

# Vitamin D 1000 IU Tablets



## Product Summary:

Vitamin D plays an important role in maintaining normal calcium and phosphorus levels, as well as bone and tooth health. Most of the vitamin D we get is through exposure to sunlight. It is also available in small amounts in fatty fish, "fortified" beverages, and through vitamin supplementation. Easy-to-swallow vitamin D softgel capsules allow for fast-absorption.

## Properties/Uses:

The claim as approved by the *Natural Health Products Directorate* (NHPD): Helps in the normal development and maintenance of bones and teeth, and in the absorption and use of calcium and phosphorus.



MUSCULAR  
& SKELETAL



## Pharmacology:

Vitamin D plays an important role in maintaining normal calcium and phosphorus levels, as well as bone and tooth health. Vitamin D is obtained through exposure to sunlight and is also available in small amounts in fatty fish, “fortified” beverages, and through vitamin supplementation.

Supplementation with vitamin D is used for the treatment and prevention of rickets in children and osteomalacia in adults.<sup>1</sup> Vitamin D may also be useful in people with a history of cancer or with a family history of cancer, working as a risk reducer of cancer through vitamin D-dependent cellular differentiation.

Vitamin D3 (cholecalciferol) is the designation for the form of vitamin D produced in the skin, from cholesterol through the direct action of sunlight on the skin. Vitamin D3 is essentially inactive until biotransformed into 25-hydroxy-vitamin D3 in the liver, becoming five times more active than D3, and then into 1,25-dihydroxy-vitamin D3 in the kidneys, becoming ten times more active than D3.<sup>2</sup>

The combined actions of the vitamin D3 network facilitate three key domains influencing the achievement and maintenance of optimal bone mineral density throughout life. Firstly, they are critical to the absorption of calcium from the intestines, and depletion of vitamin D3 for whatever reasons results in severely limited calcium absorption. Secondly, vitamin D is necessary for recouping excreted calcium found in the kidney glomerular filtrate. Such facilitated recouping helps to avoid continuous exaggerated urinary calcium loss. And thirdly, 1,25-dihydroxy-vitamin D3 is instrumental in incorporating calcium in the bone, thus boosting bone mineral density.<sup>2</sup>

A less well understood action of vitamin D is its facilitation of cellular differentiation. Proper cell differentiation lowers the risk of cancer. It is of interest that the incidence of breast cancer is observed to rise in proportion to the distance from the equator and this has been interpreted to mean reduced endogenous vitamin D3 is involved in breast cancer risk, and probably other cancers as well. Those with a history of cancer in themselves or in their families may be well advised to ensure higher levels of vitamin D3. There is a resurgence of interest in vitamin D for its health enhancements beyond bone health.

Vitamin D may be an even more important factor in maintaining good health than originally thought. Recent studies suggest a link between vitamin D deficiency and upper respiratory tract infections.<sup>3</sup>

Recent research suggests a link between increased vitamin D supplementation and decreased all-cancer risk. A study published in *The American Journal of Clinical Nutrition* found that taking Vitamin D supplements and calcium lowers all-cancer risk in postmenopausal women. The researchers found that the higher the levels of Vitamin D in the blood, the lower the relative risk of developing cancer. Another study suggests that women who consume more calcium and vitamin D may be less likely to develop breast cancer before menopause.<sup>4,5</sup> These studies and others suggesting a link between increased vitamin D supplementation and decreases all cancer risk have led the *Canadian Cancer Society* to increase their recommendations for Canadian adults, under the age of 50, from 200 IU of Vitamin D to 1000 IU daily.



The biotransformation of vitamin D3 into its more active metabolites depends on enzymes that use magnesium as a cofactor. North American magnesium depletion is accumulative and widespread because of food processing, refinement, and soil exposures to commercial fertilizers.<sup>6</sup> Thus, magnesium depletion is very likely a factor in age-related bone-thinning through a decline in the maximally active 1,25-dihydroxy-vitamin D3. Thus, along with the obvious need for calcium and vitamin D3, magnesium supplementation should be recommended in those who are trying to arrest or reverse osteoporosis. Adding magnesium to the equation is calculated to overcome magnesium depletion that can be exacerbated when only calcium is supplemented because calcium competes with magnesium for the same intestinal absorption site. As well, magnesium will enhance formation of greater calcium crystal strength by optimizing calcium crystal size and shape.<sup>6,7</sup>

Dietary and supplemental vitamin D3 is oil soluble and can only be absorbed via oil absorption, making it necessary for D3 supplementation to occur with fat/oil containing meals. Age-related decline in fat/oil absorption is a factor in diminished D3 absorption, and clinically determined D3 deficits may be required to adequately compensate in the treatment of osteoporosis.

