

Finding protection in AIDS virus fragments

Separate studies in humans and chimpanzees show that injection of harmless fragments of the AIDS virus may one day protect people from the disease-causing agent.

Two chimpanzees vaccinated with gp120, a protein from the AIDS virus' outer coat, remain free of infection more than six months after subsequent injection with the deadly virus, report researchers from Genentech, Inc., in San Francisco. In contrast, a third chimpanzee exposed only to the AIDS virus (HIV) developed infection after seven weeks, notes molecular biologist Phillip Berman of Genentech. A full account of the work, conducted in collaboration with the Southwest Foundation for Biomedical Research in San Antonio, Texas, will appear in the June 14 NATURE, Berman says.

Researchers caution that the animal study demonstrates protection against only one of the AIDS viral strains. But the finding bolsters hope of one day using key protein fragments from the virus, which by themselves cannot cause the disease, to develop an AIDS vaccine, says virologist Alan M. Schultz of the National Institute of Allergy and Infectious Diseases in Bethesda, Md., who coordinates

the national AIDS-vaccine research effort.

A new study involving humans also supports the concept of developing an AIDS vaccine by inoculation with protein fragments. Robert F. Siliciano and his colleagues at the Johns Hopkins University in Baltimore, and MicroGeneSys, Inc., in West Haven, Conn., injected eight healthy human volunteers with gp160, the protein precursor to gp120 and another AIDS protein known as gp41. The researchers found that certain lymphocytes cloned from three of the volunteers killed cells *in vitro* that had incorporated free-floating gp160 placed in extracellular fluid. The "killer" cells in their study, Siliciano and his co-workers discovered, all belonged to a class of immune system cells known as CD4, named for a molecule on their surface that acts as the binding site for the AIDS virus.

That initial finding was not surprising, Siliciano says, because he and other researchers reported several years ago that CD4 cells — generally believed only to assist other immune cells — can kill virus-infected cells on their own, lysing those that have incorporated an antigen from outside the cell onto their surfaces. But the current study takes that research a

major step further.

Siliciano and his collaborators report in the June 8 SCIENCE that seven of the 11 CD4 clones from the three human volunteers killed AIDS-infected cells. Five of the seven did not harm uninfected cells, while two killed uninfected cells incubated with gp120 protein. All five of the protective clones generated by gp160 inoculation, he says, recognized the gp41 AIDS protein, but not the gp120. The finding, Siliciano adds, suggests that attempts to make an AIDS vaccine by inoculation with viral protein fragments should include gp41 to yield the best possible results.

The new work, Siliciano says, demonstrates for the first time that CD4 cells can be triggered to kill a cell that displays surface antigens produced inside the cell, rather than outside. The AIDS virus, he notes, produces the telltale gp120 inside cells it infects. When an infected cell places gp120 on its surface, CD4 cells from inoculated volunteers can kill the cell.

"These researchers have crumbled the orthodoxy that the only way to make an AIDS vaccine is with a live or attenuated virus," says Schultz. He adds that the protective effect of these clones gives encouragement that researchers can produce an AIDS vaccine without harming healthy cells.

— R. Cowen

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Species semantics

"Modern Humans May Need Redefining" (SN: 4/14/90, p.228) illustrates a pair of problems facing all taxonomy: the failure to compare like with like, and the fact that "species" are *concepts* and not organisms.

"Modern man" is defined on a time basis — any human living today or in the recent past. Any of its physical traits thereby become "modern." But fossils are defined by their physical attributes, on an entirely separate basis. If "modern man" has a chin and one of the Klasies fossils has a chin, then either the Klasies fossil has a "modern" chin, or — looking from the other end — the chin is an "archaic" feature in modern man. Until each anatomical feature is viewed separately and its changes accurately traced through time, the arguments over "archaic" and "modern" man will be irresolvable because they are based on the erroneous idea that "species" evolved in a unitary way.

Even the few items mentioned in the article show that mosaic evolution exists in hominids (the chin appeared before the large teeth disappeared). This is in direct conflict with the basis of "punctuated equilibria" in which one invariant "species" (concept) is abruptly replaced by another concept that also shows "stasis" (the absence of change). It is clear from the details cited that this does not describe human evolution.

Recognition of mosaic evolution will be much more helpful in unraveling human evolution than semantic disputes over "species."

The concept of *Homo sapiens* will always be as impossible to define objectively as such concepts as "justice" or "truth." All concepts remain ultimately personal, not scientific.

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Electronic hazard: A new clue?

Whatever the merits of the Centers for Disease Control's conclusion on the effects of Agent Orange, it would be a mistake to discount CDC's finding of an increased risk of non-Hodgkin's lymphoma among sailors serving off the coast of Vietnam as a "statistical fluke," as described by epidemiologist Jeanne M. Stellman ("Vietnam veterans sustain cancer threat," SN: 4/14/90, p.236).

While those serving aboard ship during the Vietnam war may not have been exposed to Agent Orange, they must have been exposed to radiofrequency and microwave radiation from the many high-powered radars and communications systems used on Navy warships. The CDC notes that sailors in other theaters of operation did not show a similar elevated incidence of cancer. This would be consistent with the greater use of these electronic systems in a war zone.

Over the last few years, a large number of studies have linked exposure to low-frequency electromagnetic fields to cancer. CDC's latest findings add credibility to past allegations that

high-frequency fields also play a role in the etiology of cancer. CDC and others should follow up, not dismiss, this new lead.

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Relativity: An artist's view

The belief that three-dimensional, "straight"-edged objects can be accurately portrayed in two dimensions has not changed much since Euclidean times. Despite their clever projections of how distorted the objects would look moving at near-light speed, the students at Carnegie-Mellon may have inadvertently inhibited the distorting effect by using single-point perspective in their initial constructions ("Space-Time Odyssey," SN: 4/14/90, p.232).

To render relativity realistically, one needs to take into account that the edges of a cubic lattice would be farther away from the center and would therefore appear smaller than the center to an observer viewing from a central perspective. The net effect, ironically, would be a stationary lattice with "curved" rods, not unlike the one computed as moving toward the observer at 0.99 times the speed of light and increasingly similar to it as distance from the lattice decreased.

This is what we artists refer to when we chat about the curvature of space-time.

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