Research Abstract

The death of photoreceptor cells caused by retinal degenerative diseases often results in a complete loss of retinal responses to light. We explore the feasibility of converting inner retinal neurons to photosensitive cells as a possible strategy for imparting light sensitivity to retinas lacking rods and cones. Using delivery by an adeno-associated viral vector, here, we show that long-term expression of a microbial-type rhodopsin, channelrhodopsin-2 (ChR2), can be achieved in rodent inner retinal neurons in vivo. Furthermore, we demonstrate that expression of ChR2 in surviving inner retinal neurons of a mouse with photoreceptor degeneration can restore the ability of the retina to encode light signals and transmit the light signals to the visual cortex. Thus, expression of microbial-type channelrhodopsins, such as ChR2, in surviving inner retinal neurons is a potential strategy for the restoration of vision after rod and cone degeneration.

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