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Solid particles of RNA lipid nanoparticles

A novel, continuous drying process enhances the stability and dispersibility of RNA lipid nanoparticles (mRNA-LNPs), enabling their efficient delivery for inhalable medications and various other pharmaceuticals.

Researchers at Purdue University have developed a novel method and composition to produce stable solid particle formulations of RNA lipid nanoparticles (mRNA-LNPs) for pharmaceutical uses. Recent advances in mRNA-LNPs have allowed for their use as highly effective vaccines through intramuscular injections. Their use has also been demonstrated as treatments for respiratory infections and diseases, but current injection modalities limit their ability to reach the lungs efficiently. Stability is another significant challenge, as both mRNA and LNPs are susceptible to chemical and physical degradation. With this novel method and composition, however, researchers have developed a way of producing mRNA-LNPs with enhanced stability and a flowable, dispersible consistency that makes it suitable for inhalation directly into the lungs. In addition, this method saves time and energy compared to standard pharmaceutical drying procedures such as lyophilization.

Technology Validation:

Researchers explored certain parameters to identify the optimal formulation and drying process for RNA-LNPs. The optimal formulation produced by the optimized drying process was further evaluated for physicochemical properties such as powder crystallinity, particle morphology and in vitro aerodynamic performance, as well as their stability after storage for at least 3 months at 25 â„ƒ.

Advantages:

-Continuous and efficient process

-Better delivery to the lungs

-Increased stability

-Improved resistance to both chemical and physical degradation

Technology ID

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Category

Pharmaceuticals/Drug Delivery & Formulations

Pharmaceuticals/Pharmaceutical Manufacturing & Methods

Authors

Kinnari Arte

Manlin Chen

Li Qu

Qi Zhou

Further information

Joe Kasper

JRKasper@prf.org

Nathan Smith

nesmith@prf.org

View online

Applications:

-Rehydrated topical medications

-Inhalable medications

-Treatment of pulmonary diseases

-Injectable pharmaceuticals, such as vaccines

TRL: 3

Intellectual Property:

Provisional-Patent, 2025-05-19, United States

Keywords: RNA lipid nanoparticles, mRNA-LNPs, solid particle formulations, inhalable medications, pulmonary diseases treatment, enhanced stability, flowable dispersible consistency, pharmaceutical drying, lyophilization alternative, vaccines delivery, injectable pharmaceuticals