the FELIX Letter

A COMMENTARY ON NUTRITION

No. 86 1995

FATS IN THE FIRE

Eighty or so years ago, barely out of their teens, my mom and pop separately left tiny villages in Russia for the chance of a better life here. Their reverence for formal education seeped into my pores as I was growing up, but so did their homely, down-to-earth values. Like my parents, I am awed by much in science, yet a part of me--the peasant part?--knows that any miracles science conjures up Mother Nature can eclipse hands down.

When it comes to triumphs that improve upon her handiwork, for instance by the food industry, my alarm bells clang. A case in point is "hydrogenation"--the hardening of oils to give them desired texture and eternal life. The process, emerging in the early 1900s, uses high pressure and metal catalysts to force hydrogen atoms onto--i.e., to *saturate*--the carbons of unsaturated fatty acid molecules. In this way, liquid oils become solid fats, e.g., Crisco and Spry.

A big medical push for polyunsaturates in the national diet came about because of the scary, unprecedented rise by the 1950s of atherosclerotic heart disease. Experts focused on high blood cholesterol as the root cause. Excessive intake of saturated fats was known to raise a person's cholesterol level, while polyunsaturates tended to reduce it. Soon, saturated fats, animal fats, and cholesterol became dirty words. Butter was out; in were vegetable oils, also margarines "high in polyunsaturates."

The Birth of Trans Fats

To give the right plasticity and feel to the new margarines, a fancy technology arose: *partial* hydrogenation. The food oil chemists figured out how to harden selectively the most fluid components of the oils--the Omega-3 fatty acids--and some of the Omega-6. These then were transformed into *trans*-fatty acids (TFAs)--a distinctly new machine-made species, different from small amounts of naturally occurring *trans*-fatty acids in dairy and meat fats.

In baking and frying, liquid oils don't yield the crisp, flaky texture provided by solider animal fats, typically butter, lard, and tallow. When animal fats became medical no-no's, purveyors of packaged and fast-food increased their dependence not just on Crisco-type vegetable fats but also on traditional semi-solid tropical fats (palm, palm kernel, and coconut oils), because they provided good taste and texture and didn't need to be hydrogenated.

The Plot (& Oil) Thickens!

In the late 1980s a fierce publicity campaign was launched to remove "dangerous, saturated, artery-clogging tropical fats," and to replace them with "polyunsaturated, heart-healthy" oils. Okay, folks, here's an aside on "nasty" tropical fats (palm, palm kernel, and coconut oils, typically from Malaysia) and why we shouldn't fall for health crusades carrying hidden agendas. This one was largely fueled by the rival American Soybean Assoc., for transparently economic--not health--motives, and taken up passionately by do-gooders in the nutrition community.

The food industry fell in line, but quickly saw how polyunsaturated oils couldn't cut the mustard and had to be "partially" hardened, leading to the current huge rise of TFAs in commercial foods. A great pioneer TFA scientist, Mary G. Enig, Ph.D., wrote in *Townsend Letter for Doctors,* Dec. 1993: "These plastic, man-made fats are usually much firmer than the natural baking fats like lard and palm oil and the baker can pack more of this fat into a product without producing a greasy feel....Oils such as soybean and canola that are used by restaurants for deep frying do not need to be as solid as fats for baking, but they need to be stabilized by partial hydrogenation. The result is what is called liquid shortening."

Here's how the switch from a tallow based formula to "liquid shortening" affects consumers, as one example, in approximately 15,000 McDonald's fast food restaurants: ***TFA content of french fries rose from 5% of fat to 43%.***

Thus, with tropical fats vilified and pushed out of the picture, in the '90s we're seeing a stupendous surge of TFAs in supermarket staples: e.g., **in breads, cookies, crackers, cakes, candies, frostings, pizza crusts, pretzels, and snack chips, as well as in fried foods in fast food chains.**

Damage Report

For at least 45 years, earnest researchers have brought up troubling questions about TFAs. As I wrote in *FLs* 19 & 31 back in '84 & '86, TFAs are accepted readily by our tissues, pushing out the true polyunsaturates--the Omega-3 and Omega-6 essential fatty acids, but unable to perform their critical functions. While almost the whole thrust of research is on how TFAs disturb cholesterol levels, studies keep cropping up on other sinister aspects, such as disruption of energy metabolism in heart muscle, altered properties of membranes needed to resist cancer, and higher cancer rates in animals.

