VITAMIN D

Vitamin D has long been known to assist healthy bones by helping to stimulate bone cells to make new bone while enhancing the uptake of calcium into bones. Its role in boosting immunity, hormone regulation, brain health, metabolism, diabetes prevention, cancer prevention, and cardiovascular health are just now becoming clear. The sunshine vitamin appears poised to claim its crown.

All your body organs and cells have receptors for vitamin D, meaning that vitamin D communicates all around your body. Your cells use vitamin D to directly regulate your genes, making it one of the most powerful compounds in human health. In fact, one study with 2100 female twins showed that having adequate vitamin D extends life by five years. This is because vitamin D prevents excessive wear and tear to the telomers that are attached to the ends of your chromosomes that enable cell division (determining potential cell lifespan). This is truly a new era of nutritional science.

Vitamin D Basics

Vitamin D3 is produced in your skin when exposed to sunlight. Extra vitamin D from prolonged sun exposure is converted to non-biologically active lumisterol, which can also be converted back to D3 when sun exposure levels drop. Prolonged sun exposure results in tanning (extra melanin synthesis), which is a natural sunscreen (like clothing) and reduces the amount of vitamin D3 that is made in the first place. There is no such thing as getting too much vitamin D3 from the sun.

Vitamin D must be converted into its biologically active form (1,25(OH)2D) before it goes to work. Your kidneys are the main organ that does this for your body as a whole, but it is now recognized that many cells have the enzymes to directly activate vitamin D. For example, cells lining your lungs and digestive tract can activate vitamin D to help fight infection. The vitamin D receptors around your body are capable of binding both the active and inactive forms of vitamin D. Cells that activate vitamin D can also inactivate it, forming a convenient system of self-regulation based on a variety of needs.

Once vitamin D is active in cells it has one made job, activating genes. In other words, the basic role of vitamin D in your body is to help regulate its functions at the level of gene transcription. Because so many different tissues and types of cells use vitamin D, it can be assumed that this is a fundamental need for survival.

Your body places a high value on vitamin D and has made provisions to store it in your liver and the lining of your digestive tract. This savings account of vitamin D can be called into action during times of need, such as the long winter months. It is interesting that deficiencies of vitamin D in your liver or digestive tract are associated with the poor health of both organ systems. When your skin makes vitamin D then the vitamin D turns on antioxidants within your skin to deactivate the free radicals coming from the sun's UV radiation. This is a natural defense mechanism (a built in sunscreen). The new science shows that only 9% of the population has vitamin D receptors that don't do a good job of this. It is ridiculous to make 100% of the population think that routine sun exposure is a major health risk when such advice applies mostly to a small group.

How Much Supplemental Vitamin D Do You Need?

It is widely recognized that vitamin D is low in many Americans. Government levels for vitamin D dietary intake are 400 IU to 600 IU per day and may be lacking based on a significant body of vitamin D science. Many vitamin D researchers believe that 2000 IU are needed on a daily basis, especially in the winter months in the U.S.

Vitamin D intake of 2000 IU has been safely tested in children ages 10-17. In fact, only the dose of 2000 IU was able to bring the common vitamin D deficiency in children up to normal levels. In a study of overweight African-American children it was found that 57% who were overweight lacked vitamin D, compared to 40% of the control group. However, 1 month of vitamin D intake at 400 IU per day failed to bring vitamin D levels into normal range, indicating that current government recommendations are inadequate.

A randomized study of 180 pregnant women found that 800 IU of vitamin D per day improved their blood levels, but only a few of them and their babies reached normal levels of vitamin D on this dose. In another study with 206 pregnant women only 10% had adequate vitamin D levels. Those with the lowest D had children who experienced tooth enamel abnormalities and cavities early in life.

A new study with young healthy men found they needed 700-800 IU of vitamin D per day in the winter to maintain optimal bone health. You can imagine that someone older, most woman, or individuals in poor health would need a higher amount.

Even the Mayo Clinic is churning out press releases telling everyone to take 800-1000 IU of vitamin D per day. They are telling people that Vitamin D can improve muscle strength and help older people not fall, reduce the risk of some cancers, help chronic pain, protect against autoimmune disease, and reduce the risk for cardiovascular disease. Wow – even mainstream medicine is on the vitamin D bandwagon.

In my view, part of the issue of how much Vitamin D you should take is based on the symptoms you have that indicate likely deficiency. Keep in mind that these symptoms may crop up as winter moves along and your vitamin D savings account is depleted. Thus, I will review some of the key findings of recent vitamin D research.

Immunity

The front line troops of your immune system (innate immunity) use vitamin D to help mount an immune response for their foot soldiers. These immune cells use vitamin D to produce a germ-killing compound called cathelicidin. Your immune cells then release cathelicidin to kill bacteria, a process that does not work if there is a lack of vitamin D. The bacteria killing properties have been known for some time and have even been used to help kill tuberculosis.

Many chronic skin problems are associated with increased infection. In a recent small study of patients with atopic dermatitis it was found that taking 4000 IU of vitamin D per day for 21 days restored their skin's production of cathelicidin to normal – offering protection from infection.
A new study shows that vitamin D is directly activated by cells in your lungs to help combat infection. The researchers showed that this not only boosted the bacteria-killing cathelicidin but also improved the ability of immune troops to identify invaders.

If you have recurring skin problems or if your lungs are a friendly place for bugs to live (especially a winter-time weak spot) then it is likely you need more vitamin D.

