

# Transplanted neurons integrate into adult retinas and respond to light

Venugopalan P (1,2) , Wang Y (2) , Nguyen T (2) , Huang A (2) , Muller KJ (1,3) , Goldberg JL (1,2,4)

1 Neuroscience Program, University of Miami, Miami, Florida 33136, USA.

2 Shiley Eye Center, University of California, San Diego, California 92093, USA.

3 Department of Physiology and Biophysics, University of Miami Miller School of Medicine, Miami, Florida 33136, USA.

4 Byers Eye Institute, Department of Ophthalmology, Stanford University, Stanford, California 94303, USA.

Retinal ganglion cells (RGCs) degenerate in diseases like glaucoma and are not replaced in adult mammals. Here we investigate whether transplanted RGCs can integrate into the mature retina. We have transplanted GFP-labelled RGCs into uninjured rat retinas in vivo by intravitreal injection.

Transplanted RGCs acquire the general morphology of endogenous RGCs, with axons orienting towards the optic nerve head of the host retina and dendrites growing into the inner plexiform layer. Preliminary data show in some cases GFP(+) axons extending within the host optic nerves and optic tract, reaching usual synaptic targets in the brain, including the lateral geniculate nucleus and superior colliculus.

Electrophysiological recordings from transplanted RGCs demonstrate the cells' electrical excitability and light responses similar to host ON, ON-OFF and OFF RGCs, although less rapid and with greater adaptation. These data present a promising approach to develop cell replacement strategies in diseased retinas with degenerating RGCs.

Nat Commun. 2016 Feb 4;7:10472. doi: 10.1038/ncomms10472

PMID: 26843334

<http://www.ncbi.nlm.nih.gov/pubmed/26843334>