

# Retroviridae

## *Lentiviruses*

**HIV is a retrovirus**, a member of the *Lentivirus* genus, and exhibits many of the physicochemical features typical of the family.

**Virion:** Spherical, cylindrical core. **The unique morphologic characteristic of HIV is a cylindrical nucleoid in the mature virion.**

**genome:** Single-stranded RNA, linear, genome more complex than that of oncogenic retroviruses, contains up to six additional replication genes.

**envelope:** Present.

**replication:** Reverse transcriptase makes DNA copy from genomic RNA; provirus DNA is template for viral RNA. Genetic variability is common.

**Maturation:** Particles bud from plasma membrane.

**Outstanding characteristics:** Members are nononcogenic and may be cytotoxic. Infect cells of the immune system.

Provirus remain permanently associated with cells.

Viral expression is restricted in some cells in vivo.

Cause slowly progressive, chronic diseases.

Replication is usually species-specific.

Group includes the causative agents of AIDS

### **Classification of Retroviruses**

Retroviruses can be classified depending on the complexity of their genomes as either **simple** or **complex**.

- An example of **simple retroviruses** are **oncogene viruses**, because its expression might result in its host cell developing into a tumour cell.

- The **complex retroviruses** have additional genes, the products of which have a variety of functions in the replication cycle. The **human immunodeficiency viruses** are complex retroviruses.

**There are two medically important groups of retroviruses:**

- (1) The *oncoretrovirus* (**oncogenic viruses**) group: a viruses group that can cause cancer, which contains the sarcoma and leukemia viruses (e.g., human T-cell leukemia virus [HTLV]).
- (2) The *lentivirus* (**slow retrovirus**) group: which includes human immunodeficiency virus HIV-1 and HIV-2, are the etiologic agents of AIDS.

AIDS\_ Acquired Immune Deficiency syndrome: the illness was first described in 1981, and HIV-1 was isolated by the end of 1983. Since then, AIDS has become a worldwide epidemic, expanding in scope and magnitude as HIV infections have affected different populations and geographic regions. Millions are now infected worldwide; once infected, individuals remain infected for life. Within a decade, if left untreated, the vast majority of HIV-infected individuals develop fatal opportunistic infections as a result of HIV induced deficiencies in the immune system. AIDS is one of the most important public health problems worldwide at the start of the 21st century. The development of highly active antiretroviral therapy (HAART) for chronic suppression of HIV replication and prevention of AIDS has been a major achievement in HIV medicine.

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**Human immunodeficiency viruses (HIV):**

There are two types of human immunodeficiency virus:

1. HIV-1
2. HIV-2

They are causative agents of acquired immune deficiency syndrome (AIDS). Both viruses emerged in the late 20th century. HIV infection damages the immune system, leaving the body susceptible to infection with a wide range of bacteria,

viruses, fungi and protozoa. This condition is called acquired immune deficiency syndrome (AIDS). HIV-1 is much more prevalent than HIV-2.

HIV-1 that is largely responsible for the AIDS pandemic while HIV-2 is mainly restricted to West Africa.

### **Viral transmission:**

In most cases, HIV is a **(a)** sexually transmitted infection (homosexuality) and occurs by contact with or transfer of blood, saliva, semen, and vaginal fluids.

**(b)** Non-sexual transmission can occur from an infected mother to her infant during pregnancy, during childbirth by exposure to her blood or vaginal fluid, and through breast milk. Within these bodily fluids, HIV is present as both free virus particles and virus within infected immune cells.

### **Disease:**

HIV infects vital cells in the human immune system, such as helper T cells , macrophages, and dendritic cells. HIV infection leads to low levels of T cells through a number of mechanisms. When T cell numbers decline below a critical level, cell-mediated immunity is lost, and the body becomes more susceptible to opportunistic infections, leading to the development of AIDS. The HIV virus can remain dormant in the human body for up to ten years after primary infection; during this period the virus does not cause symptoms.

**Early HIV Symptoms:** within 4 weeks of infection, a flu-like illness can arrive. This is a body's natural response to the HIV infection. It can last anywhere from a few days to several months. The infected persons might have:

fever, headache, fatigue, sore throat, skin rash, swollen lymph glands, diarrhea, night sweats, aching muscles or joints, ulcers in the mouth.

Not everyone with HIV has these early flu-like symptoms. Only about 1 in 3 people get them. Others may not feel any different during this period. After that the HIV virus enters certain types of white blood cells (WBCs). It makes billions of copies of itself, spreading throughout the body. During this time, patients have a

higher chance of transmitting the virus to other people because there are large amounts of the virus in body fluids.

**Later-Stage HIV Symptoms:** after HIV wins against the immune system, it spreads at a slower rate. This stage is called chronic or clinical latency. Without treatment, this stage can last for 10 to 15 years.

**AIDS(Acquired Immunodeficiency Syndrome):** is a chronic, potentially life-threatening condition, it is the last stage of HIV infection. This is when the virus has seriously damaged the immune system. The body can't fight off many infections, which can lead to symptoms.

**Signs of AIDS include:** extreme fatigue, fast weight loss, diarrhea that lasts for more than a week, pneumonia, sores in mouth, anus, or genitals, fever or severe night sweats that keep coming back, memory loss, (red, brown, pink, or purple blotches on or under the skin).

### **Diagnosis:**

1. The specimen (blood) is testing with a more specific test a polymerase chain reaction (PCR).
2. The diagnostic bar-shaped nucleoid is visible in electron micrographs in those extracellular particles that happen to be sectioned at the appropriate angle.

### **Treatment:**

The treatment for HIV is called antiretroviral therapy (ART). ART involves taking a combination of HIV medicines (called an HIV treatment regimen) every day. ART is recommended for everyone who has HIV. People with HIV should start taking HIV medicines as soon as possible. ART can't cure HIV, but HIV medicines help people with HIV live longer, healthier lives and reduces the risk of HIV transmission. A main goal of HIV treatment is to reduce a person's viral load to an undetectable level. An undetectable viral load means that the level of HIV in the blood is too low to be detected by a viral load test. There is no cure, but it is treatable with medicine.