

LINUS, I LOVE YOU

Medical progress in assimilating nutritional strategies for preventive or therapeutic purposes is agonizingly slow. This reluctance is tied closely to economic factors: our health care system is based on the profitable aspects of bombarding people who are already sick with a battery of pharmaceutical and surgical procedures, rather than preventing sickness in the first place. Thirty years ago I first stumbled onto, at the time, revolutionary concepts of using the foods I served my family as prime weapons against a host of ailments which, though endlessly troublesome to my three small children and little stepson, were dismissed by doctors as normal or unavoidable. In no time at all, I saw dramatic changes in the family's health, looks, and dispositions. My stepson's badly diseased and swollen tonsils — scheduled for imminent surgical extirpation — shriveled down to normal size and color. Our roundrobin of colds, sore throats, earaches, and bronchitis stopped. It was as simple as that! Adelle Davis, my mentor by way of her books, was the spunky nutritionist who challenged the usurpation of nutrition by doctors, which, in essence, meant ignoring it, since they had neither the training nor convictions to practice it soundly.



A Natural Bag of Tricks

What had done the trick in our case? Was it the switchover from junk foods to whole grain breads and cereals, brewer's yeast, wheat germ, more vegetables, much less sugar, lots of yogurt? Or was it the introduction of supplements on a regular basis: multiminerals, B vitamins, lecithin, vitamins A and E, and hefty doses of vitamin C? I can only guess it was the synergistic effects of all the dietary innovations together that pulled it off. Little in the protocols of medical research allows for conclusions to be drawn from examining such complex, multiple factors. A pity! We could all gain from studies routinely conducted on healthy populations, say, in groups following diets similar to the one I described, to see if discernible patterns of health emerge. As I said, though, modern medicine trains its research guns on the study of sickness, not health.

When I was five years old, middle-ear surgery for mastoiditis left me with a chronic infectious discharge in that ear. The discharge disappeared permanently only after I, along with my children, began taking copious amounts of vitamin C daily. Apparently, I had suffered my whole life from a chronic undetected vitamin C deficiency. I think there are many like me. I worked with a young woman recently who, for a number of years, had frequent ear infections which the specialist treated repeatedly with antibiotics. The miserable bouts stopped for good, finally, a few months after she began taking megadoses of vitamin C and some vitamin E daily. Her doctor had never suggested this approach; most likely, he himself saw no connection between his patient's chronic problem and possible dietary deficiencies. The medical literature in his field devotes precious little time and space to this concept.

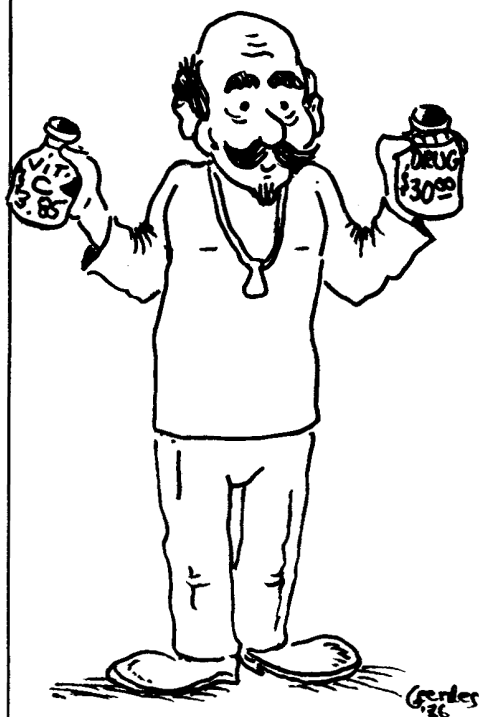
In the years since I first switched my family over to good foods and supplements, I have seen turnarounds in literally hundreds of individuals who followed similar paths. Anecdotal information in the popular literature and clinical reports from orthomolecular physicians tell us that these changes are taking place in a very wide section of the population. Vitamin C figures prominently in the reports I've read for at least 2½ decades. Among friends, family, and clients, I don't know anyone who hasn't gotten some tangible benefits from regular use of supplemental vitamin C in so-called megadose amounts. It comes as a shock therefore to read Dr. Linus Pauling's new book (*How to Live Longer and Feel Better*, New York: W. H. Freeman & Co., 1986) and learn that the medical hierarchy is still militantly opposed to acknowledging the usefulness of the vitamin in amounts above the RDA of 60 mg for adults, let alone incorporating these amounts in its treatment strategies. Despite its pop title, the book is a scholarly rundown on important current research on the vitamin, contains hundreds of journal references in an easily read bibliography, and brings us up to date on the ways in which vitamin C is being used in both alternative and allopathic medicine. Yes, plenty of 'straight' doctors treat patients with megadoses of the vitamin; Pauling gets letters from them all the time. It's the hierarchy which struggles, kicking and screaming, to deny its value!

