ChopStick gene therapy for retinitis pigmentosa and autosomal dominant disorders

Technology #cu15206

Retinitis pigmentosa (RP) is a degenerative eye disease that results in progressive vision loss due to a loss of rod photoreceptor cells, followed by cone degeneration. The autosomal dominant forms of RP can be caused by a number of genetic mutations, but are most commonly caused by hereditary mutations in the rhodopsin (RHO) gene. While some treatments have been developed to alleviate symptoms, there is currently no cure for RP. This technology uses CRISPR/Cas9 gene editing to modify mutated rhodopsin in order to treat autosomal dominant forms of RP. This technology could be developed as a means of treating RP without the need for risky surgical procedures.

ChopStick system is not mutation dependent, allowing for treatment of multiple gene variants

This technology modifies mutated rhodopsin (RHO) through a two-step “ChopStick” process. Specifically, CRISPRn/Cas9 gene editing or CRISPRi/Cas9 suppression is used to remove or suppress (“Chop”) both the mutant and wild-type copies of the RHO gene from the RP patient and replace (“Stick”) them with a Cas9 resistant healthy variant to restore rhodopsin protein function. This system is not mutation-specific, allowing for gene editing/suppressions of any rhodopsin mutation. It can also potentially be modified to target other genes for the treatment of other autosomal dominant disorders.

This technology has been used to preserve the photoreceptors in a mouse model. It has also been used to edit the RHO gene in human induced pluripotent stem cells (iPSCs).

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Applications:

• Treatment for all variants of rhodopsin-dependent retinitis pigmentosa (RP)
• Treatment for any disorder cause by autosomal dominant genetic mutations
Advantages:

- CRISPRn and CRISPRi is not mutation-specific allowing for treatment of multiple genetic variants
- Less invasive and fewer complications than retinal prosthesis or stem cell therapy

Patent Information:

Patent Pending

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Related Publications:


Inventors

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