Many consumers and physicians fail to emphasize vitamin D3 supplementation in bone health enhancement. This probably stems from assuming that sufficient vitamin D3 can be produced in the skin. In children and younger adults, exposure to sunlight in the spring, summer, and fall is expected to be adequate for producing enough vitamin D3 for those seasons, particularly since it is also acquired in milk and egg yolks. Perhaps special attention to supplementation of vitamin D3 in this younger set during the winter season would be well advised. However, optimal vitamin D3 levels in older Canadian adults may become effectively diminished over time. Firstly, there may be life-related reductions in exposure to the sun in general and there is a natural reduction of solar energy reaching northern latitudes in the winter months. Furthermore, in the winter there is less time spent outside and more of the body is covered. But secondly, despite solar exposure issues, there is a natural age related decline in our ability to produce adequate amounts of vitamin D3 in the skin, and its subsequent activated derivatives in the liver and kidneys. These factors make vitamin D3 supplementation an important consideration.

*How much is recommended?* The Adequate Intake (AI) of vitamin D3 stated above may not supply the optimal amount for adults. The AI values typically only address nutritional needs for avoiding deficiency disorders, not the nutritional needs for optimal bodily performance. Recent studies suggest that the government recommended AIs are too low. One study showed that daily supplementation with 400 IU vitamin D does not affect blood concentrations of 25-hydroxy-vitamin D3. Doses of at least 700 IU daily were needed to affect change.<sup>8</sup>

Many proactive women supplement with calcium and vitamin D3, using 400 to 800 IUs. This practice has not been found to be problematic in Canada, even when commenced in teenage years. In fact, the best defense against osteoporosis in the senior years is thought to be the attainment of maximal bone mineral density in the early life years before 20-25. Both male and female teenagers and young adults should focus on early maximal bone mineral density.





Those with diagnosed thinned bones or full-blown osteoporosis, can safely increase their calcium handling efficiencies with 800 to 1000 IUs per day. Even a subtle protracted deficiency of vitamin D3 leads to increased risk of bone loss over time and osteoporosis fractures.<sup>9</sup> Numerous studies document that up to 80% of all hip fracture patients may exhibit vitamin D deficiency.<sup>10</sup> There is a growing clinical recognition of vitamin D deficiency in the general population, leading to the conclusion that current levels of so-called adequate intake are too low.<sup>8,9,11,12</sup> Separate clinical investigations using 700 and 800 IUs instead of the usual 400 IUs have demonstrated lower hip fracture rates compared to placebo.<sup>12</sup> The omission of vitamin D3 supplementation by those with thinned bones or full-blown osteoporosis is a strategic error in judgement by physician and patient. The margin of safety is substantial for vitamin D, with prolonged daily supplementation with 10000 IUs being free of adverse effects, allowing an easy comfort level with 800 to 1000 IUs per day for adult bodies.<sup>13</sup>

Men also develop osteoporosis, and our Canadian insight can be taken from the American experience. The National Osteoporosis Foundation reports that in the United States each year, men suffer 33% of all the hip fractures that occur, and 33% of these men will not survive more than a year. In addition to hip fracture, men also experience painful and debilitating fractures of the spine, wrist, and other bones due to osteoporosis.<sup>14</sup> Osteoporosis Canada states that 1 in 4 women and 1 in 8 men over the age of 50 have osteoporosis.<sup>15</sup>

Vitamin D supplementation is especially important for the elderly because their vitamin D production abilities have declined. It is also important for people with limited sun exposure, people living in northern latitudes and dark-skinned people. To minimize health risks associated with UVB radiation exposure, while maximizing Vitamin D benefits, supplementation combined with small amounts of sun exposure is the recommended way to assure optimum levels of vitamin D.<sup>16</sup>





## Manufactured product information:

**Manufacturer:**

WN Pharmaceuticals Ltd.

**Size/UPC:**

100's ..... 7 77747 10335 5

260's ..... 7 77747 10336 2

**NPN:**

80003663

**Expiry Date:**

36 months from date of manufacture

**Active Ingredient:**

Each tablet contains:

Vitamin D3 (Cholecalciferol).....25 mcg (1000 IU)

**Non-Medicinal Ingredients (in descending order):**

Microcrystalline cellulose, dibasic calcium phosphate dihydrate, magnesium stearate.

**Appearance:**

White to off-white, round, bisect tablet.

**Packaging:**

(100's) 175 cc white round bottle with safety seal under a 38 mm white induction sealed cap with vented interior seal and a label applied to the bottle. Lot number and expiry date are printed on label applied to exterior of bottle.

(260's) 175 cc white round bottle with safety seal under a 38 mm white induction sealed cap with vented interior seal and a label applied to the bottle. Lot number and expiry date are printed on label applied to exterior of bottle.

**Storage:**

Store in a cool, dry place.





