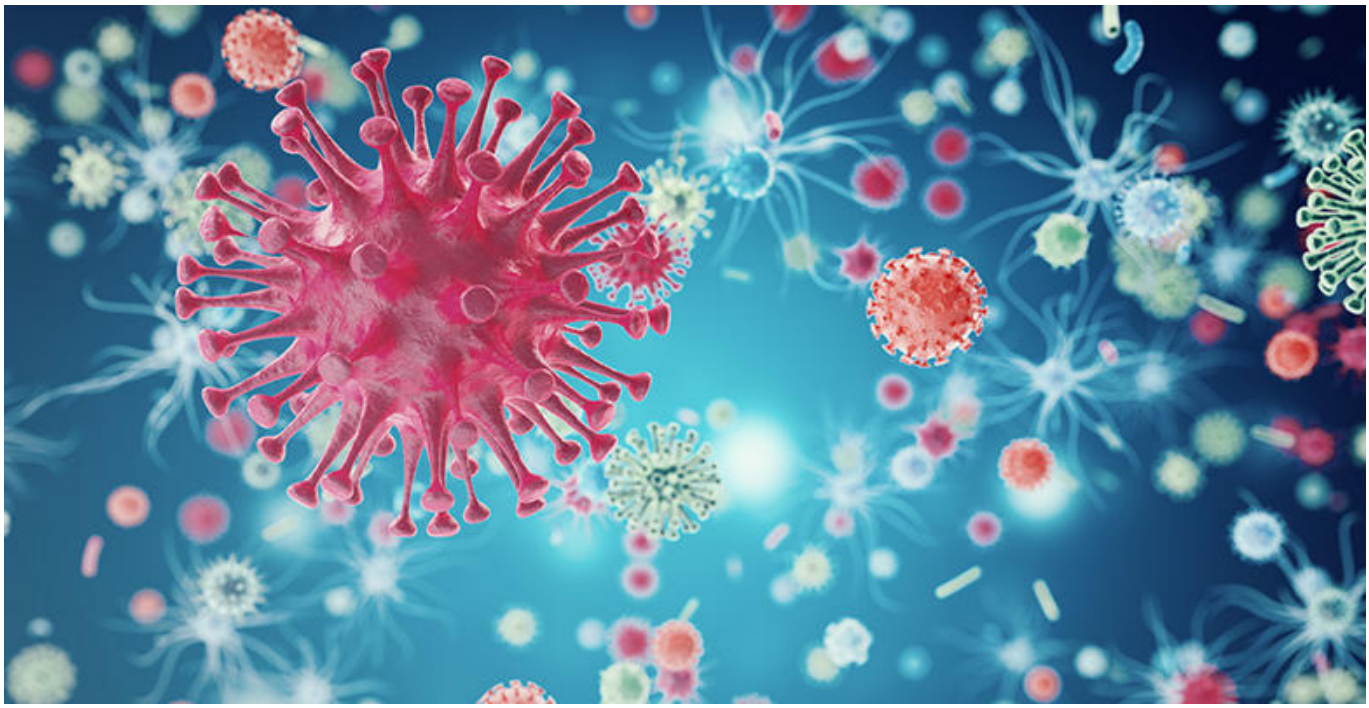
How HIV infects the body and the lifecycle of HIV



FAST FACTS

- HIV infects white blood cells in the body's immune system called T-helper cells (also called CD4 cells).
- The HIV lifecycle refers to the different steps taken by the virus to make copies of itself.
- First, the virus attaches itself to the T-helper cell; it then fuses with it, takes control of its DNA, creates copies of itself and releases more HIV into the blood.
- Anti-HIV drugs target different stages in the HIV lifecycle, so knowing how HIV infects the body can help you to understand the different prevention and treatment options.

The HIV lifecycle

HIV infects a type of white blood cell in the body's immune system called a T-helper cell (also called a CD4 cell). These vital cells keep us healthy by fighting off infections and diseases.

HIV cannot reproduce on its own. Instead, the virus attaches itself to a T-helper cell and fuses with it (joins together). It then takes control of the cell's DNA, makes copies of itself inside the cell, and

finally releases more HIV into the blood. HIV will continue to multiply and spread throughout the body – a process called the HIV lifecycle.

In this way, HIV weakens the body's natural defences and over time severely damages the immune system. How quickly the virus develops depends on a person's general health, how quickly they are diagnosed and start antiretroviral treatment, and how consistently they take their treatment.

Antiretroviral treatment and the HIV lifecycle

Antiretroviral treatment for HIV combines several different types of drugs, each of which targets a different stage in the HIV lifecycle. This means that the replication of HIV is stopped on multiple fronts, making it very effective.

If taken correctly, it keeps the immune system healthy, prevents the symptoms and illnesses associated with AIDS from developing, and means that people can enjoy long and healthy lives.

If someone doesn't take their treatment correctly or consistently (at the right time every day), the level of HIV in their blood may increase and the drugs may no longer work. This is known as developing drug resistance.

Stages of the HIV lifecycle

Binding and fusion (attachment)

HIV attaches to a T-helper cell. It then fuses to it and releases its genetic information into the cell.

The types of drugs that stop this stage of the lifecycle are called fusion or entry inhibitor drugs – because they stop HIV from entering the cell.

Reverse transcription (conversion) and integration

Once inside the T-helper cell, HIV converts its genetic material into HIV DNA, a process called reverse transcription. The new HIV DNA then enters the nucleus of the host cell and takes control of it.

The types of drugs that stop this stage of the lifecycle are called NRTIs (nucleoside reverse transcriptase inhibitors), NNRTIs (non-nucleoside reverse transcriptase inhibitors) and integrase inhibitor drugs.

Transcription and translation (replication)

The infected T-helper cell then produces HIV proteins that are used to produce more HIV particles inside the cell.

Assembly, budding and maturation

The new HIV is put together and then released from the T-helper cell into the bloodstream to infect other cells; and so the process begins again.

The type of drugs that stop this stage of the lifecycle are called protease inhibitor (PI) drugs.

HIV lifecycle diagram

To learn more about the HIV lifecycle, take a look at our HIV lifecycle infographic.

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Sources:

AIDSinfo, (2018) 'The HIV Life Cycle' (2019)

HIV.gov 'How Is HIV Transmitted?' (2019)