Common Colds & Uncommon Profits

Pauling methodically analyzes the studies which the experts continue to cite to prove the vitamin's 'uselessness' in preventing or alleviating the common cold. In almost all cases he finds that even studies using very modest amounts of vitamin C show significant reduction in the length and severity of the colds, as well as in incidence of secondary bacterial infections. One problem, he points out, is the way in which some researchers chose to deprecate their own results, for example, simply omitting from their summaries (which is all that many doctors have time to read) the fact that they had observed significant protection with the vitamin. In the study most frequently cited involving 400 students, the authors stated that no "important" protective effect was seen when, in fact, students receiving 200 mg of C per day actually lost almost one-third less time from school with colds-related illness than the non-vitamin group. More importantly, Pauling describes many well-run experiments in which superb preventive effects of the vitamin emerge.



Why is the medical establishment so adamant in its refusal to acknowledge them? Pauling quotes from an article (*Fact*, July-Aug. 1967) entitled "Why Organized Medicine Sneezes at the Common Cold" by Dr. Douglas Gildersleeve, "apparently a pseudonym for a physician who feared the consequences of writing heresy in a popular magazine." In repeated experiments with 25 subjects carried out on more than 400 colds, he found that 4 to 5 grams/day of vitamin C effectively suppressed symptoms of colds in all but 5 percent. A paper on his observations was rejected by eleven different professional journals to which he submitted it! He (Gildersleeve) "stated that medical journals depend for their existence on the support of their advertisers, and that more than twenty-five percent of the advertisements in the journals relate to patented drugs for the alleviation of cold symptoms or for the treatment of complications of colds," Pauling notes. An effective treatment, such as vitamin C, is being ignored, Gildersleeve wrote, "because of the monetary losses that would be inflicted on pharmaceutical manufacturers, professional journals, and doctors themselves."



How to Fight Off the Sniffles

From his own experience and those of other researchers, Pauling is convinced that at the first sign of a cold, scratchy throat, drippy nose, muscle pain, general malaise, etc., 2000 mg (2 grams) or more of ascorbic acid (for adults) taken every hour for several hours will nip most colds in the bud. If the symptoms disappear, he suggests reverting to normal intake, but if they don't, the regimen should be continued "with the ingestion of 10 g to 20 g of ascorbic acid per day." He refers also to the work of Robert F. Cathcart, M.D., who in treating thousands of patients successfully with vitamin C, has found that an intake just below the amount that causes a loose, watery bowel movement will best control a viral infection such as colds or flu. The same adult who, in good health, will reach this point at between 4 and 15 grams per 24 hours, may find his bowel-tolerance intake to be as high as 200 grams per 24 hours when fighting a viral illness! Cathcart interprets this as a clear indication that the body's assimilation and need for the vitamin zoom when infections strike. Both Pauling and Cathcart suggest using crystalline ascorbic acid mixed in juice or water when taking these large amounts, rather than tablets. Pauling sometimes buffers his with a small amount of baking soda. The vitamin may be taken also as sodium ascorbate or calcium ascorbate powder, or mixtures of these with plain ascorbic acid, he suggests.

Before we fall into the trap of gauging vitamin C solely by its effects on the common cold, let's remember that the real controversy swirls around its use in megadoses instead of the RDA of 60 mg which is ample to prevent scurvy. Pauling describes worldwide

research demonstrating benefits from skyhigh doses in such seemingly unrelated disorders as allergic reactions, schizophrenia, wound healing, genetic disorders, cardiovascular disease, cancer, arthritis . . . even in animal distemper! He and many scientists say the need for these amounts is based on voluminous animal evidence. Unlike most creatures on earth who are able to make their own vitamin C, primates, man included, lack just one liver enzyme needed to complete the biosynthesis of the vitamin. One theory says that a mutation occurred millions of years ago in some primate ancestors, which proved advantageous, because the environment was rich enough in sources of vitamin C to permit survival in good health without the bother and energy loss of having to synthesize the vitamin. Even today, gorillas in their unspoiled forest habitat easily obtain plant foods providing them with 4500 mg each day. If we were to base our requirements on the amounts that nonprimate animals make, we discover that creatures as diverse as cats, dogs, cows, sheep, squirrels, and goats biosynthesize about 10,000 mg daily. (Since animals produce the vitamin in proportion to their body weight, the 10,000 mg would be the amount for a 70 kg (154 lb.) weight, that of the average man.) The animals make this amount even though their diet usually provides large amounts as well. Monkeys used in lab research have been found to need 1750 to 3500 mg daily (based on 70 kg wt.) to stay in good health.

