… performing in Excellence

Methodology

The laboratory has considerable experience in various techniques of molecular biology which are applied to learn about the signals generated in the retina, RPE and choroid when refractive errors are induced. We use biochemical assays and quantitative immunohistochemistry.

Myopia is a multi-layered problem since it develops as a complex interaction of genes and (mainly visual) environment. We study myopia at several levels:

- retinal image processing of defocus
- microelectrode recordings of ganglion cells (MEA) under defocus
- visually induced changes in retinal and choroidal gene expression
- pharmacological intervention of myopia, pathway analyses
- interactions of myopia development with bright light and the role of retinal dopamine
- psychophysical studies on spatial adaptation
- behavioral analyses of visual function
- studies on the optical and adaptational limits of vision
- role of fixational eye movements and photoreceptor patterns in myopia

The lab has also extensive expertise in physiological optics and design, programming and development of new optical technologies for myopia and vision research and has developed instrumentation to measure the optics of eyes for major optical companies and for the scientific community. We also develop refractors and eye trackers for humans and various animal models.

Contact

Institute for Ophthalmic Research
Neurobiology of the Eye

Head: Prof. Dr. Frank Schaeffel

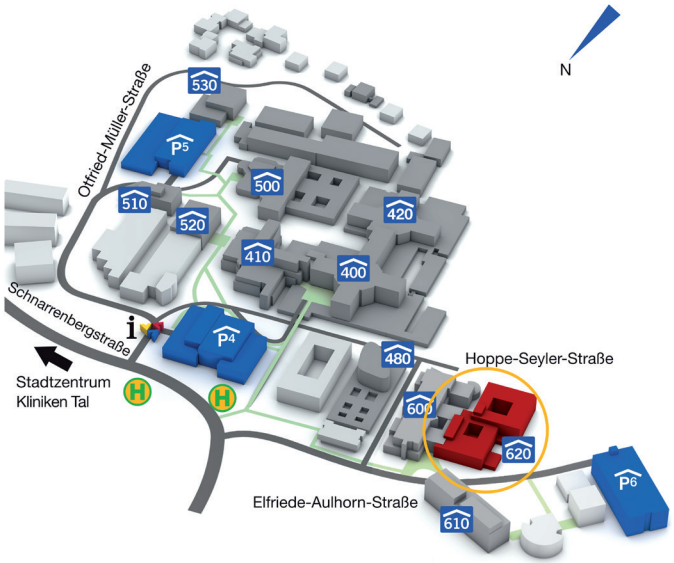
University of Tübingen

Elfriede-Aulhorn-Straße 7
72076 Tübingen
Germany

Phone: +49 7071 29 80739
Fax: +49 7071 29 5196

E-mail: frank.schaeffel@uni-tuebingen.de
Web: www.eye-tuebingen.de/schaeffellab

How to find us:

