

UPDATE ON COD LIVER OIL, DECEMBER 2008

Dear Members,

We are obliged to issue another official statement on cod liver oil after the November bulletin of the Vitamin D Council, which contains “an unprecedented warning about the ingestion of cod liver oil and resultant vitamin A toxicity.”

The warning accompanies a report on a review article co-authored by Dr. John Cannell, head of the Vitamin D Council, and fifteen other researchers, entitled “Cod Liver Oil, Vitamin A Toxicity, Frequent Respiratory Infections, and the Vitamin D Deficiency Epidemic” in the November issue of *Annals of Otolaryngology, Rhinology and Laryngology*.

NO PROOF THAT VITAMIN A IS TOXIC

Most of this paper is a review of studies showing the benefits of vitamin D in protecting against various illnesses, including respiratory infection. THIS PAPER DOES NOT PRESENT ANY INFORMATION WHATSOEVER INDICATING THAT COD LIVER OIL IS TOXIC, and, in fact, admits that vitamin A can significantly reduce the incidence of acute lower respiratory tract infections in Third World children.

A portion of the review article is an attempt to explain why a 2004 study providing 600 to 700 IU of vitamin D and 3,500 IU of vitamin A in the form of cod liver oil and a multivitamin failed to meaningfully reduce upper respiratory tract infections when studies from the 1930s found that cod liver oil could reduce the incidence of these infections by 30 to 50 percent. The authors of the recent commentary suggested that the older studies were more effective because cod liver oil in the 1930s contained much more vitamin D. They suggested that modern cod liver oil is low in vitamin D because the deodorization process removes the vitamin while manufacturers fortify the oil with only a fraction of the original amount. As an example, they cited cod liver oil made by Nordic Naturals, advertised as containing only “naturally occurring vitamins A and D,” which has only 3 to 60 IU of vitamin D per tablespoon but between 150 and 12,000 times as much vitamin A.

This conclusion is essentially the same as the conclusion reached by the Weston A. Price Foundation and the research of Chris Masterjohn; we have continually pointed out that vitamins A and D work together and that without vitamin D, vitamin A can be ineffective or even toxic. We do not recommend Nordic Naturals regular cod liver oil or any brand of cod liver oil that is low in vitamin D. But it is completely inappropriate to conclude from this 2004 study that cod liver oil is toxic because of its vitamin A content. Similar reviews could be put together showing the benefits of vitamin A and cod liver oil in numerous studies, including the studies from the 1930s. Obviously the solution is to use the type of cod liver oil that people took in the 1930s, which did not have most of the vitamin D removed by modern processing techniques.

Our recommendations for cod liver oil brands can be found at westonaprice.org/basicnutrition/cod-liver-oil-menu.html

VITAMIN A DOES NOT ANTAGONIZE VITAMIN D

The Vitamin D Council report claims that the vitamin A in cod liver oil is excessive and antagonizes vitamin D by inhibiting the binding of its active form to DNA and thus preventing its ability to regulate the expression of vitamin D-responsive genes.

Vitamins A and D are both precursors to active hormones that regulate the expression of genes. The body possesses certain enzymes that convert each of these in a two-step process to their active forms: vitamin A is converted to retinal and then to active retinoic acid while vitamin D is converted to calcidiol and then to active calcitriol. While directly consuming either retinoic acid or calcitriol would be unnatural, consuming vitamins A and D, together, as in cod liver oil, is perfectly natural. The enzymes involved in these conversions are responsible for producing incredibly powerful hormones and are therefore highly regulated.

In order for vitamin D to activate the expression of its target genes, it must bind to the vitamin D receptor (VDR) and then combine with the retinoid X receptor (RXR), which is activated by a particular form of vitamin A called *9-cis* retinoic acid. RESEARCHERS FROM SPAIN RECENTLY SHOWED THAT VITAMIN D CAN ONLY EFFECTIVELY ACTIVATE TARGET GENES WHEN ITS PARTNER RECEPTOR IS ACTIVATED BY VITAMIN A.

In the ABSENCE OF VITAMIN A, molecules called “corepressors” bind to the VDR/RXR complex and PREVENT vitamin D from functioning.

The molecular biology of *9-cis* retinoic acid, however, is extremely complex, and this has led to some confusion. The RXR and its activator *9-cis* retinoic acid partner up not only with the vitamin D receptor, but also with the receptors for steroid hormones, thyroid hormone, and most other nuclear receptors. In fact, if enough *9-cis* retinoic acid is present, RXRs will even partner up with themselves. Ordinarily, this versatile form of vitamin A is gradually derived in small amounts from the larger pool of all-*trans* retinoic acid as needed. When scientists add large amounts of *9-cis* retinoic acid to isolated cells, then, it may cause effects that smaller amounts naturally produced in the cell would not cause.