## Dose:

The Adequate Intake (AI) values for vitamin D3 are indicated below.<sup>17</sup>

AGE	INTERNATIONAL UNITS (IUS)
Infants up to 12 months	200 IUs
Children 1 to 8 years	200 IUs
Adolescents 9 to 18 years	200 IUs
Adults 19 to 50 years	200 IUs
Adults 51 to 70 years	400 IUs
Adults 71 years and up	600 IUs
Pregnant & Nursing Women	200 IUs

There has been a significant amount of information published on vitamin D requirements since the AIs were published in 1997. The Institute of Medicine (IOM) is currently conducting a review - funded jointly by the U.S. and Canadian governments - of the Dietary Reference Intakes (DRIs) for vitamin D and calcium. This report is expected in May 2010.<sup>18</sup>

Osteoporosis Canada recommends that Canadian adults 19-50 years receive 400 IUs daily and adults over the age of 50 receive 800 IUs daily.<sup>15</sup> Studies suggest that supplementation of 700-800 IU vitamin D/day should be used to prevent osteoarthritis and fractures. To prevent falls, supplementation of 800-1000 IU/day in combination with calcium is suggested.<sup>1</sup>

In 2007, the Canadian Cancer Society recommended that adults living in Canada should take vitamin supplementation of 1000 IU/day during the fall and winter. Adults likely to have lower vitamin D levels should supplement with 1000 IU vitamin D daily all year round.<sup>4</sup>

The tolerable upper intake limit according to Health Canada is 1000 IU of vitamin D daily. However, the 1997 IOM report states an upper intake limit of 2000 IU/day.<sup>19</sup> Furthermore, evidence from clinical trials shows that a prolonged intake of 10,000 IU/day of vitamin D is safe.<sup>13</sup>





## Directions:

**(Adults):** 1 tablet daily or as recommended by a physician.

## Caution:

The caution as approved by the *Natural Health Products Directorate* (NHPD): KEEP OUT OF THE REACH OF CHILDREN. STORE AT ROOM TEMPERATURE IN A DARK, DRY PLACE. DO NOT USE IF SEAL UNDER CAP IS BROKEN OR MISSING.

## Deficiency Symptoms:

Vitamin D deficiency is characterized by inadequate mineralization or demineralization of the skeleton. In children, this deficiency can result in rickets; in adults, it can result in osteomalacia. In addition, the secondary hyperparathyroidism associated with vitamin D deficiency enhances mobilization of calcium from the skeleton, resulting in porotic bone. It is well recognized that vitamin D deficiency causes abnormalities in calcium and bone metabolism.<sup>19</sup> Vitamin D deficiency is linked to an increased risk of falls.<sup>1</sup>

Vitamin D deficiency causes muscle pain and proximal muscle weakness with symptoms such as sensation of heaviness in the legs, rapid fatigue, and problems with climbing stairs and getting up from a chair. Some preliminary clinical research suggests that people with low vitamin D levels (less than or equal to 20 ng/mL) have more osteoarthritis pain and disability than people with adequate vitamin D stores. Vitamin D deficiency also increases postural sway and affects psychomotor function.<sup>1</sup>

There is some epidemiological evidence that people with vitamin D deficiency might be at an increased risk of colon, breast, and prostate cancer.<sup>19</sup>

Severe proximal myopathy is also associated with vitamin D deficiency.<sup>1</sup>



## Drug Interactions/Contraindications:

Vitamin D3 is oil soluble and can be absorbed only via fat/oil absorption, making mealtime dosing the best time to supplement. The higher the dose of vitamin D3, the greater is the need of fat or oil in the meal. Vitamin D absorption can also be enhanced if nutritional oils like flaxseed oil, Evening Primrose oil, or fish oils are taken with supplemented vitamin D. Those with chronic fat absorption problems should be investigated for vitamin D and bone status.

Since calcium supplementation is contraindicated for cancer patients, vitamin D supplementation should be guided by a physician in cancer patients.

Use of Olestra has been reported to diminish absorption of the fat-soluble vitamins, A, D, E, and K.

Magnesium supplementation is required to convert vitamin D2 to D3. Many food and milk producers use vitamin D2 as their added vitamin D component. Magnesium is also required as an enzyme cofactor for converting D3 to 25-hydroxy-D3 and 1,25-dihydroxy-D3, the most active forms of vitamin D3.

Bile acid sequestrants like Cholestyramine, corticosteroids, Dilantin, barbiturates, Phenobarbital, etidronate, tuberculosis drugs, and mineral oil interfere with vitamin D absorption and /or metabolism.<sup>2,20</sup>

## Toxicity/Adverse Reactions:

Vitamin D toxicity is not widely reported in North America. Prolonged intake of up to 2400 IUs per day has a wide margin of safety.<sup>12</sup> However, in practical terms, most supplementation does not call for more than 1000 IUs per day, unless prescribed by a physician.

Vitamin D toxicity is manifested as exaggerated calcium blood levels that can lead to calcium deposits in joints and internal organs, and cause kidney stones.<sup>2</sup>

To keep to a limit of up to 1000 IUs per day, unless more is prescribed by a physician, consumers should account for all vitamin D sources. Fish liver oils are a major source, and multi-vitamin products usually supply 400 IUs per tablet.





## Allergen Content/Ingredient Sensitivity:

NO	YES
Artificial Color	Corn Products
Artificial Flavor	Starch/Modified Starch
Artificial Sweeteners	
Egg Products	
Fish	
Gluten	
Hydrolyzed Plant Protein	
Lecithin	
Milk Products	
Peanuts	
Preservatives	
Sesame Products	
Shellfish	
Soy Products	
Sulphites	
Tartrazine	
Tree Nuts	
Wheat Products	
Yeast	

### NOT ACCEPTABLE FOR THE FOLLOWING DIETARY RESTRICTIONS:

Free of animal products

Kosher





## References:

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