

Stages and Pathophysiology of Human Immunodeficiency Virus

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DESCRIPTION

A group of ailments brought on by infection with the retrovirus known as the human immunodeficiency virus (HIV), including the human immunodeficiency virus infection and acquired immunodeficiency syndrome (HIV/AIDS). After the first infection, a person might not exhibit any symptoms or might go through a brief period of influenza-like illness. Usually, a protracted incubation period without symptoms comes afterwards. The danger of developing common diseases like tuberculosis, other opportunistic infections, and tumors—which are often uncommon in persons with healthy immune systems—increases as the infection worsens because it interferes more with the immune system. The term "acquired immunodeficiency syndrome" refers to these post-infection symptoms (AIDS). Unintentional weight loss is frequently correlated with this period as well. HIV is primarily passed from mother to child during pregnancy, childbirth, or breastfeeding, unprotected sex (including anal and vaginal sex), tainted blood transfusions, and hypodermic needles. Saliva, sweat, and tears are a few physiological fluids that don't spread the infection. HIV infection has three basic stages: acute infection, clinical latency, and AIDS.

- 1) Acute illness
- 2) Clinical lag
- 3) Acquired immune deficiency syndrome syndrome

Acute illness

Acute HIV, primary HIV, or acute retroviral syndrome are terms used to describe the first few weeks or months after contracting HIV. 2-4 weeks after exposure, many people get a disease resembling the flu or mononucleosis, while others show no symptoms at all. Most frequently, symptoms include fever, big sensitive lymph nodes, throat irritation, a rash, headache, fatigue, and/or sores of the mouth and genitalia. Symptoms are present in 40–90% of patients. The rash typically appears on the trunk and is maculopapular, occurring in 20–50% of patients. At this period, some patients also experience opportunistic

infections. It's possible to experience gastrointestinal problems like vomiting or diarrhea. There are also neurological signs of Guillain-Barré syndrome or peripheral neuropathy. Although the length of the symptoms varies, they often last one or two weeks.

Clinical lag

A stage known as clinical latency, asymptomatic HIV, or chronic HIV occurs after the initial symptoms. Without therapy, this second stage of HIV infection's natural history can persist anywhere between three and more than 20 years (on average, about eight years). At initially, there are often few or no symptoms, but by the time this stage is over, many people have fever, weight loss, gastrointestinal issues, and muscle pains. In addition, between 50% and 70% of individuals also experience chronic generalized lymphadenopathy, which is characterized by a prolonged, unexplained swelling of more than one group of lymph nodes (apart from those in the groyne).

Acquired immunodeficiency syndrome

HIV infection with either a CD4+ T cell count below 200 cells per L or the emergence of particular illnesses linked to HIV infection is known as acquired immunodeficiency syndrome (AIDS). In the absence of specialized care, almost half of HIV-positive individuals experience the onset of AIDS within ten years. Pneumocystis pneumonia (40%), HIV wasting syndrome cachexia (20%), and esophageal candidiasis are the three most prevalent first signs that signal the onset of AIDS. The recurrence of respiratory tract infections is another prevalent symptom. Opportunistic infections can be brought on by pathogens that the immune system ordinarily controls, such as bacteria, viruses, fungi, and parasites. Which infections develop partly depends on the kind of organisms that are prevalent in the individual's surroundings.

Transmission

Sexual: Sexual contact with an HIV-positive person is the most common way for the virus to spread. However, an HIV-positive person who has undergone prolonged therapy and has an

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undetectable viral load essentially has no risk of HIV transmission.

Body fluids: Blood and blood products are the second-most common source of HIV transmission. Blood-borne transmission can occur when people use intravenous drugs and share needles, when they get needle sticks, when they receive tainted blood or blood products through transfusion, or when they receive medical injections using non-sterile equipment.

Mother-to-child transmission: HIV can be passed from mother to child during pregnancy, delivery, or through breast milk, leading to HIV infection in the infant.

Pathophysiology

Following virus entry into the body, a period of fast viral replication occurs, which results in an abundance of virus in the peripheral circulation. The amount of HIV in a milliliter of blood after primary infection may reach several million viral particles. A noticeable decrease in the quantity of circulating CD4⁺ T lymphocytes occurs along with this response. The generation of antibodies, or seroconversion, follows the activation of CD8⁺ T cells, which destroy HIV-infected cells, and is almost always accompanied with acute viremia. It is

believed that the CD8⁺ T cell response plays a crucial role in regulating viral levels, which peak and then starts to fall as CD4⁺ T cell counts increase. Though it does not completely eradicate the virus, a strong CD8⁺ T cell response has been associated with a slower disease progression and a better prognosis.

HIV testing for the diagnosis

Between three and twelve weeks after the initial infection, the majority of HIV-infected individuals seroconverts, or develops specific antibodies. HIV-RNA or p24 antigen measurements are used to make a diagnosis of primary HIV prior to seroconversion. A separate antibody or PCR are used to confirm positive results from an antibody or PCR test. Because maternal antibodies are still present in infants under the age of 18 months, antibody testing is frequently erroneous. Therefore, the only ways to identify HIV infection are by PCR testing for HIV RNA or DNA or through testing for the p24 antigen. People in many regions of the world just wait until symptoms appear or the child is old enough for proper antibody testing because a large portion of the world lacks access to good PCR testing.