the FELIX Letter
A COMMENTARY ON NUTRITION
No. 114 2001

VITAMIN D: FASCINATING, COMPLEX, ELUSIVE

In sleepy, rural Woodacre, about 30 miles north of San Francisco, nutrition consultant and teacher Krispin Sullivan is working towards a large goal. She wants HMOs and all healthcare providers to make testing and retesting of patients' vitamin D levels a routine and universal procedure, no less.

She learned this the hard way. Here in the Bay Area at 38° N latitude, UV-B solar rays that make the vitamin for you in your skin are not abundant many months of the year. When Sullivan began her testing about a year ago, she found D deficiency to be the rule and sufficiency the exception. Out of 100 clients tested, *only two had sufficient D:* one, a chronic summer 'sunner' who spends winters in Hawaii, and the other a person with psoriasis who uses a UV-B light daily.

But she also encountered huge differences in how efficiently clients either absorbed or hung on to the vitamin (from supplements, food, and/or UV-B light). One client's curative supplement dose could be another client's poison! More on this later.

Forget what I wrote about getting sun on your bod every chance you get. Sorry, dear readers -- late in the game I've learned the only wavelengths of solar ultraviolet rays that can make vitamin D in your skin are in the 290 - 315 nanomole ultraviolet-B range. In northern or southern latitudes greater than 30°, UV-B is scarce many months of the year and available primarily only in the middle of the day. Check your world atlas: a good chunk of the world's population resides in higher-than-30° latitudes--*FL* readers too, except for small coveys in Malaysia, Kenya, Queensland, and South Australia.

What we're receiving in all latitudes--winter to summer, sunrise to sunset--are ultraviolet-A rays. UV-A penetrates skin more deeply than UV-B, tans you, but can't produce D in your epidermis. UV-A *can* foster moles, "age" spots, and skin cancers. While too much UV-B can burn your skin, the right exposure not only makes vitamin D for you, but according to newer studies, may protect you from skin cancer -- and much, much more.

So I'm taking back my hasty advice to you in previous *FL's* about seizing every opportunity to run around buck-naked.

My enlightenment came about through a rousing telephone conversation with Sullivan, who subsequently sent me her *Preliminary Report on the Importance of Sunlight and Vitamin D.* I stayed up entranced 'till 2 a.m. reading it. The report is condensed from her book awaiting publication which is based on voluminous research literature on D, ongoing communication with its researchers, plus her experiences with clients.

I urge readers not to wait for the book but to send 35 bucks with name & address to K. Sullivan, CN, at P.O. Box 961, Woodacre, CA 94973.* There's no way I can summarize the detailed, revolutionary information she's condensed in about 35 pages that include a separate "Physician Protocol" and "Patient Protocol" for vitamin D sufficiency, and over 100 medical references with full titles. She's done this *sans* grants or subsidies, snatching time from her consulting work.

* Krispin Sullivan also can be reached at 415-488-9636; FAX #415-488-4611; email: Krispin@krispin.com

It's Not Really A Vitamin

Whether you make it in your skin from UV-B irradiation, or derive it from food or supplemental D, when vitamin D gets into your bloodstream it enters into what's known as the vitamin D endocrine system, becoming activated as *D-based hormones.* Your body can't make any other vitamin, nor do any others turn into hormones. D is unique.

It was valued mainly for blood-calcium-regulating, anti-rickets activity, until surprising discoveries about its hormonal roles accelerated in the 1980s. Receptors for it have been identified in at least 30 different tissue sites, *including the brain.* The vitamin-turned-hormone seems to have a piece of the action everywhere, as you'll surmise from Sullivan's list, "Reasons to make sure you get enough D." Samples:

- "Osteoporosis is strongly associated with low vitamin D. Post-menopausal women with osteoporosis respond favorably (and rapidly) to higher levels of D plus calcium and magnesium."
- "Vitamin D and/or sunlight (UV-B, not UV-A or UV-C) have been shown to lower blood pressure, restore insulin sensitivity, and lower cholesterol."
- "Obese persons have impaired production of UV-B stimulated D and impaired absorption of food source and supplemental D." (This very new study shows obese individuals make 70% less vitamin D from sunlight, no matter what their skin color is.)
- "Sunlight, UV-B, and vitamin D normalize food intake and normalize blood sugar. Weight normalization is associated with higher levels of D and adequate calcium."
- "Research suggests low levels of D may contribute to or be a cause of Syndrome X with associated hypertension, obesity, diabetes and heart disease."
- "Low vitamin D is associated with several auto-immune diseases including multiple sclerosis, Sjogren's Syndrome, rheumatoid arthritis, thyroiditis, and Crohn's disease."
- "Breast, prostate, skin and colon cancers have a strong association with low levels of D and lack of sunlight."