Why We Use Up Vitamin C

Nevertheless, conservative nutrition authorities (Pauling calls them simply "old-fashioned") continue to question the *biochemical* rationale for using megadoses for people, saying that at the cellular level vitamin C, like most vitamin cofactors, works merely as a *catalyst, enabling reactions to take place without itself getting used up in the process.*

Pauling says the most effective answer to this mindset has come from the illuminating work of R. Myllyla and colleagues (*J of Biological Chem* 259:5403, 1984). One of the early recognized roles of the vitamin was in the synthesis of collagen by the body, in which vitamin C was known to catalyze several "hydroxylation" reactions: substituting a hydroxyl group (OH, or oxygen-hydrogen) for a hydrogen atom (H) in certain amino acids in collagen's long, twisted polypeptide chains. Usually, in the reactions in which vitamin C participates, it sparks the reaction but, like most vitamin catalysts, is not used up in the process. The new study shows that in collagen synthesis, however, during the hydroxylation of amino acids, proline and lysine, to hydroxyproline and hydroxylysine, *one molecule of vitamin C is destroyed for each H replaced by an OH.*

Collagen in the form of strong fibers and elastic networks (elastin) "constitutes the connective tissue that holds our bodies together," Pauling says. It's far and away the most abundant protein in the body, and it requires constant renewal for the growth and repair of

the whole human system. The continual synthesis of collagen means we lose large amounts of vitamin C continually. We now see more clearly why vitamin C, unlike vitamins used only as catalysts, disappears so rapidly from our body in such large quantities, and why it must be replaced in kind.

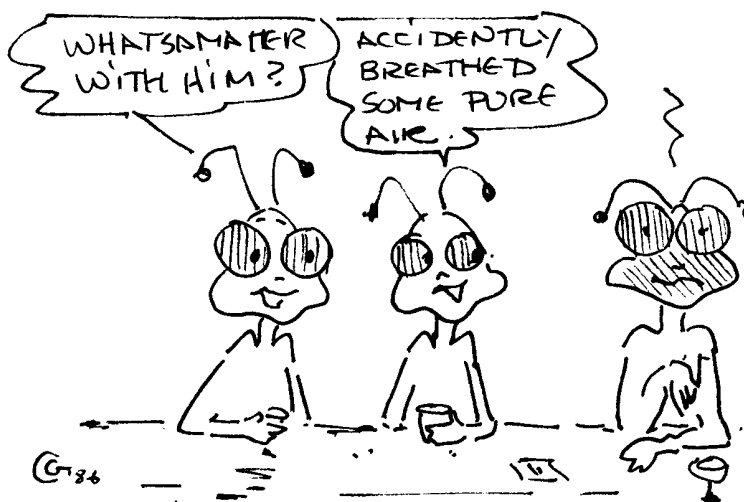
Help with Allergies

Untreated scurvy is fatal: the body literally falls apart because no more collagen can be made. Joints fail as cartilage and tendons weaken, teeth fall out of their sockets, the immune system disintegrates, and blood vessels collapse and hemorrhage. The good results seen with vitamin C in a wide variety of ailments are no doubt related in part to its revitalizing effects on the collagen-dependant structures throughout the body. But Pauling describes other functions the vitamin has in keeping us well. For example, it might be a good idea during spring hayfever season to be aware that vitamin C regulates the amount of histamine in the body and therefore the intensity of allergic manifestations. Histamine, released from storage granules into tissues, starts the reactions characteristic of hypersensitivity. Depending on the individual and the tissue affected, symptoms can range from itching eyes to intestinal upsets. Vitamin C controls histamine by converting it (via hydroxylation) into a substance which then decomposes into normal metabolic products. **With low plasma levels of vitamin C, histamine concentration rises sharply.** Researchers have even suggested that the action of runaway histamine may be responsible for some of the damage seen in scurvy . . . and, conversely, that certain allergic inflammations caused by histamine seem to resemble a localized scurvy!

