

MS and Vitamin D Supplementation

In my last column I explained why MS is best seen as a long latency vitamin D deficiency disease based on abundant and diverse scientific evidence. The current data strongly support the concept that an adequate supply of vitamin D throughout childhood and later life is protective against MS despite exposure to other environmental factors involved in MS. There is also evidence that an adequate supply of vitamin D can help slow the progression of MS for those who already have the disease. In this column I want to focus on how much vitamin D is needed to prevent or treat MS.

To understand how vitamin D can provide protection against MS and how much is needed, it is important to understand the basics of how vitamin D works in the body. When vitamin D is produced in the skin by the action of ultraviolet light or is taken orally in a food or a supplement, it is transported to the liver where it is transformed into a substance called 25 hydroxyvitamin D or more simply, circulating vitamin D. This substance circulates in the blood and is used by cells throughout the body to produce an active hormone that is often referred to as vitamin D hormone. This hormone has a powerful effect on cells and adequate vitamin D hormone is needed for proper cell functioning.

Notably immune cells need adequate vitamin D hormone for proper immune regulation. This regulation ensures that immune responses are appropriate and do not cause uncontrolled damage to self-tissue. Such uncontrolled immune damage to self is known as autoimmune disease when the damage becomes clinically apparent. When such damage occurs to myelin in the central nervous system the disease is labeled as multiple sclerosis.

With this understanding we can ask two critical questions in regards to preventing MS:

1. “What level of circulating vitamin D must one maintain from childhood onward such that the immune cells will function properly and not allow MS to develop.”
2. “How much vitamin D is needed from sun exposure, food and supplements to achieve and maintain such an optimal and protective level of circulating vitamin D”

Lately there have been a number of scientific papers that have addressed these questions. It appears that an optimal level of circulating vitamin D is between 100 and 150 nmol/l (nanomols per litre). This has been determined by various observations. First of all people who live in low latitude sunny climates where MS is rare and have reasonable sun exposure have such a level of circulating vitamin D. Also it has been found that this level is protective against osteoporosis. Given that humans evolved in a low latitude, sunny climate with lots of sun exposure, it seems reasonable that such a level is what our genes need for optimal health.

The most important question for preventing MS is how much vitamin D is needed from the sun and oral sources to ensure one's circulating vitamin D level remains in the optimal range of 100- 150 nmol/l. There have been a number of clinical trials in which the subjects were given varying amounts of vitamin D over 6 months and their resulting circulating vitamin D levels were measured. From this work it has been estimated that an intake of 4000-5000 IU each day will result in an optimal circulating vitamin D level. However it is important to note that these studies were done in the winter months when no vitamin D was obtained from sun exposure. Thus the amount of vitamin D supplement needed will depend an individual's lifestyle and genetic response to vitamin D intake. Furthermore the amount needed by each person will vary during the year with more needed during

the winter when little vitamin D is available from sun exposure. Finally the amount needed by babies and small children to achieve a protective level of circulating vitamin D will be less than that for adults. Clearly it is impossible to recommend a single supplement amount of vitamin D that will meet everyone's needs.

For babies a supplement of 1000 IU all year around appears to be sufficient. For children 3 to 10 years of age, a 2000 IU supplement all year around will be adequate. For adults a 4000 IU supplement during the winter and a 1000-3000 IU supplement depending on sun exposure during the summer is likely adequate. To ensure one's vitamin D supplement is resulting in an optimal level of circulating vitamin D, it is best to have one's level of circulating vitamin D checked once or twice a year (fall and/or spring). One's supplement regimen can be adjusted according to the test result as shown on the table below.

Finally what are the best sources of supplemental vitamin D? The easiest source is 1000 IU vitamin D pills that can be bought at a pharmacy or over the Internet. Cod liver oil can also provide some vitamin D but only up to 1500 IU can be gotten from such a source because of the associated high vitamin A content. I personally use a combination of cod liver oil and 1000 IU pills to provide 4500 IU a day.

In summary it is most important that everyone maintain a circulating vitamin D level of 100-150 nmol/l all year around to either treat MS or prevent it in the first place. For adults, a supplement in the range of 4000 IU/d should result in such a protective circulating vitamin D level but periodic checks of the one's level are needed to ensure one's supplement regimen is optimal.

VITAMIN D -25(OH)D LEVEL (test every October and April for first 2-3 years)	SUGGESTED DOSE
Less than 75nmol/ in Oct or April	4000 IU year around
Between 75 and 100nmol/L in Oct Between 75 and 100 nmol/L in April	4000 IU Oct-April; 2000 IU May-Sept
Between 100 and 125nmol/L in Oct Between 100 and 125 nmol/L in April	2000 IU Oct-Apr; 1000 IU May-Sept
Between 125 and 150 nmol/L in Oct Between 125 and 150 nmol/L in April	1000 IU Oct-April; 0 May-Sept
Over 150 nmol/L in Oct or April	No supplementation until next test indicates a need