

# VITAMIN D - THE SUNSHINE VITAMIN

The term "soaking up the sun" has never been more true than when discussing Vitamin D. Termed the "sunshine vitamin", this fat-soluble vitamin is actually produced by our bodies when a certain form of cholesterol found in our skin cells is activated by the sun's UVB light. The two main forms of Vitamin D are D<sub>2</sub> (ergocalciferol-basic building block in plants), found in organisms such as phytoplankton, invertebrates and fungi, and D<sub>3</sub> (cholecalciferol – basic building block in humans), produced by our own bodies – these are collectively known as calciferol.

It is important to remember that the Vitamin D obtained from sun exposure, foods or supplementation is biologically unusable. It needs to undergo two more steps in the body before it is activated and can be used by the body. The first metabolism of Vitamin D<sub>3</sub> takes place in the liver, kidney, lung, skin, prostate, brain, blood vessels and immune system and the second metabolism takes place in the stomach, spleen, colon, thymus, lymph nodes, lung, brain, immune system, liver and kidney.

## **Functions of Vitamin D**

Vitamin D has many important functions but one of the most well known, and possibly most important, is its role in maintaining bone calcium balance and health. Calcium and Vitamin D work together to help maintain healthy bones and teeth. Vitamin D promotes calcium absorption in the gut and maintains adequate serum calcium and phosphate concentrations to enable normal mineralization of bone and to prevent hypocalcemic tetany. It is also needed for bone growth and bone "remodelling". Without sufficient vitamin D, bones can become thin, brittle, or misshapen. Vitamin D sufficiency prevents rickets in children and osteomalacia in adults. Together with calcium, vitamin D also helps protect older adults from osteoporosis.

Vitamin D also participates in and regulates our metabolism allowing it to function correctly and sufficiently. It does this by regulating our muscle function (both skeletal and heart), our immune system, our insulin activity and blood sugar levels, our blood pressure and our calcium and phosphate balance. It is also involved in modulation of cell growth and reduction of inflammation.

Current research is also showing links between Vitamin D and cancer prevention.

## Sources of Vitamin D

Firstly we need to know how much Vitamin D we need daily. Remember that Vitamin D is a fat-soluble vitamin which means that there IS such a thing as too much and MORE is NOT necessarily better!

The amount of Vitamin D needed is dependant on age

<b>Age Group</b>	<b>Aim for this Amount</b>	<b>Stay Below this Amount*</b>
Infants 0-6 months	400IU / 10mcg	1000IU / 25mcg
Infants 7 – 12 months	400IU / 10mcg	1500IU / 38mcg
Children 1 – 3 years	600IU / 15mcg	2500IU / 63mcg
Children 4 – 8 years	600IU / 15mcg	3000IU / 75mcg
Children & Adults 9-70 yrs	600IU / 15mcg	4000IU / 100mcg
Adults over 71 years	800IU / 20mcg	4000IU / 100mcg
Pregnant & Lactating Women	600IU / 15mcg	4000IU / 100mcg
<b>*This includes Vitamin D from BOTH food and supplements</b>		

There are very few foods that naturally contain vitamin D and it may be necessary to take it as a supplement if you are not receiving adequate amounts from food sources and sunlight exposure.

### **Sunshine Therapy**

Ten to 30 minutes of sunshine 3 times weekly between 10am & 3pm is enough to produce the body's requirement of Vitamin D. The sun needs to shine on the skin of your face, arms, back, or legs (without sunscreen).

(Read the section below titled Vitamin D deficiency to make sure your "sunshine therapy" is being done correctly)

### **Food Sources**

The flesh of fatty fish (such as salmon, tuna, sardines and mackerel) and fish liver oils (cod liver oil) are among the best sources – wild caught salmon is significantly higher in Vitamin D content than non-organically farmed salmon. Small amounts of vitamin D are found in beef liver, cheese, and egg yolks. Vitamin D in these foods is primarily in the form of vitamin D<sub>3</sub>. Some mushrooms provide vitamin D<sub>2</sub> in variable amounts. Mushrooms with enhanced levels of vitamin D<sub>2</sub> from being exposed to ultraviolet light under controlled conditions are also available. Fortified foods are also a good food source – fortified yoghurts, orange juices, breakfast cereals and milk.

### **Supplementation**

Remember that if you are eating foods rich in Vitamin D daily and receiving your daily dose of Sunlight “therapy” than the chances of you needing to supplement are very slim. If you are hardly in the sunshine and have a poor dietary intake it is a good idea to test your Vitamin D levels (they will test serum concentration of 25-hydroxy-vitamin D) and begin a supplement if they are low. If you know you are vitamin D deficient, with symptoms, than it is highly likely you will need to take a supplement. Other reasons for needing to take a vitamin D supplement include aging - the production of vitamin D precursors in the skin decreases with age, health conditions that involve the parathyroid gland or kidneys, fat malabsorption and genetic polymorphisms that result in Vitamin D receptors that do not work sufficiently.

