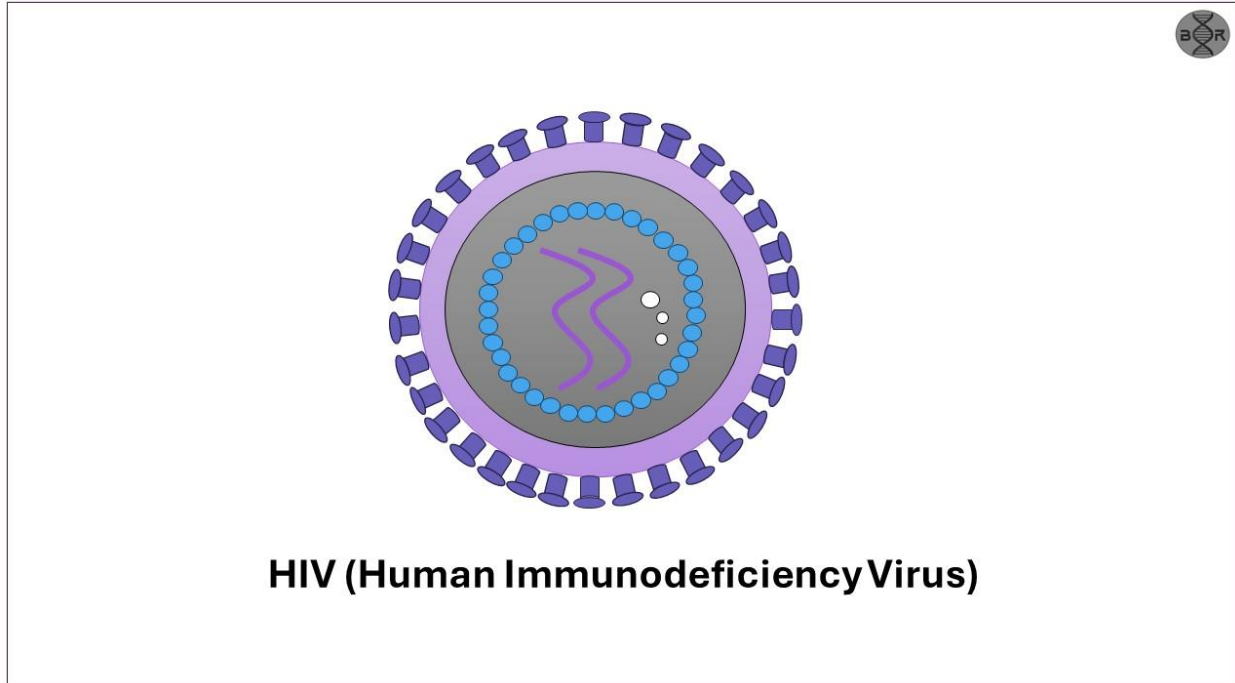


HIV – Human Immunodeficiency Virus | Details



HIV (human immunodeficiency virus) is a virus that attacks the human immune system, grouped under the genus Lentivirus and family retroviridae. Studies say that HIV infection in humans originated from a chimpanzee in Central Africa and the virus that affects chimpanzees is called as Simian immunodeficiency virus (SIV).

