... performing in Excellence

Research Topics

- Age-Related Macular Degeneration (EU-Consortium EYE-RISK; www.eyerisk eu)
- Retinal Degeneration (FFB Research Center Consortium PHOTORECEPTOR PROTEOSTASIS)
- Epidemiology & Automated Reading: German National Cohort (NAKO): Coordination Competence Platform ,Eye' (www.nako.de)
- Ciliopathies (EU-Consortium SYSCILIA; www.syscilia.org)
- Therapy Development; Ocular Drug Delivery (EU-Consortium OCUTher; www.ocuther.eu)

Related Projects:

- EYE-RISK European Union's Horizon 2020 research and innovation programme Exploring the combined role of genetic and non-genetic factors for developing Age-Related Macular Degeneration: A systems level analysis of disease subgroups, risk factors, and pathways.
- OcuTher European Union's Horizon 2020 Innovative Training Networks (ITN) Educational network in ocular drug delivery and therapeutics.
- Targeting Proteostasis and Protein Quality Control in Photoreceptors / Towards Therapeutic Intervention - Foundation Fighting Blindness Research Center Program Project Award (PPA) Study of disruption of proteostasis in inherited retinal to develop targeted treatments.
- **CURETINA** Excellence Initiative Grant, Personalized Medicine: Personalized medicine for hereditary retinal dystrophies.

Contact

Institute for Ophthalmic Research Molecular Biology of Retinal Degenerations

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How to find us:





Ueffing Lab Molecular Biology of Retinal Degenerations



Molecular Biology of Retinal Degenerations

Our research is focused on disease mechanisms in neurodegenerative diseases, on processes driving neurodegeneration as well as on mechanisms of retinal neuroprotection. We aim to develop diagnostics and therapies for retinal degenerations. Our group is teaming up with computational scientists and structural biologists to develop and apply molecular and bioanalytical strategies towards functional analysis of protein complexes and protein networks in disease. In a long-term attempt to understand retinal physiology, we study cellular signaling pathways conferring cellular integrity and longevity.

At the analytical and technical level, we apply and develop multi-omic workflows with an emphasis on advanced proteomics. We have developed a new generation of patented tandem affinity tags allowing fast and efficient complex purification without involving proteolytic cleavage of the tag and advanced massspectrometry to identify and analyse protein interactions and signaling. Applying various computational modeling approaches, we analyse patterns of molecular, physiological and histological perturbation linked to disease. Towards advanced ophthalmological read-



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- Head of Molecular Biology of **Retinal Degenerations**

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ing, we develop algorithms to automatically analyze retinal images.

Our methodology spectrum also includes custom organotypic culture systems and intraocular delivery of compounds (small molecule and peptides) using animal models that naturally bear or closely mimic retinal diseases occurring in humans.



Retinal Degeneration

Vision is crucial for mastering and enjoying life. Vision highly depends on retinal function. A large variety of diseases that are either inherited or acquired disrupt normal physiology of retinal cells. If this disruption persists for a sustained period of time, retinal cells undergo irreparable degeneration. Thus, if not stopped, retinal degeneration eventually results in vision impairment and blindness.

Impaired vision and blindness deeply affect the guality of life. Current understanding of retinal degeneration does not go far enough to offer effective therapies. Work carried out in our group aims to elucidate the mechanisms that maintain retinal function in order to gain a better understanding of retinal degeneration. Within several large-scale consortium projects, we take part in joint efforts to define risks for retinal degeneration, generate diagnostics and develop new avenues for therapy.

Research

EBERHARD KARLS

TÜBINGEN

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.