Researchers have shown, for example, that *9-cis* retinoic acid interferes with the ability of vitamin D to stimulate the production of osteocalcin, a vitamin K-dependent protein involved in organizing the mineralized matrix of bone. This may have been because the excessive amount of *9-cis* retinoic acid caused RXRs to pair up with themselves and thereby made these receptors unavailable to vitamin D. When scientists incubate cells with activated vitamin D and all-*trans* retinoic acid, ordinarily the source of *9-cis* retinoic acid in the cell, the two hormones stimulate the production of osteocalcin with remarkable synergy.

More information on the interactions between vitamins A and D can be found in these articles:

<http://www.westonaprice.org/basicnutrition/vitamin-k2.html>

<http://westonaprice.org/basicnutrition/vitamina-oste.html>

<http://westonaprice.org/basicnutrition/vitamin-d-safety.html>

The Spanish research demonstrating the necessity of 9-*cis* retinoic acid for the functioning of the vitamin D receptor can be found here:

<http://www.ncbi.nlm.nih.gov/pubmed/16936639?>

<http://mcb.asm.org/cgi/content/full/28/11/3817?>

PLANT FOODS ARE NOT A GOOD SOURCE OF VITAMIN A

In the December Vitamin D Council newsletter, Dr. Cannell further claims that consuming preformed vitamin A is “unnatural” and that the body highly regulates the conversion of carotenoids found in vegetables to vitamin A as needed. However, the enzymes that convert carotenoids to vitamin A are less critically maintained because they are unneeded when preformed vitamin A is provided in the diet—as it usually is. They are therefore, like the enzymes that convert essential fatty acids in plant oils to their elongated and desaturated forms, subject to variations in genetics, circumstantial health, and dietary and environmental influences.

Many factors can interfere with the conversion of carotenoids into vitamin A including thyroid problems, liver problems, diabetes and genetics. Babies and children convert carotenes very poorly if at all.

The statement that preformed vitamin A is unnatural is ludicrous in the light of what we know about traditional diets. The chief source of calories in the traditional Inuit diet, for example, is seal oil, which Weston Price found to be higher in vitamin A than cod liver oil. Fish heads, extremely rich in vitamin A, are a staple in the Japanese diet. Many cultures consume liver, often in high amounts—yet the authors of the review paper imply that liver is toxic. Tell that to the Frenchman enjoying his foie gras, the Englishman consuming liver and onions, or the South Sea Islander who submits to great danger to obtain shark liver for men and women, in order to ensure healthy children. The truth is that pre-formed vitamin A is more plentiful in traditional foods than vitamin D, yet politically correct nutrition insists that we must obtain vitamin A through the laborious process of converting carotenes.

More information on the conversion of carotenoids to vitamin A can be found in these articles: <http://www.westonaprice.org/basicnutrition/vitamina-saga.html> (see the section “Vitamin A Vagary”). <http://westonaprice.org/basicnutrition/vitamina-oste.html#carotenesnotad>

COD LIVER OIL IN PREGNANCY

The *Annals* paper does not cite any studies showing toxic effects from cod liver oil, but Dr. Cannell cites one study in his December newsletter associating intake of cod liver oil with hypertensive disorders during pregnancy. Users of cod liver oil in this study had about twice the intake of vitamins A and D as non-users and eight times the intake of long-chain omega-3 fatty acids. The study found the most robust association with long-chain omega-3 fatty acids, which were associated with lower risk between 0.1 and 0.9 grams per day and higher risk above 0.9 grams per day. The authors suggested that the association with high blood pressure might be related to oxidative stress caused by a high intake of polyunsaturated fatty acids.

The abstract of the study can be found here:
<http://www.ncbi.nlm.nih.gov/pubmed/16487202?>

The new *Annals* article offers nothing new to incriminate cod liver oil. It provides a well-written argument that vitamin D intakes need to be higher and incriminates only highly processed modern cod liver oils that have inadequate amounts of this critical nutrient. We recommend only high-vitamin cod liver oils that provide abundant vitamins A and D without an excess of polyunsaturated fatty acids.

THE COD LIVER OIL PUBLIC HEALTH INITIATIVE

As we pointed out in our last update on cod liver oil, during the first half of the century, cod liver oil was the focus of a worldwide health initiative. Parents were urged to give cod liver oil to their children by doctors, by government officials, by teachers and principals in schools, and even by their ministers in churches. A large portion of adults in America born before the Second World War received cod liver oil as children and this practice contributed to a high level of health, intelligence and physical development in those lucky enough to receive it. In many European countries, children received a daily ration of cod liver oil, especially during the war years. In the UK, for example, the government issued cod liver oil to all growing children until the early 1950s.

What has led to the demise of this obviously beneficial practice? Cod liver oil is a food; it can't be patented, it can't be created in a laboratory; it can't create millions for the drug companies. So interest in this wonderful superfood has naturally waned. But if you are basing your dietary habits on the principles of healthy nutritional diets, don't hesitate to include cod liver oil—our recommended brands of cod liver oil--as a healthy and natural food source of critical vitamins so lacking in modern diets.

Sally Fallon, President
The Weston A. Price Foundation