Institute of Molecular and Clinical Ophthalmology Basel

Media release - for immediate publication

Scientists create artificial human retinas

A new model to investigate gene therapy for eye diseases

Basel, September 17, 2020 Scientists have succeeded in growing accurate replicas of human retinas. This achievement will accelerate development of new therapies for eye diseases. The research was reported today in *Cell* by a team led by Botond Roska at the Institute of Molecular and Clinical Ophthalmology Basel (IOB) and collaborators at the Novartis Institute for BioMedical Research (NIBR).

The artificial tissue is referred to as an "organoid", because it has features of the human organ. "These organoids are special because, like the human retina, they have a layered structure and they react in the same way to light," explains Cameron Cowan, a senior researcher in the IOB Human Retinal Circuit Group and a first author of the paper.

A comparison of organoids with retinas from multi-organ donors confirmed the strong similarities. "We show that after 38 weeks in culture, the duration of a typical human pregnancy, our organoids contain many of the same cell types as an adult human retina," says Botond Roska, IOB director. These comparisons were made possible by the high quality of the donated retinal tissue. "For the first time, we were able to maintain human retinas in a functional, light-sensitive state after death."

Moreover, the researchers showed the high value of organoids for therapy development by demonstrating that retinal diseases map to the same sorts of cells in the organoids and real retinas. "We can grow retinal organoids from a patient's blood or skin samples and use those to develop treatments in the laboratory that are tailored to that individual patient," says Magdalena Renner, Head of the IOB Human Organoid Platform and a first author of the paper.

These research successes will accelerate the development of new therapies for blinding retinal diseases.

Original publication: Cowan et al. (2020): Cell Types of the Human Retina and Its Organoids at Single-Cell Resolution. Cell. https://doi.org/10.1016/j.cell.2020.08.013

Illustrations can be downloaded from IOB.ch (please click here)

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 develop new therapies for vision loss. Constituted as a foundation in December 2017, its 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. www.iob.ch

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