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THE OMEGA PLAN: A Review

Artemis P. Simopoulos, M.D., grew up on her family's estate in Greece, where her everyday foods were a nutritionist's dream: "The eggs that went into the spinach pie had been laid by our hens that very morning. The milk was from the day's first milking....and the olive oil that anointed the bread had been pressed from our own olives. For lunch, we had charcoal-broiled fish that had been swimming in the Mediterranean Sea only the day before." One of her happy childhood memories is of hurrying down to a breakfast that included a bowl of freshly picked fruit from their own trees.

The girl who, in 1949, first encountered dorm food when she came to the U.S. to study chemistry at Barnard College, was "in for a rude shock....The stark contrast between the American diet of the 1950s and the traditional Greek diet made such an impression on me that it helped shape my entire medical career. When I went to medical school, I specialized in pediatrics and focused much of my attention on infant and maternal nutrition. I began to realize that many of the children with serious diseases had been malnourished in the womb. This unfortunate start was made worse by the types of food eaten in the home -- refined foods, lots of saturated fat and sugar, very few fruits and vegetables, and margarine with its hidden cargo of trans-fatty acids."

The Omega Plan by Dr. Simopoulos and Jo Robinson [HarperCollins , 1998. In bookstores, or order by credit card at 800-331-3761] is a distinguished scientist's answer to the ghastly "lo-fat" dictum that's helping to make fatties out of millions of Americans, i.e., overweight adults went from 25 percent of the population (in 1955) to *40 percent* in 1995; and is not only a factor in a rise in diabetes, but may be *contributing to* instead of reducing risk of heart disease.

Ironically, the lo-fat business was a spinoff of the American Heart Association (AHA) "prudent diet" -- the doctors' and dieticians' gold standard for lowering blood cholesterol "to protect against cardiovascular disease." Daily fat intake is supposed to be lowered to 30% of total calories. (Ordinarily it's about 37% to 40%.) Saturated fat is limited to 10%. Dietary cholesterol is limited to a little more than the amount in one large egg, or 250 to 300 milligrams a day [even though many studies show dietary cholesterol has little effect on blood cholesterol, most of which is manufactured by our bodies]. A major goal has been to increase polyunsaturated fat, thought to reduce cholesterol levels, to about 10% of calories, most of it in the form of oils like corn and safflower that are high in omega-6 essential fats (and very low in omega-3s).

Even before the "prudent diet" campaign began, the American public had shortchanged itself grievously of omega-3 fats. The commercially trumpeted lo-fat flummery has turned omega-3 intake into a further disaster area.

In addition, medical advice to the public to substitute carbohydrates for fats was readily interpreted to mean it's okay to load up on anything labeled "lo-fat." In real life, folks are practically inhaling "lo-fat" commercial cookies, cakes, breads, and chips. Many of these foods are prepared with hardened omega-6 oils, the main source of those infamous "anti-nutrients," the trans-fatty acids.

So people's weights keep soaring, and so does the incidence of adult-onset diabetes. Obesity plus low omega-3 content of tissues are two propelling factors in "insulin-resistance," a condition in which folks make enough insulin but their tissues don't respond to it. End result: blood sugar stays too high and so does blood level of insulin. And obesity plus diabetes are prescriptions for *cardiovascular* trouble. In fact, we are learning that relentless consuming of low omega-3 foods coupled with high omega-6s can push buttons to set off all kinds of mischief, such as asthma, depression, even cancer.

Clear dietary how-to's in Simopoulos' "Omega Plan" incorporate the best aspects of worldwide research on the incalculable ways in which omega-3 and omega-6 essential fats affect our health. Pay attention to the word "essential." It means we *have* to consume certain fats, or our health fails. Our clever bodies can manufacture fats from sugars, starches, and fats. We can make short-chained, medium-chained, and long-chained fats (referring to the number of carbon atoms connected together in "daisy-chains" forming each fatty acid molecule). We can even desaturate fats, forming monounsaturates and polyunsaturates. *But we can't make the primary omega-3 or omega-6.* They're the fatty acids which, after we eat them, undergo chain lengthening and desaturation to snuggle into membranes of every blessed cell in our bodies, and *are the only fats that can become eicosanoids -- the major lipid regulators at the cellular level of just about every bodily function.*

