Institute of Molecular and Clinical Ophthalmology Basel

Media Release

What keeps vision cells alive?

Lessons from 20,000 lab-grown human retinas

Basel, 30 March 2026 – Scientists led by Botond Roska at the Institute of Molecular and Clinical Ophthalmology Basel (IOB) and collaborators have identified genetic pathways and compounds capable of protecting cone photoreceptors from the degeneration that underlies conditions like age-related macular degeneration.

Cone photoreceptors, concentrated in the macula, are essential for reading, recognizing faces, and perceiving colours. Their death, as it happens in many inherited retinal diseases and macular degeneration, leads to the loss of central vision. Despite decades of research, no approved therapies can halt this process. This new study, conducted by first authors Stefan Spirig, Alvaro Herrero Navarro and collaborators, addresses this unmet need using a human-based experimental system.

Key findings

- More than 2,700 compounds were tested in 20,000 human retinal organoids
- Some compound classes were found to damage cones, highlighting safety risks
- Several molecules were identified that protect cone photoreceptors from degeneration
- Inhibition of casein kinase 1 emerged as a key protective mechanism

Cone photoreceptors were selectively labelled, allowing their fate to be followed over time under controlled stress conditions that mimic disease. This approach enabled a systematic screen of compounds with known molecular targets.

Clear patterns emerged: two kinase inhibitors consistently protected cones over extended periods. The protective effects held across different stress conditions and were further confirmed in a mouse model of retinal degeneration, supporting their broader relevance.

Beyond identifying protective pathways, the study makes a comprehensive dataset publicly available, covering the compounds tested, their molecular targets, and their effects on human cone survival. This resource will guide the development of therapies aimed at preserving central vision and enable a systematic assessment of potential retinal toxicity.

By combining retinal biology, organoid technology, and large-scale compound screening, the work gives researchers a head start in developing new treatments and sharpens focus on a long-standing goal in ophthalmology: protecting the very cells that make sight possible.

The full article, "*Cell type-focused compound screen in human organoids reveals CK1 inhibition protects cone photoreceptors from death*" is available in *Neuron* at https://www.cell.com/neuron/fulltext/S0896-6273(26)00129-7

About IOB

At the Institute of Molecular and Clinical Ophthalmology Basel (IOB), basic researchers and clinicians work hand in hand to advance the understanding of vision and its diseases, and to develop new therapies for vision loss. IOB started its operations in 2018. The institute is constituted as a foundation, granting academic freedom to its scientists. Founding partners are the University Hospital Basel, the University of Basel and Novartis. The Canton of Basel-Stadt has granted the institute substantial financial support.

Scientific contact:
Botond Roska
Head of the Human Retinal and Central Visual Circuits Group
Institute of Molecular and Clinical Ophthalmology Basel (IOB)
E-Mail: headoffice_roska@iob.ch

Press contact:
Elsa Sigle
Head of Administration and Communications
Institute of Molecular and Clinical Ophthalmology Basel (IOB)
E-Mail: media@iob.ch
www.iob.ch

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