The more TFAs we eat, the more get deposited in our bodies. The more TFAs a pregnant woman eats, the more the fetus gets in *its* tissues, *where they cause loss of long-chain Omega-3's vitally needed in eyes and brain.* TFAs interfere with growth, so babies are smaller at birth, too.

And if none of the above grabs you, the *really* big news is that TFAs make people fatter! Among 540 women *with the same caloric intake* and level of exercise, those who often consumed TFAs weighed almost 5 pounds more than infrequent consumers!

Damage Control

All of this to let you know that the food oil industry, now facing a major campaign to get TFAs out of the food supply, are doing what powerful interests do best: setting up panels of "objective" scientists to cast doubt on the mounting studies that are puncturing the TFA bubble. A report by the International Life Sciences Institute (ILSI) in the September *American J of Clinical Nutrition* leaves no doubt as to where the vested interests lie--and 'tain't where our own as consumers are, believe me!

Happily, the ILSI report's half-truths, omissions, and obfuscating statistics take a beating, in the same issue of *AJCN*, from three stalwarts. Netherlands researcher Martijn Katan, whose 1990 work with R. P. Mensink blew the lid worldwide, showing margarine to be a threat to the heart, points out that not only do TFAs raise blood levels

of "bad" LDL cholesterol and lower "good' HDL cholesterol, but *TFAs raise lipoprotein(a) levels--an ominous cardiovascular sign that the apologists either ignored or dismissed.* [See *FLs 60 & 65* for Pauling & Rath's theory on why lipoprotein(a) rises when vitamin C levels fall.]

Walter C. Willett and Alberto Ascherio, Harvard scientists who blew the whistle on TFAs in major works, give the ILSI hell, too. Dr. Willett's team studied health and diet records of over 85,000 women for 8 years starting in 1980, discovering that *trans* fatty acid intake was positively associated with both heart disease *and* breast cancer. A separate study of men linked high TFA intake to*prostate cancer*.

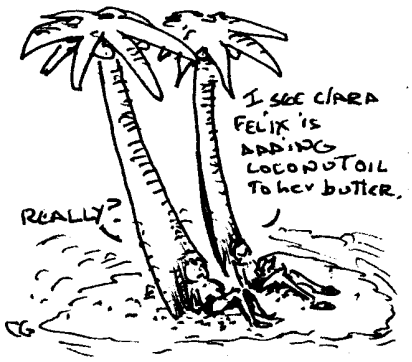
They conclude in their crisp rebuttal: "Because these artificial isomers have no nutritional benefits and are virtually certainly harmful compared with their natural precursors, the only real public health question is the magnitude of harm.....The ILSI report, by calling only for further research, supports an imprudent public policy." I say Amen to that!

A New Look at Tropical Oils

"Saturated" should never have become synonymous with "bad." After all, *the body routinely needs and makes saturated fats* (from sugars, fats, and carbohydrates), to cushion our skin, organs and bones and to combine with unsaturated fats to form all cellular membranes. Palm kernel and coconut oils are very high in *lauric acid*, a saturated fat with strong antiviral and antibacterial activity. (This is logical in warm climates, no? Incidentally, all mother's milk is rich in lauric acid, too.) These effects are so promising that Dr. Mary Enig proposes using palm kernel and coconut oils to help build up immunity in AIDS patients.

Natural palm, palm kernel, and coconut oils are semi-solid, composed of saturated, monosaturated, and polyunsaturated fats, ***but no TFAs.*** The oil palm is unique in producing two sources of oil from its fruit--palm oil from the flesh, and palm kernel oil from the seed. Coconut palms provide oil from, of course, coconuts. All were easy to produce before modern technology, having been consumed for at least 5,000 years in the tropics and subtropics. All are high in easy to digest medium-chain fatty acids that *tend to be burned as fuel by the body rather than stored as fat.* Palm oil is rich in natural antioxidants that not only keep the oil itself from turning rancid (oxidizing), but offer the same protection to blood cholesterol. (Much emphasis currently is on *oxidized cholesterol* in the blood as the trigger for heart disease, not normal, unoxidized cholesterol that's seen more and more as an innocent scapegoat.) Tropical oils don't impair our biosynthesis of long-chain Omega-3's, as TFAs do. Despite the campaign by American Soybean Assoc. flaks to portray them as villainous, *these oils never have been associated with heart disease.*

How many TFAs does it take to screw up our inner works? Nobody knows for sure, but one study found that a "high" TFA intake of 16 grams a day substantially raised risk for heart disease. Current estimates, however, *find daily TFA intake in the U.S. to average 10 to 30 grams.* Since total fat averages about 80 to 130 grams, clearly TFAs form a sizeable percentage in the daily diet of millions.



