

Technology Opportunity, Ref. No. UA-22/215

Efficient gene delivery

This invention provides novel compositions of lipid nanoparticles for efficient delivery of DNA and mRNA into target cells.

Keywords	Lipid nanoparticles, nucleic acid delivery, transfection, phosphatidylserine
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Reference	Lotter C. <i>et al.</i> (2022) European J. Pharm. Biopharm. 172 : 134 - 143
Background	There is a growing interest in lipid nanoparticles (LNPs) as a drug delivery system for nucleic acids. They offer an intriguing alternative to viral vectors because of the absence of immunogenic viral proteins and are better suited than liposomes to carry nucleic acids as a cargo due to their ionizable lipids. The technology in particular came into spotlight with the worldwide approval of COVID-19 mRNA LNP based vaccines. Despite extensive research work in the field, however, the delivery efficiency of currently used second generation LNPs is still low.
Invention	This invention utilizes biomimetic incorporation of phosphatidylserine (PS) into LNPs to increase gene delivery efficiency. PS is a known “eat me signal” and essential co-factor during the infection process of several viral types. PS mediates the so called efferocytosis in contact with target cells leading to the release of the cargo into intracellular trafficking and processing. The addition of PS to LNPs in an optimal concentration range led to a significant increase in transfection efficiency and potency of functional nucleic acid molecules both <i>in vitro</i> (liver-derived cell model) and <i>in vivo</i> (zebrafish model). Increase of delivery efficiency was shown for both pDNA and mRNA. Cell viability of targets cell was not affected by the addition of PS.
Fields of Use	Gene delivery
Patent Status	Application filed (EP 22/156898)
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