs in the liver with the formation of 25-hydroxyvitamin D (this is what we measure in the blood stream as the most accurate marker of circulating vitamin D activity), and then conversion to 1,25-dihydroxyvitamin D in the kidneys (this is the cellularly active form of vitamin D). Under the regulation of vitamin D and parathyroid hormone, our body tightly regulates calcium and phosphorus metabolism at the level of the small intestine and kidney. Interestingly, almost all tissues can directly create 1,25-dihydroxyvitamin D, something that was thought only to occur in the kidneys, and it turns out that 1,25-dihydroxyvitamin D controls more than 200 genes, many directly responsible for immune system function and regulation of cell growth. These fascinating discoveries of the role of the steroid hormone vitamin D has lead to its widespread use in so many medical conditions.

Most of the confusion for many physicians and the majority of people is the lack of a clear understanding of what is deficiency, insufficiency, and optimal vitamin D levels. Fortunately, multiple studies now indicate optimal vitamin D levels are actually at ranges vastly higher than what current laboratories list as the reference range. The ranges that I will give you are based upon sound biochemical evidence. The units that I am discussing will be ng/ml. Some labs use nmol/l, to convert between these multiply ng/ml by 2.5 to get nmol/l, or multiply nmol/l by 0.4 to get ng/ml. Deficiency of vitamin D is a level less than 30, insufficiency is a level between 31-50, and optimal is 50-100 ng/ml. Importantly, toxicity does not occur until levels of 150 occur. Given this more accurate definition of D sufficiency, and the understanding that 50% of post menopausal women have vitamin D levels below 30, we know that nearly this entire population is either insufficient or deficient in vitamin D! Dramatically, in pregnant and lactating women who are taking pre-natal vitamins and drinking over two glasses of milk per day, 73% of these women and 80% of their infants were vitamin D deficient at levels less than 20! The severity of vitamin D deficiency in our country is an unrecognized and unfortunately fatal epidemic.

With all respect to dermatologists and skin care professionals who are scaring our population into wearing sunscreen in every moment of every day, there rarely has been

a worse piece of advice ever given. When you read the following documentation of the diseases caused by lack of sun exposure, you will learn to respect the sun, avoid burning, but do all that you can to get healthy sun exposure every day. However, even this is not enough as the majority of Americans live at a latitude where 3-4 months of the year they can't make any vitamin D due to the change in the angle of sun ray exposure, and most of us have too little sun exposure anyways.

The following are lists of conditions proven to have an association with vitamin D deficiency and where vitamin D supplementation has proven to treat or prevent that condition:

- **Osteoporosis:** I will do an updated article covering this subject alone, but let's suffice it to say that 47% of women and 22% of men 50 years of age or older will sustain an osteoporotic fracture in their lifetime. Multiple studies using even the inadequate doses of vitamin D of 400-800 units per day show a 25-30% reduction in risk of hip fracture.
- **Breast Feeding and Lactation:** In one study 6400 units per day of vitamin D were required to improve vitamin D levels in the mother and nursing infant. Nearly all women taking the recommended 400 units of vitamin D had insufficient levels in themselves and their infants. Furthermore, vitamin D deficiency in pregnant women strongly correlates with insulin resistance and diabetes.
- **Metabolic Syndrome/Hypertension/Obesity/Dyslipidemia:** As people continue to avoid the sun it is unclear whether the sedentary lifestyle leads to the vitamin D deficiency or lack of vitamin D is causative. However, vitamin D therapy has been shown to improve insulin resistance, lower blood pressure, improve cholesterol profiles and most importantly, increase lifespan. It is tough to argue with that!
- **Quality of Life:** As vitamin D is so important in decreasing pain levels and improving muscle strength, multiple studies confirm that low vitamin D is a risk factor for fibromyalgia and general weakness. Supplementation with vitamin D, especially in the elderly, has been proven to improve all measures of quality of life, which includes improved mood, increased strength, improved mobility with at least a 22% reduction in falls.
- **Cancer Prevention:** Here comes some of the most startling evidence for vitamin D supplementation that exists. Multiple studies show a step-wise and incremental improvement in mortality from the most common cancers known, as vitamin D levels improve. Whether a 50% reduction in colon cancer, or most remarkably a 50-80% reduction in breast cancer occurs when vitamin D levels are greater than 50.
- **Auto-Immune Disease:** High dose vitamin D in doses of 4,000 units per day up to 40,000 units per day showed extraordinary safety and a dramatic reduction in the brain lesions present in patients with Multiple Sclerosis (MS). Furthermore, vitamin D levels have been shown to be protective in a variety of auto-immune diseases and associated with a decrease in inflammation in patients with inflammatory arthritis, such as Rheumatoid arthritis.
- **Infectious Disease:** Vitamin D has been shown to help prevent infections in those with a vitamin D deficiency, and improve many markers of immune system function.

- Allergy/Asthma: Improving vitamin D levels has been shown to improve lung function in asthmatics and decrease symptomatic allergy rhinitis (hay fever).

Among the most common of all vitamin deficiencies, vitamin D deficiency and insufficiency has been proven to be a leading factor in almost all the chronic degenerative diseases. Treatment guidelines up to this date have not come close to treating the needs of the American population. The preferred form for vitamin D-replacement therapy is vitamin D-3 (cholecalciferol) which is available at good health food stores and has far better bioavailability than prescription vitamin D-2 (ergocalciferol).

I recommend the following dosages of vitamin D-3:

- General Population 2000 IU capsule once daily
- Elderly/Osteoporosis/Pregnant/Breast Feeding 4000 IU daily
- Inflammatory/Autoimmune Disorders 4000 to 10,000 IU per day as directed by your physician and guided by blood serum levels.

Do not be cavalier with vitamin D, but it is vastly safer than many health books would indicate. Doses of 10,000 units of D-3 per day for up to 5 months have been used safely, without any evidence of toxicity. If you are ever concerned that you are taking too much or more importantly, too little, ask your physician to measure a 25 hydroxy D level. Do not use the lab reference range, but search for a blood level of 50-100 ng/ml. You don't have to "believe" in vitamin D, as this is the scientifically documented range necessary for optimal health. In my vast clinical experience using vitamin D, it usually takes closer to 4,000 units per day to reach this range.

Your Journey to Health and Healing,  
Gary E. Foresman, MD

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