How do we best protect ourselves from TFAs? The logical if not generally applicable answer, of course, is to prepare our own foods, choosing mono- and polyunsaturated oils and not being scared of butter and/or coconut, palm, or palm kernel oils--**all fats & oils in moderation, of course!** {I'm enjoying organic coconut oil. Palm and palm kernel oils may be next.)

The next best step is to *read labels.* A provident labeling law requires "partially hydrogenated" oils to be identified as such, so we can avoid these oils and all packaged foods containing them. Health food stores, bless 'em, carry a variety of non-hydrogenated oils and many tasty brands of cookies, breads, crackers, and snack chips whose labels say "Made with non-hydrogenated (Canola, soy, safflower, etc.) oil."

If you must use margarine, avoid stick varieties; these contain 16-30% TFAs. TFA content of soft (tub) margarine is lower, about 7-18%. Several new soft, lower fat margarines made of buttermilk, butter, and oil are on market shelves. If the oil isn't "partially hydrogenated" these might be okay, unless you have to avoid dairy.[1]

I didn't think the public generally was aware of the perils of TFA consumption, but times may be changing! To my surprise, I saw one brand of low-fat margarine with a huge, bold logo, **"Trans Fat Free!"**

Currently in the U.S.*trans* fats are not identified as such on food labels. ***In a more enlightened policy, Canada is testing a new labeling scheme.*** Listed under "Total Fat per serving" will be grams of cholesterol, polyunsaturates, monounsaturates, saturates, and *trans*-fatty acids.

[1]I make my own Better Butter: a half-pound melted butter (one cupful), blended with 3/4 cup of any favorite oil or mixture of oils, placed in a covered container and refrigerated. Lately, I've been adding 2 tablespoons of coconut oil because of the nice studies I'm seeing.

Well, what did you expect!

The food oil industry here is dead set against it. A news release from the combined auspices of the Institute of Food Technologists, American Institute of Nutrition, and American Society for Clinical Nutrition (publishers of *AJCN,* incidentally) declares "the scientific evidence on *trans* fatty acids is insufficient to justify any further changes in food labeling regulations." In a letter to FDA commissioner Dr. David Kessler, the societies' "shared concern is that the public's fears about the putative health risks associated with eating foods containing *trans* fatty acids or partially hydrogenated vegetable oils will lead people to avoid such foods entirely [!] and choose inappropriate alternatives instead."

Surely, they jest! Do they mean, 'inappropriate alternatives' like unhydrogenated oils? Or foods prepared with natural tropical oils, used safely for milleniums? What a travesty we get when conscience-impaired corporations and shortsighted science are joined at the hip! I feel sorry for those so committed to economic agendas, they don't dare undo the harm they've done by fooling Mother Nature. ❑

THE WILD BUNCH

They drive their parents crazy--teachers and classmates, too-- because they don't sit still, won't pay attention, and can't stick with an activity long enough to master it. Usually they're boys, and their rising numbers are alarming enough to warrant a modern medical label: "attention-deficit hyperactivity disorder" (ADHD), now the most common childhood behavioral disorder.

Researchers at Indiana's Purdue University lined up 51 of the little buggers, average age 9 years, to compare their diet, health histories, and fatty acids in their blood with those of same-age non-ADHD kids. Nobody's sure what causes ADHD but suspected factors include lead toxicity, neurotransmitter imbalances, and food sensitivities. The researchers decided to check the boys' blood levels of essential fatty acids because their biological effects mediate "a wide variety of functions in every cell in the body" (Laura J. Stevens, et al., pp 761-8, October *AJCN*).