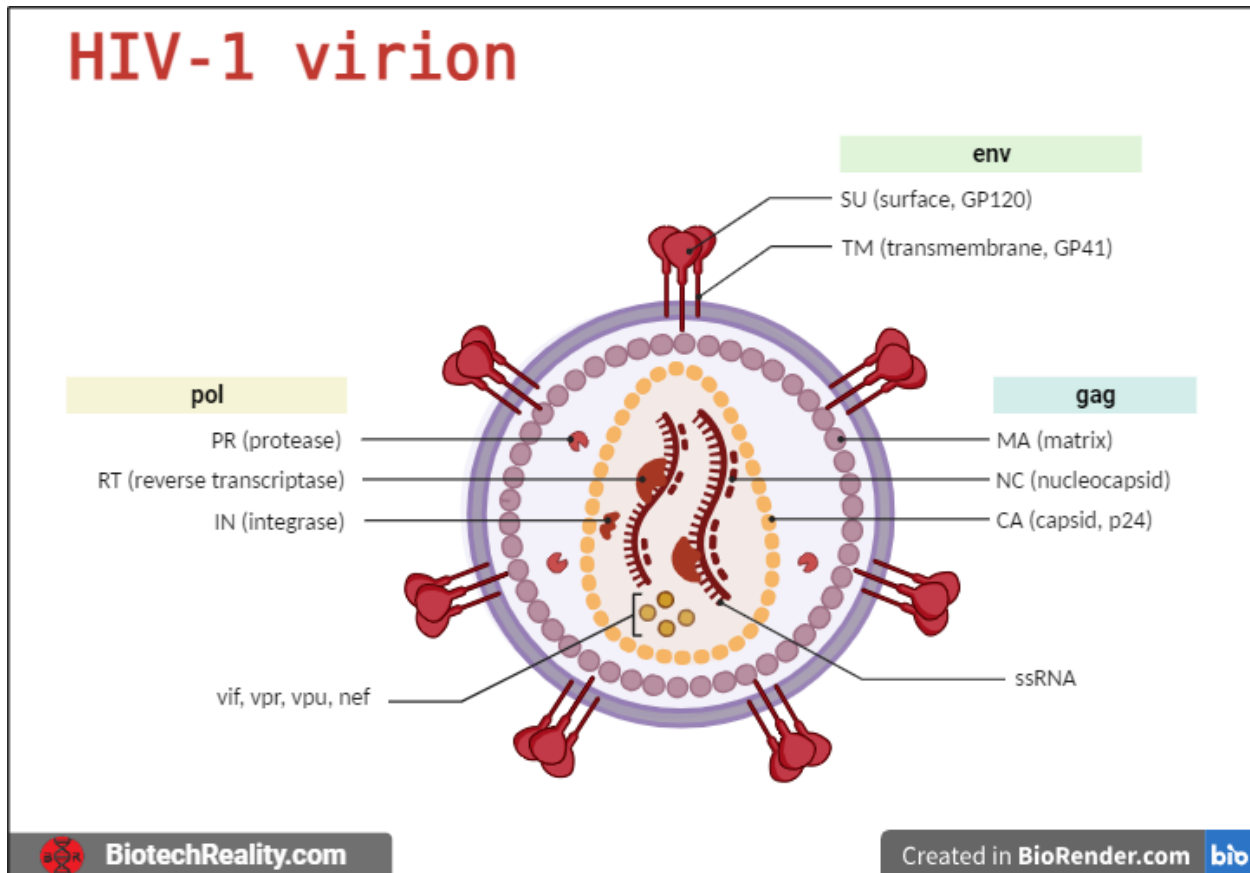
The major target of the HIV virus is CD4+ T cells and by a transmission event the virus gets hold of the mucosal tissues and after some days it spreads to the lymphoid organs. On day 10, the virus become observable in the blood and continues its spreading and reaches a peak during day 30, at which the HIV antibody becomes detectable and is the point where the individual is most infectious. After this, the immune system achieves a set point where the replication of HIV remains stable often for years.

Without treatment, the average survival time of HIV after infection is 9 to 11 years. HIV is a lifelong condition but certain treatments and therapies can prevent the virus from spreading and the disease from progressing.

