



Update

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Sensitive Assay for HIV Infection Developed

Scientists at the National Institute of Allergy and Infectious Diseases (NIAID) have developed a system that allows accurate counting of extremely low levels of AIDS virus-producing cells. This assay, or detection system, is capable of finding one virus-producing infected cell out of one million uninfected cells and is effective for counting AIDS virus-producing cells immediately after their isolation from AIDS patients. The assay differs from others that require time-consuming adaptation of AIDS virus from patients to growth in laboratory cell lines before AIDS viral particles can be detected. The assay is expected to be valuable for AIDS vaccine and drug development research.

Dr. Bruce Chesebro, chief, and his colleague Ms. Kathy Wehrly, Laboratory of Persistent Viral Diseases, at NIAID's Rocky Mountain Laboratories in Hamilton, Montana, created their assay from a cell line (cells derived from a common ancestor cell) long used in medical research called HeLa cells. The researchers used HeLa cells that have been genetically engineered to contain CD4, the cell surface receptor by which the human immunodeficiency virus (HIV), the cause of AIDS, enters cells to infect them. Thus, the cells are infectible with HIV. The advantage of using HeLa cells for creation of the assay is that they will adhere to the plastic walls of culture dishes and grow in large quantities. Scientists can more easily and accurately count HIV-infected cells that are attached to a surface than cells floating in a test tube. Other cells can be made to adhere to plastic, and are used in HIV-detecting assays, but using the processed cells is not as reliable as using HeLa cells.

As is the case with some other HIV assays, HIV-infected HeLa cells are detected by using HIV-specific antibodies (immune system-produced proteins) as tools linked to chemicals that change color, or become fluorescent when the antibody comes in contact with HIV. When researchers see fluorescence or a specific color change in the cell culture, they know that cells infected with and producing HIV are present and they can quantitate the number of virus-producing cells.

This assay has allowed the researchers to determine that neutralizing antibodies produced in response to infection with HIV can prevent spread of HIV in cell cultures of susceptible immune system cells, even blocking viral spread that usually occurs during close cell to cell contact. These results suggest that certain antibodies present in HIV-infected people may play a role in limiting viral infection, though they cannot completely eradicate or cure infection. The ability to measure and evaluate the effect of antibody response is useful for researchers working to develop effective vaccines to prevent AIDS. Researchers working to develop drugs effective against HIV may be able to use the assay to determine whether certain drugs reduce the amount of HIV present in infected persons.

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Details about the assay are presented in "Development of a Sensitive Quantitative Focal Assay for Human Immunodeficiency Virus Infectivity," Journal of Virology, October 1988, pages 3779-3788.