The 'wild kids' turned out to have a lot more ear infections, asthma, stomach aches, and headaches, and fewer had been breastfed, than the non-ADHD boys. Computer analyses of 3-day diet lists supplied by parents seemed to show all were getting reasonable amounts of nutrients, but in analysis of blood levels of fatty acids, the ADHD boys came up much lower *in the two most important polyunsaturated fats (PUFA) in the brain*---Omega-6 arachidonic acid (ARA), and Omega-3 DHA.

About 21 of the ADHD group had symptoms of essential fatty acid deficiency: *excessive thirst; frequent urination; dry hair; and dry skin.* These 21 youngsters also had the lowest ARA and DHA plasma levels. (Without enough Omega-3 and Omega-6 PUFA to form strong cellular membranes, cells become "leaky" and water chronically is lost from the body.)

The researchers explain how insufficient PUFA can affect behavior. First, with fewer PUFA there is reduced biosynthesis of eicosanoids (i.e., prostaglandins, leukotrienes, etc.), "which act as mediators or modulators of nerve transmission in the central nervous system. Second, because 22:6n-3 [DHA] is the predominant PUFA in the polar lipids of the cerebral cortex and retina, especially in cell membranes that are the most fluid and metabolically active, decreased concentrations of this fatty acid might negatively affect the function of the retina and cerebral cortex in several ways..."

They describe how caged monkeys fed a low Omega-3 diet have many more "bouts of total locomotion" than well-fed ones. Omega-3-deprived monkeys also have "decreased visual acuity" and drink water all day long.

No wonder these little boys are fidgeting around like caged animals!

No calculation of Omega-3 or Omega-6 fats in the children's diets was available to the researchers, *who suspect low Omega-3 intakes cannot be ruled out.* I have a hunch about these frenetic youngsters. When Donald O. Rudin, M.D., did his pilot study on the Omega-3's, he found an unsuspected across-the-board deficiency in his 44 subjects. His book, *The Omega-3 Phenomonon,* tells of patient after patient becoming calmer and experiencing increased well-being, as their "dry" Omega-3 reservoirs filled up.

He had them remove all *trans* and hydrogenated fats from their diet as well. The average American diet is awash in these obnoxious fats. We've learned that TFAs interfere with biosynthesis of DHA and ARA *in everyone, including infants. There's a very good chance these fifty-one ADHD children--and hundreds of thousands more--are absorbing TFAs every day of their lives, beginning when they still were in the womb.* Boys, from infancy on, require more PUFA than girls. Maybe those who develop ADHD have stronger-than-average requirements in their brain for the very PUFA they're being robbed of. And maybe it's pure coincidence that their numbers have increased as the TFA content of foods keeps rising?

If you're rearing one of these hard-to-handle kiddos and you've eliminated any foods or chemicals they may be allergic to but they're still climbing the walls, the next step might be to get 'em off TFAs and fill 'em up with flaxseed oil, flaxseed meal, seafood, and some Omega-6 GLA from evening primrose oil. Like chicken soup, it can't hurt! ❑

DYSLEXICS & w-3 DHA

A letter in the August 5th *The Lancet* from B. Jacqueline Stordy, University of Surrey, U.K., tells how a daily dose of 480 mg DHA for one month significantly improved dark adaptation (scotopic, or night vision) of all five adult dyslexics in research trials. In four of five controls "DHA had no effect on dark adaptation, although in one (a strict vegetarian) adaptation clearly improved."

Prof. Stordy writes: "DHA is a key fatty acid in both retina and brain and is usually present in large quantities in these tissues. In these studies I show the benefit of DHA supplementation for one aspect of retinal function. I have found that DHA supplements given to dyslexics can also be associated with improvements in reading ability *and behaviour [my emphasis, C.F.].* These reports are anecdotal and subjective but more formal controlled studies are in preparation."

Interesting, that the nondyslexic vegetarian's night vision improved. Strict vegetarians generally have low DHA levels because to get it they have to convert the parent Omega-3, alpha-linolenic acid (from foods like Canola oil, walnuts, flaxseeds, etc.), into DHA by a series of enzyme-controlled steps that may not happen readily.

