Vitamin D

Vitamin D deficiency is common among two-thirds of Americans, particularly if you lead a life primarily indoors, suffer with kidney issues (which obstructs vitamin conversion), have dark skin pigmentation (which curtails skin absorption), are obese (nutrients leech out via body fat), have a dairy allergy (not getting adequate calcium absorption), or follow a strict vegetarian or vegan diet (not eating fish, raw milk or eggs). In all cases, supplementing with vitamin D is an important option. However, before I discuss the evidence regarding vitamin D deficiency and illness-let us look first at the basic science regarding the importance of vitamin D for human immune function and health. A basic understanding of why vitamin D is a genetic human requirement for wellness and prevention will allow greater understanding of why vitamin D supplementation is required.

The innate immune system (that which does not need conscious control) is the component of our immune system that is genetically programmed to respond to antigens (viruses, bacteria, fungi, and any other threatening invaders). The innate immune system uses what are termed (effectors) that are genetically coded to respond to antigens or invaders. The most studied of these effectors are named antimicrobial peptides or AMP's. AMPs not only attack the invaders- they also trigger tissue repair and activate the adaptive or acquired immune system (the branch of the immune system that creates antibodies to specific antigens after exposure).

Recent research has shown that vitamin D up-regulates the genetic expression of AMPs in immune cells. Vitamin D also plays an important role in controlling the inflammatory response initiated by specialized immune cells called macrophages. A deficiency of vitamin D means deficient control of inflammation. In the skin, vitamin D also activates the immune system against antigens.

"Thus, vitamin D both enhances the local capacity of the epithelium to rapidly produce endogenous antibiotics and, at the same time, dampens certain arms of adaptive immunity, especially those responsible for the signs and symptoms of acute inflammation." Cannel et al. 2008 Cod Liver Oil and the Vitamin D Deficiency Epidemic. Annals of Otology, Rhinology and Laryngology 117(11):864-870.

So what is vitamin D? Although most often categorized as a vitamin, vitamin D is actually a hormone. Vitamins cannot be produced by the cells in your body and thus must be obtained via consumption from dietary sources. Vitamin D, however, can be made by the cells in your body in a process that involves the conversion of cholesterol derivatives into vitamin D using sunlight. Although, the majority of individuals in the northern hemisphere never spend enough time outside and without sunscreen, in order to acquire the optimal amount sunlight for vitamin D conversion.

Vitamin D3 is produced in the skin of humans (and other vertebrates) after exposure to ultraviolet B light. Vitamin D3 only becomes biologically active after 2 conversions; one in the liver (primarily) to 1,25 dihydroxyvitamin D , the circulating form of vitamin D, and then in the kidney to 1, 25-dihydroxyvitamin D, the biologically active hormone form which is also known as calcitriol. Calcitriol or biologically active vitamin D is often considered the most potent steroid hormone in human physiology. Why you may ask? Because like all steroid hormones, vitamin D is involved in the genetic regulation of the production of proteins and enzymes which are essential for wellness and prevention. Vitamin D promotes calcium absorption and maintains blood levels of calcium and phosphate for proper bone development and muscle action. Some of the other roles of vitamin D are assistance in the regulation

of cell growth, immune function, neuromuscular action, and regulation of inflammation. It assists the action of insulin and has been shown to have a significant role in cancer prevention. Many cells have vitamin D receptors and many genes are influenced by the action of vitamin D. It has been estimated that the human genome has over 2,700 binding sites for vitamin D. This is why being deficient in vitamin D can lead to increased risk of many diseases, and, conversely why being sufficient in vitamin D is essential for wellness and prevention.

So what does this all mean? It means… Vitamin D is a big deal! If you suffer from bone pain or frequent sprains and fractures, vitamin D deficiency may be the culprit. Vitamin D's most basic role is calcium absorption. Without adequate calcium, the body can suffer from a weakening of the bones, nails, hair and teeth. In fact, the long-term deficiency of the vitamin D (the sun-shine vitamin), can lead to a condition known as osteomalacia, in which the bones gradually soften, eventually causing osteoporosis, a condition that causes bone and muscle weakness as well as chronic pain. Current research has also shown that vitamin D plays a role in regulating blood pressure, weight and mood. A growing collection of research has linked vitamin D to heart health. For example, multiple studies have discovered that low vitamin D was to blame for high blood pressure worsen in during the winter or in low sunlight environments far removed from the equator. Scientists from Harvard University remind us that the blood vessels in the heart contain countless vitamin D receptors, so it makes perfect sense that vitamin D helps in the regulation and function of these structures. If you struggle with insulin im-balance and weight gain, again, vitamin D deficiency is often looked to as the culprit. Findings from an Iranian study published by the National Institutes of Health, found that low vitamin D levels may have an adverse effect on the insulin secretion and glucose tolerance of type II diabetics.

Another unexpected symptom of vitamin D deficiency are mood swings. From periods of unexplained irritability to Chronic Seasonal Affective Disorder (SAD), and other mood disorders, a massive body of scientific research links lack of sunshine to an inevitable drop in vitamin D levels, which cause serotonin (a happy mood enhancer hormone) levels to plummet in the brain, leading to depression.

Researchers from across the globe including Harvard Medical School attest that sunlight is the best and purest source of vitamin D. The body will produce its own store of vitamin D, when our skin is appropriately exposed to ultraviolet light (without sunscreen). For the average individual, studies recommend from 10-30 minutes of sunlight without sunscreen several times each week would be adequate for vitamin D synthesizing. However, for many individuals, even those who do not live in colder climates- this does not happen.

Even though I personally and professionally believe that dietary measures should be utilized prior to supplementation-natural vitamin D food sources can be hard to come by and difficult to satisfy daily requirements which is 1000 international units per 40 pounds of body weight. Focus on: fatty, cold water fish such as; (i.e., salmon, herring, sardines, tuna and mackerel.) Portobello mushrooms, tofu, caviar, dairy products such as butter, buttermilk, cheese, fortified yogurt, pork, and eggs.

In summary: we must remember that vitamin D is an essential vitamin required by the body for the absorption of calcium, bone development, immune functioning and alleviation of inflammation. Vitamin D is oil soluble, which means you need to eat fat to absorb it. Natural foods high in vitamin D include; fish oils, fatty fish, mushrooms, beef liver, cheese and egg yolks. Vitamin D is also naturally made by your body when you sufficiently expose your skin to the sun. In addition, vitamin D is widely added to many foods such; as milk and orange juice, and can also simply be consumed as a supplement.

However you acquire the appropriate amount of vitamin D-they call it essential for reason!