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Vitamin C: Cancer cure?

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Is mainstream medical science ignoring an inexpensive, painless, readily available cure for cancer?

Mark Levine mulls this loaded question.

The government nutrition researcher has published new evidence that suggests vitamin C can work like chemotherapy - only better. But so far, he hasn't been able to interest cancer experts in conducting the kind of conclusive studies that, one way or the other, would advance treatment.

"If vitamin C is useful in cancer treatment, that's wonderful. If it's not, or if it's harmful, that's fine, too," said Levine, a Harvard-educated physician at the National Institute of Diabetes and Digestive and Kidney Diseases. "The goal is: Find what's true. Either way, the public wins, clinicians win, and patients win."

If Linus Pauling, the two-time Nobel laureate turned vitamin C zealot, had taken an equally dispassionate stance 30 years ago, who knows where the vitamin would be in oncology today. Surely not where it is: a dubious alternative on the fringes of medicine, despite its continuing links to remissions and cures.

This is not about popping supplements. It's about putting high-dose vitamin C, or ascorbic acid, into a vein, which requires needles and trained professionals.

The distinction between oral and intravenous is crucial. The body automatically gets rid of extra C through urine. Levine's lab has shown that, at high concentrations, the vitamin is toxic to many types of cancer cells in lab dishes. But to get that much C into the body before it's eliminated, it must be put directly into the blood.

This may explain the defining setback of Pauling's crusade. He and his collaborator, Scottish surgeon Ewan Cameron, gave C intravenously and orally, and claimed many of their cancer patients lived surprisingly long and well. In the 1970s, two rigorous government studies intended to test their claims gave only pills - and found no benefits.

How could so many smart people, including Pauling, ignore a variable as basic as the body's ability to absorb and clear a drug?

"I don't want to impugn anyone," Levine said. "It's one of these things where somebody didn't ask the right questions."

So Levine keeps on, driven by the still-open question:

Can intravenous C do what even the costliest, most targeted, most effective therapies cannot: kill cancer cells without harming healthy ones?

500 oranges

Loretta Hill, 42, of Pittsgrove, Salem County, sits at a faux granite table, facing a TV, chatting with two other cancer patients in the Marlton office suite of family physician Vivienne Matalon.

Each patient is tethered to an intravenous bag of C and other nutrients hung above the table that will take 40 minutes to drip into them. The fee, not usually covered by insurance, is \$110.

Hill can't prove that C saved her from colon cancer, but she fervently believes it has.

She was diagnosed in 2001, at age 38, after a sudden bout of rectal bleeding. She had surgery, radiation, two courses of chemo. Six months later, the cancer was back - but had spread to both lungs.

After those tumors were cut out, her oncologist offered irinotecan, which costs about \$9,500 a week. But, she says, he held out little hope. He declined to be interviewed.

By then, Hill could barely function, much to the anguish of her husband and 9-year-old daughter.

When she heard about Matalon's ascorbate infusions, she figured, "If this doesn't work, at least I'll be in a better position for more chemo."

Today, almost four years later, Hill is in college part time, plays soccer, and has no signs of cancer. Her weekly C dosage has been cut to 30 grams - about 500 oranges' worth - but she has no plans to quit because her only side effects are "fabulous hair and skin."

Bill Nath, 69, a Wichita, Kan., businessman, is an even more provocative case.

In 1996, blood in his urine led to a diagnosis of bladder cancer. Tumors were invading the organ and surrounding muscle.

Nath consulted experts at four major cancer centers from Wichita to New York. All recommended chemo, radiation, and removal of all or part of the bladder. Total removal would include the prostate, adding risks of incontinence and impotence.

One specialist "said if I didn't remove the whole bladder, I would die," said Nath. "It was pretty traumatic."

Nath ultimately made a choice that seemed suicidal to his wife, friends, and doctors: to keep part of his bladder and forgo chemo and radiation.

Instead, he got 30 grams of C twice a week for three months, then every month or two for four years at the Center for the Improvement of Human Functioning in Wichita. It was founded by Hugh Riordan, a physician and friend of Pauling's, now deceased.

