

# Why Flu Epidemics Occur in Winter

John Cannell MD — Vitamin D Council

The cure for flu epidemics was right under the noses of all the bacteriologists and epidemiologists all along. Read every word. Stock your home with vitamin D3 capsules. Dismiss all claims that high-dose vitamin D is potentially toxic. Side effects don't begin till 40,000 units are consumed for many months.

— [Link to article](#)

As we wait for this year's influenza epidemic, keep in mind we are also waiting for the big one, the pandemic (pan: all, demic: people). A severe pandemic will kill many more Americans than died in the World Trade Centers, the Iraq war, the Tsunami and Hurricane Katrina combined. Perhaps a million or two in the USA alone. Such a disaster would tear the fabric of our society. Our entire country would resemble New Orleans after Katrina.

Also, it's only a question of when it will come, not if it will come. Pandemics come every 25 years or so, severe ones every hundred years or so. The last pandemic, the Hong Kong flu, occurred in 1968, killing 34,000 Americans. In 1918, the Spanish flu killed more than 500,000 Americans. So many millions died in other countries, they couldn't bury the bodies.

## The Influenza Pandemic of 1918

Young healthy adults, in the prime of their lives in the morning, drowning in their own inflammation by noon, grossly discolored by sunset, were dead at midnight. An overwhelming immune response to the influenza virus - macrophages releasing large amounts of inflammatory agents called cytokines and chemokines into the lung of the afflicted - resulted in millions of deaths in 1918.

Nature. 2004 Oct 7;  
431(7009):703-7.

Keep in mind, that the Germans recently discovered that vitamin D is intimately involved in reining in the macrophages, holding their cytokine production back, so they don't overshoot, and kill their owner along with the invader.

Blood - 2005 Aug 23;  
[Epub ahead of print]

Your annual flu shot won't help when the big one hits, the antigenic shift one. Once the pandemic starts, a new vaccine, specific to the new virus must be manufactured and that takes time. You can and should get some antiviral drugs from your doctor in advance. Once the pandemic starts - this year, or ten years from now - the supply of antivirals may be limited and the lines will be long.

It may surprise you that influenza remains an enigma. Current theory holds that influenza infects like measles, one person gets it, gives it to others, in a chain of infectious events. That theory has some problems. For example, Dr. Carolyn Buxton Bridges, of the CDC, recently published a review paper on the transmission of influenza. She noted, 'Our review found no human experimental studies published in the English-language literature delineating person-to-person transmission of influenza.'

Clin Infect Dis.  
2003 Oct 15;37(8):1094-101

Most experts also think pandemic strains originate in birds or other animals. Dr. Ann Reid and Dr. Jeffery Taubenberger, of the Armed Forces Institute of Pathology recently wrote, 'it is important to recognize that the mechanisms by which pandemic strains originate have not been explained yet.' Furthermore, there is a persistent theory that influenza lies

dormant in humans, not birds or swine, where it mutates into a killer strain.

J Gen Virol. 2003 Sep;84(Pt 9):2285-92.  
Vaccine. 2002 Aug 19;20(25-26):3068-87.

So, get your flu shot for this year's flu, stock up on some antivirals, and let's go looking for some ignored facts that might improve your family's chances when the pandemic comes. Last month we saw that aggressive treatment of vitamin D deficiency prevented children from getting infections. Dr. Rehman didn't differentiate between viral and bacterial infections but most of the illnesses vitamin D prevented were probably viral.

J Trop Pediatr. 1994 Feb;40(1):58.

When looking for ignored facts, one should always start with epidemiology, the detective branch of medicine. Epidemiologists look for clues, clues that lead to theories, theories that can be tested, and, if true, save your family's lives. One of the world's pioneering epidemiologists died recently, R. Edward Hope-Simpson. He used meticulous, and solitary, detective work to discover that the chickenpox virus was reactivated in adults, causing shingles. Dr. Hope-Simpson became famous.

Proc R Soc Med. 1965 Jan;58:9-20.

In 1979, he turned his attention to influenza A. He studied two remote populations, one in Wales and the other in England. He found that most affected households had only one case of influenza. Furthermore, no serial time intervals could be identified in cumulative household outbreaks, that is, different families didn't get sick one after another, but around the same time. He discovered other facts that just didn't fit with the theory that influenza A is primarily spread by person-to-person transmission of this year's virus.

J Hyg (Lond). 1979 Aug;83(1):11-26.

Then he spent the rest of his life trying to alert us to one of the basic facts of influenza. It is distinctly seasonal. All theories about its transmission must take into account its seasonality. Hope-Simpson reminded us what Davenport said, 'Epidemiological hypotheses must provide satisfactory explanations for all the known findings - not just for a convenient subset of them.'

Going back to 1945, he discovered that influenza epidemics above 30 degrees latitude in both hemispheres occurred during the six months of least solar radiation. Outbreaks in the tropics almost always occur during the rainy season. Hope-Simpson concluded, 'Latitude alone broadly determines the timing of the epidemics in the annual cycle, a relationship that suggests a rather direct effect of some component of solar radiation acting positively or negatively upon the virus, the humans host or their interaction.' That is, something may be regularly reducing our immunity every fall and winter.

J Hyg (Lond). 1981 Feb;86(1):35-47.

In 2003, researchers confirmed that influenza epidemics in the tropics occur, with few exceptions, during the rainy season - when vitamin D levels should be falling.

Paediatr Respir Rev. 2003 Jun;4(2):105-11.

Furthermore, in his 1981 paper, Hope-Simpson wondered how the same virus could cause influenza outbreaks at exactly the same time (middle of winter) over a six-year period (1969 - 1974) in two widely separated areas (Prague, Czechoslovakia, and Cirencester, England). Surely, during the middle of the Cold War, infected people did not arrive at two locations hundreds of miles apart, in the middle of winter, for five years in a row to infect the well people. On thing Prague and Cirencester do have in common, they are both at 50 degrees latitude.

In 1990, researchers confirmed a relative lack of country-to-country transmission, by looking at two countries with heavy tourist traffic between them.

J Hyg Epidemiol Microbiol Immunol.  
1990;34(3):283-8

Hope-Simpson rejected the theory that this year's virus is only transmitted from actively infected persons to well persons, concluding instead the facts were more consistent with transmission by symptomless carriers who become contagious when the sun is either in the other hemisphere or obscured by the rainy season. He theorized that annual movement of the sun caused a 'seasonal stimulus that reactivates latent virus in the innumerable carriers who are everywhere present, so creating the opportunity for epidemics to occur in the wake of its passage.' And thus the celebrated scientist committed heresy.

Everyone knows influenza transmission is direct; the ill people infect the well people. The accepted theory of pandemics is that the virus first spreads in birds, perhaps jumps to a mammal (pigs in 1918), then jumps to humans already infected with a common influenza strain. There it combines and mutates (reassortment) to a hybrid virus in the index case and that single person spreads it to others who spread it to others, etc. No, said Hope-Simpson, the epidemiology just does not fit that theory. Heresy, said the experts.

Hope-Simpson practiced medicine in a small village in southwest England, Cirencester. He went back and looked at 16 years of his medical records and found evidence of 20 influenza outbreaks, spaced over those 16 years. In every outbreak, he found young children were the most frequently affected but in none of the 20 outbreaks did the children appear to be major disseminators of the influenza virus. Furthermore, all ages seemed to get sick around the same time. He concluded, 'Such age-patterns are not those caused by a highly infectious immunizing virus surviving by means of direct transmissions from the sick, whose prompt development of the disease continues endless chains of transmissions.'

J Hyg (Lond).  
1984 Jun;92(3):303-36.