Structure

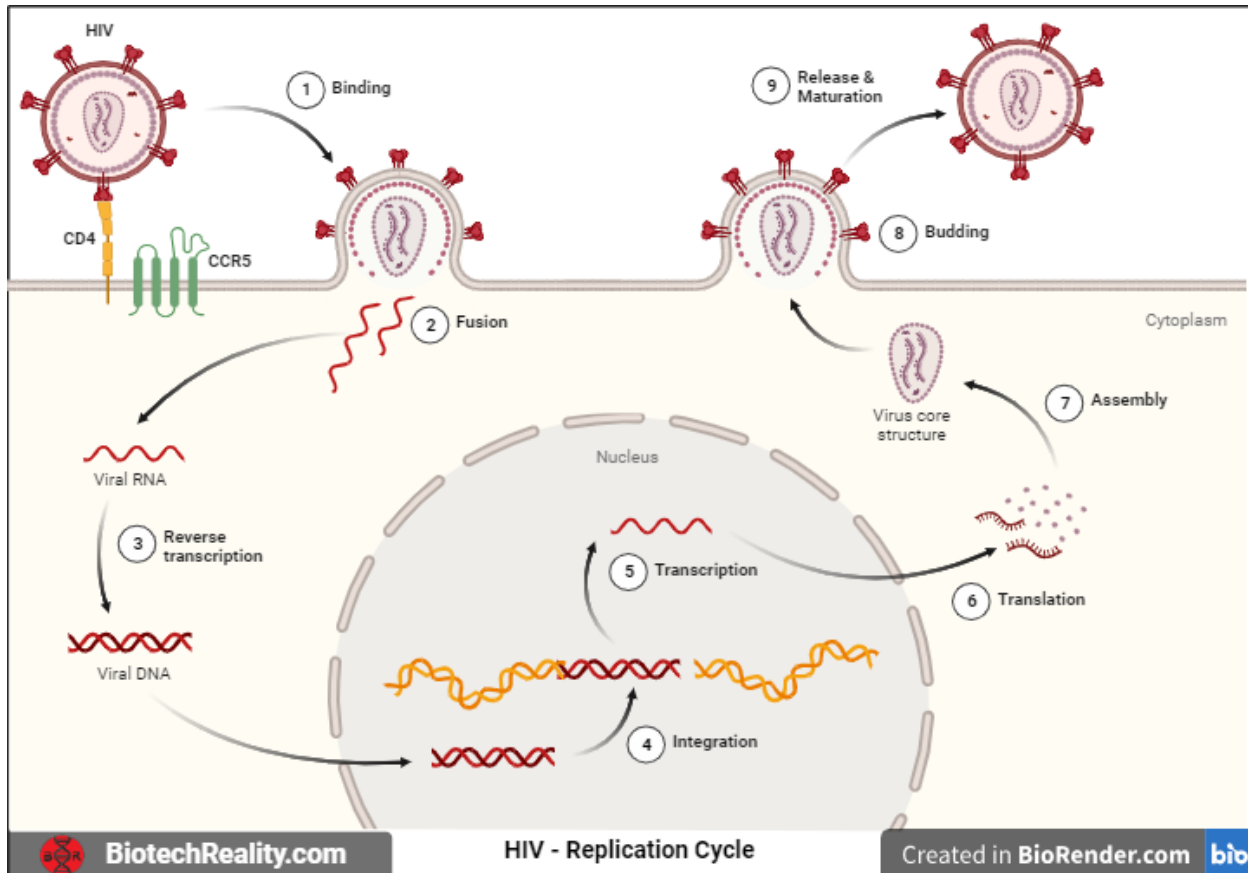
HIV structure is similar to other retroviruses. It is spherical with a diameter of 120nm and has a volume of 100,000 times smaller than RBC. There are nine genes in the virus that are encoded by 2 copies of positive single-stranded RNA encased in a conical capsid

made up of 2000 copies of a viral protein P24. Ribonuclease and integrase are a few enzymes that are strongly attached to single-stranded RNA along with nucleocapsid protein.



