

313 Nanoparticle-hydrogel Composite for Nucleic Acid Molecule Delivery

► Asset Overview

Product Type	Others
Indication	Oncology
Current Stage	Preclinical
Target(MoA)	Delivery of cancer-specific microRNAs
Brief Description	<ul style="list-style-type: none"> • Mesothelioma is an aggressive cancer covering anatomic surfaces (e.g. lining of the lungs, heart, abdomen, etc.) that resists multi-modality therapies. Regional recurrence of mesothelioma from residual tumor cells prevents long-term benefits after surgical resection. Furthermore, there is no clinical consensus on intracavitary adjuvants that are effective in extending the tumor reduction effect of surgery • A new technology developed which fulfills this unmet clinical need by providing a local regional therapeutic platform to shuttle cancer-specific microRNA, thereby circumventing systemic administration challenges • Nanoparticles comprised of microRNA bound to disordered peptides that are embedded in a hydrogel engineered from self-assembling β-hairpin peptides • After administration of a single application, this hydrogel composite produced a durable pre-clinical response in multiple xenograft cancer models • In principle, this localized regional treatment strategy could be applied to other surface cancers
Organization	National Institutes of Health

► Differentiation

□ Competitive Advantages

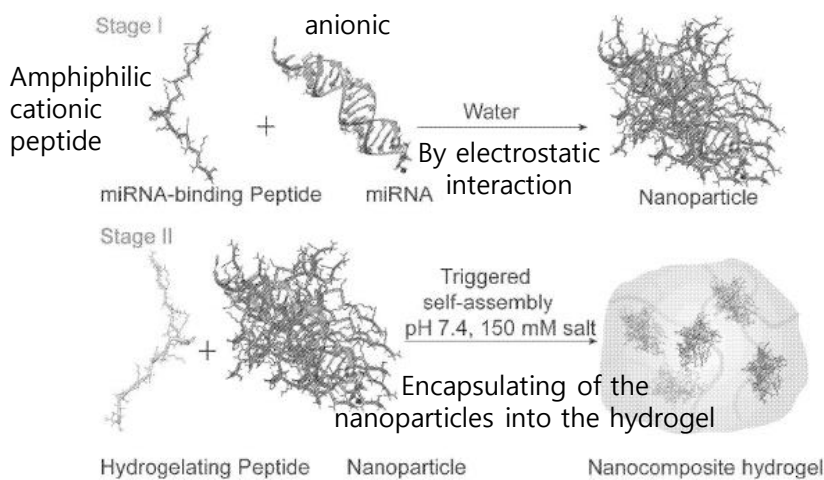
- Biodegradable and biocompatible material that minimizes cytotoxic side effect in vitro and in vivo
- Can be fine-tuned by choice of self-assembling peptides in the gel matrix, of disordered peptides in the nanoparticles, and of nucleic acids to produce an optimal therapeutic effect with time-released delivery
- Both syringe-injectable and sprayable to effectively cover complex tissue surface topology
- Only needing a single administration should reduce clinical trial, manufacturing, and commercialization costs
- Only needing a single administration should improve patient compliance for future applications

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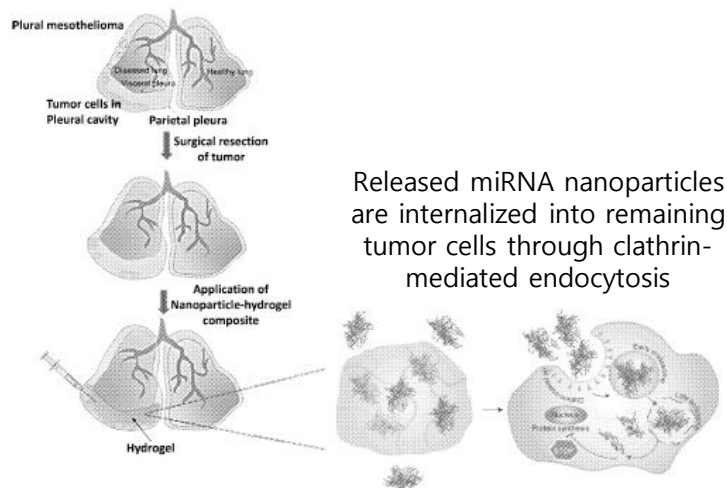
► Key Data

