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Discovery of HIV

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2008 Nobel Prize Medicine (Part 2)

Human Immunodeficiency Virus or what is commonly known as HIV was discovered by Françoise Barré-Sinoussi and Luc Montagnier.

Barré-Sinoussi and Montagnier were awarded the Nobel Prize in “Medicine or Physiology” of 2008 for this discovery together with Harald zur Hausen for the discovery of human papilloma viruses causing cervical cancer.

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HIV is the cause of the Acquired Immunodeficiency Syndrome or AIDS that was declared to be a pandemic by the WHO. The major effect of HIV is the impairment of the immune system of the infected patient making him prone to other infections. HIV is usually not the direct cause of the death of the patient with AIDS; the other infections brought by the impaired immune system are usually the cause of death.

Human Immunodeficiency Virus or HIV and AIDS are the major concerns of most healthcare oriented research today. From its discovery in the early 1980s to 2006, AIDS already caused 25 million deaths. In 2005, AIDS caused the death of more than 3 million lives and an estimated 20% of which were children. Moreover, HIV was found to have infected more than 0.6% of the world’s population exclusive of the unreported cases.

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Scientific Context Prior to the Discovery

During the late 1970s to the early 1980s, there was a sudden increase in patients, mostly homosexuals, suffering from an unknown disease. Willy Rozenbaum was one of the first clinicians in France to observe the alarming new disease and reported it to the Center of Disease Control. The initial hypothesis about the cause of the new disease was HTLV. HTLV is Human T-Lymphotropic Virus which is the only retrovirus known during the time. This virus is known to cause secondary immune depression which is one of the symptoms of their unknown disease. This hypothesis [1] was proven wrong by the studies of Françoise Barré-Sinoussi and Luc Montagnier.

The Enlightened

Françoise Barré-Sinoussi [2] was born in 1947 in France. She has a PhD in virology and served as a professor and director of Regulation of Retroviral Infections Unit, Virology Department, Institut Pasteur in Paris. During the early years of his career, she served only as a volunteer in a laboratory of a research group led by Jean-Claude Chermann at the Institut Pasteur. Very quickly after being a part of the group, she was offered a PhD project about the use of a synthetic molecule which inhibited the reverse transcriptase to control leukaemia.

The other Nobel Prize recipient is Luc Montagnier, born in 1932 also in France. He also has a PhD in virology and is Professor emeritus and Director of the World Foundation for AIDS Research and Prevention in Paris. He had major contributions in the field of Viral Oncology, the ultimate goal of which was the detection of viruses involved in cancer.

Discovery of the Human Immunodeficiency Virus Hiv

The clinical observations pertaining to the new disease suggested that the disease attacked the immune cells of the patients. The virus causes strong depletion of CD4 lymphocytes that greatly hindered the isolation of the virus with full-blown AIDS. The way around this problem was to take sample from a patient with the early signs of HIV infection which is lymphadenopathy.

During the late 1982, Françoise Brun-Vézinet, a former student of Luc Montagnier, who was working with Willy Rozenbaum contacted Luc Montagnier, her professor, about this new disease. Luc Montagnier then organized a research group for the putative retrovirus from the patient presenting with early signs of the disease, lymphadenopathy. The patient was a young homosexual who travelled to USA and was consulting Dr. Willy Rozenbaum for swollen lymph nodes in the neck.

The biopsy from the lymph nodes of the patient arrived on January 3, 1983. The lymphocytes were dissociated from the lymph nodes, T-cell growth factors were added and Montagnier observed that the T cells grew well. His associates Françoise Barré-Sinoussi and Jean-Claude Chermann measured the reverse transcriptase or RT activity in the culture medium every 3 days. During the first week, the samples did not show any RT activity but during the second with, Françoise detected a weak enzymatic activity which increased significantly [3] during the next days. Subsequently, the RT activity dropped dramatically as the T lymphocytes in the culture were dying. To save the culture, they decided to add T lymphocytes from a blood donor. Successfully, the virus infected the new lymphocytes and there was a significant increase in RT activity again. The virus was initially named Lymphadenopathy Associated Virus LAV.

Immediately after the isolation of the virus, amplification and characterization rapidly ensued. The collective studies and efforts of the virologists, the physicians and the researchers brought a convincing evidence for the scientific community that the LAV, which will later be named Human Immunodeficiency Virus HIV, is the causative agent of AIDS.

Clinical Correlations

What Do We Know About Aids

Acquired Immunodeficiency Syndrome or AIDS is characterized by the failure of the immune system to act against opportunistic infections. This condition enables other infective agents to successfully infect the patient with AIDS. Human Immunodeficiency Virus, or HIV, is the causative agent of AIDS. HIV infects vital cells in the immune system like CD4 T cells causing a decrease in CD4 T cell levels.

Hiv Transmission

HIV Transmission [4] occurs via blood, semen, vaginal fluid, pre-ejaculate and breast milk. The major causes of HIV transmission is unsafe sex, use of contaminated needles, breast milk and the transmission of the virus from the mother to the child during birth. Generally, if an open wound comes in contact with HIV infected blood, HIV may be transmitted. A correct and consistent use of condoms can lessen the risk of HIV transmission by around 85%. 12-14% of babies who breastfeed from infected mothers may acquire HIV. HIV is also found in urine, saliva and tears but the amount is negligible. It is not possible for mosquitoes to transmit HIV.

Human Immunodeficiency Virus Hiv Diagnosis

HIV testing consists of an initial screening with the use of ELISA to detect antibodies. Specimens with nonreactive ELISA are reported HIV negative. If the specimens were reactive

to ELISA, it will be retested. Specimens that were found to be repeatedly reactive to ELISA will be subjected to a more sensitive test like Western Blot or IFA. Specimens that are repeatedly reactive to ELISA and positive by IFA or reactive to Western Blot are considered HIV positive which is indicative of HIV infection.

Signs and Symptoms

A progressive decrease in CD4 T cell level is associated with HIV infection. The stage of the infection is characterized by the levels of CD4 T cells and the level of HIV in the blood. The first stage of infection is the incubation period wherein no symptoms are manifested by the patient. This stage usually lasts between two to four weeks. The second stage is the acute infection which includes symptoms like fever, lymphadenopathy or swollen lymph nodes, pharyngitis or sore throat, rashes and muscle pains. The third stage is the latency stage which also has no symptoms. The last stage is AIDS with symptoms that are consistent with the symptoms of the other infections that have already infected the patient. For children, the primary symptom associated with HIV infection is growth retardation, recurring diarrhea and lung infection.

Treatment

Currently, there are no vaccines or cure for HIV infection or AIDS. However, an antiretroviral treatment given immediately after exposure to the virus, which is known as post-exposure prophylaxis, is found to reduce the risk of HIV infection. The treatment available today is the Highly Active Antiretroviral Therapy or HAART. The only reliable means to escape infection is to avoid exposure to the virus. Prevention is always better than cure.

Source URL: <https://explorable.com/human-immunodeficiency-virus>

Links

[1] <https://explorable.com/research-hypothesis>

[2] http://www.nobelprize.org/nobel_prizes/medicine/laureates/2008/barre-sinoussi-autobio

[3] <https://explorable.com/significance-test>

[4] <http://en.wikipedia.org/wiki/HIV>