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Molecular Strategies for the Eradication of HIV: Dual Agents that Simultaneously Activate HIV Latency and Prevent New Infection

A novel single-agent molecular therapy streamlines the "shock and kill" treatment for latent HIV, eliminating drug interaction risks and preventing new infections.

Although advances in modern medicine have made HIV a livable condition, complete eradication of the virus in infected individuals remains a significant barrier to an actual cure. Currently, people infected with HIV are treated using combined Anti-Retroviral Therapy (cART) medications. Patients must maintain continuous treatment or risk full-scale infection due to latent or inactive reservoirs of HIV lingering in their cells. Recently, efforts to eradicate these latent reservoirs have emerged, utilizing a "shock and kill" approach, where latent HIV is reactivated and can then be targeted by cART drugs and the body's natural immune system. However, current shock and kill treatments suffer from unwanted drug interactions and cART's ineffective penetration in regions where latent HIV is most common. Also, by relying on two separate components, the activator and the cART agents, these treatments run the risk of causing new infections if latent HIV is activated and allowed to proliferate before the cART component can reach it.

Researchers at Purdue University have developed a novel molecular strategy that improves upon current shock and kill treatments for latent HIV. By creating a single combined treatment that effectively takes the place of both the activator and the cART agents, they have simplified the treatment process and eliminated the risks of harmful drug interactions and potential new infections. Use of this novel molecular approach could make it possible for people living with latent HIV infections to eliminate HIV from their body.

Technology Validation:

Test inhibitors were developed for both HDAC3 and HIV protease and were combined into three test compounds. In both cases, enzymatic assays were

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performed for the test compounds in triplicate, and an IC50 value was recorded for each. Several examples were then provided as methods for synthesizing the proposed compounds.

Advantages:

-Combines both traditional treatment components into one simplified medication

-Eliminates concerns of harmful drug interactions

-Effectively prevents new infections by delivering both drug components at once, eliminating a risk of prior treatment methods

-Eradicates latent HIV reservoirs, potentially ridding the body completely of any HIV infection

Applications:

-Treatment and potential eradication of latent HIV reservoirs with prevention of new infection.

TRL: 5

Intellectual Property:

Provisional-Patent, 2024-07-11, United States | PCT-Patent, 2025-07-08, WO | CIP-Patent, 2025-09-12, United States

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