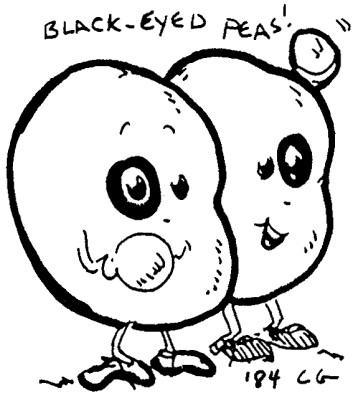
Dr. Simopoulos was one of the first scientists to warn about potential perils from our lopsided omega-6/omega-3 intake. In earlier works, she described a one-to-one ratio as probably closer to that of our hunter-gatherer ancestors. In *FLs 94/95,* I summarized an electrifying review by Harumi Okuyama[1] and colleagues from Nagoya, Japan, on the downward slide in their people's health, ever since traditionally high intake of omega-3 fats gave way to an unprecedented consumption of high omega-6 vegetable oils. A big source is commercial snack foods, especially popular with younger Japanese who, it seems, are coming down disproportionally with once-rare "western" diseases, which the older folks who stick to traditional foods are able to avoid.

Simopoulos, on the same wavelength as the Japanese researchers, writes:

"A critical finding is that your body functions best when your diet contains a balanced ratio of EFAs [essential fatty acids], yet the typical Western diet contains approximately *fourteen to twenty times more omega-6 fatty acids than omega-3s.* [My emphasis. CF] She says a spate of studies have accumulated by now to link this imbalance -- hold on to your hats -- with:

- Heart attack
- Stroke
- Cancer
- Obesity
- Insulin resistance
- Diabetes
- Asthma
- Arthritis
- Lupus
- Depression
- Schizophrenia
- Attention deficit hyperactivity disorder
- Postpartum depression
- Alzheimer's disease"

Surely it's no coincidence that most of these are the same ailments that rose for the first time in Japan, on the heels of that country's big increase in omega-6 oil intake.



A 20-Year Medical Mystery

Many scientists are content to labor for months, even years, on a single, small investigation, hoping they can contribute one fragment to a large research puzzle. Others enjoy gathering and *synthesizing* data into a broad picture that can solve medical mysteries. Dr. Simopoulos contributed to the solution of one of the biggest, and that's what the book is about. In 1960, the important 15-year "Seven Countries Study" [Ancel Keys. "Coronary heart disease in seven countries." *Circulation*, 1970;41 (suppl 1): 1-211] revealed that men from the Greek island of Crete "were healthier than all the other 12,000 men surveyed in seven quite different countries -- Greece, Italy, the Netherlands, Finland, Yugoslavia, Japan, and the United States."

The men from Crete had half the cancer death rate and *one-twentieth* the mortality from coronary artery disease, compared with American men. They had half the overall death rate of Japanese men -- "even though the Crete diet was a 40 percent-fat diet that contained three times more fat than the Japanese diet."

In Crete the traditional diet of the men "was virtually unchanged from 4,000 B.C. until modern times." Somehow, it was working wonders, but at the time the "educated guess" was that it had to do with its lower saturated fat and higher olive oil content. Scientists weren't paying much attention yet to the omega-3s. Twenty years later, she was able to provide the missing clue: *the diet had an ideal ratio of omega-6 to omega-3 fats.*

The answer came about because she knew, from her own background, that people of Crete ate lots of greens and wild plants, including ***purslane***. In her studies of wild versus cultivated plants, purslane proved to have an exceptionally high content of the primary omega-3, alpha-linolenic acid (LNA). Simopoulos' and Norman Salem's purslane paper came out in 1986 in the *New England J. of Medicine*, 315, p. 833.

Not long afterwards, her hunch was confirmed by the landmark Lyon Diet Heart Study conducted in France by Michel deLorgeril, Serge Renaud, et al. ("Mediterranean alpha-linolenic acid rich-diet in the secondary prevention of coronary heart disease." *Lancet* 1994:343:1454-9. Also, "Cretan Mediterranean diet for prevention of coronary heart disease." *Am. J. Clin. Nutrition*, 1995;61 (suppl):1360S-7S.)