No one listened. Everyone knew, and still knows: influenza only occurs when sick people infect well people, who in turn infect other well people. I don't think so, said Hope-Simpson. In search of more evidence, he went to all the parishes in Gloucestershire, separated by many miles. He looked at burial records for the last 500 years and found evidence of repeated influenza epidemics. He concluded, 'In each century, influenzal excess mortalities in Gloucestershire parishes coincided with the date of the relevant influenza epidemic as recorded from widely different parts of Britain.' That is, long before modern rapid transit, everyone in Britain got the flu around the same time! How could one person come down

with the flu, infect others, etc, when everyone in Britain got sick at the same time, long before modern rapid transit?

J Hyg (Lond). 1983 Oct;91(2):293-308.

In fact, after studying influenza epidemics in schools, Hoyle and Wickramasinghe also decided that direct spread by infected children could not explain what was happening. They theorized that influenza viral precursors were reaching earth from outer space!

Nature. 1987 Jun 25-Jul 1;327(6124):664.

Content to stay on earth, Hope-Simpson published a detailed theory of influenza's infectivity in 1987, based on the facts he observed. Right or wrong, Hope-Simpson's paper is wonderful reading for anyone interested in influenza. Here is a great mind at work. He noted any theory of influenza must explain a number of facts:

'Vast explosions of disease which may attack 15% or more of a large community within six weeks and then cease,' 'Successive outbreaks of type A influenza in small relatively remote communities often coincide closely season after season with those of the country as a whole and, although the virus changes, the identical strains of virus appear contemporaneously in the two situations,' 'Cessation of epidemics despite abundant available non-immune subjects,' household outbreaks occur all at once, not one after another, 'Low secondary attack rates within households,' 'epidemic patterns of influenza have not changed in four centuries . . . and does not seem to have altered with the increasing speed and complexity of human communications.'

Epidemiol Infect. 1987 Aug;99(1):5-54.

Hope Simpson proposed that symptomless carriers became infective in response to a seasonal stimulus and then infect others causing simultaneous explosions of disease in widely different areas. Furthermore, he concluded that those who got sick were not particularly contagious. He proposed that the stimulus for infection 'is dependent on variations in solar radiation, an extraterrestrial influence unaffected by the rapidity of human travel. The rapidity of influenza spread was as rapid in previous centuries as it is at present because it does not depend on case-to-case transfer.'

He added, 'The primary agency mediating seasonal control remains unidentified.' That is, something is weakening our immune system, every year, as regularly as changing of the leaves and declining vitamin D levels, but he didn't know what it was. Hope-Simpson's 1987 paper was his last. In 1992, he compiled all his work on influenza into a book. He died in 2003, at the age of 95.

The Transmission of Epidemic Influenza

I wish Hope-Simpson could have lived a while longer, to read Dr. Colleen Hayes and her colleagues from the University of Wisconsin-Madison. She is one of the brightest vitamin D researchers out there. In 2003, she reviewed the profound effect vitamin D has on the immune system, including the role vitamin D plays in fighting infections.

Cell Mol Biol (Noisy-le-grand).  
2003 Mar;49(2):277-300.

Yes, as regularly as the flu season, vitamin D levels plummet in the fall and winter. Yes, vitamin D has profound effects on the immune system. Yes vitamin D may be involved in the epidemiology of influenza. But is there any direct evidence?

Two animal studies showed vitamin D prevents the flu and one showed it does not. Nothing after 1956. If you obtain and read the first citation below, you'll see the very first animal paper indicting vitamin D protected rats from influenza was published in Japan during World War II, apparently part of

Japan's biological weapons research. The CIA confiscated the paper after the war.

Proc Soc Exp Biol Med. 1949 Dec;72(3):695-7.

Virology. 1956 Jun;2(3):415-29.

One last thing, when you give flu shots to hemodialysis patients, those taking activated vitamin D develop significantly better immunity.

Nephron. 2000 Sep;86(1):56-61.

Will normal vitamin D levels protect your family against the flu? No one knows. It would be nice if we had a report from a big hospital, were some patients were on vitamin D and some who weren't and see what happened when the flu struck the hospital. Were the patients on vitamin D less likely to get the flu?

In the meantime, it seems to me the smart thing to do is to take enough real vitamin D (cholecalciferol) or get enough sunlight to get and keep your 25-hydroxy-vitamin D level at about 50 ng/ml. Of course, it is a good idea to keep your level around 50 ng/ml year around even if you don't fear the coming influenza pandemic. 50 ng/ml is the normal human level and protects the owner from a myriad of chronic diseases.

J Nutr. 2005 Feb;135(2):317-22.

Eur J Clin Invest.

2005 May;35(5):290-304.

Also, don't depend on high levels in the summer being stored and used in the winter. Vieth believes that the intracellular

kinetics of vitamin D metabolism means that declining vitamin D blood levels may cause rapidly declining intracellular levels. That is, declining levels in the autumn may be as dangerous as low levels in the winter.

Int J Cancer. 2004 Sep 1;111(3):468

Professor Robert Heaney believes healthy blood levels may require up to 4,000 units a day for those with no sun exposure. Most people need to take more in the winter than the summer. Big people need more than little people. African Americans need more than whites. Sunphobes need more than those who enjoy God's invention.

J Steroid Biochem Mol Biol. 2005 Jul 15

Children over 50 pounds need up to 2,000 units a day. Under 50 pounds, about 1,000 units a day. There is no way to know for sure how much you need without a blood test, called a 25-hydroxy-vitamin D. That test should be conducted in the late winter, when your levels are the lowest, and at the beginning of fall, when your levels are the highest. Then you can figure out how much you need to take to keep stable levels. Or adults can simply take 4,000 units a day, every day, except for those late spring, summer, and early fall days when you go into the sun.

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## Vitamin D for Flu - Influenza

### The Real Reason Flu Hits In Winter - And How To Stop It Naturally

Dr. Robert J. Rowen, MD 12-15-6

For decades we've heard the myth that flu strikes in winter because of the colder weather. But numerous studies have all debunked that theory. Studies have shown that flu hits the tropics in their "winter" when it's still quite warm (usually during the rainy season).

No, there's another reason flu hits in winter. And it gives you an easy way to stop the flu before it hits. And it doesn't involve getting a flu shot.

We already know that our bodies produce a lot less vitamin D during the winter. But is it possible the reduced vitamin D levels in winter contribute to the flu?

The evidence is there. Years ago, an observant British general practitioner, R. Edgar Hope-Simpson, connected influenza epidemics in the northern hemisphere with winter solstice. So, flu hits right when vitamin D levels begin to plummet. Conventional medicine has largely ignored his work, until now.

Just this year, two major medical journals released a report written by Dr. John Cannell, a California psychiatrist at the Atascadero State Hospital in California. This is a maximum security facility for the criminally insane. In his report, Dr. Cannell noted that wards all around his got hit hard with a severe flu-like outbreak in April 2005. None of his 32 patients caught the flu - even after they mingled with infected inmates from other wards.

Dr. Cannell wondered why his ward avoided the flu when it hit all the others. He soon realized it was the high doses of

vitamin D he prescribed to all the men on his ward. He had found that his patients, like most other people in the industrial world, had a deficiency. (He must be one of the very few psychiatrists that pays attention to nutrition!) His efforts to correct the deficiency boosted their immune system and completely protected them from the flu.

Why does it work? Science recently discovered that vitamin D stimulates your white blood cells to make a substance called cathelicidin. Researchers haven't studied this chemical on the flu virus yet, but they have previously reported that it attacks a wide variety of pathogens. These include fungi, viruses, bacteria, and even tuberculosis.

So, it turns out that my suggestions for you to have your vitamin D levels checked this time of year were right on target. But now, armed with this new information, I don't even think it's necessary to spend the money on a test. Vitamin D is cheap. And it stimulates your body to make what might be the ultimate antibiotic! One with no toxicity at all and only kills those organisms invading you (not your own cells).

