

Pauling's panacea: No good for cancer

Old ideas die hard. So do relatively new ones, especially to that guru of scientific intuition, Linus Pauling.

In the early 1970s, Pauling proposed that large doses of vitamin C could help treat cancer. Pauling, of Palo Alto, Calif., based his claims on a Scottish study showing a striking survival advantage for cancer patients treated with vitamin C. But researchers at the Mayo Clinic in Rochester, Minn., announced in the Jan. 17 *NEW ENGLAND JOURNAL OF MEDICINE* that high-dose vitamin C, the elixir Pauling made famous, has no advantage over placebo as a therapeutic agent for advanced cancer.

The Mayo Clinic researchers denounced the Scottish study, conducted by Pauling and Ewan Cameron, of Vale of Leven Hospital in Loch Lomondside, Scotland, because it relied on historical controls—the records of previous cancer patients at the hospital—as a comparison for the vitamin C-treated group. “Whenever you’re comparing results achieved today with results achieved yesterday, it doesn’t mean very much,” says Charles Moertel, an author of the paper.

The Scottish study first reported a survival rate about four times greater for the vitamin C-treated group than for the historical controls. In a revised report, they gave a survival rate about seven and one-half times greater for the treated group. The Mayo Clinic researchers say Pauling and Cameron were able to report a greater survival rate in their second study because they replaced about 50 percent of the historical controls and 20 percent of the vitamin C-treated group to make the results look better. Pauling says the subjects had been changed to ensure they had similar types of cancer and had reached the same untreatable stage of the disease.

The Mayo Clinic researchers first showed that vitamin C has no effect in treating cancer in 1979. Instead of using a retrospective (historical controls) study, they used a prospective, randomized, double blind study. Such a research design protects against “conscious or unconscious bias on the part of investigators,” the researchers say. “There was no such protection against bias for Cameron and Pauling as they selected and then re-selected the patients they decided to evaluate for their first and second reports.”

Pauling criticized the Mayo results because some of the patients had undergone chemotherapy. He said the drugs mitigated any possible benefit from vitamin C because they damaged host resistance mechanisms that otherwise would have been enhanced by vitamin C.

So the Mayo Clinic group undertook a new study, using only patients who had advanced cancer of the large bowel—the most frequent tumor type for which Paul-

ing and Cameron reported improvement with vitamin C therapy—and who had not received chemotherapy. The Mayo researchers said they felt “ethically justified” in not offering chemotherapy because there is no known form of the therapy that helps such patients.

The researchers found that cancer patients lived just as long on placebos as on high-dose vitamin C. In fact, probably by chance, more long-term survivors had received placebos than vitamin C. In an interview with *SCIENCE NEWS*, Pauling countered that the new results do not negate the vitamin C theory because the Mayo group had given the vitamin for a short period of time (two and one-half

months) whereas Cameron’s patients “got vitamin C at as early a stage as possible, continuing all through their lives.

“There’s a big difference between what they did and what Cameron did,” Pauling says. “Cameron was interested in improving nutrition. Moertel gave [vitamin C] for a short period of time because he was thinking of it as a drug.”

But the Mayo Clinic researchers and other scientists believe the issue has been laid to rest. Nevertheless, Pauling, now 83, is working on another book about vitamins, which deals largely with vitamin C’s effectiveness in treating the common cold, influenza, mononucleosis, cancer and heart disease. — *D.D. Bennett*

Talent Search winners announced

Consider the computer: It can be used to develop a new method of personal identification based on dental bitemarks that may aid efforts in law enforcement and forensic dentistry; it can be designed so that it runs multiple interacting programs simultaneously almost three times faster than a single microprocessor-based system; and when combined with theoretical number formulas, it can show that an odd perfect number—in which the sum of its factors is twice the original number—must be at least 10^{79} . In fact, the computer has been used in these ways by three high school seniors who are among the 40 winners of the 44th Annual Science Talent Search.

The scope of scientific research by the winners, aged 16 to 18, does not stop with computers, however. It includes archaeology, astrophysics, chemistry, cognitive psychology, environmental genetics and molecular biology.

The winning projects, submitted by 30 boys and 10 girls, were selected from 1,069 completed entries. The winners are invited to Washington, D.C., to attend a five-day, all-expenses-paid session of the Science Talent Institute, beginning Feb. 28. They will compete for \$89,500 in Westinghouse science scholarships and awards. The competition is conducted by Science Service, Inc.

This year’s winners are:

CALIFORNIA: Joseph William Bencze, St. Francis H.S., Mountain View; Alan John Hu, La Jolla H.S., La Jolla; Bill Li-Chien Tsai, Van Nuys H.S., Van Nuys.

FLORIDA: Sheryl Lynn Ames, Ft. Lauderdale Christian School, Ft. Lauderdale; Laura Joan Ricci, Rockledge H.S., Rockledge; John Michael Rose, Coral Gables Sr. H.S., Coral Gables.

ILLINOIS: Rachel Lee Amdur, Lincoln Park H.S., Chicago; Anna Asher Penn, University of Chicago Laboratory Schools H.S., Chicago; Anne Marie Wilkinson, Evanston Township H.S., Evanston.

MASSACHUSETTS: Michael William

Gesner, Cardinal Spellman H.S., Brockton; Mark Kantrowitz, Maimonides School, Brookline; David Pollen, Lexington H.S., Lexington.

MICHIGAN: Katharine Anne Duderstadt, Pioneer H.S., Ann Arbor; Victor Achilles McCastle, Cass Technical H.S., Detroit.

MISSOURI: Marilyn Sue Thompson, Central H.S., St. Joseph.

MONTANA: David William Hyndman, Hellgate H.S., Missoula.

NEW JERSEY: Bram Seth Boroson, Glen Rock Jr.-Sr. H.S., Glen Rock; Jonathan Michael Passner, Jewish Educational Center, Elizabeth.

NEW YORK: Paul Chan, Stuyvesant H.S., New York; Kristi Ann Dell, Bellport H.S., Brookhaven; Michael Friedman, Stuyvesant H.S., New York; Boris Y. Gelfand, Bronx H.S. of Science, New York; Michael Steven Graziano, City Honors H.S., Buffalo; Junjiro Horiuchi, Stuyvesant H.S., New York; Pasi Antero Jänne, United Nations International School, New York; John Shu-Shin Kuo, Bronx H.S. of Science, New York; Leonard Tze-Yung Lee, Liverpool H.S., Liverpool; Huw Michael Nash, Webster H.S., Webster; Louis Craig Paul, Baldwin Sr. H.S., Baldwin; Audrey Zelicof, Stuyvesant H.S., New York.

OREGON: Eric James Gaidos, Beaverton H.S., Beaverton.

PENNSYLVANIA: Anthony Mario Ciabarra, Cheltenham H.S., Wyncote; Allan Moises Goldstein, Cheltenham H.S., Wyncote; Kimberley Anne Jacobs, Northeastern Sr. H.S., Manchester.

VIRGINIA: Jeffrey Russell Ambroziak, Lake Braddock Secondary School, Burke; Thomas Patrick Heavner, Lake Braddock Secondary School, Burke; Kent Christopher New, T.C. Williams H.S., Alexandria; Mark Raboin Swain, Stonewall Jackson H.S., Manassas.

WISCONSIN: Todd Michael Minter, Madison East H.S., Madison.

PUERTO RICO: Edwin Alfonso Sosa, San Antonio H.S., Isabela. □