Over 600 French patients recovering from heart attacks were placed either on the high omega-6 "prudent diet" recommended by the American Heart Assoc. (AHA), or on a modified Crete diet, in which canola oil was used as the major source of omega-3 alpha-linolenic acid. The Crete-type diet contained 35% fat; the AHA diet was 30% fat. *The ratio of omega-6 to omega-3 on the Crete-type experimental diet was 4 to 1 -- much lower than the AHA diet.*

Compared with the control group on the AHA "prudent diet," those on the experimental diet soon had lower blood levels of omega-6 fats and much higher levels of all omega-3s. Clearly, some of the dietary alpha-linolenic acid was being converted in their system into EPA and DHA, the super-poyunsaturated omega-3s which are known to protect cardiovascular health.

Simopoulos writes: "The results of the study made medical history. Just four months into the clinical trial, the researchers discovered there had been significantly fewer deaths in the group on the modified Crete diet than on the AHA diet. This in itself is remarkable because no other heart diet or drug has ever shown a lifesaving benefit until patients have been treated for at least six months. The survival gap widened with each passing month. When the patients had been followed for about two years, the study was halted abruptly because the new diet was proving so superior it would have been unethical to continue the research. *Compared to those on the AHA diet, the patients on the Crete diet had an unprecedented 76 percent lower risk of dying from cardiovascular disease or suffering heart failure, heart attack, or stroke!*

"Remarkably, the new diet had proven more effective at saving lives than any other heart diet, drug, surgical technique, lifestyle program, or any combination of these elements."

Here's a quirky aspect of the French study: the protective effects in the Crete-type diet were *not* related to patients' serum concentrations of total, LDL, or HDL cholesterol. (Meaning, patients on the Crete-type diet had no better blood cholesterol picture than those on the AHA diet, but were avoiding heart attacks and even death better!) Moreover, the *Am. J. Clinical Nutrition*, June 1997, pp 1882-6, has a follow-up by A. Kafatos et al. from University of Crete School of Medicine on the *actual men from Crete* who were among the "winners" in the original Seven Countries Study, thirty some years ago. Guess what? Their serum cholesterol picture was *never* in the so-called desirable range (under 180 mg/dL), even when they were in top notch shape at age 40 to 59, back in 1960. It averaged about 205 mg/dL. Now that they're age 70 to 89, it's gone up, averaging about 220. In spite of this, they've gone on to become healthy old guys, thanks at least to plentiful omega-3s. (Methinks we've got to rethink the low- cholesterol theory.)

A Little Fats Prehistory

How did we unbalance the omega-6/omega-3 seesaw? Early humans got most of their nourishment from fish, shellfish, meat, fruits, and vegetables, including starchy roots and tubers. Omega-3s are concentrated in seafood, sea vegetables, and in green leaves of plants, Simopoulos explains, while omega-6s are highly concentrated in seeds and grains. These became part of our diets only about 10,000 years ago and have since become a mainstay, in the form of cereals, bread, crackers, cakes, cookies, etc. What has totally unbalanced the seesaw nowadays is the lavish availability of high omega-6 oils that didn't exist 30-40 years ago.

Back to purslane! In the early 1980s, "few realized that green plants are a significant source of omega-3 fatty acids. Plants, as a rule, are generally low in fat, and their omega-3 content was thought to be negligible. As fate would have it, I helped revise this thinking." She remembered that it was used by traditional societies, including Native Americans, African tribes, and East Indians, to treat some of the same ailments that were now responding to omega-3s. "Theophrastus (372-287 B.C.), the father of botany, had recommended purslane as a remedy for heart failure, scurvy, sore throats, earaches, swollen joints, and dry skin." She convinced Norman Salem, Jr., Ph.D., who was at the National Institutes of Health where she was chair of the Nutrition Coordinating Committee, to help her analyze its fatty acid content.

