Technology Offer

A LIGHT-TRIGGERABLE NANOPARTICLE LIBRARY FOR THE CONTROLLED RELEASE OF RNAS

KEYWORDS

Drug delivery; Polymeric nanoparticle library; RNA-based therapies; Light-triggerable formulations; Transfection agent

TECHNOLOGY DESCRIPTION

A light-triggerable polymeric nanoparticle (NP) library composed of 160 formulations with physicochemical diversity and differential responsiveness to light for delivery of RNA-based therapies or RNA for research purposes.

Physicochemical diversity: allows the selection of the best NPs considering the cell type being transfected, diminishing the time required for transfection. Some NPs presented cell transfection of 10 min or less.

Differential responsiveness to light: allows the selection of the more efficient NPs in endolysosomal escape after light-triggering the release.

Proof-of-concept:

- Six formulations were more efficient (up to 500%) than commercial Lipofectamine in gene knockdown activity in HeLa cells (in vitro) using an anti-GFP siRNA;
- Acute skin wounds treated with the top hit NP complexed with miRNA-150-5p* healed faster than wounds treated with scramble miRNA (in vivo).

The NPs described were effective in releasing siRNA and miRNA but can also be extended to releasing mRNA and other RNA types.

*miRNA-150-5p: miRNA recently identified to be involved in keratinocyte proliferation and migration as well as skin fibroblast survival in ischemic conditions

ADVANTAGES OVER ALTERNATIVE TECHNOLOGIES

Solving the main issue (delivery) related to the usage of RNA-based therapies through a rapid and efficient intracellular release of RNAs: rapid delivery to reduce clearance from the place they are administered in vivo and efficient endolysosomal escape through temporal control of release triggered by light.

APPLICATIONS

Drug delivery system (library of nanoparticles) of RNA-based therapies for treatment of skin lesions and disorders such as skin cancers

Transfection delivery agent of RNA molecules for research purposes

PATENT SPECIFICATIONS

Reference: PCT/IB2020/054585

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