

# Association found between gut immune cells and eye damage from glaucoma

August 5 2023, by Bob Yirka

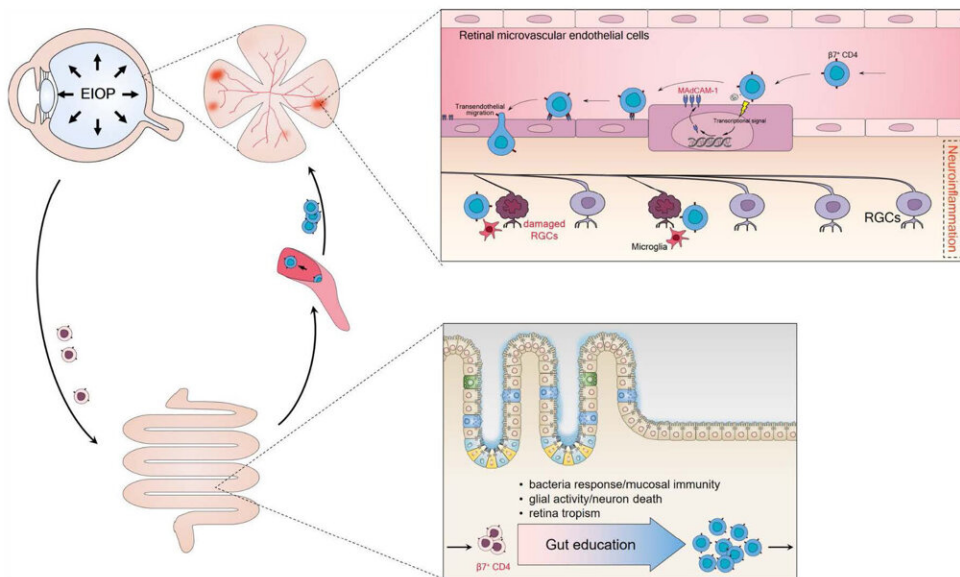


fig. S16. Schematic hypothesis of how EIOP-induced  $\beta 7^+$   $CD4^+$  T cells enter the retina

Schematic illustrating how  $\beta 7^+$   $CD4^+$  T cells enter the retina. Credit: *Science Translational Medicine* (2023). DOI: 10.1126/scitranslmed.adg1656

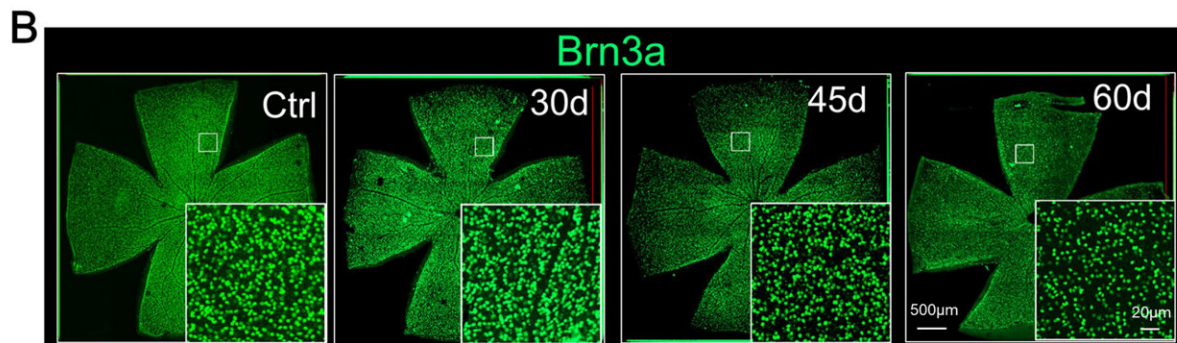
A team of medical scientists at the University of Electronic Science and Technology of China, working with a colleague from the Army Medical University and another from the Luzhou Maternal and Child Health Hospital, has found an association between immune cells in the gut and damage to the retina due to glaucoma. In their study, reported in the

journal *Science Translational Medicine*, the group analyzed the behavior of CD4<sup>+</sup> T cells and the protein integrin  $\beta$ 7.

Glaucoma is one of the leading causes of blindness and has no cure, though there are treatments that slow the damage it can wreak. It is a condition where ganglion cells in the retina and the optic nerve are damaged. Most therapies work to lower pressure inside the eyeball, one of the symptoms of glaucoma.

Prior research has suggested that T cells are likely involved in damage caused by glaucoma, but until now, the cause has been mostly a mystery. In this new effort, the research team suspected that CD4<sup>+</sup> T cells may play a role in the disease.

They began by testing [blood samples](#) of 519 patients with glaucoma, and found that those with higher levels of CD4<sup>+</sup> T cells experienced more damage to their eyes.



Retinas from mice with glaucoma damage, stained with Brn3a (green) to measure the loss of retinal ganglion cells over time. Credit: *Science Translational Medicine* (2023). DOI: 10.1126/scitranslmed.adg1656

In mice, CD4<sup>+</sup> T cells express integrin  $\beta$ 7 in the gut—this is a protein encoded by the ITGB7 gene. They also found that the CD4<sup>+</sup> T cells were reprogrammed in the gut in a way that allowed them to use integrin  $\beta$ 7 to access the retina and attack retinal [ganglion cells](#) when transported through the blood.

To learn more about the association between CD4<sup>+</sup> T cells and glaucoma damage, the team gave test mice antibodies that prevented the cells from interacting with a protein known as MAdCAM-1, which led to a reduction in inflammation in the eye and damage to the retina.

The team concludes that in addition to linking gut [immune cells](#) to glaucoma damage, their study also highlights the role that the [immune system](#) can play in diseases such as glaucoma.

**More information:** Chong He et al, Gut-licensed  $\beta$ 7 + CD4 + T cells contribute to progressive retinal ganglion cell damage in glaucoma, *Science Translational Medicine* (2023). [DOI: 10.1126/scitranslmed.adg1656](#)

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