

3. Lenacapavir- Science & Technology

Scientists confirm HIV capsid is a good drug target despite resistance. The fight against HIV/AIDS has entered a transformative era with the introduction of long-acting inhibitors like **Lenacapavir**. This breakthrough signifies a shift from daily management to biannual prevention, offering a powerful tool to achieve the global goal of ending the epidemic by 2030.

1. Lenacapavir- A Breakthrough in HIV Prevention

Mechanism of Action- It is the world's first capsid-based HIV inhibitor. Unlike traditional drugs that target enzymes, Lenacapavir inhibits the HIV capsid protein, effectively blocking the virus from replicating.

The "Adherence" Solution- Requires only two subcutaneous injections per year (once every six months).

1. Eliminates the "pill fatigue" associated with daily oral Pre-Exposure Prophylaxis (PrEP).

High Efficacy- Clinical trials have demonstrated 100% effectiveness in preventing HIV infection among high-risk individuals.

Resistance Dynamics- A new study indicates that for HIV to develop resistance to Lenacapavir, the virus must damage its own capsid, which significantly impairs its ability to function.

Global Implementation- Zimbabwe has become a pioneer by rolling out Lenacapavir to address adherence challenges in high-burden regions.

2. Evolution of HIV Drug Development

Drug Era	Representative Drug	Target Mechanism	Key Limitation
First Generation (1987)	Zidovudine (AZT)	Reverse Transcriptase enzyme.	Rapid development of drug resistance.
Combination Therapy	Various Antiretrovirals	Protease, Integrase, and Reverse Transcriptase.	Required daily adherence to multiple pills.
Modern Long-Acting (2025-26)	Lenacapavir	Viral Capsid Protein.	High initial cost and infrastructure needs for injections.

3. Understanding HIV/AIDS

HIV (Human Immunodeficiency Virus)- Attacks the body's white blood cells (CD4 cells), weakening the immune system and making the body vulnerable to tuberculosis and other opportunistic infections.

AIDS (acquired immunodeficiency syndrome)- The most advanced stage of HIV infection.

Transmission- Spread through body fluids (blood, semen, vaginal fluids, breast milk).

Status of Cure- There is currently no cure; however, Antiretroviral Therapy (ART) can suppress the virus to undetectable levels, allowing patients to live long, healthy lives.

4. HIV/AIDS Landscape in India

India has shown a more prominent decline in infections than the global average.

Prevalence- Declined from 0.33% in 2010 to 0.20% in 2024.

Global Comparison- India's prevalence (0.20%) is significantly lower than the global average of 0.7%.

Infection Share- India accounts for only 5% of new global infections.

5. National AIDS Control Programme (NACP) Phases

The NACP is a comprehensive Central Sector Scheme that has evolved through five distinct phases-

NACP I (1992-1999)- Launched as the first comprehensive prevention and control programme to slow the spread and reduce mortality.

NACP II (1999-2006)- Focused on strengthening national capacity for a long-term response.

NACP III (2007-2012)- Successfully aimed to halt and reverse the epidemic through scaled-up prevention for High-Risk Groups (HRGs).

NACP IV (2012-2021)- * Targeted a 50% reduction in new infections.

1. Mission Sampark- Launched to "bring back" patients who had dropped out of ART.
2. HIV/AIDS Act, 2017- Legally prohibited discrimination against People Living with HIV (PLHIV).

NACP V (2021–2026)–

1. Objective- To end the HIV/AIDS epidemic as a public health threat by 2030 (aligning with UN SDG 3.3).
2. Focus- Sustainability, universal viral load monitoring, and community-led outreach.

6. Conclusion

India's success in combating AIDS is attributed to a multi-pronged strategy- broadened testing, enhanced ART access, and aggressive efforts to combat stigma. The potential integration of long-acting injectables like Lenacapavir into national programmes could be the final "prahaar" (strike) needed to meet the 2030 goal.

Source- <https://www.thehindu.com/sci-tech/science/lenacapavir-study-confirms-hiv-capsid-as-drug-target-despite-resistance/article70666577.ece>

