

CHAPTER 7.3 • HUMAN HEALTH AND DISEASE

Understanding AIDS: The Biology of HIV

Pathology, Transmission, and Clinical Management

An evidence-based overview of the Human Immunodeficiency Virus, its replication mechanism, and the progression of Acquired Immuno Deficiency Syndrome.

Defining HIV and AIDS

A.I.

Acquired Immuno

Meaning it is acquired during the lifetime of an individual, not a congenital disease.

D

Deficiency

Refers to the severe weakening and deficiency of the body's immune system.

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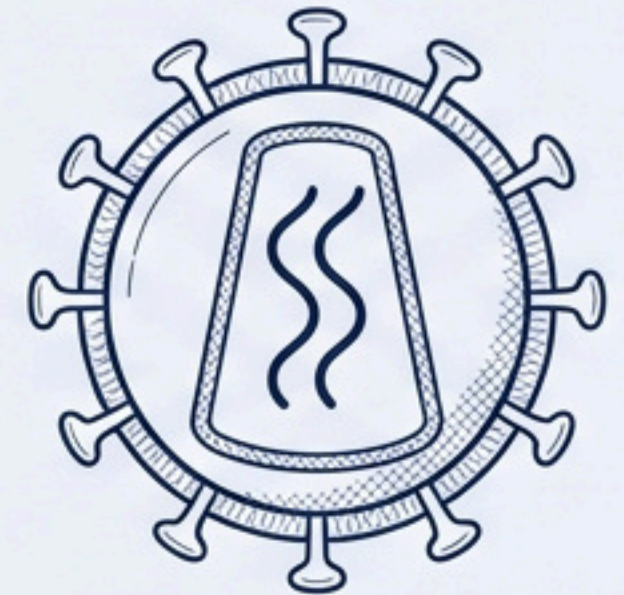
Syndrome

A group of symptoms indicating a specific medical condition.

Pathogen Profile

Human Immunodeficiency Virus (HIV)

HIV is a **retrovirus**. It features an envelope that encloses an **RNA genome**. It is the specific causative agent that leads to AIDS.



How HIV is Transmitted (and How it Isn't)

Spreads via Body Fluids

Transmission strictly requires the exchange of specific infected body fluids.

- ✓ Sexual contact with an infected person.
- ✓ Transfusion of contaminated blood and blood products.
- ✓ Sharing infected needles (e.g., intravenous drug use).
- ✓ From infected mother to child through the placenta.

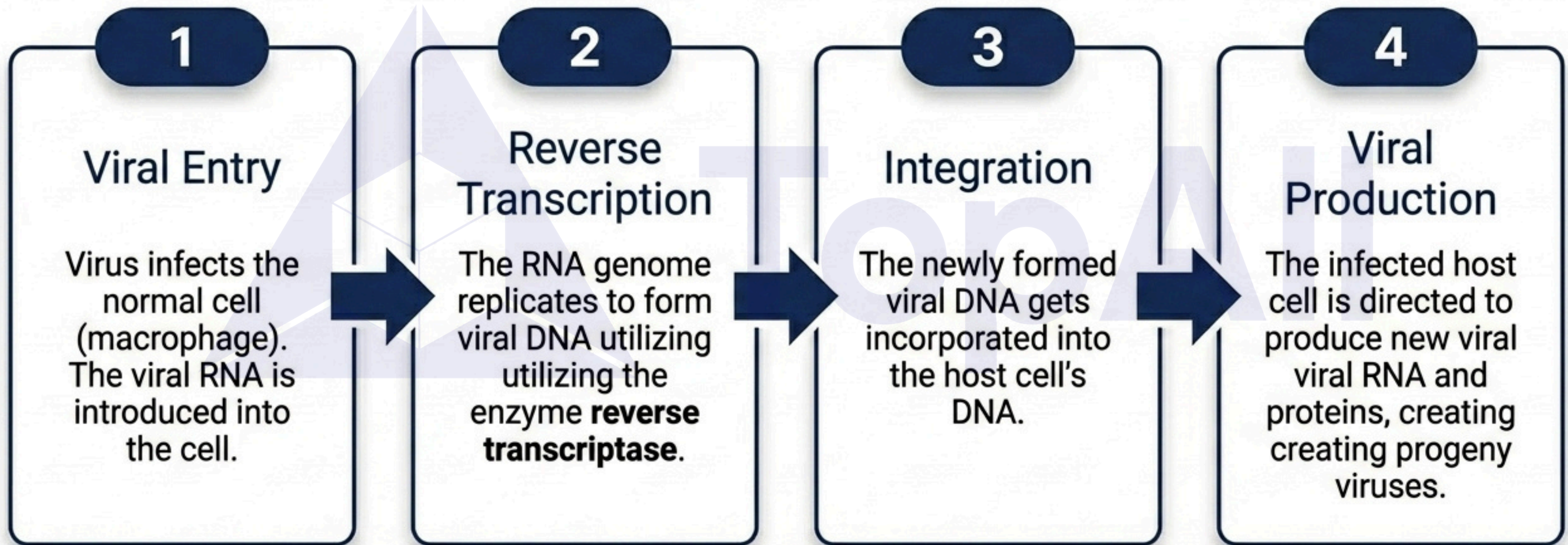
Safe Contact



HIV/AIDS is **not spread by mere touch or physical contact.**

It is imperative for physical and psychological well-being that HIV/AIDS infected persons are not isolated from family and society. Compassion is vital.