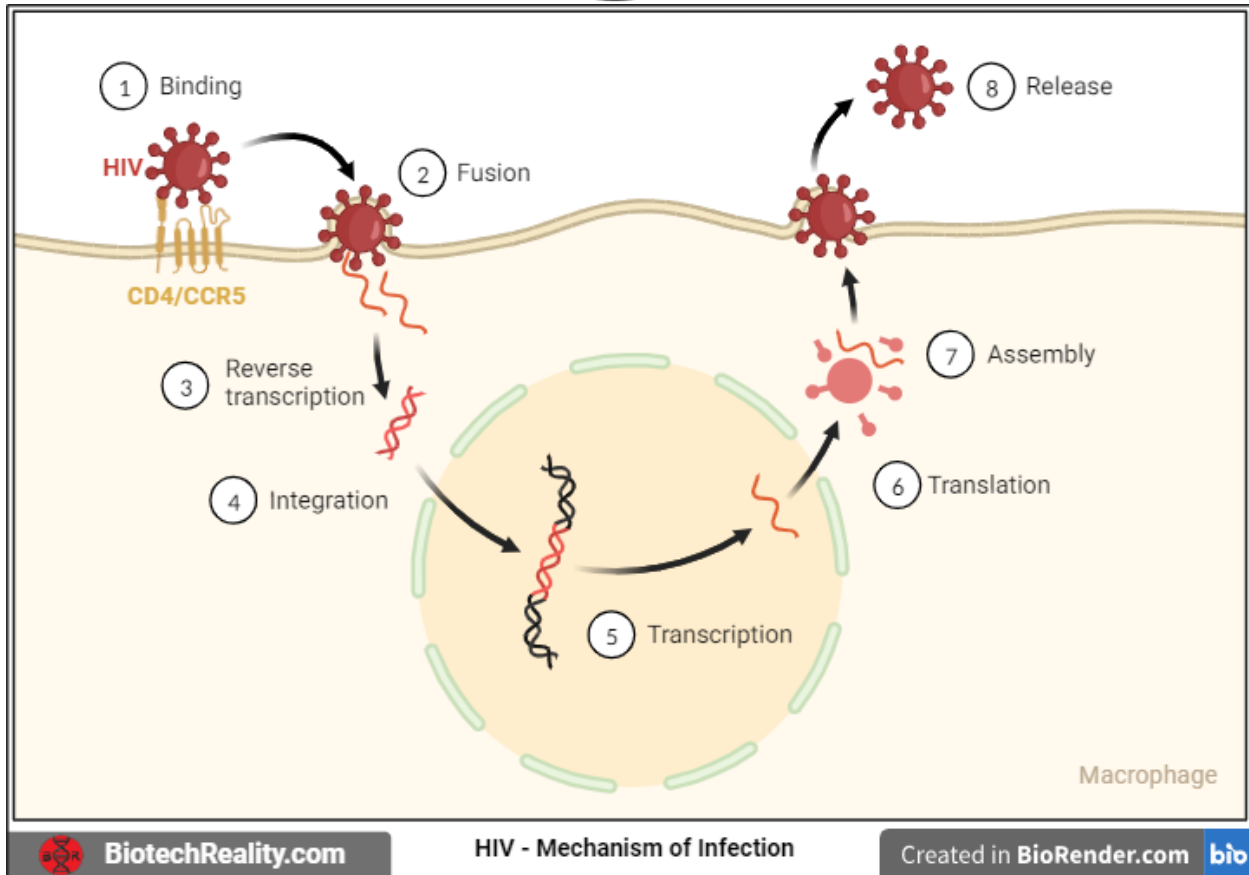
The capsid is encased in a matrix made up of viral protein P17, which preserves the virion particle integrity. The viral envelope which surrounds this in turn is made of the lipid bilayer. The HIV envelope protein is composed of a cap made up of glycoprotein and a stem consisting of three gp41 molecules that anchor the structure into the viral envelope. The molecular structure of the viral spike has been determined by X-ray crystallography and a cryogenic electron microscope.

Virus life cycle



HIV has the ability to integrate its DNA into a host genome. After gaining entry into the cell single-stranded RNA is reverse-transcribed into HIV DNA and then integrated into host DNA. The primary receptor for HIV-1 is CD4+, which is found on the surface of T lymphocytes, monocytes, macrophages and dendritic cells. HIV also requires a co-receptor to enter the host cell, typically the chemokine receptor CCR5 and CXCR4.

Different HIV 1 typically use one or other chemokine receptors. CCR5 and CXCR4 are expressed in some T cells. CCR5 is expressed in T cells but not in naive T cells and is also expressed in macrophage and dendritic cells but CXCR4 is expressed in both naive and mature T lymphocytes. The preferred targets for infection are activated T lymphocytes, which for reasons that remain to be defined are more permissive to infection than resting cells. Although dendritic cells are difficult to infect with HIV-1, they are able to capture the virus and promote Trans-infection of neighbouring T cells.



