ASHBi SEMINAR

From developmental biology to the clinics – Retinal Organoids

Lecturer: Stefan Liebau, Ph.D.

Professor, University of Tübingen,
Institute of Neuroanatomy and Developmental Biology (INDB)

Date Monday, 16 June 2025

Time 16:00 – 17:00 [JST]

Venue Conference Room Onsite Only*
B1F, Faculty of Medicine Bldg. B

Register here

Abstract

Human induced pluripotent stem cell (hiPSC)-derived retinal organoids (ROs), retinal pigmented epithelial (RPE) cells, and retina-on-chip (RoC) technologies represent powerful and complementary in vitro platforms to model human retinal development and disease. Retinal organoids recapitulate key stages of retinogenesis in a three-dimensional context, enabling the study of layered retinal architecture, cellular differentiation, and the emergence of photoreceptors, bipolar cells, and ganglion cells under controlled conditions. In parallel, RPE cells derived from hiPSCs allow for the investigation of the critical interplay between photoreceptors and their supportive epithelium, including aspects of phagocytosis, pigment metabolism, and outer segment renewal.

When integrated into microfluidic retina-on-chip platforms, these retinal components can be subjected to physiologically relevant flow, perfusion, and compartmentalization, enabling the simulation of aspects of retinal microenvironment and drug delivery. Collectively, these systems provide a scalable and ethically sustainable alternative to animal models for high-throughput toxicity screening, offering insight into compound-induced retinal stress and degeneration. Moreover, their human cellular origin allows for the development of personalized treatment strategies, including gene and cell-based therapies. As such, these models are not only valuable for elucidating mechanisms of retinal development and pathology, but also for accelerating the translational pipeline in ophthalmological drug discovery and precision medicine.

Organizer : Graduate School of Medicine
Institute for the Advanced Study of Human Biology (WPI-ASHBi), Kyoto University

Host: Prof. Cantas Alev
[E-mail] ashbi-event@mail2.adm.kyoto-u.ac.jp