

Nutrition Factors and Multiple Sclerosis

Part II Vitamin D

In the Health and Wellness column in the last issue of *The Motivator*, the concept that various nutritional factors play roles in the onset and progression of MS was introduced. In that column the “prime suspects” were identified on the basis of the available scientific evidence. A deficiency in vitamin D, the sunshine vitamin, was one of the nutritional factors that appear to figure prominently in the MS disease process.

Vitamin D first reached the public’s attention in the 1920s when it was isolated and named. At that time it was shown that a deficiency in vitamin D was responsible for rickets, a serious bone disease that affected many children in North America and Europe. The main source of vitamin D for most people comes from the sun. Notably vitamin D is found only in very few foods with fatty fish such as salmon and mackerel being the best sources. When skin is exposed to ultraviolet B rays of the sun, cholesterol in the skin is converted into vitamin D. The vitamin D is then transported to the liver where it changes form and is released into blood circulation. Many cells in the body from the kidneys to the brain to various immune cell types, convert the circulating vitamin D into an active hormone that is required for proper cell functioning.

The action of this vitamin D hormone is usually associated with its ability to facilitate the absorption of calcium from the intestines. Calcium is a mineral that is essential for many critical physiological functions and thus vitamin D’s role in this regard is of the utmost importance. When vitamin D levels are too low, various biochemical reactions occur to ensure calcium levels are maintained and one result of these actions is the loss of calcium from the bone. Thus a long-term deficiency in vitamin D may result in osteoporosis in later adulthood.

Cells of the immune system also require vitamin D for proper functioning. This is why vitamin D deficiency may well be a factor in MS, a disease of a malfunctioning immune system. A deficiency in vitamin D was first hypothesized to be a significant factor in MS 30 years ago when it was noted that variations in rates of MS closely followed changes in vitamin D supply. For example, in Australia, where there are very large variations in the rate of MS, the MS rate correlates almost perfectly with the supply of ultraviolet light from the sun, the main source of vitamin D. A similar relationship has also been documented in North America and decreasing sunshine and vitamin D supply provides a ready explanation for why MS is four times as common in Washington state compared with southern California.

Notably other very diverse scientific data also support the concept that a deficiency in vitamin D plays a major role in MS. Animal experiments have demonstrated that injections of vitamin D hormone or just simple exposure to ultraviolet light will prevent or halt the animal form of MS in mice. Immunological studies reveal how vitamin D plays an important role in affecting the MS disease process that is dominated by the attack of immune cells on myelin, the fatty substance that wraps around nerve axons in the central nervous system. It has been shown that vitamin D hormone can significantly slow down such an immune attack by preventing the problematic immune cells from multiplying.

Other important scientific evidence which demonstrates that vitamin D is involved in MS includes a study which showed that nurses who took a vitamin D supplement had a 40% lower risk of MS, a

study which showed that people who work in jobs where they are exposed to lots of sunshine had low rates of MS and a study which showed that people who were exposed to lots of sunshine as children had an 85% lower chance of contracting MS.

Most studies provide good evidence that adequate vitamin D can prevent the onset of MS in many cases. An obvious question becomes can adequate vitamin D affect MS disease activity in those who are already diagnosed with the disease. In the 1980s a small clinical trial using 5000 IU of vitamin D a day demonstrated a marked reduction in attack rate over the 2 years of the study. However the study was quite small so the results need to be confirmed by a larger better-controlled study. Recently, in a small study that used fish oil, a good dietary source of vitamin D, as the therapeutic agent, 85% of the participants went attack free over the two-year study period. Finally it was shown that MS disease activity, as revealed by lesion activity on MRI scans, increased and decreased in concert with seasonal changes in vitamin D levels of the participants.

People who live in latitudes greater than 35 degrees (most of the USA and Europe) do not make much vitamin D for up to 6 months of the year because of the low angle of the sun in the winter months and a consequent substantial lessening of UVB rays. That is likely the main reason why MS is so common in these higher latitudes. It has been estimated that humans use up to 4000 International Units (IU) of vitamin D a day and that many people in the higher latitudes average only 500-1000 IU/d from all sources over the year. This relatively low intake results in a fluctuating blood level of circulating vitamin D of 20-30 ng/ml. This is about half of the estimated optimal level of 40-60 ng/ml which is found in persons in lower latitudes where MS is rare. This deficiency in circulating vitamin D results in many cell types, including immune cells, not being able to manufacture adequate vitamin D hormone for proper functioning.

Given all of the above it would seem that it would be wise for persons with MS and their close relatives who have a higher susceptibility to MS to ensure they have an optimal amount of circulating vitamin D so that all their cells, especially their immune cells, have access to all the vitamin D which is required. Vitamin D supplements provide one way on accomplishing this. Increased sun exposure would be of benefit for increased vitamin D but this may also raise the risk of skin cancer. Because of differences in genetics, lifestyle, geographic location and sun exposure, the amount of supplement required will differ from person to person depending on their individual circumstances. Each person with the help of their physician can determine what level of supplementation is needed to ensure their circulating blood level of vitamin D stays above 40 and below 60 ng/ml. For many people an adequate supplement level seems to be about 4000 IU/d from October to March and 2000 IU/d from April through September. However it is emphasized that yearly checks of one's circulating vitamin D level and a discussion with their physician are essential for making sure one's level is not too low or too high.

In summary, a very diverse scientific database indicates that lower than optimal levels of circulating vitamin D are associated with MS. Persons with MS and their close relatives may want to consider using an adequate vitamin D supplement, especially in winter, to ensure they do not become deficient in this very important nutrient.