Does Your Well-Being Depend on D?

The following knocked my socks off, it was so unexpected:

•"Activated vitamin D in the adrenal gland regulates tyrosine hydroxylase, the rate-limiting enzyme necessary for the production of dopamine, epinephrine and norepinephrine. [Nature's pepper-uppers. CF] *Low D may contribute to chronic fatigue and depression.*"

She cites a 1999 study in which subjects with "Seasonal Affective Disorder" (SAD: depression associated with long, dark winters) were treated for 30 days either with 2-hour daily use of therapeutic 'light boxes' or with vitamin D. The depression completely resolved in the D group but not in the light-box group.

Here I digress to offer some pre-history on the vitamin/hormone's effect on mental states. As our early human forebears gradually spread out from equatorial Africa to higher and higher UV-B-deprived latitudes, their dark skin (high melanin), that protected against damage from all-year-round UV-A and UV-B, instead became a barrier to synthesizing vitamin D. Nature solved the problem: skins got fairer and more permeable to what little UV-B there was. That's how *rock-bottom-basic vitamin D was to reproduction and survival.*

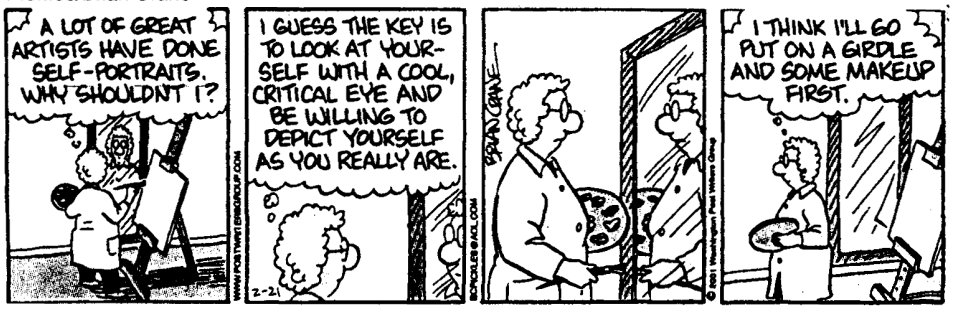
After the last Ice Age ended and glaciers receded, for the brave folks who ventured far north to very high latitudes the skimpy UV-B rays couldn't cut the mustard. But they prospered by feasting on the land and sea creatures whose tissues, organs, and fat -- not just livers -- contained the vitamin: mammoths, seals, salmon, herring, sardines, shrimp, etc. and, of course, cod liver oil.

Canny readers have caught the drift, right? i.e., the same vitamin-D-rich foodstuffs enabling them to flourish *also supplied priceless long-chain omega-3 (w3) fats, including EPA and DHA.*

In *FL#113* I wrote how daily doses of high-w3 salmon oil helped John Vaughn recover from 35 years of unresponsive bipolar illness (manic-depression); and how effective compared to placebo a similar dose, ~10 grams of w3 fish oil, was in Dr. Andrew Stoll's trial with 30 bipolar patients. We've learned too that the more fish and shellfish a population eats, the lower the incidence of clinical depression.

There's a sublime symmetry in this. Nature gave us the means not only to be healthy, but to be *happy* -- but only if we pay attention!

Pickles/Brian Crane



Catching the Elusive Rays

Krispin Sullivan explains why making optimal vitamin D from sunlight on your skin is a complicated affair. It depends on latitude, altitude, time of year, of day, sunlight angle, skin color, age, length of exposure, amount of skin exposed, presence or absence of clouds, fog, smog (UV-B doesn't penetrate them.) While 78% UV-A light penetrates window glass, only 5% of UV-B does. Darker skins may require 4-6 times more UV-B exposure than light skins to make the same amount of D. (Recent news reports describe a scary rise of rickets in young black kids in Texas.) Older skin may need much more exposure time than younger skin. Her *Preliminary Report* touches on these issues, offering "UV-B Exposure Guidelines" for six different skin types.

She also suggests a way to simplify: a UV-B meter! I ordered one and liked it so much I ordered 3 more for my kids.* It's tiny, handy, and gives UV-B readings on the spot. Now I can use it with Krispin's Guidelines to find the best time for 'making D while the sun shines.' I'll also avoid sunning in UV-A-only light. That's the time to cover up or apply sunscreen if you're fair-skinned and/or prone to skin cancers or precancerous lesions. Luckily, if you're dark-skinned you're much more resistant to skin cancers as well as sunburn. While you need more UV-B exposure time to make vitamin D, you can do so for longer periods without harm.

