



TECHNOLOGY

Delivery of Therapeutics using Crystallized DNA

OVERVIEW

Background

As therapeutics for disease become more specified, precise delivery of these treatments becomes more important. Recently, numerous new methods for the delivery of therapeutics have been developed and tested. Many of these methods involve encasing the therapeutic in a synthetic vesicle to protect and guide the treatment to its target. However, the use of non-biological components for the manufacture of these vesicles can cause allergic reactions in patients.

Enzyme replacement therapy (ERT) has been developed for some of the more common and severe enzyme deficiency diseases, which has led to remarkable improvements in patient outcomes. ERT infuses recombinant enzymes to replace the missing or malfunctioning host enzymes. Although ERT relieves the symptoms, the enzymes degrade over time and patients must receive infusions at minimum every two weeks. This constant treatment limits the quality of life for patients and can cost hundreds of thousands of dollars a year.

The development of a biologically based vesicle for the stabilization and delivery of therapeutics to patients could be useful for the treatment of many diseases.

Innovative Technology

Researchers at the University of Maryland have developed a system for crystalizing DNA strands. These crystal structures are stable in solution for long periods and have the ability to incorporate enzymes into their core. These enzymes can be permanently bound to the structures while still maintaining their enzymatic activity. These crystals could stabilize the enzymes used in enzyme replacement therapy, lengthening the time between treatments and improving quality of life for patients.

These crystals can also be used to stabilize enzymes during bioremediation. Natural enzymes have been developed to break down pollutants into less harmful products. By using these DNA crystals, the enzymes can be stabilized in the environment allowing less solution to be used for remediation. As the structures break down, there is no contamination as the solution is comprised of natural biologically based materials.

APPLICATIONS

- Stable delivery of therapeutics to patients
- Enzyme-based bioremediation

ADVANTAGES

- Extended availability of enzymes for ERT
- Biocompatible product limits immune reactions in patients
- Purely biological crystals produce no harmful breakdown products during bioremediation

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

LICENSE STATUS

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CATEGORIES

- Biomaterials
- Drug delivery devices

EXTERNAL RESOURCES

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