

HIV Infection

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Key Points

- Caused by virus HIV and AIDS.
- Ways of spread.
- Affecting immune system.
- Stages of infection.
- Cure or prevention.

At the present time more than 37 million individuals are living with human immune deficiency syndrome while more than 75 have already been affected with this virus. If untreated it can lead to many immunobiological abnormalities such as CD4⁺ T cell loss and ultimately leading to an increased risk of infectious diseases e.g., AIDS (acquired immunodeficiency syndrome). This virus can also lead to various complications such as cardiovascular diseases, bone diseases and dysfunctions like hepatic and renal failure, etc. Antiretroviral drugs are highly effective at inhibiting HIV replication.¹

Human immunodeficiency virus (HIV) infection probably spreads from non-human primates. e.g., chimpanzee, macaques, grivet, etc throughout 1900s. Though it became centre of attention for scientists in 1980s when mostly individuals of urban areas started to show immunodeficiency symptoms, which was eventually presented as AIDS (acquired immunodeficiency syndrome), within a period of 2 years whose causative virus was represented as HIV.²

Ways of spread:

There are various ways of its spread the most common of which are sexual contact, sharing needles or syringes, sharing utensils, etc. Hospital is an important place for HIV/AIDS screening, and a general hospital is composed of multiple

departments. Different departments have different levels of understanding of HIV/AIDS, especially the sexually transmitted diseases (STD) department is the main place for HIV/AIDS screening.³

Mechanisms and effects:

A complex immunopathogenic mechanisms are involved in the initiation and continuation of human immunodeficiency virus (HIV) disease. Acute presence of viruses is indicated with the start of HIV infection, called Viremia, which continues with its spread. During this period the HIV is entrapped within the dendritic cells of the follicles (lymphoid tissue). The expansion of certain subsets of CD8+T cells that are identified in some patients, are presented as manifestations of response to HIV, they might be the control centre of progression of the virus. In addition, inappropriate immune activation and elevated secretion of certain proinflammatory cytokines occur during HIV infection.⁴ Once HIV enters the body, it launches a direct attack on the immune system.

- How the virus damages health
- How they're diagnosed

The timing of their treatment can make a huge difference as well.

HIV targets the types of cells that would normally fight off an invader such as HIV. As the virus replicates, it damages or destroys the infected CD4 cell and produces more virus to infect more CD4 cells.

Without treatment, this cycle can continue until the immune system is badly compromised, leaving a person at risk for serious illnesses and infection.⁵

Stages:

Seroconversion illness

Asymptomatic stage

Symptomatic HIV

Late-stage HIV

Initial infection and late-stage infection were estimated to be 26 and 7 times, respectively, more infectious than asymptomatic infection (in which the response of T-cells is variable). High infectiousness during initial stage infection was thought to last for 3 months after seroconversion, whereas high infectiousness during late-stage infection was estimated to be much between 19 months and 10 months before death.⁶

Cure or prevention:

Despite the success of antiretroviral therapy (ART) for people living with HIV, lifelong treatment is required and there is no cure. HIV can integrate in the host genome and persist for the life span of the infected cell. These latently infected cells are not recognized as foreign because they are largely transcriptionally silent, but contain replication-competent virus that drives resurgence of the infection once ART is stopped.⁷ Advances in treatment and prevention technologies have led to a decrease in incident HIV infections in the World; however, sustained efforts are required to meet global and national targets to end HIV transmission. Combination HIV prevention programmes employ a mix of biomedical, behavioural and structural interventions and strategies to meet the prevention needs of a given population.⁸

HIV and AIDS (acquired immunodeficiency syndrome):

HIV is basically a retrovirus which weakens the body immunity by removing CD4 T- cells, and if untreated, it continues to multiply in the host till it reaches the highest level leading to a very serious stage called

AIDS.⁹ AIDS is actually the late stage of HIV infection till which immune system of the body is badly damaged.

References:

1. Deeks SG, Overbaugh J, Phillips A, Buchbinder S. HIV infection. *Nature reviews Disease primers*. 2015 Oct 1;1(1):1-22.
2. Deeks SG, Overbaugh J, Phillips A, Buchbinder S. HIV infection. *Nature reviews Disease primers*. 2015 Oct 1;1(1):1-22.
3. Yu Y, Shen L, Li Y, Zhao J, Liu H. The Epidemiological Analysis of HIV/AIDS Patients: Sexually Transmitted Diseases Department vs. other Departments in A General Hospital of Shanghai, China. *Current HIV research*. 2022 Jan 1;20(1):63-73.
4. Fauci AS, Pantaleo G, Stanley S, Weissman D. Immunopathogenic mechanisms of HIV infection. *Annals of internal medicine*. 1996 Apr 1;124(7):654-63.
5. Nowak MA, McMichael AJ. How HIV defeats the immune system. *Scientific American*. 1995 Aug 1;273(2):58-65.
6. Hollingsworth TD, Anderson RM, Fraser C. HIV-1 transmission, by stage of infection. *The Journal of infectious diseases*. 2008 Sep 1;198(5):687-93.
7. Deeks SG, Archin N, Cannon P, Collins S, Jones RB, de Jong MA, Lambotte O, Lamplough R, Ndung'u T, Sugarman J, Tiemessen CT. Research priorities for an HIV cure: International AIDS Society Global Scientific Strategy 2021. *Nature medicine*. 2021 Dec;27(12):2085-98.
8. Cabecinha MA, Saunders J. HIV prevention strategies. *Medicine*. 2022 Mar 2.
9. Endashaw EE, Mekonnen TT. Modeling the Effect of Vaccination and Treatment on the Transmission Dynamics of Hepatitis B Virus and HIV/AIDS Coinfection. *Journal of Applied Mathematics*. 2022 May 5;2022.