Man-made interferon counters cancer

At last the way seems to have been cleared for testing interferon's true potential as an anticancer drug. Two years ago researchers learned how to make interferon with recombinant DNA techniques, thus opening up large, economic sources of it for clinical testing (SN: 1/26/80, p. 52). And now interferon made by recombinant DNA methods appears, like its natural counterpart (SN: 11/22/80, p. 327), to be active against at least some forms of human cancer.

Last year the first preliminary trials to test recombinant DNA-produced interferon on human cancer patients were launched at Stanford University School of Medicine, at the M.D. Anderson Hospital and Tumor Institute in Houston and at the National Cancer Institute in Bethesda, Md. (SN: 1/24/81, p. 55). The results from the Stanford trial have now been published in the March 26 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION by Thomas C. Merigan and colleagues at Stanford.

In this trial, human leukocyte interferon (one of the three known kinds of interferon) was manufactured by recombinant DNA techniques under the auspices of the recombinant DNA firm Genentech and the pharmaceutical company Hoffman-LaRoche. The synthetic interferon was tested on experimental animals to make sure it was safe, then was given in eight to 11 escalating doses, over a 32- to 56-day period, to eight patients with advanced cancer. The patients' cancers included ovarian cancer, malignant melanoma, breast cancer, colon cancer, lymphoma and chronic myelogenous leukemia. Of the eight patients, four — the two with lymphoma, the one with chronic myelogenous leukemia and one of the two with breast cancer — experienced tumor regression, implying that the interferon treatments had brought about this regression. Thus, "further investigation of this biologically active material is warranted," Merigan and his team conclude. In an accompanying editorial, JAMA Senior Editor Lawrence D. Grouse agrees.

The results from the M. D. Anderson Hospital trial are to be published in the April ANNALS OF INTERNAL MEDICINE. In this study, eight cancer patients received the same synthetic interferon that the eight patients in the Stanford study did. Three of the eight experienced tumor regression.

Results from the NCI trial, which are now being assessed, will be reported at a meeting of the American Society of Clinical Oncology in St. Louis late April.

—J. A. Treichel

DSDP: Rethinking the accretion model

Until two years ago, scientists thought that the Guatemala margin of the Middle America Trench embodied the clearest features of a classic subduction zone. But when the *Glomar Challenger* visited the site on Leg 67 of the Deep Sea Drilling Project, results were confusing (SN: 8/25/79, p. 133). The drill cores seemed to refute the accepted model of the way sediments and oceanic crust behave when one plate slides beneath another at plate margins. Now, on a return visit to the site, scientists aboard Leg 84 of the DSDP have confirmed their suspicions: The sediment, rather than being sluiced off the subducting plate and plastered onto the overriding plate, slips beneath the margin.

The finding is unexpected because it was thought that the sediment built up in front of the margin with the oldest sediment nearest the continent and the youngest nearest the plate junction. But rather than sediment, the core displays igneous rock, called ophiolite, that has been altered and disrupted over time. Roland von Huene of the United States Geological Survey in Menlo Park, Calif., says that no sediment has accreted — a similar situation to that off the coast of Japan. von Huene and Jean Aubouin of the Universite Pierre et Marie Curie, Paris, were co-chief scientists aboard the drill ship.

The ophiolite, the same kind of rock that comprises Central America, composes the landward wall of the trench and extends down to the point where the Cocos Plate — the floor of the Pacific — edges beneath the wall. The igneous rock was emplaced more than 70 million years ago; it did not result from the activity of the present tectonic system of arcs and subduction zones, which began only 25 years ago. This puzzle awaits explanation.

Though its tectonic history is uncertain, the site does conform to models for overthrust belts, which occur when one plate is thrust up over another. The scientists found that as expected, pore pressures are highly elevated. The pore waters, along with sediments and oceanic crustal material, are carried beneath the Caribbean Plate. Deep in the earth, these ingredients are heated and compressed, later to participate in the profuse volcanic activity of Central America.

On Leg 67, the unexpected discovery of gas hydrates prevented the scientists from drilling deeply enough to sample the landward wall of the trench. This time the crew was prepared, and successfully extracted a core of white methane hydrate. The drill hit a three- to four-meter-thick layer of gassy ice at 249 meters beneath the seafloor. At room temperatures, the hydrates melt to residual water, and yield more than one hundred times their volume in gas.

—C. Simon

Solar neutrinos: Putting an ore in

For millenia the sun has been our metaphor for constancy, reliability, even laziness. Astrophysicists' standard model of the nuclear processes going on in the sun had about it a good bit of this sense of solar changelessness: It posited what is called a "steady-state" sun. However, experiments designed to record the flux of neutrinos that the sun was expected to put out under the standard model have not found the expected flux. At least one of the new models proposed in response to this failure discards the steady-state assumption. A proposal to test such models by analyzing geologic samples is published in the April 2 SCIENCE by G. A. Cowan of Los Alamos National Laboratory and W. C. Haxton of Purdue University.

Neutrinos are recorded by the changes they induce in atomic nuclei that capture them. The operating solar-neutrino experiments use the reaction in which a neutrino turns a chlorine-37 atom to argon-37. This reaction is triggered by a wide range of neutrino energies. What is needed now is reactions sensitive to narrow energy ranges so as to select neutrinos made in different kinds of processes. The various models differ in the nuclear processes that go on and their proportion to one another. The process of most current interest is the beta decay of boron-8.

For measuring boron-8 neutrinos Cowan and Haxton proposed the neutrino-induced transformation of molybdenum-98 to technetium-98. The record of this going back millions and billions of years would be found by assaying the proportions of those two isotopes found in old deposits of molybdenite ore. The advantages of using a geologic sample are that over all those years good statistics build up and that this record is sensitive to changes in solar nuclear activity over the eons. Molybdenum-to-technetium is not the first capture process proposed for investigation in geologic samples, but Cowan and Haxton argue that the others all suffer from unresolved problems.

Cowan and Haton propose to use molybdenite from the Henderson ore body buried under Red Mountain in Clear Creek, Colo. They argue that such ore will not be hopelessly contaminated by the radioactivity from surrounding rock or by the activity of cosmic-ray muons.

The particular solar theory they cite, by F. W. Dilke and D. O. Gough, proposes that matter in the sun, which is well layered most of the time, undergoes a mixing process every few million years. This lowers both the neutrino and light output. Lowering the light output causes ice ages on earth. The Pleistocene epoch began about 3 million years ago. This suggests we may be in one of those mixing periods.

—D. E. Thomsen