Supplements can be taken in the D<sub>2</sub> or D<sub>3</sub> form but more and more research is showing that the D<sub>3</sub> form may be more usable by the body.

### **Vitamin D Deficiency**

(The following paragraphs have been taken directly from ‘The World’s Healthiest Foods’ website, <http://www.whfoods.com/genpage.php?tname=nutrient&dbid=110>, and are placed in inverted commas because they are a quote)

“By far the most important Vitamin D-deficiency contributing factor faced worldwide is insufficient exposure to sunlight. More specifically, it is ultraviolet B sunlight in the range of 290-300nm that is needed to convert the cholesterol found in our skin cells into cholecalciferol (the preliminary form of vitamin D<sub>3</sub>).”

“Although the task of “getting enough sunlight” may seem like a fairly straightforward one, the relationship between our vitamin D status and our time in the sun is not nearly as simple as many people might think. First, there is the fluctuating nature of UVB light. UVB light-the kind needed for skin synthesis of vitamin D-is not always

present with the same intensity just because there is visible sunlight. The intensity of UVB light varies dramatically with geographical location (latitude), time of year, time of day, degree of cloud cover, and other factors. In other words, there are times when your eyes might leave you thinking that you are getting good intensity UVB light and synthesizing optimal amounts of vitamin D in your skin cells, but you actually are not.”

“Under optimal circumstances, our skin can synthesize between 10,000-20,000 IU of vitamin D (cholecalciferol) in 30 minutes. Yes, all of the practical factors still have to line up correctly (like angle of the sun, time of day, degree of cloud cover, etc.), but when people spend generous amounts of times outdoors in the sun on a regular basis, their chances of adequate vitamin D synthesis are greatly increased”

Complete cloud cover reduces UV energy by 50%; shade (including that produced by severe pollution) reduces it by 60%. UVB radiation does not penetrate glass, so exposure to sunshine indoors through a window does not produce vitamin D. Sunscreens with a sun protection factor (SPF) of 8 or more appear to block vitamin D-producing UV rays, although in practice people generally do not apply sufficient amounts, cover all sun-exposed skin, or reapply sunscreen regularly

(The following paragraph has been taken directly from 'Office of Dietary Supplement-National Institutes of Health' website, <http://ods.od.nih.gov/factsheets/vitamind/>, and is placed in inverted commas because it is a quote)

“Nutrient deficiencies are usually the result of dietary inadequacy, impaired absorption and use, increased requirement, or increased excretion. A vitamin D deficiency can occur when usual intake is lower than recommended levels over time, exposure to sunlight is limited, the kidneys cannot convert 25(OH)D to its active form, or absorption of vitamin D from the digestive tract is inadequate. Vitamin D-deficient diets are associated with milk allergy, lactose intolerance, ovo-vegetarianism, and veganism.”

Signs and symptoms of Vitamin D deficiency can include:

- ✓ Rickets – childhood disease characterized by deformity of long bones
- ✓ Osteomalacia – bone thinning disorder leading to weak bones
- ✓ Muscle aches

- ✓ Stunted growth in children
- ✓ Lowered immunity

## DID YOU KNOW??

- 🔗 Vitamin D was chemically characterized in 1932 and in 1936 the chemical structure of Vitamin D<sub>3</sub> was established
- 🔗 Researchers have found virtually no loss of vitamin D following pasteurization of processed cheese under normal commercial conditions
- 🔗 Certain drugs can affect your body's utilization of Vitamin D, these include:
  - Anticonvulsant medications – decrease Vit D's activity
  - Bile Acid Sequestrants – decrease intestinal absorption of Vit D
  - Cimetidine – may reduce Vit D activation by the liver
  - Corticosteroids – reduce activation of Vit D
  - Heparin – may interfere with Vit D activation
- 🔗 Vitamin D may interfere with certain medications:
  - May decrease the effectiveness of calcium channel-blockers
  - Supplementing Vitamin D & calcium while taking thiazide diuretics may increase blood levels of calcium to above normal
- 🔗 Breastfed infants usually cannot meet Vitamin D requirements especially if exclusive breastfeeding is prolonged beyond 6 months. The AAP recommends that exclusively and partially breastfed infants be supplemented with 400IU of Vitamin D per day.
- 🔗 People with darker skin have reduced ability to produce Vitamin D from sunlight

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