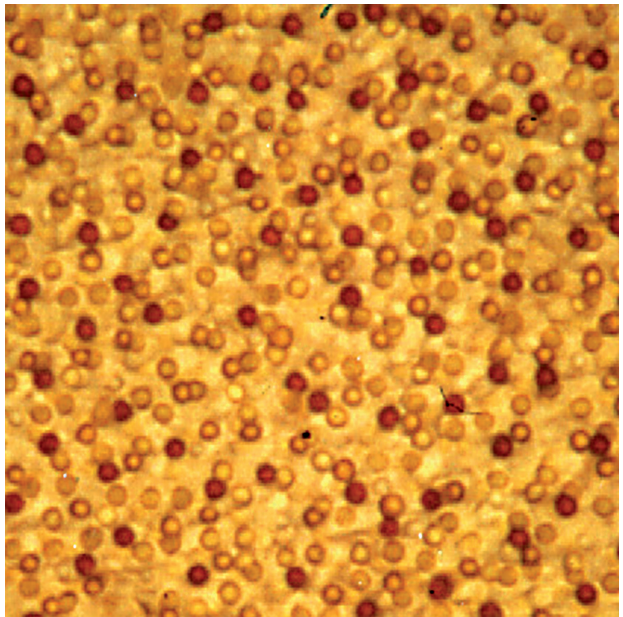


Institute for Ophthalmic Research
Centre for Ophthalmology

UNIVERSITÄTS KLINIKUM TÜBINGEN

Schaeffel Lab

Neurobiology of the Eye



Neurobiology of the Eye

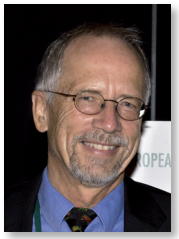
UNIVERSITÄTS KLINIKUM TÜBINGEN

EBERHARD KARLS UNIVERSITÄT TÜBINGEN

Our central research goal is to understand how visual experience and genetic factors affect eye growth and the development of myopia.

We are studying these questions in chicken and mouse models, but also in human subjects. When animal models wear spectacle lenses or diffusers in front of their eyes, they develop myopia or hyperopia. The predictable effect of these visual perturbations on eye growth permits to study the underlying retinal image processing.

One can learn how the output of retinal image processing merges into the release of growth signals from the retina that reach the retinal pigment epithelium where they may be converted into other signals that pass through choroid to the sclera. While these approaches merge into pharmacological interventions of myopia development (more recently very low dose atropine eye drops), there are a number of less invasive strategies.



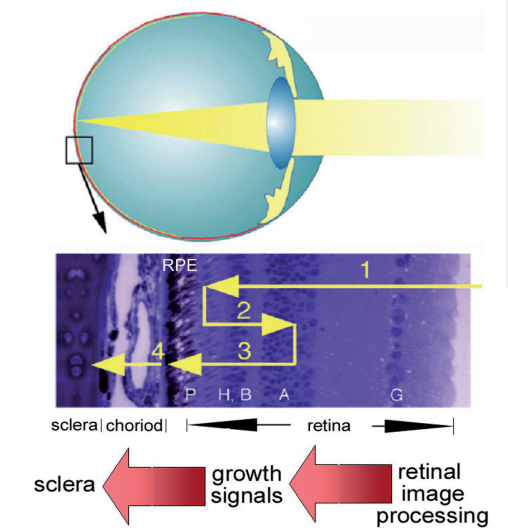
Frank Schaeffel

- Professor, Biophysicist , Dr. rer. nat.
- Professor and Head of the Section for Neurobiology of the Eye
- Deputy director of the Institute for Ophthalmic Research

Marita Feldkämper

- Dr. rer. nat.
- Head of the molecular biology unit of the Section for Neurobiology of the Eye

Bright light has an inhibitory effect on myopia development in both animal models and children but the required intensities and the most effective temporal patterns are not well defined. Also defocus in the periphery of the visual field has an unexpectedly strong effect on the visual control



Signalling in myopia

of eye growth, raising the question whether conventional spectacles really represent the optimal solution for the correction of myopia. To this end, we are studying the retinal defocus error signals across the visual field since they define the rate of axial eye growth and myopia. Also, the still unresolved central question remains “How does the retina know whether the focus of the image is in front or behind?” Over the past few years, we have coodinated three multicentric European networks, funded by the European community, on myopia and optics of the eye.

Research to See

The Institute for Ophthalmic Research

Seeing is an essential part of human life. As a leading centre for vision research we conduct rigorous research in order to break new ground in understanding the principles of vision and the mechanisms of blinding diseases. We are confident that this research will enable us to rationally develop effective treatments that ultimately retain or restore vision.

Within the Center for Ophthalmology at the University of Tübingen Medical Centre, we and our colleagues at the University Eye Hospital jointly strive for scientific excellence, for speed in translating the advancements into patient’s benefit, and for training and mentoring the next generation of leaders in our field.

As leaders and partners in multi-national collaborations, we work for continuous strengthening our ties to fellow international scientists in the public and private sector and to foundations, industry and patient organizations.

As an integral part of Tübingen’s biomedical and neuroscience campus, we offer a scientific environment that favors creativity for generating groundbreaking ideas, their transfer into reality and their translation into diagnostics and therapy to help those that suffer from vision loss.