"But where to find purslane? I knew it was commonly eaten in Greece, my homeland, and throughout most of Europe, Mexico, and Asia, but in the United States it was considered a noxious weed...

"You can imagine my delight when I found a clump of purslane growing in a highly convenient place: the cracks in the pavement outside my office at NIH. I collected the stalwart plants and submitted them for analysis. The results confirmed my hunch. Purslane is loaded with omega-3 fatty acids. One hundred grams contain 400 milligrams of the plant-based form of omega-3 fatty acids called alpha-linolenic, or LNA....As an added bonus, it is rich in antioxidants. One serving fulfills the daily requirement of vitamin E and provides significant amounts of vitamin C, beta-carotene, and glutathione."

An Aha! Moment

One of the implications of her discovery, she realized, "is that purslane and similar wild plants must have contributed a substantial amount of LNA and antioxidants to the diets of early humans. Purslane, in particular, is very widespread. Ranked as the eighth most common wild plant in the world, it was also one of the first plants cultivated by early humans: purslane seeds were found in a cave in Greece that was last inhabited 16,000 years ago."

Chickens, she found, are very fond of purslane -- and the eggs they lay after consuming it have 20 times more omega-3s than usual supermarket eggs!

Simopoulos reasoned that free-grazing animals would naturally feed on purslane and many other wild plants providing plent of LNA. Their tissues, in turn, would be high in omega-3s, as Dr. Michael Crawford learned when he found nearly six times more omega-3s in the flesh of a wild Cape buffalo than in the flesh of a grain-fed steer. She reflects, "Whether early humans were eating fish, plants, or land animals, they were being nourished by omega-3 fatty acids. Today, we consume a fraction of this essential nutrient."

"Seven Dietary Guidelines"

Here's how Simopoulos says we can turn this around:

1. Eat foods rich in omega-3 fatty acids such as fatty fish (salmon, tuna, trout, herring, mackerel), walnuts, flax oil, canola oil, flaxseeds, and green leafy vegetables. "Ideally, you should be getting seven grams of EPA plus DHA per week," from fish and/or fish oil supplements. Additionally, two grams a day of LNA -- about the amount in a teaspoon of flax oil -- is recommended UNLESS you don't eat fish or take fish oil supplements. Then you'll need much more LNA, because "it takes about ten grams of LNA to yield one gram of EPA and DHA."

2. Use monounsaturated oils such as olive oil and canola oil as your primary oil.

3. Eat seven or more servings of fruits and vegetables every day.

4. Eat more peas, beans, and nuts.

5. Avoid saturated fat by choosing lean meat over fatty meat (if you eat meat) and low-fat over full-fat milk products. (I question Dr. Simopoulos' admonition against using tropical fats; while saturated, they have an even longer history of safe use by humans than olive oil. Of course, moderation is the key.)

6. Avoid oils high in omega-6 fatty acids, including corn, safflower, peanut, soybean, sunflower, and cottonseed oils. Avoid mayonnaise and salad dressings made with these oils.

7. Avoid trans-fatty acids by cutting back on margarine, vegetable shortening, commercial pastries, deep-fat fried food, and most prepared snacks, mixes, and convenience food.

She takes us on a wonderful research journey, illuminating how the good omega-3/omega-6 balance of the Omega Plan actually works to help protect and heal us from heart attacks, cancer, insulin resistance, obesity, immune disorders, etc.

For instance, we know now the essential fats can "talk" to our genes, sending messages to make more or less of certain proteins. Simopoulos tells of a new study showing that oils high in omega-6 "send a message to the genes to produce more of a cancer-promoting protein called 'ras p21.' By contrast, omega-3 fatty acids render this protein inactive, possibly reducing the risk of cancer."

Can the fatty acid balance affect our mind and our moods? Absolutely! She describes medical studies showing that people who eat a lot of fish have low rates of depression! "The Japanese are a striking example. The traditional Japanese diet contains about fifteen times more omega-3 fatty acids than the American diet. Careful studies show that the Japanese people have one-tenth the rate of depression of Americans....The very lowest rates of depression in Japan are found in fishing villages."

