

## Vitamin D

Vitamin D is a unique fat-soluble vitamin, which our body needs to help regulate calcium and phosphorus. It is unique in that our bodies can make Vitamin D through exposure of the skin to the sun. Once our bodies make Vitamin D or we ingest it in our diets, it is stored in the liver and then must be activated by the kidneys in order to work. Vitamin D is needed in our bodies to maintain bone health, and research suggests that it may help regulate the immune system, play a role in cell growth, cell differentiation, and also communication between cells.

### Sources of Vitamin D:

Food	Serving Size	IUs per serving
Salmon, canned	3.5 oz	300-600
Tuna, canned in oil	3.5 oz	230
Sardines, canned in oil, drained	1.75 oz	300
Milk, Vitamin D fortified	1 cup	100
Margarine, Vitamin D fortified	3.5 oz	430
Cereal, Vitamin D fortified	1 cup	100
Egg, Vitamin D in yolk	1 whole egg	20
Liver (beef, chicken, pork)	3.5 oz	15
Cod Liver Oil	1 tsp	400-1000
Superior Source® Extra Strength D <sub>3</sub> *	1 sublingual tablet	10,000
<b>Sunlight**</b>	<b>5-10 minutes of exposure</b>	<b>3000</b>

\*The number of tablets needed varies greatly between individuals. Patients should have their Vitamin D serum levels checked every six months until a steady state has been reached with their individualized therapy.

\*\*Exposure of arms and legs without sunscreen between the hours of 10am and 3pm during the months of March through October at least twice weekly is recommended. During November through February at this latitude, we must get Vitamin D from our diet or supplements

### Vitamin D recommended intake and supplementation:

- **40% to 75% of the world is Vitamin D deficient**
- Recommended Daily Allowances (RDA) for Vitamin D:
  - Doses of 200 IU/day for birth to 50 years old up to 600 IU/day for the elderly were found to cure rickets, a disease caused by Vitamin D deficiency
- Recent findings suggest that daily intake of about **2000 IU/day** is needed to prevent diseases linked to Vitamin D deficiency
- Grassroots Health at the University of California, San Diego found the oral doses of 10,000 IU daily did not show any toxicity and the average oral dose to test at 60 ng/ml was around 6000 IU daily
- Some conditions are more sensitive to Vitamin D levels and the doctor or pharmacist should be consulted if any of the following exist: liver or kidney disease, kidney stones, hypercalcemia, hyperphosphatemia, heart disease, arteriosclerosis, tuberculosis, sarcoidosis, and other granulomatous diseases

### Serum 25-Hydroxyvitamin D [25(OH)D] concentrations:

- Recent findings suggest that levels between **40-60 ng/ml** are beneficial in preventing diseases linked to Vitamin D deficiency
- 1,000 IU increases serum 25(OH)D levels by approximately 2-10 ng/ml depending on serum level. 1,000 IU should raise serum levels the most when the initial level of serum 25(OH) D is low.

The most recent research by experts has defined the following parameters for Vitamin D status:

ng/ml	nmol/L	Vitamin D status
<20	<50	Vitamin D deficiency
21-29	52-72	Vitamin D insufficiency
≥30	≥75	Vitamin D sufficient
60	150	New Healthy Level
>150	>374	Vitamin D intoxication

- Causes of Vitamin D deficiency include sunscreen use, darker skin pigment, aging, liver or kidney disease, excess animal protein in the diet, low UVB exposure due to season, latitude, or time of day, and certain medications including anticonvulsants, glucocorticoids, HIV/AIDS medications, transplant medications, and Alli® or Xenical®.
- Certain diseases can also cause malabsorption of Vitamin D such as cystic fibrosis, celiac disease, Crohn's disease, and Whipple's disease.

- Poor absorption and metabolism of fat soluble nutrients can be caused by stress, dieting, illness, environmental toxins, digestive disorders, low or high fat diet, high sugar intake, drug and alcohol consumption, allergies, low aerobic exercise, aging, processed and fried foods
- Blood spot test kits can be obtained from Grassroots Health for testing Vitamin D levels for \$65.00
  - **Information on blood tests and other resources at:** <http://www.grassrootshealth.net/d-action>

**Diseases linked to Vitamin D deficiency:**

Alzheimer's disease	Diabetes Mellitus (Type 1&2)	Insulin production & release
Autoimmune diseases (RA, MS, Crohn's disease, thyroiditis, psoriasis)	Bone disorders (osteoporosis, osteomalacia, rickets, tooth decay and loss, bone pain)	CNS disorders (seasonal affective disorder, depression, stress)
Behavioral & Learning disorders	Glucose, gluten, and lectin intolerance	<b>***Cancers (breast, colon, prostate, skin)***</b>
Fibromyalgia	Heavy metal toxicity	Pain
Bowel disorders	Hyperparathyroidism	Parkinson's disease
Obesity	Hypertension	Peripheral neuropathy
Chronic fatigue syndrome	Infertility	Polycystic ovary disease
Myopia	Rickets	PMS

**\*\*\*Vitamin D and Cancer Risk Reduction\*\*\***

- Recent studies published in the American Journal of Preventive Medicine, Lancet, Cancer Research, International Journal of Cancer, and International Journal of Epidemiology support the role of Vitamin D in cancer prevention
- Study by Lappe and colleagues in 2007 found **77% reduction in the incidence of all cancers** with calcium and Vitamin D intake
- Study by Gorham and colleagues in 2007 found **50% reduction in incidence of colorectal cancer** with serum 25(OH)D levels of  $\geq 33$  ng/ml
- Study by Lowe and colleagues in 2006 found **80% reduction in incidence of breast cancer** with 25(OH)D levels of  $\geq 65$  ng/ml

**Vitamin D toxicity:**

Vitamin D **toxicity is extremely rare** and studies have shown that levels of greater than 150ng/mL are only reached if doses of over 50,000 IU/day are consumed for extended periods of time. The cause of Vitamin D toxicity is too much calcium in the body. There are both early and late symptoms.

- **Early Symptoms:** Bone and muscle pain, constipation, diarrhea, drowsiness, dry mouth, increased thirst, headache, increased urination, irregular heartbeat, loss of appetite, metallic taste in mouth, nausea and vomiting, itching, unusual tiredness or weakness
- **Late Symptoms:** Cloudy urine, conjunctivitis, fever, high blood pressure, increased light sensitivity, irregular heartbeat, itching, lethargy, pancreatitis, psychosis, weight loss, calcium deposits in tissues other than bones, bone pain

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