

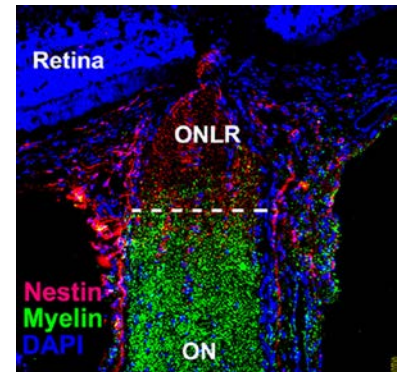


Treating Optic Nerve Diseases with Neural Stem Cell Factors

Overview

The optic nerve lamina region (ONLR) is a small junctional region between the eye and optic nerve (ON), and is the primary damage site in age-related eye diseases, such as open angle glaucoma (OAG). Dr. Bernstein's group at UMB discovered that the ONLR of both human and rodent contains an adult neural progenitor cell (NPC) niche, which is mitotically active and age-depletable. Early ONLR-NPC loss causes regional dysfunction and hypomyelination. In adulthood, ONLR-NPCs may enable glial replacement and remyelination. ONLR-NPC depletion may help explain why ON diseases such as OAG progress in severity during aging.

The ONLR had been a challenge for others to isolate, but Dr. Bernstein's team determined how to study this important region in detail. They found the ONLR cell population has adult NPC characteristics [e.g., expression of SOX2 and nestin; *see FIGURE showing localization of nestin in the rodent ONLR*]. Using a multifactorial approach, they demonstrated that the postnatal ONLR-NPC niche can generate all macroglial cell forms in the optic nerve, contributing to normal postnatal ON growth, myelination, fluid regulation and cellular replacement.



Market & Applications

Glaucoma is a group of eye conditions that damage the optic nerve, and is associated with an abnormally high pressure in the eye. It is one of the leading causes of blindness for people over the age of 60. Patients experience a gradual change in vision, with few warning signs until the condition is at an advanced stage. Early diagnosis is very important – if glaucoma is treated early, vision loss can be slowed or prevented. The most common treatment is prescription eye drops, which reduce eye pressure (e.g., Pfizer's Xalatan® and Allergan's Lumigan®); however, such prescription eye drops don't cure glaucoma or reverse vision loss. Other treatment options may include oral medications, laser treatment, surgery or a combination [Sources: www.mayoclinic.org and www.nei.nih.gov].

In 2010, glaucoma affected ~ 1.9% of people in the U.S. age 40 and older. Women account for 61% of U.S. cases. The forecast for glaucoma prevalence in the major world markets of US, Europe, China & Japan is for an annual growth rate of 0.6% per year over the next 10 years, reaching ~ 27 million cases by 2026. There's an active pipeline for developing new glaucoma drugs, the majority being early-stage small molecules. [Source: GlobalData, 2019]

Technology Advantages

Unlike currently available treatments for glaucoma, which only manage disease symptoms, UMB's discovery shows promise to lead to curative therapies for glaucoma and potentially other age-related eye diseases.

Stage of Development

Dr. Bernstein's team discovered a distinct cell population in the ONLR with characteristics of adult NPCs, and the group is currently testing candidate therapeutic strategies aimed at restoring and sustaining NPC function.

Investigator(s)

Steven Bernstein
Candace Kerr
Sally Temple

Description

Stem cell; eye disease;
glaucoma

Field

Treatment of age-related eye
diseases

Technology Status

Available for licensing
& sponsored research

Patent Status

International Patent Appl'n
filed Feb. 2019:
[WO 2019/152812](http://www.uspto.gov/patents/applications/ipa/wo2019152812)

UMB Docket#

SB-2015-057

References

Bernstein et al., 2020 PNAS
[10.1073/pnas.2001858117](https://doi.org/10.1073/pnas.2001858117)

GlobalData Report Jan.
2019 "Glaucoma:
Competitive Landscape to
2026"