Today, a decade after his diagnosis, Nath is cancer-free.

Levine, in collaboration with National Cancer Institute pathologists, reexamined, then published Nath's case and two others from Riordan's center. While such "case reports" prove nothing, Levine hoped they would stir interest in reexamining ascorbate in oncology.

But as Nath has discovered, when it comes to C, people who hear hoofbeats look for zebras.

"Everybody thought I was crazy," he said. "Now they probably think... it's a miracle or something."

Not a miracle

Vitamin C is not miraculous, proponents say. Just as some people die despite standard treatment, some die despite ascorbate drips.

"We may not be able to affect the ultimate outcome," said Matalon, who sees about 15 ascorbate patients a week. "But I think we see a dramatic improvement in quality of life."

The problem is, anecdotes and impressions don't count. Skeptics ask: Where's the data on dosing and regimens, on tumor responses, on survival?

"As far as I know, that kind of registry just doesn't exist now, and it's a huge weakness of the movement," acknowledged Ron Hunninghake, chief medical officer at Riordan's center, which is starting a database.

In any case, as consumers clamor for alternative therapies, intravenous C is gaining fans. Reports of side effects are rare, and risky patients - with kidney problems or blood disorders - are easily screened out.

"Interest is definitely growing," said Kenneth Bock, physician and president of the American College for Advancement in Medicine, an alternative-medicine society that teaches ascorbate infusion protocols.

Interest is not growing, however, among mainstream oncologists, judging from conferences, publications, and interviews with some of them.

The National Cancer Institute, with a \$5 billion budget, is not sponsoring studies of intravenous C. Neither is the National Center for Complementary and Alternative Medicine - although it is paying for cancer studies of the noni extract herbal supplement and Reiki energy healing. The American Cancer Society and the American Association of Clinical Oncologists warn patients against high-dose C, as do leading cancer centers such as the University of Pennsylvania's and Memorial Sloan-Kettering in New York.

Jeffrey White, director of the National Cancer Institute's office of cancer complementary and alternative medicine, said that he's tried to "generate awareness" of Levine's research, and believes it justifies more studies in humans. But White acknowledged that the NCI has rejected "a few" proposals for such studies.

At the prestigious Mayo Clinic in Rochester, Minn., oncologist Edward Creagan said the idea that intravenous, but not oral, levels are toxic to cancer is "an intriguing concept."

"However, my own belief is that the vitamin C story is really ancient history," he said. "It would be very difficult for patients and clinicians to mount a lot of enthusiasm for another vitamin C study."

It was Creagan and his Mayo colleague, Charles Moertel, since deceased, who in the 1970s conducted the two NCI-funded "clinical trials" that showed vitamin C pills were no better than placebo pills for cancer patients.

A clinical trial is considered ultra-reliable because it is designed to keep beliefs and hopes from slanting findings.

Pauling lobbied for a trial, then later contended that the Mayo researchers enrolled unsuitable patients. A second trial in response to Pauling's criticism also bombed. Again he faulted the Mayo oncologists. He also threatened a libel suit against a Rochester newspaper for the headline "Pauling Wrong on Vitamin C for Cancer," and accused the New England Journal of Medicine and the NCI of accepting a "fraudulent" study, according to Australian medical historian Evelleen Richards.

By then, Pauling advocated treating everything from the common cold to mental illness with vitamins and other substances he dubbed "orthomolecular," meaning "right molecule." To many colleagues, this genius and visionary, winner of the 1954 Nobel in chemistry and the 1962 Nobel Peace Prize for his antiwar work, had become a kook - "The Old Man and the C".

Decades later, both skeptics and fans of C are gun-shy about more trials.

"There's tremendous resistance to even test this," Levine said. "It's very hard to revisit something like this without data. Information is diamonds."

As the chief of the molecular and clinical nutrition section at the National Institute of Diabetes and Digestive and Kidney Diseases - hardly a hotbed of federal cancer research - Levine discovered some diamonds "by accident."

