

Use of Interleukin (IL)-34 to Treat Retinal Inflammation and Neurodegeneration

Summary (1024-character limit)

Researchers at the National Eye Institute have developed a new cytokine therapy that delivers functional interleukin 34 (IL-34) to the retina for treating ocular inflammatory diseases – such as uveitis and degenerative retinal diseases. Intraocular delivery of IL-34 protein or IL-34 gene expression system can effectively prevent retinal inflammation. Thus, it may be a promising strategy to produce long-lasting effects in suppressing abnormal retinal inflammation and preventing photoreceptor death.

NIH Reference Number

E-091-2018

Product Type

- Therapeutics

Keywords

- Interleukin 34, IL-34, Gene Therapy, AAV Vector, Inflammatory Disease, Retinal Degeneration, Inherited Retinal Dystrophies, Retinal Inflammation, Neurodegeneration, Photoreceptor Death, Uveitis, National Eye Institute, NEI, Caspi

Collaboration Opportunity

This invention is available for licensing and co-development.

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Description of Technology

Interleukin (IL)-34 is a homodimer that is produced mainly by keratinocytes, neuronal cells and regulatory T cells (Tregs). It is believed to play important roles in chronic inflammation and the homeostasis of microglia. Currently, there is no effective treatment for many types of retinal degeneration. An improved treatment of autoimmune uveitis is also needed, as current uveitis treatment primarily uses steroidal anti-inflammation medication, which may produce significant unwanted side effects in long-term use. The inventors at the National Eye Institute (NEI) found that various retinal degeneration and uveitis models in mice with congenital mutations affecting vision have varying degrees of IL-34 deficiency in their intraocular environment. This suggests that IL-34 may be essential in

modulating autoimmune uveitis and retinal degeneration. Therefore, Adeno-associated Virus (AAV) AAV8-IL-34-mediated gene therapy or other extended delivery methods of IL-34 protein to the eyes of patients with uveitis or retinal degeneration is a promising strategy for reducing retinal damage caused by ocular inflammation or degeneration and counteracting vision loss. AAV8 is a promising delivery method, as it preferentially infects retinal cells.

Potential Commercial Applications

- New therapeutic approach for uveitis and retinal degenerative diseases.

Competitive Advantages

- Abrogates the need for chronic steroid use in uveitis, diminishing the risk of side effects from long-term use
- AAV8 preferentially infects retinal cells; therefore, it could be a good choice for IL-34 gene therapy of uveitis for improved efficacy
- Potential platform approach to the more than 200 inherited retinal dystrophies (IRDs) associated with progressive retinal degeneration.
- A regulatory path to approval now exists: the first FDA-approved gene therapy, voretigene neparvovec (Luxturna; Spark Therapeutics) was already approved by FDA and the European Medicines Agency (EMA) in November 2018.
- IRDs are strong candidates for gene therapy when causative mutations have been identified and, to some degree, the eye is an immune-privileged space.
- In clinical trials, no significant immune reactivity or systemic adverse events have been associated with the AAV as gene delivery vehicle.

Inventor(s)

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Development Stage

- Pre-clinical (in vivo)

Patent Status

- **PCT:** PCT Application Number 15/957,019, Filed 05 Mar 2019

Therapeutic Area

- Immune System and Inflammation
- Eye and Ear, Nose & Throat