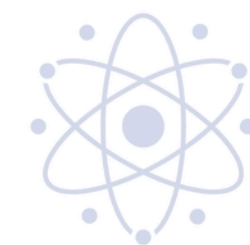
Replication of Retrovirus





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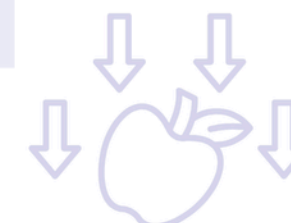
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Target Cells and Immune System Collapse



Macrophages

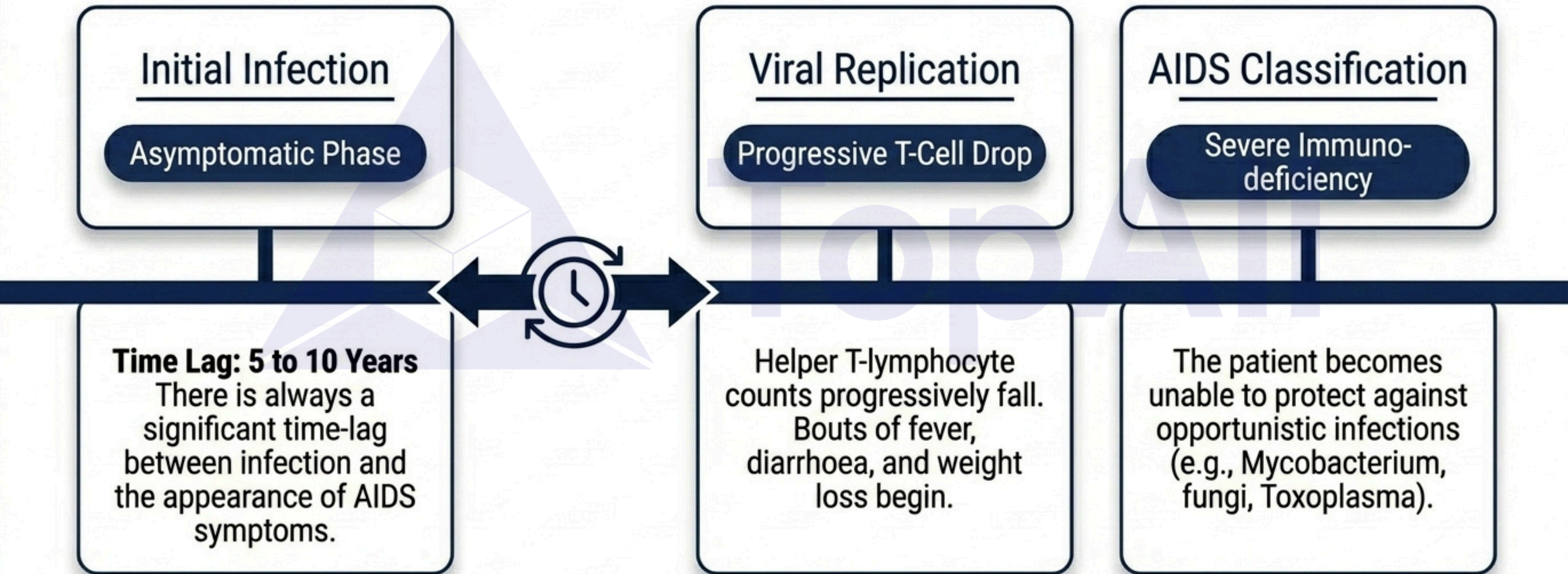
After entering the body, HIV enters macrophages, which continue to produce the virus. The macrophage acts as an ongoing "HIV factory."



Helper T-Lymphocytes (T_H)

Simultaneously, HIV enters Helper T-cells, replicates, and releases progeny viruses into the blood. These attack other Helper T-cells, causing a progressive, severe decrease in T_H cell numbers.

Disease Progression and Symptoms



Clinical Diagnosis and Management



Diagnostic Testing (ELISA)

The most widely used diagnostic test for detecting HIV antibodies is the **Enzyme Linked Immuno-Sorbent Assay (ELISA)**. Early detection allows for better management.



Anti-Retroviral Drugs

Treatment relies on anti-retroviral therapies. These drugs are partially effective; they can significantly prolong the life of the patient, though they cannot currently cure the disease or prevent eventual death.

Key Takeaways

- ✓ **Viral Nature:** AIDS is caused by HIV, a retrovirus with an RNA genome.
- ✓ **Mechanism:** Replicates using reverse transcriptase; macrophages act as viral factories while Helper T-cells are destroyed.
- ✓ **Progression:** Characterized by a 5–10 year time lag before severe immunodeficiency allows opportunistic infections.
- ✓ **Transmission:** Spread strictly via body fluids (sexual contact, blood, needles, placenta) — **never by casual touch.**
- ✓ **Clinical Care:** Diagnosed via ELISA and managed (though not cured) with anti-retroviral drugs.



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