Vitamin D

Vitamin D3, also know as cholecalciferol, which plays an important role in bone metabolism and calcium absorption has been recently brought into the highlight with new research and therapeutic uses. In humans, this form of Vitamin D is produced in the skin as well as taken into the body by dietary consumption.

Vitamin D receptors, previously known to be found in the gut and bone, are now known to be found in the brain, breast, prostate, and lymphocytes. This information, along with the new Food and Nutrition Board's Upper Limit (UL) for safe intake of Vitamin D up to 5,000 IU/day for adults, is essential for protection from many health conditions including diabetes mellitus, osteoporosis, epilepsy, osteoarthritis, musculoskeletal pain, multiple sclerosis, polycystic ovary syndrome, hypertension, depression, cardiovascular disease, several autoimmune diseases, and cancers of the colon, prostate, and breast.

With this new found knowledge many doctors and researchers are finding innovative ways to maintain and improve their patients' health with preventive and therapeutic applications. They are also trying to expand the awareness that Vitamin D is no longer just a bone nutrient but an "extraordinary molecule with far-reaching effects in a variety of cells and tissues."

Vitamin D is metabolized in the body in the following two pathways: endocrine and autocrine. Cholecalciferol, in endocrine metabolism, is formed in the skin after exposure to sunlight and it travels to the liver in our bloodstream, where it is converted to calcidiol by an enzyme called vitamin D-25-hydroxylase. The final route for calcidol is to the kidney where it is then changed to calcitrol by an enzyme called 25-hydroxyvitamin D3-1 alpha-hydroxylase (1-OHase). Calcitrol is very essential in our bodies for bone remodeling, to increase calcium and phosphorus absorption in the intestine, to promote calcium deposition in bone, and to reduce parathyroid hormone (PTH). In autocrine metabolism, calcidiol circulating in our body is taken in by cells and tissues with nuclear vitamin D receptors (VDR) and the enzyme 1-OHase, and then converted directly into calcitriol. Primarily these cells and tissues include the lymph nodes, colon, breast, prostate, lungs, skin, pancreas, brain, and adrenal medulla. Being such that all of these areas of the body can metabolize Vitamin D, the potential is evident that Vitamin D also plays roles in an array of metabolic processes and disease states. It appears that Vitamin D has an ability to modulate neurotransmitter and neurological function and has an immunoregulatory function.

Through clinical trials, epidemiologic surveys, and laboratory experiments, the benefits from oral Vitamin D supplementation are evident in many disease states and as a preventive medicine tactic for health maintenance and disease prevention. In the cardiovascular system, Vitamin D deficiency has been noted in patients with congestive heart failure and documented in many case reports to be a cause of heart failure. In one case study, it was found that by adding small amounts of oral cholecalciferol to a patient's diet over 8 weeks, it lowered both their blood pressure and heart rates.

Pertaining to diabetes, "Vitamin D supplementation in infants (less than one year of age) and children with 2,000 IU of Vitamin D per day reduced the incidence of type-1 diabetes by approximately 80%" and in type-2 diabetes the increase of Vitamin D in a system correlated with the 60% improvement in insulin sensitivity. Vitamin D supplementation has also been found to slow the progression of osteoarthritis, significantly improve mood with people suffering from depression and seasonal affective disorder (SAD), significantly reduce seizure frequency in patients with epilepsy, as well as showing a reduction in frequency, duration, and severity of menstrual migraine attacks in women. In a case of 150 patients with persistent, non-traumatic musculoskeletal pain, the study showed that 93% of them were deficient in Vitamin D and in another case with 299 patients with low-back pain, a 5,000 – 10,000 IU/day supplementation of Vitamin D for three months, lead to pain reduction in nearly 100% of the patients.

Vitamin D deficiency is evident also in a large number of patients suffering from Grave's disease, rheumatoid arthritis, ankylosing spondylitis, and systemic lupus erythematosus. Vitamin D supplementation in some patients with "prolonged critical illness" showed a significant and dose dependent anti-inflammatory effect.

In conclusion, Vitamin D deficiency has become prevalent in our world where people are not being exposed as much to sunlight as they use to. Many people are working indoors, wearing partial or full clothing when outside, and wearing topical sunscreens which block vitamin D production. Through these recent studies, it has been found that increasing Vitamin D production through more-prolonged exposure to sunlight or supplementation has been shown to be beneficial. With the many disadvantages of excess ultraviolet radiation exposure overweighing the benefits of the Vitamin D production, for the majority of patients oral Vitamin D supplementation is a better option and easily available even on cloudy days. With the current research, physicians have more guidelines to ensure the safety and effectiveness of supplementation by periodic monitoring. The oral Vitamin D supplementation range of 1,000 IU/day for infants, 2,000 IU/day for children, and 4,000 IU/day for adults max meet physiological requirements, promote optimal health, and reduce the risk of many serious diseases.

We are currently using Vitamin D in our practice to improve immunity, reduce bone loss, and treat autoimmune disorders. We frequently monitor the level of 25-OH Vitamin D to keep it at the near maximal level.

Vasquez, A., Manso, G., Cannell, J. The Clinical Importance of Vitamin D (Cholecalciferol): A Paradigm Shift with Implications for All Healthcare Providers. *Alternative Therapies*. 2004; 10(5): 28-36.