

Drug Delivery System for Extended Release of Retinal Drugs

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Technology description

Prolongs Delivery and Release of Drugs for Treating Retinal Diseases

This drug delivery system delivers ophthalmic drugs that release to the retina over an extended period of time to treat retinal diseases. Diseases of the retina are one of the leading causes of vision loss and cost an estimated \$343 billion globally. However, the challenge lies in facilitating the delivery of therapeutic substances across the blood-retina barrier, the lining of cells joined together which restricts the transport of substances into the retina. Available treatments overcome this barrier with intravitreal injections, but frequently injecting drugs directly through the eye is invasive, time consuming, and anxiety provoking for patients, leading to low patient compliance and possible complications including infection and retinal detachment.

Researchers at the University of Florida have developed an oleogel formulation that releases retinal drugs over longer durations of time than comparable treatments which reduces the frequency of necessary treatments when injected into the eye intravitreally. Oleogels are semisolids composed of gelling agents called gelators mixed in an oil phase. The oil phase may also contain a water-oil emulsion. The oleogel formulations are unique because they can mimic the drug delivery of existing systems while mitigating some of the side effects. Additionally, their manufacturing is low-cost and they can be adapted to a variety of different drug types based on the needs of the patient.

Technology

The oleogels possess low solubility and are highly viscous, allowing them to remain in the vitreous over time and dissolve slowly until they clear the region. As a result, the oleogels extend the drug release period and decrease the number of necessary treatments. Adding drug particles to the formulation at high concentrations extends the release of the hydrophobic drugs. Hydrophilic drugs loaded into the aqueous phase of the water-oil emulsion followed by the oil gelation creates water droplets in the oleogel formulation. Experimental drug release trials performed with several types of drugs show release profiles ranging from just a few days to over a year. Additionally, the device usage will not add significant cost to treatment because they are easily manufactured and inexpensive.

Application area

Retinal drug delivery system that slows drug release, increasing the timespan of a treatment

Advantages

Extends the duration of drug release, reducing the frequency of injections needed

Releases and degrades slowly, extending the duration of drug release and concentration

Accommodates different drug types and concentrations, increasing availability for patients with various types of retinal diseases

Uses an oleogel formulation, ensuring it remains in the vitreous for extended durations

Accommodates high customization of the various components including: drug loading, release duration, type and concentration of gelling polymer and oil type, water content in the water-oil emulsion, needle size, and surfactant addition, making it adjustable depending on the patient's needs

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