Big Caution

K. Sullivan says be careful about taking vitamin D unless your calcium and magnesium intakes are sufficient (minimum of 1000 to 1200 milligrams calcium daily for teens and adults, and at least half that or equal amounts of magnesium).

Hormones from your parathyroid gland together with the D-based endocrine system [to simplify, I'll call it D-hormones] are responsible for maintaining normal calcium levels in your blood. (D-hormones also promote calcium absorption from the gut.) If serum calcium levels are too low, your parathyroid hormone level shoots up, setting off complex interplay with D-hormones, actually causing calcium and phosphorus to be withdrawn from the major storehouse, your bones. This is 'robbing Peter to pay *Peter*: apparently, blood calcium levels are more critical to your life processes than strong bones!

Here's the rub: both too-low and *too-high* blood levels of D can screw up your calcium metabolism. In the one case, blood calcium drops too low, in the latter, too high (hypercalcemia). *But either scenario can cause calcium to be dumped into your so-called soft tissues* (i.e., any place but bone) where it can harm blood vessels, muscles, joints, and organs. This kind of insidious injury occurs slowly over a long period and is almost never recognized, let alone diagnosed, until significant damage has been done.

So these are some of the reasons why Krispin Sullivan says we can't afford to be cavalier about taking high-dose D but must get tested before and after. Right now, she's doing battle with some of her favorite researchers who haven't yet fully accepted this concept, even though their groundbreaking studies are waking up the healthcare community to the reality of widespread D insufficiency.

*Sunsor™, $39.95 + S/H from Sunsor, Inc, Allison Park, PA 15101. 1(800) 492-9815.

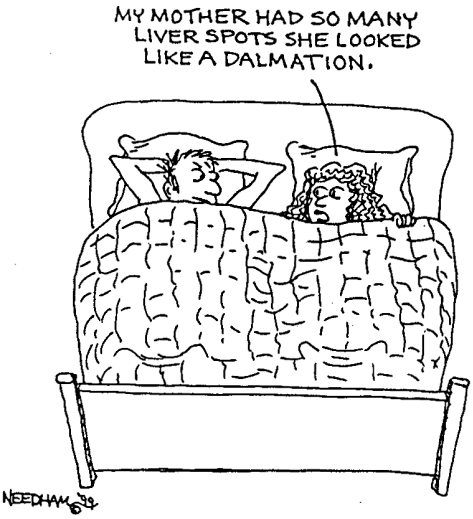
Shooting for Optimal D Values

Currently accepted as the best indicator of vitamin D status is your blood serum level of a metabolite your liver makes: **25-hydroxyvitamin D, or 25(OH)D.** The new minimum "safe" value set by M.F. Holick[1] is 20 nanograms per milliliter [ng/mL]. Multiplied by 2.5, that's 50 nanomoles per liter [nmol/L]. Canada uses nmol/L units; the USA uses ng/mL.

This value is needed to keep parathyroid hormone at normal levels. However, 20 ng/mL isn't even in the ballpark for 'optimal,' *because values under 40 ng/mL are strongly associated with chronic bone loss,* even without obvious calcium or parathyroid hormone abnormalities.

For her clients Krispin aims for a serum 25(OH)D range of **50 to 65 ng/mL (125 to 162 nmol/L).** She believes this is safest, based on studies of healthy people living below 30° latitude who absorb ample vitamin D year-round and whose serum 25(OH)D seldom goes lower than 50 or higher than 65 ng/mL. The latter appears to be an optimal level beyond which no apparent advantage is gained.

As a point of interest, no matter how much UV-B exposure you get, your serum 25(OH)D doesn't rise too high. Any excessive vitamin D made in your skin gets converted into inert molecules that don't circulate to your liver, thus can't be converted to 25(OH)D. Chronic sun overexposure could burn you but won't cause vitamin D intoxication -- nature in its infinite wisdom!



Unwise supplementation, however, *can* bring on vitamin D intoxication. By now, having witnessed a stunning variety of responses, it's become clear to Krispin that genetics has much to do with how efficiently we absorb and retain vitamin D from sun, supplements, or food. Without before and after testing, she's learned that one person could remain deprived on the same intake that provides another with optimal D status. Worse yet, a few individuals would have suffered a toxic reaction to this same dosage had she not been forewarned by their test results.

