

HIV Infection

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Key points

- Introduction
- Causes of spread
- HIV mainly targets CD4+ T Lymphocytes
- Prevention

HIV (human immunodeficiency virus) is a virus that attacks the body's immune system. If not treated, it can lead to AIDS (acquired immunodeficiency syndrome).

With more than thirty years of the HIV epidemic, there is still no cure or effective vaccine; however, there have been appreciable advances in treating HIV^{1,2}, as the availability and rapid scale up of antiretroviral therapy (ART) has transformed what was inevitably a lethal disease into a chronic, manageable condition, leading to significant declines in global rates of AIDS-related deaths and new infections. While research into HIV vaccines and vaginal microbicides continues, major advances in HIV prevention include voluntary male medical circumcision^{3,4} and antiretrovirals for the prevention of mother-to-child transmission⁵, as well as for preventing transmission and as pre-exposure prophylaxis.⁶

Causes of spread

1. Using contaminated needles
2. Sexual contact
3. Vertical transmission: from mother to baby, during pregnancy or breastfeeding
4. Blood transfusion from blood of affected person

Not spread by

1. Air or water
2. Mosquitoes or insects
3. Saliva, tears, sweat or feces.
4. Non-sexual contact

Mechanism

HIV explicitly targets immunological cells, specifically CD4+ T-lymphocytes. The virus then binds to a host cell receptor or co-receptor, such as CCR5 or CXCR4, which is responsible for HIV entrance into lymphocytes and macrophages. When gp120 binds to these receptors, it

causes a cascade of molecular conformational changes and the exposure of gp41, bringing the HIV virion much closer to the target cell. The subsequent fusion of the viral envelope with the host cell membrane is required for the virus's inner matrix core to enter the host cell's intracytoplasmic realm.⁷

Stages

1. Seroconversion illness
2. The asymptomatic stage of HIV
3. Symptomatic stage
4. Late-stage HIV

Prevention

No such cure has been developed yet; patients require lifelong treatment.

Since the introduction of highly active ART about 20 years ago, a series of improvements, including the reduction of complex regimens to single fixed-dose multidrug pills, have significantly improved both the efficacy and tolerability of HIV infection management. In the absence of a cure or an effective vaccine, antiretroviral therapy (ART) remains the foundation of HIV treatment and prevention. For the most part, current antiretroviral regimens have reached maximal antiretroviral efficacy and tolerability, changing HIV infection from a lethal disease to a tolerable chronic condition. Adherence to daily oral medicine intake, however, remains a problem, as it is the most critical factor of long-term viral suppression and the prevention of the formation of drug-resistant virus strains. In fact, only about two-thirds of patients achieve the commonly touted 90% adherence level associated with optimum viral suppression.⁸

References

1. Temprano ANRS 12136 Study Group. A trial of early antiretrovirals and isoniazid preventive therapy in Africa. *New England Journal of Medicine*. 2015 Aug 27;373(9):808-22.
2. Insight Start Study Group. Initiation of antiretroviral therapy in early asymptomatic HIV infection. *New England Journal of Medicine*. 2015 Aug 27;373(9):795-807.
3. Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, Puren A. Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLoS medicine*. 2005 Nov;2(11):e298.
4. Gray RH, Kigozi G, Serwadda D, Makumbi F, Watya S, Nalugoda F, Kiwanuka N, Moulton LH, Chaudhary MA, Chen MZ, Sewankambo NK. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *The lancet*. 2007 Feb 24;369(9562):657-66.
5. Guay LA, Musoke P, Fleming T, Bagenda D, Allen M, Nakabiito C, Sherman J, Bakaki P, Ducar C, Deseyve M, Emel L. Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial. *The Lancet*. 1999 Sep 4;354(9181):795-802.
6. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, Hakim JG, Kumwenda J, Grinsztejn B, Pilotto JH, Godbole SV. Prevention of HIV-1 infection with early antiretroviral therapy. *New England journal of medicine*. 2011 Aug 11;365(6):493-505.
7. Wilen CB, Tilton JC, Doms RW. HIV: cell binding and entry. *Cold Spring Harbor perspectives in medicine*. 2012 Aug 1;2(8):a006866.
8. Thoueille P, Choong E, Cavassini M, Buclin T, Decosterd LA. Long-acting antiretrovirals: a new era for the management and prevention of HIV infection. *Journal of Antimicrobial Chemotherapy*. 2022 Feb;77(2):290-302.