Adrenaline, the pivotal hormone involved in "fight or flight" reactions, as well as in overall healthy functioning of the nervous system, is formed from the amino acid, tyrosine, in a series of hydroxylation steps requiring vitamin C. **Carnitine**, a substance of growing interest in biomedicine, is needed by the body to transport fatty acid molecules into the mitochondria — the "power factories" in our cells — where the fat is oxidized to provide energy for muscular activity. We can get carnitine in a meat diet, but we usually make our own carnitine from the amino acid, lysine. Vitamin C is needed for this transformation. The loss of muscular strength due to decreased carnitine synthesis may be yet another effect of a vitamin C deficiency. Many more functions of the vitamin are known; many more are expected to emerge with the use of increasingly sensitive techniques.

Powerful Protection

Pauling writes: "Ultraviolet light, X rays, cosmic rays, natural radioactivity, radioactive fallout from nuclear explosions, and mutagenic and carcinogenic chemicals produce their effects in part by forming free radicals, which then attack other molecules by changing



them or cross-linking them." Insoluble cross-linked "sludge" found in cells undoubtedly speeds up the aging process. **Vitamin C, vitamin E, and the trace mineral selenium are the body's main defense against free-radical oxidative attacks on our cells.** By insuring the cell's integrity, they minimize damage to arteries, joints, lungs, skin, etc. and so help protect against ailments such as heart disease and cancer, as well as premature aging.

A strong immune system is recognized now to be the best defense against cancer. Pauling explains why we can't have a healthy immune system without vitamin C. Our body needs it to make antibodies, certain components of complement (special proteins used for immune mechanisms), and interferon — the immune system product with antiviral and possibly anticancer activity. Leucocytes, the white cells patrolling for cancer cells in blood and lymph fluids, have to be full of vitamin C before they can do a thorough "search and destroy" job on malignant cells or other invaders. The vitamin works to prevent cancer in another way: by its exceptional power to neutralize toxic and carcinogenic substances. Ascorbic acid collaborates with enzymes in the liver to convert these dangerous molecules into harmless ones that can then be safely eliminated in the urine.

Pauling's book is at once a revelation of and a fighting-mad response to the forces in the 'business' of medicine which employ underhanded tactics to ignore, distort, or bury research where harmless nutritional substances such as vitamin C and E have been shown to be effective. Don't miss it! When a gentle scientist of his stature gets mad, it behooves us to pay attention! Dr. Pauling has nothing to gain by his uphill battle to investigate the use of natural substances in treatment, except the advancement of our understanding of health. There's no economic profit in it; funding is a constant struggle. His detractors, on the other hand, have everything to lose, for their prestige and profits rest on the foundations of invasive medical procedures. The success of nutrition as a primary preventive and healing force rocks their boats. It threatens to relegate drugs and high-tech medicine to the rightful position of last-resort, backup measures, which means kissing a lot of power and money goodbye.

Staying Healthy

Dr. Pauling's regimen for better health and longer life includes daily vitamin (A, B, C and E) and mineral supplements, plenty of water, moderate exercise, avoidance of stress, only moderate use of alcohol (if at all), and a relaxed approach to foods except for keeping intake of sugar (sucrose, raw sugar, brown sugar, or honey) down to 50 pounds a year. That's half to one-third the present U.S. intake. **NO SMOKING**, of course. He suggests 400 to 1600 IU of Vitamin E each day, and 6 to 18 grams (6,000 to 18,000 milligrams) of vitamin C for adults.* Questions about possible or reputed side effects of supplements are thoroughly discussed. For instance, individuals with a tendency to form uric acid kidney stones, especially when their urine is acid, often are told by their doctors to stay away from vitamin C because it will increase the urine's acidity. Pauling explains that in these cases, **sodium ascorbate** should be taken, or plain ascorbic acid with just enough ordinary baking soda to neutralize it. **Vitamin C is in fact the ascorbate ion, which is not in itself acidic.** Actually, ascorbic acid is "**hydrogen ascorbate**" — **the hydrogen ion is the acidifying element.** Ascorbate combined with either sodium or calcium ions forms sodium ascorbate or calcium ascorbate, which are **not** acidic in solution. Of course, in certain more common kinds of urinary calculi, an acidic urine is to be preferred, and in these types which the physician can designate, vitamin C in the form of straight ascorbic acid is quite helpful in preventing stone formation. It also helps to prevent urinary tract infections.

*The only caution I would ask is for individuals with an inherited trait affecting approximately 10% North American black men and 2% black women, known as glucose-6-phosphate dehydrogenase (G-6-PD) deficiency. Like sickle cell anemia, it may have survived as a hereditary trait because it offered the bearers protection against malaria. Certain drugs and foods are known to cause some degree of hemolysis (destruction of red blood cells) in persons with the trait, leading to what can become a serious anemia. Vitamin C in amounts of 1.5 grams per day may produce mild hemolysis also. Thus, individuals with G-6-PD deficiency have to be careful with vitamin C supplementation in amounts over 1 gram per day. Incidentally, vitamin E, 400 to 800 IU daily, has been shown to improve survival of red blood cells and reverse anemia in individuals with this trait.



