

Medicine by John Grauerholz, M.D.

AIDS research advances biology

New links have been discovered between the brain and the immune system through this task-oriented research.

While AIDS (Acquired Immune Deficiency Syndrome) continues to spread, research on the disease, and the virus now believed to cause it, is shedding new light on fundamental questions of human biology. As usually occurs in any task-oriented scientific mobilization, new relationships are discovered and previous theories are tested and revised.

In terms of the disease itself, in addition to the usual susceptibility to unusual infections and rare cancers, an unusual debilitating dementia occurs frequently in adults and children with AIDS.

This dementia, or encephalopathy (disease of the brain), usually begins with impaired concentration and mild memory loss and progresses to severe loss of all cognitive functions.

In addition, victims may develop spasticity, staggering gait, and frank paraparesis (loss of leg function). These symptoms progress over a period of weeks to months, and are believed to occur in many, if not most AIDS patients.

In a paper published in *Science* magazine (Jan. 11, 1985), researchers report finding evidence of the HTLV-III virus, believed to be the cause of AIDS, in the brain tissue of patients with AIDS and encephalopathy.

This indicates that the virus itself, and not a secondary virus, parasite, or fungus, is responsible for the brain damage.

Aside from the immediate clinical implications of this finding, it suggests that there are similarities be-

tween the surface membranes of T-lymphocytes and brain cells. It is known that T-lymphocytes and brain cells share receptors for thymus hormone, and the affinity of HTLV-III for brain cells and T-lymphocytes suggests that there are other common receptors.

This could shed important light on the communication of information between the immune system and the nervous system.

HTLV-III is a retrovirus, a virus which lacks the hereditary material DNA (deoxyribonucleic acid) and contains instead RNA, which is normally synthesized from DNA. These viruses contain an enzyme, called reverse transcriptase, which causes synthesis of DNA from RNA in an infected cell. This is the reverse of the usual order and hence the name retro (backward) virus.

It was the knowledge that another retrovirus, HTLV-I, caused a cancer of T-cells that led researchers to suspect that a retrovirus might be responsible for the destruction of T-cells characteristic of AIDS. This led to the identification of another T-cell cancer-causing virus, HTLV-II, and to the discovery of the T-cell destroying virus, HTLV-III.

It now turns out that HTLV-III strongly resembles a retrovirus called visna virus, which causes a chronic degenerative brain disease in sheep.

Recent experiments have established that HTLV-III is genetically closer to visna virus than it is to HTLV-I or HTLV-II.

As opposed to HTLV-III, which kills T-cells, HTLV-I and HTLV-II viruses cause T-cells to transform and undergo uncontrolled growth. Recently, scientists at Harvard's Dana-Farber Cancer Institute have discovered that these viruses produce a protein which affects certain genes which control the expression of other genes.

These substances may be responsible for activating the so-called oncogenes (See *EIR*, Jan. 15, 1985), the genes which apparently occur in normal cells and cause them to become cancer cells.

The search for a treatment for AIDS has led to advances in knowledge of the action of the various chemicals which act on the immune system. These chemicals, the so-called lymphokines, have great promise in the treatment of cancer, aging, and many diseases such as rheumatoid arthritis and lupus erythematosus. One of these substances, lymphotoxin, specifically destroys tumor cells and spares normal cells.

A great deal of this research has been made possible by advances in biotechnology which enable scientists to utilize highly precise chemical probes to study processes within specific cells.

What is most evident from all of this is that there is a tremendous amount of information about basic mechanisms of cell growth and development coming out of this research.

This continually brings us up against the fundamental irony of tremendous advances in human biology occurring against a background of biological holocaust.

Unless a major scientific and economic mobilization against disease and malnutrition is undertaken, the net effect of all this research will be to very accurately and precisely describe our descent into hell.