Arm yourself with the incredible protection of vitamin D. Get sunlight when you can. Just be sure not to burn. If you are mostly indoors, I strongly suggest that you add vitamin D to your daily regimen. I recommend 5,000 IU per day. I see no downside to this dose, especially in the winter months!

Robert Jay Rowen, MD

Ref: FASEB Journal July 2006; Epidemiology and Infection, online, December 2006.



# Understanding Vitamin D Cholecalciferol

## Vitamin D Council

The high rate of natural production of vitamin D3 *cholecalciferol* (pronounced *cho-le-cal-ci-fer-ol*) in the skin is the single most important fact every person should know about vitamin D—a fact that has profound implications for the natural human condition.

Technically not a "vitamin," vitamin D is in a class by itself. Its metabolic product, *calcitriol*, is actually a *secosteroid hormone* that targets over 2000 genes (about 10% of the human *genome*) in the human body. Current research has implicated vitamin D deficiency as a major factor in the pathology of at least 17 varieties of cancer as well as heart disease, stroke, hypertension, autoimmune diseases, diabetes, depression, chronic pain, osteoarthritis, osteoporosis, muscle weakness, muscle wasting, birth defects, periodontal disease, and more.

Vitamin D's influence on key biological functions vital to one's health and well-being mandates that vitamin D no longer be ignored by the health care industry nor by individuals striving to achieve and maintain a greater state of health.

### Sunshine and Your Health

If one regularly avoids sunlight exposure, research indicates a necessity to supplement with at least 5,000 units (IU) of vitamin D daily. To obtain this amount from milk one would need to consume 50 glasses. With a multivitamin more than 10 tablets would be necessary. Neither is advisable.

The skin produces approximately 10,000 IU vitamin D in response 20–30 minutes summer sun exposure—50 times more than the US government's recommendation of 200 IU per day!

## How to Get Enough Vitamin D

There are 3 ways for adults to insure adequate levels of vitamin D:

- **Regularly** receive midday sun exposure in the late spring, summer, and early fall, exposing as much of the skin as possible.
- **Regularly** use a sun bed (avoiding sunburn) during the colder months.
- **Take 5,000 IU** per day for three months, then obtain a 25-hydroxyvitamin D test. Adjust your dosage so that blood levels are between **50–80 ng/mL** (or 125–200 nM/L) year-round.

# Vitamin D3 (cholecalciferol)

## Higher Doses Reduce Risk of Common Health Concerns

Chris D. Meletis, ND — [link to article](#)

When examining the medical literature, it becomes clear that Vitamin D3 affects human health in an astonishing number of ways and that not obtaining enough of this important nutrient can leave the door open to developing a number of health conditions.

Vitamin D3 is one of the most useful nutritional tools we have at our disposal for improving overall health. This vitamin is unique because cholecalciferol (Vitamin D3) is a vitamin derived from 7-dehydrocholesterol; however, Vitamin D3 acquires hormone-like actions when cholecalciferol (Vitamin D3) is converted to 1,25-dihydroxy Vitamin D3 (Calcitriol) by the liver and kidneys. As a hormone, Calcitriol controls phosphorus, calcium, and bone metabolism and neuromuscular function. Vitamin D3 is the only vitamin the body can manufacture from sunlight (UVB). Yet, with today's indoor living and the extensive use of sunscreens due to concern about skin cancer, we are now a society with millions of individuals deficient in life-sustaining bone building and immune modulating 1,25-dihydroxy Vitamin D3.

For more than a century, scientists have recognized that Vitamin D3 is involved in bone health. Research has continued to accumulate, documenting Calcitriol's role in the reduction of the risk of fractures to a significant degree. The latest research, however, shows that 1,25-dihydroxy Vitamin D3 deficiency is linked to a surprising number of other health conditions such as depression, back pain, cancer, both insulin resistance and pre-eclampsia during pregnancy, impaired immunity and macular degeneration.

As it becomes clear that Vitamin D3 plays a wide role in overall health, it's becoming equally clear that a large percentage of individuals are deficient in this important nutrient, which has hormone-like activity. The fear of skin cancer has stopped many individuals from obtaining beneficial amounts of sunlight. The skin uses the energy of UVB to convert 7-dehydrocholesterol into Vitamin D3. Even individuals, who venture out into the sun often and use suntan lotion, may be deficient in Vitamin D3. Furthermore, as we age, we are less equipped to produce sufficient quantities of this vital nutrient. One study found that age-related declines in kidney function may require older people to ingest more Vitamin D3 to maintain the same blood levels as younger people.<sup>1</sup>

The Recommended Daily Intake (RDI) of Vitamin D3 is set so low those mature individuals who consume this small amount (400 to 600 International Unites (I.U.'s)) are still likely to be deficient if they live north of the Tropic of Cancer or south of the Tropic of Capricorn. In fact, researchers have discovered that the RDI, which was considered adequate to prevent osteomalacia (a painful bone disease) or rickets, is not high enough to protect against the majority of diseases linked to 1,25-dihydroxy Vitamin D3 deficiency. For example, an analysis of the medical literature found that at least 1,000 to 2,000 IU of Vitamin D3 per day is necessary to reduce the risk of colorectal cancer and that lower doses of Vitamin D3 did not have the same protective effect.<sup>2</sup>

### Researchers Call for Higher Doses

In an editorial in the March 2007 edition of the American Journal of Clinical Nutrition, a prominent group of researchers from leading institutions such as the University of Toronto, Brigham and Women's Hospital, Tufts University

and University Hospital in Zurich, Switzerland, lashed out at the conventional media for its inaccurate reporting of Vitamin D supplementation.<sup>3</sup>

The researchers wrote, "Almost every time the public media report that Vitamin D nutrition status is too low, or that higher Vitamin D intakes may improve measures of health, the advice that accompanies the report is outdated and thus misleading. Media reports to the public are typically accompanied by a paragraph that approximates the following: 'Current recommendations from the Institute of Medicine call for 200 IU/day from birth through age 50 years, 400 IU for those aged 51–70 years, and 600 IU for those aged >70 years. Some experts say that optimal amounts are closer to 1,000 IU daily. Until more is known, it is wise not to overdo it.' The only conclusion that the public can draw from this is to do nothing different from what they have done in the past."

The researchers point out that supplemental intake of 400 IU per day barely raises blood concentrations of 25(OH)D, which is the circulating Vitamin D metabolite that serves as the most frequently measured indicator of Vitamin D status. To raise 25(OH)D from 50 to 80 nmol/L requires an additional intake of 1,700 IU Vitamin D per day.

The researchers went on to write that, "The balance of the evidence leads to the conclusion that the public health is best served by a recommendation of higher daily intakes of Vitamin D. Relatively simple and low-cost changes, such as increased food fortification or increasing the amount of Vitamin D in Vitamin supplement products, may very well bring about rapid and important reductions in the morbidity associated with low Vitamin D status."

One of the challenges is the outdated acceptable upper limit for Vitamin D3 consumption, which was set at 2,000 IU. However, researchers point out that more recent studies have shown that 10,000 IU is the safe upper limit.<sup>4</sup>

Dr. R. Vieth, one of the foremost authorities on Vitamin D3 supplementation, has extensively studied Vitamin D, and lamented the low requirements for Vitamin D3 in a recent issue of the Journal of Nutrition: "Inappropriately low UL [upper limit] values, or guidance values, for Vitamin D have hindered objective clinical research on Vitamin D nutrition; they have hindered our understanding of its role in disease prevention, and restricted the amount of Vitamin D in multivitamins and foods to doses (that are) too low to benefit public health."<sup>5</sup>

When examining the medical literature, it becomes clear that Vitamin D3 affects human health in an astonishing number of ways and that not obtaining enough of this important nutrient can leave the door open to developing a number of health conditions.