How practical is an intake of 480 milligrams DHA? Very! A 100 gram portion (3-1/2 oz) of either trout, salmon, shark, tuna, bass, halibut, herring, or mackerel will do it with milligrams to spare. Squid, clams, oysters, and shrimp have quite a bit of DHA, although less than the above fatty fish. All fish and shellfish have some DHA--the fatter species have more. And for those who cannot eat seafood, a vegetarian (from algae) DHA supplement should be available in the near future! ❑

CATARACT & LIPOIC ACID

On the subject of eyesight, a brand new study by U.C. Berkeley's Dr. Lester Packer[2], who was my prof when I was an undergrad in the late 70's, had me scouring my textbooks. "Alpha-lipoic acid" had a remarkably protective effect against cataract formation, induced in newborn rats by BSO, a nasty drug. *Alpha-lipoic acid??* Sure enough, it turns out to be an obscure, essential co-factor for enzymes responsible for converting glucose and fatty acids into chemical energy in our bodies. That makes it a vitamin, but not necessarily for mammals, which presumably can biosynthesize it.

Nevertheless, the study found that "supplementation with alpha-lipoic acid protected 60% of BSO-treated animals from cataract formation." That's *impressive.*

Lipoic acid, a sulfur-containing fatty acid, is also known as thioctic acid. Besides its energy-making role, it seems to be a newer member of the "antioxidant network"--those sterling nutrients that sponge up destructive free radicals in our tissues. Apparently, it works synergistically with the others, our old friends *vitamin E, vitamin C, and glutathione. These happen to be key elements in protecting the lens of the eye against oxidative damage from light, etc.*

In the experiments alpha-lipoic acid restored lens concentrations of glutathione, vitamin C, and vitamin E to normal after the destructive BSO treatment. It also restored the major antioxidant enzymes in the lens, including glutathione peroxidase.

Dr. Packer's group suggests "that alpha-lipoic acid can prevent the formation of cataract by overall enhancement of the lens oxidative defenses.....This protective effect...on cataractogenesis could be of major therapeutic value."

That qualifies for mighty good news, in my book. I checked vitamin suppliers and, sure enough, some of the leaders are carrying it (as alpha lipoic or thioctic acid). It occurs to me that this 'almost-vitamin' could be like other "non-essential" but crucial molecules, which our bodies are supposed to be able to make---only, some of us aren't doing such a hot job! Choline, taurine, and carnitine fall into this category--with plenty evidence of benefits from longterm supplementation. Perhaps as we get older, biosynthesis falters, or in some individuals wasn't so great at any age. In any event, I think I'll add lipoic acid to my ludicrously high supplement intake--all for the sake of research, naturally! ❑

[2]Maitra, I., Serbinova, E., Trischler, H. and Packer, L., *Free Radical Biol. Med., 18*:823-829, 1995.

Rewarding news about an unsung hero: Dr. Michael A. Crawford of The Institute of Brain Chemistry and Human Nutrition, Queen Elizabeth Hospital for Children, London, has been honored with the 1995 International Award for Modern Nutrition.

From the bottom of my heart, congratulations, Dr. Crawford! Your luminous writings[3] and research over many decades helped to achieve the impossible---the scientific community's current acceptance of the importance of Omega-3 and Omega-6 polyunsaturates in the developing brain.

[3] *The Driving Force: Food, Evolution, and the Future*, the 1989 book by Crawford and David Marsh (now in paperback), links evolution of all life forms--from one-celled to *homo sapiens*--to concurrent availability of key nutrients; e.g., our big brains may have gotten that way because of opulent Omega-3s in an aquatic environment.

THE FRIENDLY HORMONE!

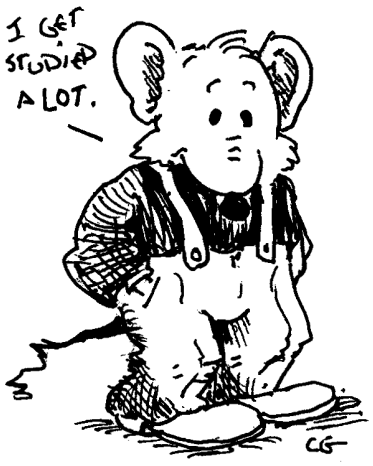
Good news on the natural progesterone front. A new study[4] compared the effects of gels containing either (a) progesterone, (b) estradiol (an estrogen), (c) or both, or (d) placebo, applied topically to the breast in 40 premenopausal women, for 10 to 13 days preceding breast surgery for a presumably benign lump. The purpose was to see the effect physiological amounts of the hormones applied transdermally would have on proliferation of breast epithelial tissue.

