

# HIV and Retroviruses: Understanding the Science and Impact

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# DESCRIPTION

There is no cure for HIV, but Antiretroviral Therapy (ART) can effectively manage the virus. ART consists of a combination of drugs that suppress viral replication and prevent disease progression. Nucleoside Reverse Transcriptase Inhibitors (NRTIs) Block reverse transcription (e.g., AZT, tenofovir). Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs) Inhibit reverse transcriptase differently. Protease Inhibitors (PIs) Prevent viral maturation. Integrase Inhibitors Block integration into host DNA. Entry Inhibitors prevent viral entry into cells. Several strategies can help prevent HIV transmission safe Sex Practices Using condoms reduces the risk of sexual transmission. Pre-Exposure Prophylaxis (PrEP) Daily medication for individuals at high risk. Post-Exposure Prophylaxis (PEP) Emergency treatment within 72 hours of potential exposure. Needle Exchange Programs Reduce the spread among intravenous drug users. Mother-to-Child Prevention ART during pregnancy and childbirth minimizes transmission risk. HIV Vaccines currently under research but not yet available. Since the early 1980, HIV has caused a global pandemic. Key statistics approximately 38 million people worldwide are living with HIV. Over 75 million people have been infected since the epidemic began. Sub-Saharan Africa remains the most affected region. Efforts by organizations like UNAIDS and WHO focus on global prevention, treatment, and education initiatives. Advancements in HIV research includes Gene Editing Technologies (CRISPR-Cas9) Potential for viral eradication. Long-Acting Antiretrovirals reduce pill burden and improve adherence. HIV Cure Strategies research on functional and sterilizing cures continues. HIV Vaccines trials are ongoing to develop effective vaccines. HIV, as a retrovirus, has posed significant challenges to global health. While there is no cure, advancements in ART have transformed HIV from a fatal disease into a manageable condition. HIV is primarily transmitted through direct contact with infected bodily fluids. The main modes of transmission includes unprotected Sexual

Contact Vaginal, anal, or oral sex with an infected partner can transmit the virus through semen, vaginal fluids, and rectal secretions. Blood Exposure sharing contaminated needles, transfusions with infected blood, or accidental healthcarerelated exposures. Mother-to-Child Transmission (Vertical Transmission) HIV can be passed from an infected mother to her child during pregnancy, childbirth, or breastfeeding. Continued research, education, and global cooperation are essential to ultimately eradicating HIV/AIDS. HIV infection occurs in several stages, each with distinct symptoms and effects acute HIV Infection (2-4 weeks post-exposure) Flu-like symptoms such as fever, swollen lymph nodes, rash, sore throat, and muscle aches. Clinical Latency Stage (Chronic HIV). The virus remains in the body at low levels without causing significant symptoms, lasting for years if untreated. AIDS (Advanced HIV Disease): The immune system is severely weakened, leading to opportunistic infections such as tuberculosis, pneumonia, and certain cancers. Without treatment, AIDS is fatal.HIV is a member of the Lentivirus genus within the Retroviridae family. Lentiviruses are slow-acting viruses that progressively weaken the immune system over time. HIV primarily targets immune cells, specifically CD4+ T-helper cells, which play a crucial role in orchestrating the immune response. Over time, the depletion of these cells leads to immunodeficiency, leaving the body vulnerable to opportunistic infections and cancers. HIV remains a major global health challenge. While it is currently incurable, effective treatment and prevention strategies allow individuals with HIV to lead long, healthy lives. Ongoing research continues to bring hope for a future without HIV/AIDS.

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## **CONFLICT OF INTEREST**

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