### Depression

Vitamin D3 deficiency is common in older adults and has been implicated in psychiatric and neurologic disorders. For example, in one study of 80 older adults (40 with mild Alzheimer's disease and 40 nondemented persons), Vitamin D3

deficiency was associated with low mood and with impairment on two of four measures of cognitive performance.<sup>6</sup>

### **Back Pain**

Musculoskeletal disorders have been linked to Vitamin D3 deficiency in a number of studies. One of the newest studies explored the role that low Vitamin D3 levels play in the development of chronic low back pain in women. Sixty female patients in Egypt complaining of low back pain lasting more than three months were studied. Researchers measured levels of Vitamin D3 in the women with low back pain and compared those levels to those of 20 matched healthy controls.

The study revealed that patients with low back pain had significantly lower Vitamin D3 levels than controls. Low Vitamin D3 levels (25 OHD < 40 ng/ml) were found in 49/60 patients (81 percent) and 12/20 (60 percent) of controls.<sup>7</sup>

### **Bone Health**

One of the best known and long-established benefits of Vitamin D3 is its ability to improve bone health and the health of the musculoskeletal system. It is well documented that Vitamin D3 deficiency causes osteopenia, precipitates and exacerbates osteoporosis, causes a painful bone disease known as osteomalacia, and exacerbates muscle weakness, which increases the risk of falls and fractures. Vitamin D3 insufficiency may alter the regulatory mechanisms of parathyroid hormone (PTH) and cause a secondary hyperparathyroidism that increases the risk of osteoporosis and fractures.<sup>8</sup>

### **Cognitive Enhancement**

Scientists are developing a greater appreciation for Vitamin D3's ability to improve cognition. In a recent study, Vitamin D3 deficient subjects scored worse on mental function tests compared to individuals who had higher levels of the Vitamin.<sup>9</sup> The researchers wrote, "In conclusion, the positive, significant correlation between serum 25(OH)D concentration and MMSE [mental state examination scores] in these patients suggests a potential role for Vitamin D in cognitive function of older adults."

### **Cancer**

One researcher first noted the connection between Vitamin D3 and protection from cancer in the 1940s, when he discovered that individuals at sunny latitudes had a reduced rate of deaths from cancer. He suggested that sunlight provided "a relative cancer immunity."

Since then, a number of studies have strongly suggested that Vitamin D3 deficiency is associated with an increased risk of developing many forms of cancer including breast, ovarian, prostate and colon cancer.<sup>10</sup> In one recent clinical trial, researchers studied 1,179 healthy, postmenopausal women (all 55 years or older and free of known cancers for at least 10 years prior to entering the study) who were taking large amounts of Vitamin D3 with calcium. The subjects were randomly assigned to take daily dosages of: (1) 1,400-1,500 mg supplemental calcium, (2) 1,400-1,500 mg supplemental calcium plus 1,100 IU of Vitamin D3, or (3) placebos. Over the four-year trial, women in the calcium/Vitamin D3 group experienced a 60 percent or greater reduced risk of cancer than their peers in the placebo group, who were not consuming these supplements.

Because there was the chance that some women may have had undiagnosed cancers at the study's start, the researchers threw out the first-year results and then analyzed the results from the last three years of the trial. These later years resulted in even more dramatic decrease, with the calcium/Vitamin D3 group experiencing a 77 percent reduction in cancer risk.

There was no statistically significant difference in cancer incidence between the participants taking placebos and subjects consuming only calcium supplements.<sup>11</sup>

Another interesting study demonstrated that in vitro Vitamin D3 may cause tumor cells to be more sensitive to chemotherapy drugs, increasing the efficacy of the cancer treatment.<sup>12</sup>

### **Immunity**

Scientists have linked various aspects of immune health to a Vitamin D3 deficiency. Vitamin D3 regulates T cells, which are important to the functioning of a strong immune system. Vitamin D3 acts as an immune system modulator, preventing excessive expression of inflammatory cytokines and increasing the killing efficiency of macrophages. In addition, it dramatically stimulates the expression of potent anti-microbial peptides, which exist in immune system cells such as neutrophils, monocytes, natural killer cells, and in cells lining the respiratory tract. These Vitamin-D3-stimulated peptides play a major role in protecting the lung from infection.<sup>13</sup>

In addition, Vitamin D3 deficiency may influence development and progression of various autoimmune diseases.<sup>14</sup>

### **Multi-Talented Nutrient**

Vitamin D3 deficiency has been linked to a host of other conditions such as high blood pressure, fibromyalgia, diabetes, multiple sclerosis, rheumatoid arthritis, and an increased risk of pre-eclampsia and insulin resistance during pregnancy.<sup>11, 15-16</sup> Most recently, low Vitamin D3 levels have been linked to an increased prevalence of early age-related macular degeneration.<sup>17</sup>

### **Proper Dosage**

In many of my patients, even after consuming 2,000 to 4,000 IU of Vitamin D3 per day, their test results indicate that their Vitamin D3 levels have not increased. These patients needed to consume 8,000 IU of Vitamin D3 per day to achieve proper blood levels of the Vitamin. Patients should, therefore, have their physicians test their serum 1,25-dihydroxy D3 levels to determine the proper level of supplementation required. Testing is very important due to the fact that, in a small number of patients, Vitamin D3 supplementation can raise calcium levels to an excessively high level. I have found this to be especially true in African American patients. Testing for 1,25-dihydroxy Vitamin D3, PTH and calcium blood levels should therefore become a part of every woman's regular blood work.

### **Conclusion**

A growing number of researchers who have widely studied Vitamin D3 are almost begging the general public to consume more of this important nutrient. Due to Vitamin D3's high safety profile in doses up to 10,000 IU per day and because of the wide role it plays in our health, consuming 2,000 to 4,000 IU per day of this nutrient at times of the year when sunlight is scarce is a prudent way to improve overall health.

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# Top 10 Myths About Vitamin D

Jared M. Skowron, ND

## **Myth 1: Vitamin D is a vitamin.**

*The truth:* Vitamin D is a hormone. It's derived from cholesterol. It activates cellular processes and does not do so as a co-factor.

Vitamin D receptors have direct effects on the following cells: adipose, adrenal, bone, brain, breast, cancer, cartilage, colon, endothelium, epididymis, ganglion, hair follicle, intestine, kidney, liver, lung, muscle, osteoblasts, ovary, pancreatic B, parathyroid, parotid, pituitary, placenta, prostate, skin, stomach, testis, thymus, thyroid and uterus.

## **Myth 2: Normal activity provides us enough vitamin D from average sun exposure.**

*The truth:* Most people do not get enough sunshine to maintain adequate vitamin D levels. Our ancestors spent most of the day in the sun, farming, fishing and hunting. Our bodies physiologically developed to need that much vitamin D. Today's indoor society of office workers, television watchers and hermits gets much less sun exposure and vitamin D production. Add on clothing and sunscreen, which also inhibit vitamin D production, and you understand the problem.

## **Myth 3: Supplemented vitamin D in foods is adequate.**

*The truth:* Vitamin D2 is one-third as effective in the body as naturally occurring vitamin D3. Most foods – milk, most notably – have D2 added. A study that analyzed vitamin D2 levels in milk off supermarket shelves showed almost 50 percent had less than the label claim of 400 IU of D2. A support scientist from the USDA believes no food-label claims are accurate and these labels cannot be trusted.

## **Myth 4: 1,25(OH)D3 is the best analysis for vitamin D levels.**

*The truth:* Vitamin D is mostly stored in adipose and should not be routinely measured. It then converts to 25(OH)D3, which has a long half-life and is the best analysis of vitamin D levels. It then converts to bi-hydroxy forms such as 1,25(OH)D3, 24,25(OH)D3 and other forms, which have the actual action of the cell receptors. However, this form has a short half-life and is not a good measurement.