"The only way to solve this impossible-to-predict variability," she told me, "is for everyone to live where their ancestors used to be. That being out of the question, all we can is *test, treat, and retest."*

[1] *Vitamin D, Physiology, Molecular Biology, and Clinical Applications,* Michael Holick, ed. Humana Press, 1999.

Pickles/Brian Crane

The point is, once D gets into your circulation from food, supplements, or sunlight, it metamorphoses into hormones. People learned long ago to shun toxic doses in food (e.g., polar bear liver). Sunlight synthesis in your skin provides its own brakes against D toxicity. *Supplements don't. Let's be careful out there.*

Getting Tested

A very reasonably priced state-of-the-art 25-hydroxyvitamin D test became available only within the last year or so. She suggests if your physicians or healthcare providers don't know where to order it, they can call LabOne in Kansas which has collection sites throughout the USA, 1-800-646-7788. Her *Preliminary Report* provides instructions.

Your intrepid editor got herself tested by prescription, soon discovering that current lab guidelines do ***not*** alert doctors to vitamin D insufficiency. My MD told me my 25(OH)D test was "normal." At a miserable 25 ng/mL it darn well wasn't! My so-so knee had healed fully during the past year on increased supplements, so I shudder to think what my D status must have been all the years before.

I've changed to a fish oil-based D, hoping to absorb it better. When my iddy-bitty meter lets me know UV-B levels are high, on days when it's possible I'll try to expose back, arms, legs to the good rays. After a month or so I'll get retested to see what's what. My savvy chiropractor says she'll prescribe the "25-hydroxyvitamin D" test.

Until K. Sullivan's book is published, few clinicians will know what the test means or how to treat. When you order the *Preliminary Report* the packet includes her copyright permission for one copy to be made to give to your physician. Educate, educate!

She tells me, "Please understand this information is so new that it will take up to seven years for it to disperse just in the USA. My hope is the book will push this process into a fast track."

Big thanks, Krispin, for laying out practical imperatives we can set in motion *ourselves*. Without your spurring, the good works of researchers might've moldered in journals forever! ❐

SPRING (ARTERY) CLEANING

Remember when the ads told us to tank up on corn oil margarine as *the* sure road to unclogged arteries? A week spent reorganizing my files and filling recycling bins with outdated stuff netted me some gems from the year 1984 by *NY Times* nutrition *mayven* Jane E. Brody.

Her work reflected prevailing orthodoxy that high blood cholesterol derived from dietary cholesterol and saturated fats was *the* cause of coronary artery disease. Dinosaurs in the dietetics/medical community still cling to this concept.

"Rather than being used to perform vital functions, cholesterol from food does little more than accumulate on the walls of blood vessels," Brody wrote. [CF: *Wrong, wrong.* Cholesterol in food doesn't raise blood cholesterol levels. The kind that accumulates in arteries may be *emergency repair molecules* .]

Along with her standard advice to reject wholesome time-honored foods such as organ meats, butter ("Use margarine"), chicken fat, shrimp, egg yolks ("the worst cholesterol offenders"), came this nugget:

"Limit consumption of fatty fishes, such as salmon, mackerel, and canned tuna, salmon, and sardines packed in oil."

Brody's routine warnings in 1984 not to consume "fatty fishes" came at a time when worldwide discoveries of preventive roles in heart disease by these same w3 fatty acids in "fatty fishes" were making medical history. By 1984, Dr. Donald Rudin and I had already been working for a year to convert his 1000-page unpublished book into *The Omega-3 Phenomenon* (1987).

Better Science -- Better Theories

Time has flown and so has much of the experts' certainty about pinning heart disease on high blood cholesterol from dietary cholesterol and saturated fats. Of course, Brody has long since repented, but she and her backers can't undo decades of damage.

In my old files I also found a 1984 *Medical Hypotheses* article by Dr. Edward Calabrese confirming Dr. Kilmer McCully's prophetic theory, published as early as 1969, that *high homocysteine levels were the root cause of vessel damage and atherosclerosis.*

Today, this is getting lots of thumbs-up from medical research circles, as well as the means of prevention consisting primarily of increased intake of vitamins B6, folic acid, and B12 . [See *FL#109*]

Long-simmering inflammation in blood vessels -- possibly because of hidden infection and/or longterm deficiencies of nutrients to protect arteries -- is another theory about the genesis of atherosclerosis that's perking doctors' ears up.

None of these theories ascribes villainy to dietary cholesterol and saturated fats.

Statins for All? I Think Not.