Schematic diagram showing the design of the nanoparticle hydrogel composite and its application for miRNA delivery to complex anatomical surfaces

Nanoparticle hydrogen composite



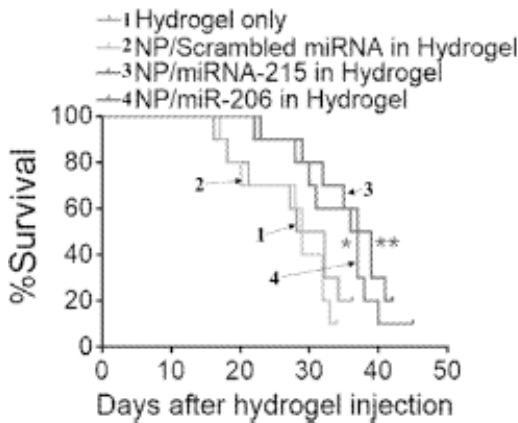
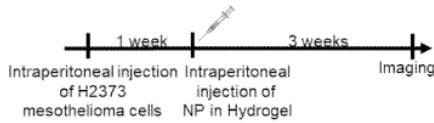
Application to pleural space following surgical resection



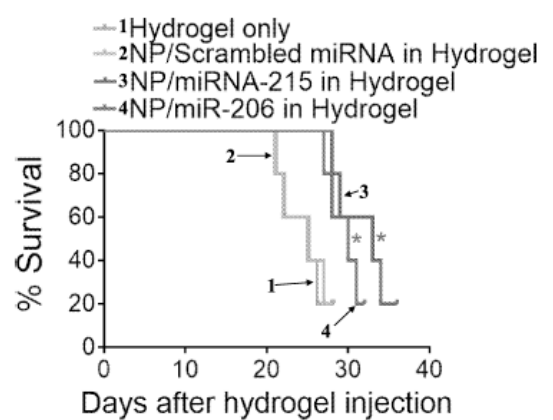
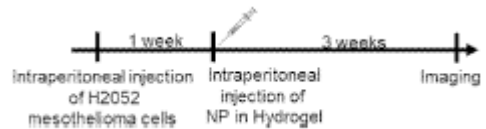
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Nanoparticle-hydrogel composites can effectively reduce tumor growth in orthotopic H2373 and H2052 peritoneal tumor models in NOD/SCIDg mice

H2373 model



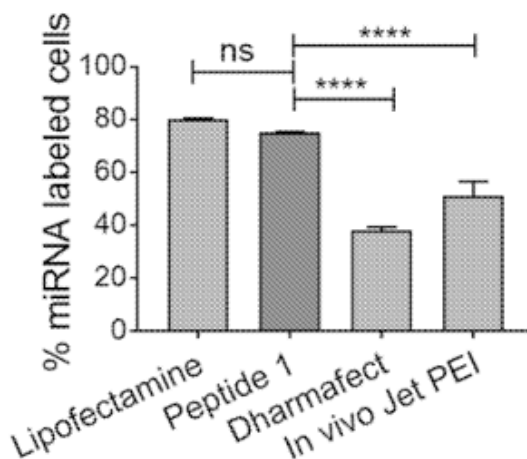
H2052 model



human lung mesothelioma cell lines

miRNA transfection efficiency of Peptide I as compared to commercially available transfection reagents

Percentage of cells transfected with miRNA delivered in each case for 1h post-exposure, n=3, ****p<0.0001, student's t-test



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► Intellectual Property

Patent No.	PCT-US2019-017354
Application Date	2019.02.08
Status	Application Pending
Country	

► Contact Information

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