Mouse Model of Glaucoma

WARF: P06465US

Inventors: Robert Nickells

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a mouse model for high throughput screening of glaucoma drugs.

Overview

Glaucoma is a group of diseases that can result in vision loss and blindness. According to the World Health Organization, glaucoma is the second leading cause of blindness worldwide.

Glaucoma causes a progressive loss of retinal ganglion cells. These cells, which form one end of the optic nerve, transmit visual information from photoreceptors in the eye to the brain. Because ganglion cells cannot regenerate, glaucoma is an incurable disease.

Existing treatments for glaucoma are designed to prevent further damage to the optic nerve. However, while they can slow or prevent vision loss for a number of years, they also may be invasive or result in adverse side effects.

To learn more about how glaucoma occurs and to identify additional agents that prevent ganglion cell loss, methods for identifying retinal ganglion cells in mice are needed. However, existing techniques are laborious and their results often are complicated with artifacts.

The Invention

A UW-Madison researcher has developed a mouse model that can be used for high throughput screening of neuroprotective glaucoma drugs. The retinal ganglion cells in these mice can easily be identified and assessed using a qualitative scoring system or image processing software.

To create the mouse model, the inventor started with DBA/2J mice, which develop secondary glaucoma. He then backcrossed an allele, known as R3, into these mice. R3 encodes a reporter protein that the mice express in their retinal ganglion cells.

To identify ganglion cells, the mice are euthanized, and their eyes are removed and stained for R3 protein activity. The retinas are then whole mounted onto glass slides and digitized. The ganglion cells appear as easily identifiable dark blue spots.

In addition, the inventor has developed a solution assay to quantitatively monitor the expression of the R3 gene. Because the silencing of this gene is part of the early stages of ganglion cell death, this assay makes it possible to evaluate whether certain drugs can potentially treat glaucoma before significant vision loss occurs.

Applications

- Provides a rapid and accurate method of studying ganglion cell loss
- Allows the pattern and timing of cell loss, along with the symmetry of disease progression in both eyes, to be assessed
- Enables high throughput screening of potential glaucoma therapies

Key Benefits

- Enables rapid processing and quick identification of retinal ganglion cells
- Amenable to image processing
- Several hundred animals can be screened in a relatively short time.

Additional Information

For More Information About the Inventors

- Robert Nickells

Publications

- Schlamp C.L., Li Y., Dietz J.A., Janssen K.T. and Nickells R.W. 2006. Progressive Ganglion Cell Loss and Optic Nerve Degeneration in DBA/2J Mice is Variable and Asymmetric. BMC Neurosci. 7, 66.
- McKinnon S.J., Schlamp C.L and Nickells R.W. 2009. Mouse Models of Retinal Ganglion Cell Death and Glaucoma. Exp. Eye Res. 88, 816-824.

Tech Fields

- Research Tools : Animal & disease models

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854