## **Myth 5: The reference range for vitamin D levels is accurate.**

*The truth:* The reference range for 25(OH)D3 is horribly inaccurate and is maintaining our vitamin D deficiency in this country. The current reference range of 20-100 is too low. Levels <25 are disease level. Levels between 25 and 75 are suboptimal. Levels between 75 and 200 are optimal.

## **Myth 6: Vitamin D supplementation is nontoxic.**

*The truth:* The major consequence of vitamin D toxicity is hypercalcemia, which should be monitored periodically while under therapy. Changes in cardiac rhythms or lithiasis are common concerns. Urine calcium monitoring is not accurate. Serum calcium should be monitored monthly to check vitamin D toxicity, which normally occurs at 40,000 IU/day. Right now, 10,000 IU/day is being proposed as the safe upper limit.

## **Myth 7: The RDA for vitamin D is accurate.**

*The truth:* People taking only the RDA of vitamin D will lower their 25(OH)D3 levels. The RDA is too low. When treating with vitamin D supplementation, three months of daily dosing is sufficient to max out 25(OH)D3 levels. Five thousand IU/day for three months should elevate 25(OH)D3 by 80 nmol/L, and 10,000 IU/day for three months should elevate 25(OH)D3 by 120 nmol/L. People on 1,000 IU/day will elevate their levels by only 10 nmol/L.

## **Myth 8: Forms of vitamin D are all the same.**

*The truth:* Vitamin D3 is the preferred form. Avoid D2 at all costs. D3 is derived either from plant sources or from lanolin. Lanolin-derived D3 is more active and absorbable. I take the 10,000 IU capsules of D3.

## **Myth 9: Vitamin D only treats osteoporosis and rickets.**

*The truth:* The therapeutic benefits of vitamin D are still being discovered. Benefits relative to cancer, cardiac, immune-boosting, diabetes and neurological (such as multiple sclerosis) therapies, as well as low bone density, are just the tip of the iceberg. I test all of my patients for vitamin D deficiency and supplement regularly up to the 75-200 reference range of 25(OH)D3.

## **Myth 10: Vitamin D should be avoided in pregnancy and breastfeeding.**

*The truth:* Pregnant women should receive 4,000 IU of daily vitamin D supplementation. Breast-feeding women should receive 6,000 IU of daily vitamin D supplementation. Vitamin D, not 25(OH)D3, crosses into the breast milk, and daily doses are preferred over weekly doses. Avoid supplementing the infant and instead supplement the breast-feeding mother directly. If the infant is bottle-fed, supplement with 400-800 IU/day.

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# Epidemic Influenza And Vitamin D

John Cannell, MD — Medical News Today — 15 Sep 2006

In early April of 2005, after a particularly rainy spring, an influenza epidemic (epi: upon, demic: people) exploded through the maximum-security hospital for the criminally insane where I have worked for the last ten years. It was not the pandemic (pan: all, demic: people) we all fear, just an epidemic. The world is waiting and governments are preparing for the next pandemic. A severe influenza pandemic will kill many more Americans than died in the World Trade Centers, the Iraq war, the Vietnam War, and Hurricane Katrina combined, perhaps a million people in the USA alone. Such a disaster would tear the fabric of American society. Our entire country might resemble the Superdome or Bourbon Street after Hurricane Katrina.

It's only a question of when a pandemic will come, not if it will come. Influenza A pandemics come every 30 years or so, severe ones every hundred years or so. The last pandemic, the Hong Kong flu, occurred in 1968 - killing 34,000 Americans. In 1918, the Great Flu Epidemic killed more than 500,000 Americans. So many millions died in other countries, they couldn't bury the bodies. Young healthy adults, in the prime of their lives in the morning, drowning in their own inflammation by noon, grossly discolored by sunset, were dead at midnight. Their body's own broad-spectrum natural antibiotics, called antimicrobial peptides, seemed nowhere to be found. An overwhelming immune response to the influenza virus - white blood cells releasing large amounts of inflammatory agents called cytokines and chemokines into the lungs of the doomed - resulted in millions of deaths in 1918.

As I am now a psychiatrist, and no longer a general practitioner, I was not directly involved in fighting the influenza epidemic in our hospital. However, our internal medicine specialists worked overtime as they diagnosed and treated a rapidly increasing number of stricken patients. Our Chief Medical Officer quarantined one ward after another as more and more patients were gripped with the chills, fever, cough, and severe body aches that typifies the clinical presentation of influenza A.

Epidemic influenza kills a million people in the world every year by causing pneumonia, "the captain of the men of death." These epidemics are often explosive; the word influenza comes from Italian (Medieval Latin *influentia*) or influence, because of the belief that the sudden and abrupt epidemics were due to the influence of some extraterrestrial force. One seventeenth century observer described it well when he wrote, "suddenly a Distemper arose, as if sent by some blast from the stars, which laid hold on very many together: that in some towns, in the space of a week, above a thousand people fell sick together."

I guess our hospital was under luckier stars as only about 12% of our patients were infected and no one died. However, as the epidemic progressed, I noticed something unusual. First, the ward below mine was infected, and then the ward on my right, left, and across the hall - but no patients on my ward became ill. My patients had intermingled with patients from infected wards before the quarantines. The nurses on my unit cross-covered on infected wards. Surely, my patients were exposed to the influenza A virus. How did my patients escape infection from what some think is the most infectious of all the respiratory viruses?

My patients were no younger, no healthier, and in no obvious way different from patients on other wards. Like other wards, my patients are mostly African Americans who came from the same prisons and jails as patients on the infected wards. They were prescribed a similar assortment of powerful psychotropic

medications we use throughout the hospital to reduce the symptoms of psychosis, depression, and violent mood swings and to try to prevent patients from killing themselves or attacking other patients and the nursing staff. If my patients were similar to the patients on all the adjoining wards, why didn't even one of my patients catch the flu?

A short while later, a group of scientists from UCLA published a remarkable paper in the prestigious journal, *Nature*. The UCLA group confirmed two other recent studies, showing that a naturally occurring steroid hormone - a hormone most of us take for granted - was, in effect, a potent antibiotic. Instead of directly killing bacteria and viruses, the steroid hormone under question increases the body's production of a remarkable class of proteins, called antimicrobial peptides. The 200 known antimicrobial peptides directly and rapidly destroy the cell walls of bacteria, fungi, and viruses, including the influenza virus, and play a key role in keeping the lungs free of infection. The steroid hormone that showed these remarkable antibiotic properties was plain old vitamin D.

All of the patients on my ward had been taking 2,000 units of vitamin D every day for several months or longer. Could that be the reason none of my patients caught the flu? I then contacted Professors Reinhold Vieth and Ed Giovannucci and told them of my observations. They immediately advised me to collect data from all the patients in the hospital on 2,000 units of vitamin D, not just the ones on my ward, to see if the results were statistically significant. It turns out that the observations on my ward alone were of borderline statistical significance and could have been due to chance alone. Administrators at our hospital agreed, and are still attempting to collect data from all the patients in the hospital on 2,000 or more units of vitamin D at the time of the epidemic.

Four years ago, I became convinced that vitamin D was unique in the vitamin world by virtue of three facts. First, it's the only known precursor of a potent steroid hormone, calcitriol, or activated vitamin D. Most other vitamins are antioxidants or co-factors in enzyme reactions. Activated vitamin D - like all steroid hormones - damasks the genome, turning protein production on and off, as your body requires. That is, vitamin D regulates genetic expression in hundreds of tissues throughout your body. This means it has as many potential mechanisms of action as genes it damasks.

