

## Media Release

### What if you could reboot sick cells?

#### ***Scientists develop MitoCatch, a system that delivers healthy mitochondria directly to the cells that need them most***

**Basel, 15 April 2026** – Scientists led by Botond Roska at the Institute of Molecular and Clinical Ophthalmology Basel (IOB) have developed *MitoCatch*, a groundbreaking technology that can deliver healthy mitochondria, the tiny structures in cells that generate energy, directly to the cells most affected by disease. This innovative approach represents a major step toward treating conditions where damaged mitochondria play a central role, including neurodegenerative diseases like Parkinson's, optic nerve degeneration, and certain types of heart failure.

Mitochondrial dysfunction is at the root of many currently untreatable diseases. While researchers have experimented with transplanting healthy mitochondria into damaged cells, traditional methods still lack efficiency and cannot ensure the mitochondria reach the cells that need them most. *MitoCatch* changes that.

The system is based on engineered protein “binders” that act like a cellular GPS, guiding mitochondria into the right cells. IOB researchers designed three complementary strategies: binders displayed on the cell surface (*MitoCatch-C*), binders attached to mitochondria (*MitoCatch-M*), and bispecific binders linking mitochondria and cell surfaces (*MitoCatch-Bi*). By adjusting the binders, scientists can fine-tune how efficiently and selectively mitochondria reach different cell types.

Experiments conducted by first authors Temurkhan Ayupov, Veronica Moreno-Juan and collaborators show that *MitoCatch* successfully delivers mitochondria to neurons, as well as retinal, heart, endothelial, and immune cells. Once inside, the mitochondria remain functional, moving, fusing, and dividing, which are processes essential for normal cell energy management. IOB scientists demonstrated that donor mitochondria improve survival of neurons derived from patients with optic nerve atrophy and promote recovery of retinal ganglion cells after injury. So far, this method is well tolerated in animal models, with no detectable immune reaction.

By overcoming a long-standing barrier in cell-specific mitochondrial delivery, *MitoCatch* represents a potential paradigm shift in treating mitochondrial diseases. This is more than a breakthrough: it provides a new strategy for precision mitochondrial medicine.

The full article, “*Cell type-targeted mitochondrial transplantation rescues cell degeneration*” is available in *Nature* at <https://www.nature.com/articles/s41586-026-10391-0>.



### **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.

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