While worry about cholesterol is getting to be old hat, scientifically speaking -- you'd never guess it from the deluge of TV and magazine ads for statin drugs that lower cholesterol by interfering with your synthesis of it.

Interesting, isn't it, that statin-makers have never acknowledged the potential harm caused by the drug's interfering as well *with your ability to make coenzyme Q10* (CoQ10), *a molecule involved in creating energy in every cell.*

But at the Orthomolecular Health Meeting in San Francisco in February, Dr. Julian Whitaker told us how one pharmaceutical firm has patented the inclusion of CoQ10 in its newest statin. Significance: (a) the makers implicitly acknowledge that statins reduce your CoQ10 synthesis; and (b) their patents prevent all other drug companies from adding CoQ10 to *their* statins! P.S. He thinks this is grounds for a massive class-action suit by patients who've been prescribed statins without being given supplemental CoQ10.

And Now -- Trans-Fats!

In 1985, the American Heart Assoc. (AHA) was telling us to limit use of shrimp, lobster, sardines, whole eggs, and organ meats [you know, 'high cholesterol'], but adding: "However, liver is so rich in iron and vitamins, a small serving (4 ounces) is recommended about once a month." Wow.

Their 1985 brochure I dug out of my files ("We're Fighting for Your Life") also warns us to "avoid completely hydrogenated oils because they resemble saturated fats. Many margarines contain partially hydrogenated oils and may be acceptable if their labels state that they contain twice as much polyunsaturated as saturated fat."

Dear readers, "partial hydrogenation" is the chemicals-plus-heat process that creates trans fatty acids. (Dr. Rudin and I named them "funny fats.") By now, tankcars full of partially hydrogenated oils have stuffed trans-fatty acids into everyone's tissues in the USA, with the AHA's blessing, even though pristine research long before the 1980s uncovered systemic harm from them.

The Dutch Shine Lights for Us

In 1990 a powerful Netherlands study in *New England J. Med* showed trans-fats increased the risk of heart disease. It blew trans-fats defenders right out of the water [see FL#55].

Europe has wisened up long before the USA has. Here, the good people in nutrition and medicine struggle to lower trans-fat output and intake, while the apologists are still weaseling.

But now another great Dutch study just appeared in *Lancet*, March 10, 2001 (Claudia M Oomen et al, vol 357: 746-751), stating: "In the Netherlands, because of publicity about adverse effects of trans fatty acids on blood lipoproteins, the amount of trans fatty acids in fats for use in households has decreased substantially." In fact, their intake declined from 4.3% of energy in 1985 to 1.9% in 1995 and was even lower in 1996.

This decrease "could have contributed to about 23% less coronary deaths (ie, *about 4600 of 20,000 coronary deaths in the Netherlands per year*)." [Emphasis mine.]

The Dutch researchers may be paying attention to both early and new rumblings of systemic upheavals from trans-fats. Besides effects on cholesterol levels, Claudia Oomen et al. say trans-fats "might have other adverse physiological effects on, e.g., thrombotic mechanisms or insulin resistance."

They write that in the USA, trans-fat intake remained the same from 1985 to 1995 "because a decrease in trans fatty acids from margarines *was counterbalanced by an increase in trans fatty acids from commercially baked products and fast foods.*" [Emphasis mine.]

Note: As reported in *FL#112,* new AHA Guidelines in 2000 at last recommended limiting intake of trans-fatty acids. Implementing it is another matter. In Canada, trans-fat content must appear on labels of commercial foods. Here in the good ol' USA, how will people know how to limit intake until this happens here???

At least you can avoid foods that include "partially hydrogenated oils" in the ingredients list. Carry a magnifier or reading glasses when you shop; the print is microscopic. ❐

CALICO UNCLEAR ON THE CONCEPT?

I'm a sucker for daughter Elissa's tales about their two felines, the ones I kitty-sit for in rustic Aptos when she and Bob go roaming. Majestic Pawsley is a mighty hunter, ceremoniously depositing his prey, usually a wood rat, on the door-step.

The little calico, Silky, may be listening to a different drummer. Mesmerized by the numerous gopher holes in the untamed yard, she's forever peering in them. But on the one occasion a gopher actually popped out, the little critter and Silky just stared at each other curiously for the *longest* time. Then the gopher casually slipped back down its hole.

We're speculating: do the young calico and gopher see one another as potential playmates? Silky often watches the neighbor's brown and white bunny, plopping herself in front of its fenced pen, her green eyes round with interest. I'll stay alert for bulletins from Aptos' semi-peaceable kingdom. ❐

Illustrations are by the late Clay Geerdes and other artists as noted.

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