Second, vitamin D does not exist in appreciable quantities in normal human diets. True, you can get several thousand units in a day if you feast on sardines for breakfast, herring for lunch and salmon for dinner. The only people who ever regularly consumed that much fish are peoples, like the Inuit, who live at the extremes of latitude. The milk Americans depend on for their vitamin D contains no naturally occurring vitamin D; instead, the U.S. government requires fortified milk to be supplemented with vitamin D, but only with what we now know to be a paltry 100 units per eight-ounce glass.

The vitamin D steroid hormone system has always had its origins in the skin, not in the mouth. Until quite recently, when dermatologists and governments began warning us about the dangers of sunlight, humans made enormous quantities of vitamin D where humans have always made it, where naked skin meets the ultraviolet B radiation of sunlight. We just cannot get adequate amounts of vitamin D from our diet. If we don't expose ourselves to ultraviolet light, we must get vitamin D from dietary supplements.

The third way vitamin D is different from other vitamins is the dramatic difference between natural vitamin D nutrition and the modern one. Today, most humans only make about a thousand units of vitamin D a day from sun exposure; many people, such as the elderly or African Americans, make much less than that. How much did humans normally make? A single, twenty-minute, full body exposure to summer sun will trigger the delivery of 20,000 units of vitamin D into the circulation of most people within 48 hours. Twenty thousand units, that's the single most important fact about vitamin D. Compare that to the 100 units you get from a glass of milk, or the several hundred daily units the U.S. government recommend as "Adequate Intake." It's what we call an "order of magnitude" difference.

Humans evolved naked in sub-equatorial Africa, where the sun shines directly overhead much of the year and where our species must have obtained tens of thousands of units of vitamin D every day, in spite of our skin developing heavy melanin concentrations (racial pigmentation) for protecting the deeper layers of the skin. Even after humans migrated to temperate latitudes, where our skin rapidly lightened to allow for more rapid vitamin D production, humans worked outdoors. However, in the last three hundred years, we began to work indoors; in the last one hundred years, we began to travel inside cars; in the last several decades, we began to lather on sunblock and consciously avoid sunlight. All of these things lower vitamin D blood levels. The inescapable conclusion is that vitamin D levels in modern humans are not just low - they are aberrantly low.

About three years ago, after studying all I could about vitamin D, I began testing my patient's vitamin D blood levels and giving them literature on vitamin D deficiency. All their blood levels were low, which is not surprising as vitamin D deficiency is practically universal among dark-skinned people who live at temperate latitudes. Furthermore, my patients come directly from prison or jail, where they get little opportunity for sun exposure. After finding out that all my patients had low levels, many profoundly low, I started educating them and offering to prescribe them 2,000 units of vitamin D a day, the U.S. government's "Upper Limit."

Could vitamin D be the reason none of my patients got the flu? In the last several years, dozens of medical studies have called attention to worldwide vitamin D deficiency, especially among African Americans and the elderly, the two groups most likely to die from influenza. Cancer, heart disease, stroke, autoimmune disease, depression, chronic pain, depression, gum disease, diabetes, hypertension, and a number of other diseases have recently been associated with vitamin D deficiency. Was it possible that influenza was as well?

Then I thought of three mysteries that I first learned in medical school at the University of North Carolina: (1) although the influenza virus exists in the population year-round, influenza is a wintertime illnesses; (2) children with vitamin D deficient rickets are much more likely to suffer from respiratory infections; (3) the elderly in most countries are much more likely to die in the winter than the summer (excess wintertime mortality), and most of that excess mortality, although listed as cardiac, is, in fact, due to influenza.

Could vitamin D explain these three mysteries, mysteries that account for hundreds of thousands of deaths every year? Studies have found the influenza virus is present in the population year-around; why is it a wintertime illness? Even the common cold got its name because it is common in cold weather and rare in the summer. Vitamin D blood levels are at their highest in the summer but reach their lowest levels during the flu and cold

season. Could such a simple explanation explain these mysteries?

The British researcher, Dr. R. Edgar Hope-Simpson, was the first to document the most mysterious feature of epidemic influenza, its wintertime surfeit and summertime scarcity. He theorized that an unknown "seasonal factor" was at work, a factor that might be affecting innate human immunity. Hope-Simpson was a general practitioner who became famous in the late 1960's after he discovered the cause of shingles. British authorities bestowed every prize they had on him, not only because of the importance of his discovery, but because he made the discovery own his own, without the benefit of a university appointment, and without any formal training in epidemiology (the detective branch of medicine that methodically searches for clues about the cause of disease).

After his work on shingles, Hope-Simpson spent the rest of his working life studying influenza. He concluded a "seasonal factor" was at work, something that was regularly and predictably impairing human immunity in the winter and restoring it in the summer. He discovered that communities widely separated by longitude, but which shared similar latitude, would simultaneously develop influenza. He discovered that influenza epidemics in Great Britain in the 17th and 18th century occurred simultaneously in widely separated communities, before modern transportation could possibly explain its rapid dissemination. Hope-Simpson concluded a "seasonal factor" was triggering these epidemics. Whatever it was, he was certain that the deadly "crop" of influenza that sprouts around the winter solstice was intimately involved with solar radiation. Hope-Simpson predicted that, once discovered, the "seasonal factor" would "provide the key to understanding most of the influenza problems confronting us."

Hope-Simpson had no way of knowing that vitamin D has profound effects on human immunity, no way of knowing that it increases production of broad-spectrum antimicrobial peptides, peptides that quickly destroy the influenza virus. We have only recently learned how vitamin D increases production of antimicrobial peptides while simultaneously preventing the immune system from releasing too many inflammatory cells, called chemokines and cytokines, into infected lung tissue.

In 1918, when medical scientists did autopsies on some of the fifty million people who died during the 1918 flu pandemic, they were amazed to find destroyed respiratory tracts; sometimes these inflammatory cytokines had triggered the complete destruction of the normal epithelial cells lining the respiratory tract. It was as if the flu victims had been attacked and killed by their own immune systems. This is the severe inflammatory reaction that vitamin D has recently been found to prevent.

I subsequently did what physicians have done for centuries. I experimented, first on myself and then on my family, trying different doses of vitamin D to see if it has any effects on viral respiratory infections. After that, as the word spread, several of my medical colleagues experimented on themselves by taking three-day courses of pharmacological doses (2,000 units per kilogram per day) of vitamin D at the first sign of the flu. I also asked numerous colleagues and friends who were taking physiological doses of vitamin D (5,000 units per day in the winter and less, or none, in the summer) if they ever got colds or the flu, and, if so, how severe the infections were. I became convinced that physiological doses of vitamin D reduce the incidence of viral respiratory infections and that pharmacological doses significantly ameliorate the symptoms of some viral respiratory infections if taken early in the course of

the illness. However, such observations are so personal, so likely to be biased, that they are worthless science.

As I waited for the hospital to finish collecting data from all the patients taking vitamin D at the time of the outbreak - to see if it really reduced the incidence of influenza - I decided to research the literature thoroughly, finding all the clues in the world's medical literature that indicated if vitamin D played any role in preventing influenza or other viral respiratory infections. I worked on the paper for over a year, writing it with Professor Edward Giovannucci of Harvard, Professor Reinhold Vieth of the University of Toronto, Professor Michael Holick of Boston University, Professor Cedric Garland of U.C., San Diego, as well as Dr. John Umhau of the National Institute of Health, Sasha Madronich of the National Center for Atmospheric Research, and Dr. Bill Grant at the Sunlight, Nutrition and Health Research Center. After numerous revisions, we submitted our paper to the same widely respected journal where Dr. Hope-Simpson published most of his work several decades ago.

