AIDS VACCINES

Chimps Protected From Infected Cells

When researchers announced 2 years ago that they had developed a vaccine that could protect a chimpanzee against infection when a bolus of HIV was injected into the animal's veins, optimists hailed the achievement as an important milestone on the road to the development of a human vaccine. But pessimists were unimpressed. In the real world, they argued, free virus is a rarity: HIV is usually transmitted from person-to-person in infected blood cells, where it may be hidden from the immune system. A more realistic experiment would be to show that a vaccine could prevent infection when a chimp was challenged with HIV-infected white blood cells, they said.

Now that experiment has been done, and the results are prompting broad smiles from the optimists and maybe just a hint of a grin from the pessimists. On page 1687 of this issue, Patricia Fultz of the University of Alabama, Birmingham, along with colleagues at the Pasteur Institute in Paris, Duke University, and the National Cancer Institute (NCI) report that they were able to protect three chimpanzees against a challenge from cell-associated virus. (One animal had previously also been challenged with cell-free virus.) A control animal that had not been vaccinated did become infected with HIV after being injected with infected cells.

Although the vaccine used for each animal was slightly different, each received a mix of the peptides made by HIV, and one animal was vaccinated with the peptides plus whole, inactivated virus. Fultz and her team used a variety of techniques to try to spot any hint of infection following challenge, but to their delight they found none. Seven months following challenge, one chimp died of congestive heart failure, and a variety of tissues were examined for the presence of virus: still no sign of infection.

But the paper is not all good news. One year following challenge, one of the chimps was rechallenged and became infected. The researchers are not sure why their vaccine worked in the first place, and they don't know why it stopped working, since the immune system of the chimp that was reexposed to cell-associated HIV seemed to have developed a stable antibody response to the virus. Moreover, Ronald Desrosiers of the New England Primate Research Center outside Boston urges caution in interpreting the results of any positive vaccine test. "The occasional success makes it into *Science* or *Nature*, but there are plenty of failures that don't get reported on," he says.

Peter Nara, one of the paper's co-authors from the NCI, emphasizes the positive, however: Clearly the vaccine worked, at least for a time, he points out. "We're all on a learning curve," he says. Alan Schultz, the acting chief of the vaccine research and development branch at the National Institute of Allergy and Infectious Disease, adds that the Fultz study needed to be done, if only to show that cell-associated virus will not be a show-stopper in vaccine development.

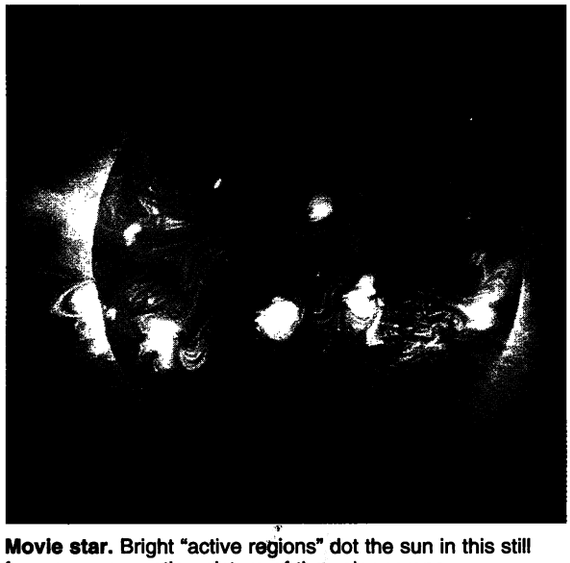
–Joseph Palca

SPACE SCIENCE

Scene From a Solar Thriller

Over the past 9 months, the Japanese Yohkoh satellite has been watching as the sun fumed and flared through the peak of its 11-year cycle. At last week's meeting of the American Astronomical Society in Columbus, Ohio, Yohkoh scientists unveiled some of the most striking footage, taken with an x-ray camera, sensitive to the normally invisible gases of the sun's seething million-degree corona. Snapping pictures such as the one shown here as often as every 2 to 4 seconds, Yohkoh created a motion picture of the corona. And like an audience at a thriller, researchers were dazzled by all the throbbing, fire-sputtering action.

The plot unfolds at the so-called active regions, where the sun's magnetic field concentrates the hot coronal gases into the loops and streamers visible in the image and where the still-mysterious solar flares erupt. Yohkoh's x-ray pictures—the first since the Skylab mission of 1973—may help researchers understand what causes the flares, says project scientist Takeo Kosugi. Scientists speculate that the flares erupt when regions of the churning magnetic field build up stress and then snap, like chunks of rock that shift suddenly to trigger an earthquake. But no one knows what contortions in the magnetic field generate the stress. There's a powerful incentive for unraveling the process: Erupting about once a week during the peak of the solar cycle, flares can spray high energy particles all the way to Earth, exposing satellites and orbiting astronauts to high doses of radiation.



LOCKHEED PALO ALTO RESEARCH LAB

Movie star. Bright "active regions" dot the sun in this still from an x-ray motion picture of the solar corona.

While the current pictures haven't solved the puzzle of solar flares, they show that active regions, though they span tens of thousands of kilometers, can wink on and off or shift places in a matter of seconds, say the researchers. That pace was a surprise, says solar physicist Keith Strong of the Lockheed Palo Alto Research Laboratory, which built the camera, and so was the scale of the changes. "There is an enormous volume [of gases] involved when things change," says Lockheed solar physicist Marilyn Bruner.

To catch all this fast-paced action, the Yohkoh project itself had to be quick on its feet. The Japanese space agency (the Institute for Space and Astronautical Science) had to get the project off the ground by 1991 to catch the sun at its peak months during the current solar cycle. The kinds of delays that often plague NASA missions would have spelled disaster for the Yohkoh mission. But in Japan, U.S. researchers say, the satellites run on time.

"They've had 17 launches, every one on schedule," comments Lockheed's Bruner. "I've never seen that happen [elsewhere]." The Japanese space agency originally scheduled the flight for August 29, 1991; the launch was delayed by 1 day, says Strong, because of a typhoon. Strong, who also worked on NASA's Solar Maximum Mission in 1980, credits the smooth running of the mission to the Japanese practice of having scientists do nearly all the work, from designing and building the instruments to operating the satellite. NASA projects, by contrast, delegate much of that work to engineers or contract workers. "It's a united effort," he adds. Admits NASA solar researcher William Wagner, "Yohkoh sets an example we should aim for."

–Faye Flam