[Note: The hallmark of the pilot studies conducted by Donald O. Rudin, M.D. in the early 1980s, which he described in his two books that I coauthored (*The Omega-3 Phenomenon*, Rawson 1987; and *Omega 3 Oils*, Avery 1996) was the very real sense of well-being experienced by previously 'normally' moody subjects by the end of the two-year experiment, in which they took flax oil and/or fish oil supplements while reducing their omega-6 oil intake.]

The Omega Plan has recipes, menus, sources, a table of omega-6 & omega-3 content of foods, etc. to make implementation of the Plan a pleasure not a pain. It may prove to be the most effective weapon yet for combatting the lethal effects of outdated medical policies. I suspect that the Big Wheels in medicine and the food industry already are sitting up and taking notice. ❑

PURSLANE AGAIN!

James A. Duke, Ph.D., the great botanist who retired from the USDA in 1995 only to embark on another lively writing and research career, sent me a copy of pages 156 and 157 from his 1992 *Handbook of Edible Weeds* (CRC Press, Inc., Boca Raton, FL, 1992) on *Portulaca Oleracea L.* - Common Purslane. It has the drawing I've used below. (I'm going to try to grow purslane again in the spring, although there may not be enough sun in my backyard.)

He writes: "...this mucilaginous potherb has been used by many ethnic groups on many continents...Tender parts, leaves, flowers, pods, seeds, and stems all may be stewed as potherbs, improved by adding egg and/or breadcrumbs....Buntings, doves, larks, long-spurs, mice, and sparrows eat the seed. Rats and rabbits graze the foliage. Weed scientists tend to overlook its value as food, instead stating it is now 'used widely as a food for pigs.' So there may be a bit of purslane in a pig's ear." [He loves puns.] "Cherokee squeezed purslane juice into the ear for earache, also used the plant for worms. Iroquois poulticed it onto bruises and burns. Navajo used it for pain and stomachache, almost as a panacea. Chinese use it for anthrax, boils, bug bites, colic, dermatitis, eczema, enteritis, erysipelas, herpes, indigestion, leukorrhea, ophthalmia, piles, snakebite, and tumors (Duke and Ayensu, 1985)..."

Just as I finished writing the above, my copy of Duke's *The Green Pharmacy* (Rodale Press, 1997) came, delivered by a very wet mailman -- the Bay area is getting socked and soaked by El Nino this winter. The book, delicately illustrated by wife Peggy (they met as young folks at Univ. of N. Carolina graduate school), is a goldmine of information on how to use easy-to-get plants to heal body 'n soul. Here are some of many references to purslane:

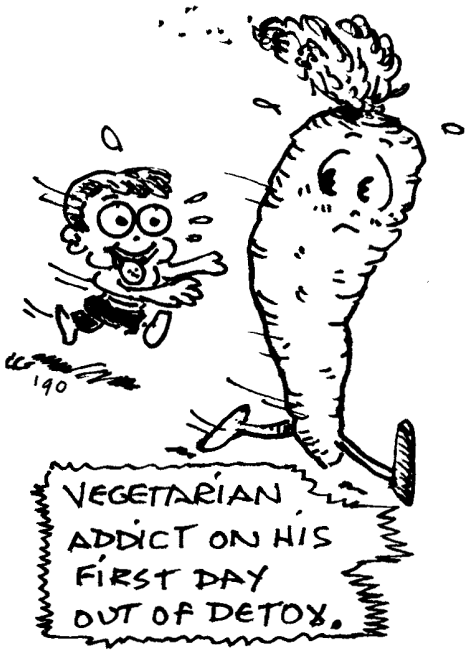
(On aging): "Exceptionally rich in antioxidants, purslane is the top herb that pops up in my database when I'm looking for combinations of the antioxidant vitamins A, C and E. It's also rich in the compound glutathione, which is both a powerful antioxidant and an immune system booster...."

(Intermittent claudication): "The beneficial oils known as omega-3 fatty acids help prevent cardiovascular disease, and purslane is our best leafy source of omega-3's.....Purslane is a delicious vegetable. I steam the leaves and eat them like spinach or add them raw to salads and soups."