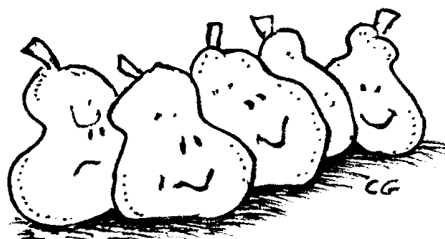
A Man of Courage ...and I Don't Mean Rambo

In an addendum to the book, Dr. Robert Paradowski of the Rochester Institute of Technology tells us about the scientist and the citizen: "Linus Pauling first came to the notice of many of his countrymen outside of science when he framed the issue on which public opinion compelled, at last, the suspension by the United States, the Soviet Union, and the United Kingdom of the testing of nuclear weapons in the atmosphere." The U.S. government had been issuing reassuring press reports about the harmless, even beneficial, nature of the bomb since regular testing began in Las Vegas in 1951. "It was Linus Pauling, speaking with the authority of a Nobel laureate (in chemistry, 1954), who exposed the fraud of this governmental public relations campaign. He translated the physics of nuclear explosions into words and numbers people could understand." Pauling calculated that the output of radioactive carbon-14 from the then-scheduled tests would produce hundreds of thousands of cases of birth defects, miscarriages, stillbirths, leukemia, and bone cancer. "Throughout his campaign against the weapon tests in the polarized American political climate of the 1950s, Pauling had had to endure the impugning of his citizenship and even the official affront of the lifting of his passport for a time ..." By the end of the repressive McCarthy era, the U.S. finally was encouraged to join the other superpowers in signing a treaty in 1963 to suspend the testing of atomic bombs in the atmosphere. On the same day, the Nobel Peace Prize for 1962 was awarded to Linus Pauling. As late as 1963, though, "his Nobel Peace Prize was headlined in LIFE magazine as a 'Weird Insult from Norway.'"

On March 28-30, 1986, a conference little noted in the U.S. press took place in Tokyo, only a few weeks before the Reagan administration decided to go ahead with its underground nuclear weapons test in Nevada despite strong world and U.S. opposition. Speakers from the South Pacific nations of Fiji, Palau, the Marshall Islands, etc. told the meeting that 150,000 of their people have died since the end of World War II from birth defects, leukemia, and other forms of cancer resulting from nuclear testing by the U.S., Britain, and France. More than 250 nuclear tests had been exploded in the South Pacific. High radiation levels still haunt the island people.

Linus Pauling was right. He knew his atomic physics. The experts who reassured us were liars, but he, not they, was labeled a subversive and had his passport revoked. My gut feeling is that history will prove he was right in his much more optimistic theories about the protective and therapeutic effects of nutrition as well.

PEAR-GROUP
PRESSURE!



New Look at Vitamin C

An army is a lot more than its generals; pressure from the ranks is clearly affecting the direction in which medicine is moving. *The New England J. of Medicine* of April 3rd features a comprehensive seminar by Mark Levine, M.D. on "New Concepts in the Biology and Biochemistry of Ascorbic Acid," which questions sharply the current criteria being used for determining the RDA for vitamin C. Experiments with monkeys and guinea pigs (which also can't make vitamin C) show "approximately a 10-fold difference between the amount of ascorbate necessary to maintain general health and the amount needed to prevent scurvy ... This suggests that the use of scurvy prevention alone to gauge ascorbate

needs may result in underestimating those needs." He urges instead the use of refined biochemical techniques which can measure how much vitamin C is needed for enzymatic transformations of certain key molecules in the body, since the list of such reactions known to require vitamin C keeps growing yearly.

In the cautious language of science, Dr. Levine tells of the vitamin's benefits in lowering serum cholesterol, healing bed sores, improving immune system functions, blocking carcinogenic substances in the body, etc. Ascorbic acid, he suggests, "may yet have some role in the prevention or treatment of cancer." He ends the seminar with this comment:

I have come to explain my work today in order to change some of the preconceived notions that many of us have about vitamins and cofactors. We really don't know how much of these entities the human body needs for optimal function ... We should not laugh at or disparage investigations designed to answer questions about the optimal amounts of vitamins and cofactors to meet physiologic and biochemical needs. On the contrary, we have to realize that very little is known in this important area. The outcome of such investigations may be very valuable to all of us. ■



Illustrations are by Clay Geerdes and other artists as noted.

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