The Virus can also attach to the follicular dendritic network, which retains the infectious virus in a concentrated manner within B cell follicles of lymph nodes. In addition, HIV causes lymphoid tissue fibrosis through several mechanisms, including upregulation of T regulatory Cells and release of transforming growth factor- β . Much of the harm associated with the virus in both Untreated and treated diseases probably occurs in this lymphoid structure.

AIDS (acquired immunodeficiency syndrome)

It is the final stage of infection when the body is losing T cells and their ability to fight infections. Once the CD4 count falls low an infected person is said to have AIDS or HIV disease. A person diagnosed with AIDS may need to be on antibiotic prophylaxis to prevent certain opportunistic infections from occurring.

The AIDS-defining infections include,

- Pneumonia caused by *Pneumocystis jirovecii*, which causes severe shortness of breath and dry cough

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- Toxoplasmosis is a brain infection that can cause problems with thinking, headache, or symptoms that mimic a stroke
- Yeast (Candida) infection of the mouth and swallowing tube (oesophagus), which causes pain in swallowing
- Lymphoma can cause fever and swollen lymph nodes throughout the body.
- A cancer of the soft tissues called Kaposi's sarcoma causes brown, reddish, or purple lumps that develop on the skin or in the mouth

How HIV spread

It can spread through sexual contact, get the infection by having vaginal, anal or oral sex with an infected partner whose blood, semen or vaginal secretions enter the body, illicit injection drug use or sharing needles, sharing contaminated injection needles, contact with infected blood, or from mother to child during pregnancy, childbirth or through breastfeeding etc. Infected mothers can pass the virus on to their babies. Mothers who are HIV-positive and get treatment for the infection during pregnancy can significantly lower the risk to their babies.

Diagnosis

HIV can be detected using a number of different assays. The ideal test is chosen for each patient by healthcare professionals.

1. Antigen/Antibody test

The most popular tests are those involving antibodies and antigens. Typically, they can have positive outcomes in 18 to 45 days. These examinations look for antibodies and antigens in the blood. The body produces an antibody, a particular type of protein, in response to an infection. An antigen, on the other hand, is the part of the virus that activates the immune system. Other antibody tests can be done at home.

OraQuick HIV Test. An oral swab provides results in as little as 20 minutes.

Home Access HIV-1 Test System. After the person pricks their finger, they send a blood sample to a licensed laboratory.

2. Nucleic acid test

This expensive test is not employed for routine screening. It is for those who are at risk for HIV or who have early indications of the disease. This test looks for the virus itself rather than antibodies. The time it takes for HIV to be found in the blood can range from 5 to 21 days.



In addition, a blood test called a Western blot is necessary to confirm the diagnosis.

Treatment

Several drugs are available to fight HIV infection as well as the infections and malignancies that are associated with it. The drugs are Highly active antiretroviral therapy (HAART). They are more frequently referred to as ART. They are more frequently referred to as ART. Antiretrovirals have significantly decreased HIV-related complications and mortality, although the fact that they do not treat HIV/AIDS.

A combination of at least three ART drugs is needed to suppress the virus from replicating and boost the immune system. The best course of treatment will be determined by the patient's preferences, any resistance mutations in their virus, other medical conditions, past treatment history, and the most recent treatment recommendations. Highly active antiretroviral therapy, reverse transcription inhibitor drug prevents the virus from replicating itself

Prevention

Safer sex

Get tested for other sexually transmitted infections (STIs). If they test positive for one, they should get it treated, because having an STI increases the risk of contracting HIV. Apply condoms whether they engage in vaginal or anal sex, they should learn how to properly use condoms and always use them. Remember that pre-seminal secretions, which are released before male ejaculation, might contain HIV.

Avoid sharing needles or other items. HIV is spread by blood and can be acquired by utilising objects that have had contact with the blood of an HIV-positive person.

Consider PrEP

If you have been exposed to HIV, you should talk to your doctor about getting post-exposure prophylaxis (PrEP). PrEP can lessen the chance of getting HIV. It consists of three antiretroviral drugs given for 28 days. But PEP should be started soon as possible.