*Epidemiology and Infection*, known as *The Journal of Hygiene* in Hope-Simpson's day, recently published our paper. The editor, Professor Norman Noah, knew Dr. Hope-Simpson and helped tremendously with the paper. In the paper, we detailed our theory that vitamin D is Hope-Simpson's long forgotten "seasonal stimulus." We proposed that annual fluctuations in vitamin D levels explain the seasonality of influenza. The periodic seasonal fluctuations in 25-hydroxy-vitamin D levels, which cause recurrent and predictable wintertime vitamin D deficiency, predispose human populations to influenza epidemics. We raised the possibility that influenza is a symptom of vitamin D deficiency in the same way that an unusual form of pneumonia (*pneumocystis carinii*) is a symptom of AIDS. That is, we theorized that George Bernard Shaw was right when he said, "the characteristic microbe of a disease might be a symptom instead of a cause." In the paper, we propose that vitamin D explains the following 14 observations:

1. Why the flu predictably occurs in the months following the winter solstice, when vitamin D levels are at their lowest,
2. Why it disappears in the months following the summer solstice,
3. Why influenza is more common in the tropics during the rainy season,
4. Why the cold and rainy weather associated with El Nino Southern Oscillation (ENSO), which drives people indoors and lowers vitamin D blood levels, is associated with influenza,
5. Why the incidence of influenza is inversely correlated with outdoor temperatures,

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-- Dr. John Umhau, Laboratory of Clinical and Translational Studies, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, Bethesda, MD

6. Why children exposed to sunlight are less likely to get colds,
7. Why cod liver oil (which contains vitamin D) reduces the incidence of viral respiratory infections,
8. Why Russian scientists found that vitamin D-producing UVB lamps reduced colds and flu in schoolchildren and factory workers,
9. Why Russian scientists found that volunteers, deliberately infected with a weakened flu virus - first in the summer and then again in the winter - show significantly different clinical courses in the different seasons,
10. Why the elderly who live in countries with high vitamin D consumption, like Norway, are less likely to die in the winter,
11. Why children with vitamin D deficiency and rickets suffer from frequent respiratory infections,
12. Why an observant physician (Rehman), who gave high doses of vitamin D to children who were constantly sick from colds and the flu, found the treated children were suddenly free from infection,
13. Why the elderly are so much more likely to die from heart attacks in the winter rather than in the summer,
14. Why African Americans, with their low vitamin D blood levels, are more likely to die from influenza and pneumonia than Whites are.

Although our paper discusses the possibility that physiological doses of vitamin D (5,000 units a day) may prevent colds and the flu, and that physicians might find pharmacological doses of vitamin D (2,000 units per kilogram of body weight per day for three days) useful in treating some of the one million people who die in the world every year from influenza, we remind readers that it is only a theory. Like all theories, our theory must withstand attempts to be disproved with dispassionately conducted and well-controlled scientific experiments.

However, as vitamin D deficiency has repeatedly been associated with many of the diseases of civilization, we point out that it is not too early for physicians to aggressively diagnose and adequately treat vitamin D deficiency. We recommend that enough vitamin D be taken daily to maintain 25-hydroxy vitamin D levels at levels normally achieved through summertime sun exposure (50 ng/ml). For many persons, such as African Americans and the elderly, this will require up to 5,000 units daily in the winter and less, or none, in the summer, depending on summertime sun exposure.

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<http://www.vitamincouncil.com>

Cannell JJ, Vieth R, Umhau JC, Holick MF, Grant WB, Madronich S, Garland CF, and Giovannucci E. Epidemic Influenza and Vitamin D. *Epidemiol Infect.* 2006 Sep 7;:1-12 (Epub ahead of print)

# Treating Disease With Vitamin D

John Jacob Cannell, MD – Vitamin D Council – 2004.12.14

We predict the future recommended daily allowance (RDA) for vitamin D, for otherwise healthy people, will be at least 1000 IU/day (in the new official units for vitamins, this translates to 25 ug/day). This amount is already the consensus of nutrition experts in the field of osteoporosis and vitamin D. Such recommendations only apply to healthy people. If you have vitamin D deficiency, or the diseases of vitamin D deficiency, you need to be under the care of a physician.

## Monitoring 25(OH)D Levels

Take control of your health by monitoring your own vitamin D levels! We predict that treatment with physiological doses of vitamin D3 (between 4,000–10,000 IU/day from all sources, including sun, food and supplements) along with periodic monitoring of blood calcidiol and calcium levels will become routine.

Zittermann A. Vitamin D in preventive medicine: are we ignoring the evidence? Br J of Nutr. 2003;89:552–572. Holick M. Vitamin D: A Millennium Perspective. J Cell Biochem. 2003;88:296–307.

Research indicates it will help several vitamin D deficiency-associated diseases such as: autism, autoimmune illness, cancer, chronic pain, depression, diabetes, heart disease, hyperparathyroidism, hypertension, influenza, myopathy (neuromuscular disorders), and osteoporosis.

At this time, we advise even healthy people (those without the diseases of vitamin D deficiency) to seek a knowledgeable physician and have your 25(OH)D level measured. If your levels are below 40 ng/mL you need enough sun, artificial light, oral vitamin D3 supplements, or some combination of the three, to maintain your 25(OH)D levels between 40–65 ng/mL year-round.

## How Much Vitamin D?

If you refuse to see a physician, or can't find a knowledgeable one, purchase the 1000 IU/day vitamin D3 cholecalciferol pills that are available over-the-counter in North America. Take an average of 2 pills a day (50 ug or 2,000 IU) year-round if you have some sun exposure. If you have little, or no, sun exposure you will need to take more than 2,000 IU per day. How much more depends on your latitude of residence, skin pigmentation, and body weight. Generally speaking, the further you live away from the equator, the darker your skin, and/or the more you weigh, the more you will have to take to maintain healthy blood levels. For example, Dr. Cannell lives at latitude 32 degrees, weighs 220 pounds, and has fair skin. In the late fall and winter he takes 5,000 IU per day. In the early fall and spring he takes 2,000 IU per day. In the summer he regularly sunbathes for a few minutes most days and thus takes no vitamin D on those days in the summer. The only way you can know how much you vitamin D you need to take is by repeatedly getting your blood tested—known as a 25(OH)D test—and seeing what you need to do to keep your level around 50 ng/mL.

## Infants and Children

Infants and children under the age of one, should obtain a total of 1,000 IU (25 mcg) per day from their formula, sun exposure, or supplements. As most breast milk contains little or no vitamin D, breast-fed babies should take 1,000 IU per day as a supplement unless they are exposed to sunlight. The only exception to this are lactating mothers who either get enough sun exposure or take enough vitamin D (usually

4,000–6,000 IU per day) to produce breast milk that is rich in vitamin D. Formula fed babies should take an extra 600 IU per day until they are weaned and then take 1,000 IU a day, as advised below.

Children over the age of 1 year, and less than 4 years of age, should take 1,500 IU vitamin D per day, depending on body weight, latitude or residence, skin pigmentation, and sun exposure.

Children over the age of 4, and less than 10 years of age, should take 2,000 IU per day, unless they get significant sun exposure. On the days they are outside in the sun, they do not need to take any; in the winter they will need to take 2,000 IU every day.

Children over the age of 10 years old should follow instructions for adults detailed above.

## Vitamin D Upper Limit

If you absolutely avoid the sun, you should have your 25(OH)D level measured and remember that a maximum of two pills a day (50 ug or 2,000 IU) is the upper limit (UL) currently listed by the Food and Nutrition Board as the amount not to exceed unless under the care of a physician. When it comes to vitamin D, the right amount is good—a lot is not better and can be dangerous. However, 2,000 IU a day is simply not enough for many people to get the full benefit of vitamin D, nor is it enough to keep vitamin D levels around 50 ng/mL, especially in the winter.

## Maintaining 25(OH)D Levels

If you are suffering from any of the diseases associated with vitamin D deficiency you need to be under the care of a knowledgeable physician. Your physician needs to replete your vitamin D system with sunlight, artificial light, oral vitamin D, or a combination of the three, while treating your vitamin D deficiency illnesses using conventional means. Regardless of the method used, we believe your physician should be certain your 25(OH)D levels are maintained between 35–65 ng/mL.

