Stable Drug-Polymer Particles for Sustained Release in Multi-Drug Formulations

This technology enables the formation of stable, co-assembled drug-polymer particles that deliver multiple antiviral agents with sustained release properties. The method supports simplified dosing and improved drug stability for combination therapies.

What is the Problem?

Combination drug therapies are widely used to treat chronic viral infections such as HIV, but they often face challenges related to drug compatibility, stability, and dosing complexity. Many antiviral agents differ in solubility and degradation profiles, making it difficult to formulate them together without compromising efficacy. Conventional approaches rely on separate encapsulation or physical mixing, which can lead to inconsistent drug release and reduced shelf life. There is a need for formulations that maintain drug integrity while enabling synchronized delivery of multiple agents.

What is the Solution?

This technology offers a method to co-assemble multiple antiviral drugs—such as lopinavir, ritonavir, and tenofovir—into stable particles using lipid-based polymers. The process involves controlled solvent removal, which allows hydrophilic and hydrophobic drugs to organize into a unified structure with long-range molecular order. These particles, referred to as multi-drug motifs (MDMs), exhibit sustained release properties and maintain drug stability over time. The approach simplifies manufacturing and supports fixed-dose combinations, potentially reducing pill burden and improving patient adherence.

What is the Competitive Advantage?

-Enables co-formulation of chemically diverse drugs into a single, stable particle.

-Controlled solvent removal technique avoids harsh processing conditions and preserves drug activity.

-Particles exhibit long-range molecular order, which contributes to predictable and sustained drug release.

-Compatible with lipid excipients commonly used in pharmaceutical formulations.

Technology ID

BDP 7827

Category

Therapeutics/Infection
Selection of Available Technologies
Therapeutics/Other

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-Supports simplified dosing regimens and may reduce the need for multiple pills or separate delivery systems.

Patent Information:

US20220096503A1

References

1. Yu, J., Yu, D., Lane, S., McConnachie, L., Ho, R. J. Y.(2020) , https://pmc.ncbi.nlm.nih.gov/articles/PMC8986323/, https://www.sciencedirect.com/journal/journal-of-pharmaceutical-sciences, 109, 3480-3489