Epithelial hyperplasia (excessive breast cell proliferation) is one of the major risk factors for breast cancer. In the women's normal breast tissue, taken from the non-lump area during surgery, estradiol caused cell proliferation to increase significantly compared with placebo, *while progesterone actually decreased it below placebo levels.* Where the gel contained both hormones, progesterone prevented estradiol's tendency to accelerate breast cell proliferation. (Incidentally, applying the gels topically caused estradiol and progesterone to show up in significant amounts in breast cells.)

The results suggest that transdermal progesterone administered monthly may reduce the risk of breast cancer!

More good, surprising, news: Studies with mice showed that progesterone produced in nerves serves as a natural repairer of damaged myelin sheaths. French scientists, reporting in *SCIENCE*, June 9, say that progesterone is not only a sex steroid, but "an active neurosteroid....The high concentrations of progesterone in intact adult nerves also indicate a role for this neurosteroid in the slow but continuous renewal of peripheral myelin....our observations may lead to new pharmacological approaches for the treatment of demyelinating diseases." ❑

[4] Chang, K. et al., *Fertility and Sterility*, Vol 63, No. 4, April 1995



WINDS OF CHANGE, MAYBE

Before the invention in 1831 of the McCormick reaper which mechanized wheat harvesting, people in this country depended a lot on sorghum and millet as their cereal grains. Sorghum and millet--but not wheat--contain cyanogenic glycosides, also known as nitrilosides. In plain English, edible nitrilosides provide small amounts of cyanide which, when consumed, are detoxified into thiocyanate, a normal constituent in plasma.

I was reminded of this by Dr. Ernst Krebs Jr. when I phoned him the other night. He's getting on now but still crusty and eloquent on the subject of the distortions accorded his theories ever since his work with Laetrile in the 70's. The nitrilosides abound in the natural world. They're found in common grasses, seeds, berries, tubers, yams, and beans---favored foods of animals, birds, and humans. According to Krebs and others, here are some of the ways in which nitrilosides, as well as thiocyanates found also in plants, serve to protect whoever ingests them:

- Prevent or reduce bacterial infections and parasitic infestations.
- Reduce sickling of red blood cells in sickle cell disease.
- Normalize blood pressure, possibly by relaxing arterioles.
- Relieve migraine and other headaches.
- Increase resistance to cancer.

Most of these effects are documented, some are anecdotal. They're impressive enough for Dr. Krebs to have designated nitrilosides as *vitamins*, i.e., substances required in small amounts for health, which have to be obtained from food. This hypothesis has earned him guffaws and sneers from mainstream scientists, most of whom continue to classify nitrilosides solely as toxic substances.

A little breeze, though, has begun wafting through their stuffy ranks lately, whispering, "Isothiocyanate may be anti-carcinogenic!" (It's a form of thiocyanate found in broccoli and all cruciferous vegetables.) A Medline search netted me a slew of new studies showing truly remarkable inhibition of chemically-induced cancers in laboratory animals. Feeding isothiocyanates to them protected the wee beasties from cancers in liver, lung, mammary gland, esophagus, and stomach! Y. Zhang and Paul Talalay of Johns Hopkins School of Medicine review the mechanisms by which isothiocyanates block carcinogenesis, suggesting they are "ideal candidates for the development of effective chemoprotection of humans against cancer."[5]

Don't forget, dear readers, when you eat nitriloside-rich foods, your thiocyanate levels rise, just as they do with thiocyanate-containing foods. (See *FLs 77/78* for food lists.) Dr. Krebs wrote to say: "Please eat 3 apricot seeds or kernels a day for at least 5 days of the week." I'm doing it. ❑

[5] *Cancer Res.*, 1994 April, Suppl. pp 1976s-81s.

Illustrations by Clay Geerdes and other artists as noted.

***The Felix Letter*, P.O. Box 7094, Berkeley, CA 94707, has been published independently by Clara Felix since 1981 and supported solely by subscriptions. Descriptive list of back issues & sample, $1. Year's subscription (6 issues) $12; two-year (12 issues) $22.**