



## Vitamin D: The Most Common Vitamin Deficiency in the United States

Vitamin D deficiency has been linked to increased risk for many common and serious diseases, including some cancers, diabetes, liver disease, cardiovascular disease, and osteoporosis. Studies suggest that exposure to sunlight, which enhances the production of vitamin D in the skin, prevents many chronic diseases.

Approximately 70% of American children do not get enough vitamin D. If childhood deficiencies are not corrected, they could lead to early development of diabetes, high blood pressure, cardiovascular disease, or any of several forms of cancer. Deficiency is also prevalent in infants who are solely breastfed and who do not receive vitamin D supplementation. Adults of all ages who have darker skin (increased skin melanin) or who always wear sun protection, or limit their outdoor activities, such as homebound elderly people, are also prone to vitamin D deficits.

The NHANES (National Health and Nutrition Examination Survey) provided data on the vitamin D nutritional status of the U.S. population. Approximately 9% of the pediatric population, representing 7.6 million U.S. children and adolescents, were vitamin D deficient, and 61%, representing 50.8 million U.S. children and adolescents, did not have optimal levels of vitamin D. Generally, younger people had higher vitamin D levels than older people, males had higher levels than females.

Vitamin D is essential for the formation, growth, and repair of bones. Vitamin D is necessary for normal calcium absorption and immune function. It also improves muscle strength and helps reduce inflammation. Most people receive substantial vitamin D through sunlight exposure. Vitamin D can also come from supplementation and diet; however, there are very few foods that naturally contain vitamin D. Some foods that contain vitamin D are fatty fish, fish liver oil, and eggs. Our Vitamin D Test can help determine if sun exposure is adequate, if dietary vitamin D is sufficient, and can assess the likelihood of malabsorption or liver disease.

### Recommended for the Following Disorders

- *Autism Spectrum Disorders*
- *Cardiovascular disease (including stroke and hypertension)*
- *Cancer, especially prostate*
- *Osteoporosis/osteomalacia*
- *Low blood calcium*
- *Periodontal disease*
- *Diabetes type I & II*
- *Inflammatory Bowel Diseases*
- *Rheumatoid Arthritis*
- *Other Autoimmune Diseases (Including Multiple Sclerosis)*
- *Chronic bone/muscle/joint pain*
- *Chronic fatigue*
- *Depression and mood disorders*
- *Schizophrenia*
- *Cognitive impairment in seniors*
- *Birth defects*

## Test Description

The Vitamin D Test is available in a dried blood spot (DBS) or as a serum assay that quantitates 25-hydroxyvitamin D2 and 25-hydroxyvitamin D3 metabolites. The metabolite 25-hydroxyvitamin D is the major circulating form of vitamin D in the body and the best indicator of a patient's true vitamin status, due to its long half-life of 2-3 weeks. The major biologic function of vitamin D is to maintain the normal blood levels of calcium and phosphorus involved in bone mineralization. Vitamin D also influences expression of more than 2,000 genes, including those responsible for regulation of cellular proliferation, cell differentiation, apoptosis, and angiogenesis. The immune-modulating effects of vitamin D are profound, as evidenced by the many conditions which are associated with vitamin D deficiency. The range for adequate vitamin D is 40-80 ng/ml.

### Vitamin D Testing is Recommended for:

- Patients diagnosed with any of the vitamin D related diseases (cancer, diabetes, hypertension, liver disease, heart disease, multiple sclerosis, systemic lupus erythematosus, depression, Alzheimer's, Parkinson's, epilepsy, and other diseases)
- Patients with osteoporosis or rickets
- Persistent and nonspecific musculoskeletal pain
- Signs of depression or lack of energy
- Patients with gastrointestinal disease and/or who have had a cholecystectomy
- Elderly individuals
- Overweight individuals with a BMI >25
- Infants that are exclusively breastfed or children lacking a well-balanced diet
- Individuals taking vitamin D supplementation greater than 50 mcg (2,000 IUs) per day
- Individuals that reside above 42 degrees north latitude (a line approximately between the northern border of California and Boston, Massachusetts)
- Individuals with medium to dark complexions or who do not regularly receive 20 minutes of direct sunlight each day
- Total serum/plasma vitamin 25(OH)D is quantitatively analyzed by the most accurate, state-of-the-art technology, LC/MS/MS. This technology is very sensitive and specific, and accurately determines the concentration of individual forms of D2 and D3. Consequently, the values reported include total, as well as fractionated 25(OH) D2, 25(OH) D3. The accuracy of our results is monitored by two independent, third party organizations which are the College of American Pathology (CAP) and DEQAS (Europe).

## Sample Report

### Vitamin D 25 OH

Metabolic Marker	Reference Range - ng/mL	Patient Value - ng/mL
25-Hydroxy D2		< 4.0
25-Hydroxy D3		29.0
25-Hydroxy D Total (D2+D3)	25 - 80	29.0 ***



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