Background on AIDS Virus

Monday, April 23, 1984

Intramural scientists at the National Cancer Institute have discovered that variants of a human cancer virus are the probable cause of Acquired Immune Deficiency Syndrome (AIDS).

Because of this exciting discovery, two important steps can be taken to control AIDS: within 3-6 months, a simple test to detect the virus in blood samples should be available, and that this discovery will lead to an effective vaccine.

Dr. Robert C. Gallo, Jr., chief of the NCI Laboratory of Tumor Cell Biology, who directed the research, isolated the new group of viruses. They are variants of a family of viruses known as human T-cell leukemia/lymphoma virus (HTLV), of which HTLV-I and II are members.

The new virus is named HTLV-III, and was isolated from blood samples from more than 50 patients with AIDS or symptoms that sometimes lead to AIDS and from some healthy male homosexuals at risk of developing AIDS. About 90 percent of AIDS patients tested so far have high levels of antibody to the virus (an indicator of infection). Similar results have been found with patients with lymphadenopathy syndrome and other symptoms associated with AIDS. Normal people who are not at high risk of developing AIDS have very low levels or none.

(More)

Papers published by Dr. Gallo and coworkers have been accepted by Science and will appear in an upcoming issue. The scientists can not only isolate HTLV-III from infected persons; they are also able to detect the presence of viral antibodies in blood samples of infected people. In addition they have developed a method for growing the viruses in the laboratory in bulk amounts, and have characterized the biochemical and immunological features of proteins and genes of the viruses.

Dr. Peter J. Fischinger, NCI associate director, with Drs. Gallo and Samuel Broder as the scientific and clinical directors, respectively, organized the research. Scientists from CDC, FDA, other NIH Institutes and the extramural community were regularly involved.

Scientists from Memorial Sloan-Kettering Cancer Center, Duke University, the University of North Carolina, North Shore University Hospital on Long Island, and the New Jersey Medical School in Newark also were able to isolate the HTLV-III viruses by finding human cells that grow well in the laboratory and are especially permissive for infection by these viruses. This discovery made possible the isolation of proteins made by the viruses from these cells. Enough viral protein was produced to test selected blood samples for the presence of antibody to the viruses. As a result, a simple laboratory test that diagnoses the presence of HTLV antibodies in blood has been devised.

Within a few months we will have the amounts of viral protein we need for large-scale screening of blood samples by blood banks and diagnostic laboratories. Rapid tests for antibodies in human blood are already

(More)

feasible. Scientists at the NCI Frederick Cancer Research Facility are collaborating with Dr. Gallo's group to develop procedures for large-scale production of these proteins. Further efforts are needed to perfect and to scale up the technique for routine screening of blood and to obtain the necessary data base for approvals to permit commercialization of these exciting research findings. It is anticipated that on a research basis, there will be the capacity to perform about one thousand tests per week.

Within two years, a vaccine should be ready for clinical testing. This massive effort will require the cooperation of several PHS agencies, as well as the private sector to produce and test it as quickly as possible.

Scientists are now exploring the detailed biochemical and immunological characteristics of the new HTLV-III viruses, which infect some cells preferentially. Their lethal effect on T-cells is unusual for the HTLV viruses. Together with detectable differences in some of their proteins and genetic information, their ability to kill T-cells clearly separates these viruses from other members of the HTLV family.

The virus isolated is a member of a family of viruses called retroviruses, which have been studied extensively in animals. The genetic material in these viruses is ribonucleic acid (RNA). The retroviruses are named for their ability to convert RNA into deoxyribonucleic acid (DNA), the hereditary chemical comprising the genes of human and animal cells. In so doing, these viruses use the genetic machinery of the cells they infect to make the proteins they need for survival. In the process, many retroviruses can cause a variety of ailments in the animals, including depressed immune functions and cancer.

(More)