In the early 1990s, his lab began looking at how the concentration of a nutrient affects its function, and how the body gets the proper concentration.

"As part of those studies, we looked at how vitamin C is absorbed in the intestine," Levine said.

By 2000, when that work led to an increase in the U.S. recommended daily allowance of vitamin C, Levine had become an expert on ascorbate's "pharmacokinetics" - what the body does to the drug.

Consumers and scientists already knew that ascorbate was an "antioxidant," meaning it protects cells from reactive oxygen molecules - the same marauders that turn peeled apples brown and wet metal rusty.

Indeed, the reason the American Cancer Society and others discourage ascorbate megadoses is that a few studies of cells in dishes suggest C might protect cancer from oxidant damage. Chemotherapy and radiation work partly by intentionally unleashing this damage.

But Levine's lab-dish studies showed that ascorbate transforms from an antioxidant into just the opposite - an oxidant *promoter* - when it reaches high concentrations. At these levels, which are achievable in the body only intravenously, C acts like a toxic drug by generating hydrogen peroxide, a powerful oxidant used as a bleaching agent, an antiseptic, and even a World War II rocket fuel.

Still, the biochemistry was puzzling. Putting pure peroxide in the bloodstream can be fatal, so why did patients feel fine when the vitamin that produces it was dripped into their veins?

Levine's experiments offered possible answers. Vitamin C did not generate peroxide in blood, only in liquid such as that found in body cavities. Thus, in the body, intravenous C must seep out of the blood to work.

Five out of nine types of cancer cells that were put in simulated body-cavity fluid died when concentrated ascorbate or peroxide was added to the dish. And the best part: This same lethal marinade had no effect on healthy cells.

For some reason, cancer cells were like the Wicked Witch of the West splashed with water - powerful villains vanquished by a mundane substance that is harmless to good guys.

Previously, Riordan had speculated that this was partly because an enzyme that neutralizes peroxide is abundant inside normal cells, and scarce inside cancerous ones. But by inducing cells to take in C, Levine proved that the internal concentration doesn't matter; malignant cells withered only when C surrounded them.

Armed with this new evidence, a coterie of researchers - all associated with Pauling or his disciples - have recently obtained private funding for small trials of intravenous C.

University of Kansas Medical Center physician Jeanne Drisko has \$375,000 for a trial of 30 ovarian cancer patients. In Montreal, McGill University oncologist Wilson Miller has \$300,000 to find the maximum safe doses for treating various cancers.

Meanwhile, Levine is forging ahead with animal studies, trying to decipher the molecular magic of C's selective toxicity.

Does that mean he believes C is an unsung cancer weapon?

"I think that question is akin to 'Do you still beat your wife?' " he said. "The question I would ask is: Shouldn't we investigate the potential of ascorbate as a drug?... Let's not guess anymore. Let's be motivated by the truth."

Web Sites and Information

For more information on the pros and cons of intravenous vitamin C use, and where you might find the treatment:

- The Center for the Improvement of Human Functioning in Wichita, Kan., specializes in certain alternative medical approaches, including intravenous vitamin C: <http://www.brightspot.org/>

Its intravenous C treatment protocol can be found at: <http://www.canceraction.org/gg/recnac.htm>

- The American College for Advancement of Medicine is a medical society that educates health-care professionals about alternative therapies. It teaches vitamin C infusion protocols as part of training in chelation therapy. It has a physician referral phone line (1-888-439-6891) and a searchable online physician directory:

http://www.acam.org/dr_search/index.php

- The American Cancer Society is a national research, education, advocacy, and service organization. It offers information on alternative therapies. A Web page on vitamin C is at: http://www.cancer.org/docroot/ETO/content/ETO_5_3X_Vitamin_C.asp?sitearea=ETO

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- The National Cancer Institute's Office of Cancer Complementary and Alternative Medicine has information about treatments, research, and clinical trials:

<http://www.cancer.gov/cam/>

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