For those who do not fear the sun, judiciously expose as much skin as possible to direct midday sunlight for 1/4 the time it takes for one's skin to turn red during those months when the proper ultraviolet light occurs at one's latitude (usually late spring, summer and early fall). Do not get sunburned. Vitamin D production is already maximized before your skin turns pink and further exposure does not increase levels of vitamin D but may increase your risk of skin cancer. Black patients may need 5–10 times longer in the sun than white patients, depending on skin type. After several months of judicious sun exposure, a 25(OH)D level should again be obtained to ensure levels between 35–65 ng/mL.

Several artificial light sources are commercially available that provide the proper wavelength for vitamin D production. Sperti makes a good UVB lamp and even has data available on the vitamin D production of its sunlamps.

As far as vitamin D supplements are concerned, we believe cholecalciferol is the preferred oral form of vitamin D, as it is the compound your skin makes naturally when you go in the



In-Home ZRT Vitamin D Blood Test Kit

sun. It is more potent and perhaps even safer than the synthetic analog, ergocalciferol, in more common use.

Vieth R, Chan PC, MacFarlane GD. Efficacy and safety of vitamin D3 intake exceeding the lowest observed adverse effect level. Am J Clin Nutr. 2001 Feb;73(2):288-94.

Cholecalciferol is 1.7 times more efficient at raising 25(OH)D levels than is ergocalciferol.

Trang HM, Cole DE, Rubin LA, Pierratos A, Siu S, Vieth R. Evidence that vitamin D3 increases serum 25-hydroxyvitamin D more efficiently than does vitamin D2. Am J Clin Nutr. 1998 Oct;68(4):854-8.

### **Calcitriol Contraindicated in Vitamin D Deficiency**

Ergocalciferol has been used safely by physicians for years for a variety of indications. Unfortunately, when doctors don't prescribe ergocalciferol, they sometimes prescribe calcitriol or newer analogs of calcitriol, costing thousands of times more than cholecalciferol. Calcitriol, and its analogs, are contraindicated in vitamin D deficiency because they may cause hypercalcemia and they fail to address the real problem: low stores of 25(OH)D. Cholecalciferol repletes the vitamin D system by filling up your vitamin D tank with 25(OH)D, the vitamin D fuel. Vieth R. **The pharmacology of vitamin D, including fortification strategies.** In: Feldman D, Glorieux F, eds. Vitamin D, Chapter 61, in press, 2nd ed. Academic Press, San Diego.

Giving calcitriol, or its analogs, for vitamin D deficiency is like shooting ether into your engine to keep your car running.

In addition, they pose a significant risk of hypercalcemia (high blood calcium). If you have a simple vitamin D deficiency and your doctor insists on prescribing calcitriol or an expensive analog of vitamin D (other than cholecalciferol or ergocalciferol), find another doctor.

### **Hypersensitivity Not Toxicity**

Vitamin D hypersensitivity syndromes are often mistaken for vitamin D toxicity. This rare syndrome occurs when abnormal tissue subvert the kidney's normal regulation of endocrine 1,25(OH)2D3 (calcitriol) production. Aberrant tissues, usually granulomatous in nature, convert 25(OH)D into 1,25(OH)2D3 causing high blood calcium. The most common of such conditions are sarcoidosis, oat cell carcinoma of the lung, and non-Hodgkin's lymphoma although other illness, such as primary hyperparathyroidism, can cause the syndrome. Periodic measurements of 25(OH)D levels and serum calcium will alert the physician to the need to do more tests, such as 1,25(OH)2D3 or PTH.

Toxicity is simply not a concern in doses below 10,000 units a day. Restoring physiological serum levels of 25(OH)D will help many more patients than it will hurt.

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# Pandemics and Poor Information

The best health professionals can do is convert unknown risks to known risks.

L. Gordon Crovitz — WSJ — May 11, 2009

In cities across China, authorities rounded up all the Mexican nationals they could find, put them in isolation, and then shipped them by plane back to Mexico. In Hong Kong, as the Journal reported, foreign guests inside a quarantined hotel lobby held a sign: "We will exchange information for beer and food and cigarettes."

Whenever there's a threat of epidemic, alongside early deaths comes the casualty of information. Asian governments at least learned from their recent experience of bird flu and SARS the importance of not covering up outbreaks. The still open question is how to assess warnings that health professionals make based on inadequate information. Almost by definition, the risk of an epidemic occurs when the one thing disease experts know for sure is that they don't know for sure what will happen.

Institutions like the Centers for Disease Control and Prevention focus on stopping worst-case outcomes. The worst is indeed terrible. The pandemic of 1918 infected one in five people around the world, killing at least 50 million -- three times as many as died in World War I. So many Americans were killed in 1918 that the average life span for that year in the U.S. fell by 12 years.

The uncertainty about the longer-term threat of the current swine flu is a reminder that nature is more complex than mathematical models. Epidemiologists try to understand how infections spread by identifying variables relevant to particular illnesses. These could include the presence of swine, the proportion of the population infected, and how infectious a virus might be. Scientific hypotheses can then be tested, but this approach has limits when it comes to predictions.

"Disease outbreaks are fundamentally unpredictable in detail," argues public-health academic Philip Alcabes, author of "Dread." Instead of looking to physicians to predict epidemics, "we should leave the job of seeing the future to the mystics, prophets and fortunetellers."

He likens the challenge of predicting epidemics to the surprise of the financial crisis. Risk assessment in markets broke down as complex credit factors interacted in new ways, from low interest rates to new securities that brought systemic risk. Likewise, epidemics have causes that are "complex, multicausal and determined more powerfully by interacting forces in the environment."

Epidemics are not predictable, and many that are predicted don't occur. Consider the great swine flu of

1976 that wasn't. A soldier died at Fort Dix, N.J., of a virus that seemed similar to the flu of 1918. Fear of the worst case led the U.S. to mandate vaccinations across the country. The controversial program ended when there were few cases. In the meantime, vaccine manufacturers demanded government protection from liability for alleged side effects, which amounted to almost \$100 million.

This episode led to a fascinating analysis by historians Richard Neustadt and Ernest May. They interviewed the top health advisers whose consensus led to the faulty decision to order vaccinations. They noted that at no point were the experts asked to declare publicly the odds they assigned to an epidemic. After the fact, it was determined that their private estimates ranged from just 2% to 20%.

Messrs. Neustadt and May recommended an information-gathering approach they called "Alexander's Question," named for a physician who had posed a canny question of his fellow experts: What information might make the group change its mind about the need for immunization?

The question was raised at a key meeting but not answered. Focusing on it would have led to more focus on uncertainties: the trade-off between side effects and flu, the difference between the severity of the flu and its spread, and the choice between mandatory vaccinations and stockpiling in case of later need. Decision makers should ask themselves what new "knowns" would change their views.

Instead, as Gina Kolata noted in her book "Flu," the medical community's low-risk assessment somehow became translated by policy makers into a probability of epidemic.

The policy prescription calls for more transparency about the great limits of our knowledge about epidemics. We know that rounding up all Mexicans in China defies logic. We also know that if health experts fully understood the causes of epidemics, they would know with certainty when to mandate vaccinations. It's understandable that we want action, but we should be logical enough to do more than demand action for its own sake.

As much progress as prevention has made, the probability of flu becoming an epidemic defies current scientific understanding. Instead of asking health professionals to divine the future, we should accept that the best they can do is focus on the science, over time converting unknown risks to known risks. This creates the information needed to make life and death more predictable, or at least less unpredictable.



A couple waves from the quarantined Metro Park Hotel in Hong Kong.