

# Polymer-Based Nanoplatfrom for mRNA Delivery to Cancer Cells and Stem Cells

**A novel nanoparticle system designed for efficient mRNA delivery to various cancer cell types and human induced pluripotent stem cells.**

## What is the Problem?

Current cancer treatments often face challenges such as non-specific targeting, poor cellular uptake, and degradation of therapeutic agents before they reach their target. Messenger RNA (mRNA) offers great flexibility and utility as a therapeutic. Lipid nanoparticles (LNPs) are the current gold standard method to deliver mRNA, but LNPs suffer from limitations in safety profiles and storage requirements. Additionally, effective delivery of mRNA to cells remains challenging due to its inherent instability and the difficulty in ensuring it reaches the intended cells without being degraded. Therefore, there is a need for advanced mRNA delivery platforms that are robust and efficient in transfection.

## What is the Solution?

This technology introduces a novel polymer-based nanoparticle platform that offers a stable and efficient method for delivering mRNA to cells. The nanoparticle core is made of polyethylenimine polymer with fluorinated groups, which allows mRNA to be reversibly associated with the nanoparticle. This design ensures that the mRNA is protected from degradation, can be targeted to specific tissues, and facilitates cellular uptake and release into the cytoplasm for protein expression. This approach enhances the therapeutic efficacy for cancer treatment and applications involving human induced pluripotent stem cells.

## What is the Competitive Advantage?

**Targeted Delivery:** The nanoparticle system can selectively target cancer cells and stem cells, reducing off-target effects and improving treatment specificity.

**Enhanced Stability:** The polymer-based design protects mRNA from degradation, ensuring it remains intact until it reaches the target cells.

**Efficient Cellular Uptake:** The fluorinated groups on the polymer facilitate better cellular uptake and endosomal escape, ensuring the mRNA is effectively delivered into the cytoplasm.

**Enhanced Safety Profile:** This polymer-based nanoparticle platform has shown minimal toxicity across various cancer cell types and human induced pluripotent stem cells.

## Technology ID

BDP 8495

## Category

Materials/Nanomaterials  
Therapeutics/Oncology  
Therapeutics/Platform  
Technology  
Selection of Available  
Technologies

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Versatility: This platform can be adapted for various types of mRNA therapies, making it a versatile tool for different therapeutic applications.

**Patent Information:**

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