(Cardiac arrhythmia): "According to estimates I've seen, more than 70 percent of Americans may get insufficient magnesium. Maybe that's why we have so much arrhythmia...Purslane is very rich in magnesium (nearly 2 percent on a dry-weight basis)...."

(Skin problems): "Like carrots, purslane is generously endowed with carotenoids. I'm not the facial mask type, but if I were, I might try putting a handful of this useful weed into a blender with a carrot and maybe even some pineapple. This would create an invigorating face mask with healing properties. I'd suggest leaving it on for 20 minutes or so."

Yep, I'm *definitely* going to grow purslane this year. ❑



A PERSONAL JOURNEY

In 1982, I first read Dr. Rudin's paper "The major psychoses and neuroses as omega-3 essential fatty acid deficiency syndrome: Substrate pellagra" in *Biological Psychiatry* (16:837-850, 1981). It was my introduction to a long voyage of discovery. I knew next to nothing about the omega-3s, nor did I find much enlightenment in my 1970s textbooks or class notes from U.C. Berkeley 1975-77. Quickly, I chased down every paper he'd published, haunting the stacks and waiting on long lines at the [then] few and crummy copy machines at UCSF's Medical and UC Berkeley's Biology libraries. Rudin's concepts about a group of fatty acid molecules that were missing in all our diets, yet were needed for regulating most bodily systems, were utterly bewildering to me, but I kept ploughing through his work, slowly picking up the gist.

I began to find substantiating papers by what amounted to a handful of scientists laboring in the same vineyard. This was getting exciting! I remember nearly flipping my lid when I learned from Lars Svennerholm's 1968 paper in *J. of Lipid Research,* vol 9, pp 570-579, that the brain's grey matter was loaded with omega-6 arachidonic acid ***and*** omega-3 DHA, and that DHA gradually dominated over a person's lifespan.

It was the first I realized that the developing brain of the fetus *must receive omega-3 fatty acids from the mother.* Not a single textbook or lecture had addressed this issue when I was a re-entry undergraduate in UC Berkeley's nutrition department.

On Feb. 18 I received a letter from Prof. Harumi Okuyama, Ph.D, of the Faculty of Pharmaceutical Sciences, Nagoya City University, Nagoya, Japan, thanking me for sending him a letter and *FLs 94/95,* in which I'd summarized his great review. [1]

He wrote that it was Dr. Rudin's early study "on pellagra and linseed oil" [in *Biological Psychiatry,* 1981, the same paper that fired me up!] "that led me to the research field of essential fatty acid deficiency. While demonstrating that [alpha-linolenic] deficiency in the presence of [omega-6 linoleic acid] really leads to altered behavioral pattern in rodents, I had long been awaiting the follow-up paper from Dr. Rudin's laboratory. Then I found *The Omega-3 Phenomenon."*

He continues: "In 1992, we founded a society, the Japan Society for Lipid Nutrition, for which I am serving as the president. Now we have more than 500 members....and I feel that lipid nutrition is changing steadily in Japan. Of course, people in [the] food industry are not willing to change but consumers are gradually forcing them to change."

Dr. Okuyama writes that Americans "consume ten times more non-steroidal anti-inflammatory drugs (NSAID, e.g., aspirin) than do average Japanese. Of course, difference in accessibility to these drugs (sold in local markets in the USA but not in Japan) may account for the difference, but much higher n-6/n-3 [omega-6/omega-3] ratios in the USA may be producing more inflammatory mediators requiring more NSAID." Interesting!

Just before my letter came, he said he'd received the new Japanese edition of the Rudin-Felix book *Omega 3 Oils.* Maybe Dr. Rudin and I will see a copy some day. There's a Taiwanese edition in Chinese in the works, too. Hooray!

Thank you, Donald and Joan Rudin -- what a great space trip it's been! ❑

[1] Harumii Okuyama et al. "The n-6/n-3 balance and chronic elderly diseases. Excess linoleic acid and relative n-3 deficiency syndrome seen in Japan." *Progress in Lipid Research,* Vol. 35, No. 4, pp 409-457, 1997. 491 references.

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

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