PATENT

ciber CENTRO DE INVESTIGACIÓN BIOMÉDICA EN RED

NANOPARTICLES WITH ANTIBODIES FOR OCULAR TREATMENT

The Need

To develop forms of antibody administration for the treatment of diseases to achieve that enough amount of antibodies (or other drugs) reaches the desired tissue, especially if it is located in the posterior part of the eye.

The Solution

Lipid nanoparticles loaded with antibodies for ocular treatment (retinal degenerative diseases, retinitis pigmentosa), which could be administered directly by the ocular topical (ophthalmic) route, in the form of drops.

Innovative Aspects

The lipid nanoparticles of this invention comprise lipids which are liquid at room temperature additionally to lipids which are solid at room temperature, differing from the nanoparticles called solid lipid nanoparticles (SLN).

The blend of solid and liquid lipids gives rise to an unstructured matrix with higher entrapment efficiency than SLN , which allows to hold a greater number of drug molecules than SLN and also to give rise to lower toxicity risk, better drug protection and more stability upon storage.

Treatment can be administered directly by the ocular topical (ophthalmic) route, in the form of drops, as the nature of the nanoparticle of the invention makes possible that enough amount of the antibody arrives at the retina to be effective, without having to use the intraperitoneal, subcutaneous or intravitreal route, avoiding nuisance, undesired side effects and risks associated to said routes, and also avoiding the need of administering high amounts of drug to be effective, particularly when the drug is an antibody.

Sustained release of the antibody after ocular topical administration by instillation (drop by drop onto the eye surface).

The use of antibodies against TNFα also help to diminish the ocular inflammation and, also, other related symptoms such as reactive gliosis, microglia migration, or increase of gene expression of pro-inflammatory molecules. Besides, they contribute to ameliorate loss of vision including an improvement in light perception, a better retinal electrical response to light stimuli and a reduction in photoreceptor degeneration.

Nanoparticles of the invention are also appropriate for intravitreal (injection) administration.

Stage of Development:

The present technology has been demonstrated *in vitro* and *in vivo* in retinitis pigmentosa murine models of retinal degenerative disease, with beneficial outcomes.

Intellectual Property

European patent application (Priority date: January 30, 2023)

PCT application: January 30, 2024

Available for:

- **Licensing**
- **Further development**

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