

Current approaches and future prospects for stem cell rescue and regeneration of the retina and optic nerve

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The 3 most common causes of visual impairment and legal blindness in developed countries (age-related macular degeneration, glaucoma, and diabetic retinopathy) share 1 end point: the loss of neural cells of the eye. Although recent treatment advances can slow down the progression of these conditions, many individuals still suffer irreversible loss of vision.

Research is aimed at developing new treatment strategies to rescue damaged photoreceptors and retinal ganglion cells (RGC) and to replace lost cells by transplant. The neuroprotective and regenerative potential of stem and progenitor cells from a variety of sources has been explored in models of retinal disease and ganglion cell loss.

Continuous intraocular delivery of neurotrophic factors via stem cells (SC) slows down photoreceptor cells and RGC loss in experimental models. Following intraocular transplantation, SC are capable of expressing proteins and of developing a morphology characteristic of photoreceptors or RGC.

Recently, recovery of vision has been achieved for the first time in a rodent model of retinal dystrophy, using embryonic SC differentiated into photoreceptors prior to transplant.

This indicates that clinically significant synapse formation and acquisition of the functional properties of retinal neurons, and restoration of vision, are distinct future possibilities.

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<http://www.ncbi.nlm.nih.gov/pubmed/20648090>