Autoimmune Problems

Vitamin D has a dampening effect on excessive and inappropriate behavior of immune cells. It helps reduce the amount of inflammation produced by immune cells. In fact, a deficiency of vitamin D may be an underlying and possibly causative issue for almost any autoimmune problem and a theory can be put forth that vitamin D adequacy is required to prevent your immune system from going into an improper hyperactive and excessively inflammatory state – a problem that is at least a part of all diseases of aging.

Studies show the ability of vitamin D to help prevent as well as improve such issues as arthritis, autoimmune type I diabetes, and inflammatory bowel disease.

Any person with any autoimmune disease should have their vitamin D levels tested by their physician and these should be corrected as a first step in seeking to improve any problem.
It is an interesting point that vitamin D helps both a lacking and hyper-active immune system work well. A key theme of nutrition is that it works in your body to promote efficiency of healthy function. In the case of vitamin D it not only boosts up underperformance, it quiets down excessive and improper activity. Obviously, no drug has such intelligence.

Cancer

One of the main functions of vitamin D is telling your genes what to do. Many of these functions relate to cell growth and division. For example, adequate vitamin D is crucial to the healthy growth of your skin and hair. In fact, a lack of vitamin D can result in an autoimmune reaction that makes your hair fall out or in disruptions to consistent skin pigmentation.

Cancer problems imply that cell division has gotten out of control in an inappropriate way. Just as vitamin D is needed by immune cells so they don't become hyperactive and inappropriate, so it is that vitamin D may be needed to help regulate cell growth and differentiation to keep it in a healthy condition.

A number of precise cell growth factors are favorably influenced by vitamin D, which is likely to have benefit for many kinds of cancer. Current vitamin D cancer research has tended to focus on colon, breast, and prostate cancer.

One aspect of the current research shows that vitamin D is a partner in the antioxidant defense system of cells, helping to clear them of free radicals and thereby protecting them from DNA damage that can lead to mutation. Interestingly, vitamin D is smart enough not to protect cancer cells. That finding, along with earlier work, led this research group to claim "Our findings reflect what we see in those studies and demonstrate that vitamin D not only can be used as a therapy for prostate cancer, it can prevent prostate cancer from happening."

Some of the newer colon cancer research finds that vitamin D turns on death signals in colon cancer cells and works synergistically with calcium to help prevent colon cancer cells from spreading.

A definitive German study has now proven that low levels of vitamin D in premenopausal women are associated with an increased risk in breast cancer. Compared to the women with the highest vitamin D, the increased risk ranged from 45% - 68%, depending on the amount of deficiency.
Diabetes and Obesity

Vitamin D levels are low in obese adults. It is well known that vitamin D helps stimulate the release of insulin from your pancreas. A lack of vitamin D drastically increases the risk for type I diabetes and is likely involved with the insulin and leptin resistance that eventually causes type II diabetes. There is a lot more work needed in this area to fully understand these issues, but here is what we know so far.

The further you live from the equator the higher your risk for getting type I diabetes. If you live in Finland your risk goes up 400 fold. How vitamin D protects the beta cells of your pancreas is not known, but it likely dampens inflammatory immune signals and boosts antioxidant protection – as it has been shown to do in other areas of your body.

Pooled data from existing studies shows that a child supplemented with vitamin D is 30% less likely to develop type I diabetes even as an adult. In a very large Finnish study those infants and children who consistently took 2000 IU of vitamin D per day had a 78% reduced risk of type I diabetes.

Many overweight people are low in vitamin D and correcting vitamin D deficiency has been shown to improve insulin resistance, giving vitamin D a role in also helping to prevent type II diabetes (the most common form in society).

New research shows that vitamin D is metabolically active within your stored fat, although we don't know exactly what it is doing. We know from earlier research that vitamin D helps reduce excess leptin from fat. High leptin lowers another fat hormone called adiponectin which we know must be at higher levels to prevent insulin resistance and type II diabetes. While there is a lot more about this to learn, it does appear that adequate vitamin D is helpful for healthy metabolism of blood sugar and fat.

If you are struggling with weight or the health of your pancreas it may be another sign that some extra vitamin D is needed.

Heart Health

Researchers at the University of Michigan have nick named vitamin D "the heart tranquilizer" because it helps keep your heart from working so hard and swelling in size. Their findings indicate that vitamin D can help prevent heart failure.

Vitamin D has been shown to improve blood flow in your extremities, helping to improve what researchers call peripheral artery disease (PAD). The researchers evaluated 4839 U.S. adults and found those with the best vitamin D levels had the least amount of PAD.

Brain Health

Research with animals has shown that low vitamin D during pregnancy causing brain abnormalities similar to those seen in patients with schizophrenia. Because vitamin D is involved with gene transcription in the evolving nervous system a lack of it is bound to cause some kind of problems.

In older Americans low vitamin D is associated with depression. I think just about everyone feels better when there is more sun.

An interesting study compared vitamin D levels in older Americans to Parkinson's and Alzheimer's disease. Patients with Parkinson's were 55% more likely to be low in vitamin D.

Thus, if your hands are a bit shaky and/or your mood is a bit off then maybe you could use a little more vitamin D.

Summary

Vitamin D does so many things helpful to your health that you absolutely do not want to run short. Government recommendations for dietary intake of vitamin D are too low, especially for the winter months when vitamin D is so important to the function of your immune system.