



Department für Augenheilkunde

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Bachelor/ Master's thesis positions available on the ciliary role in signaling and degenerative processes

The Institute for Ophthalmic Research (www.eye-tuebingen.de/ueffinglab/) and the Core Facility for Medical Bioanalytics are part of the Centre for Ophthalmology. Gene editing is used to modify ciliated cells for downstream analysis using affinity proteomics and mass spectrometry, high-resolution fluorescence microscopy, RNA and protein expression analysis (qPCR, western blot). Our focus is to elucidate how gene variants and mutations affect protein complexes, cilia and cilia-dependent signaling and thereby cause disease. We can offer to work in a team of highly motivated scientists, a stimulating atmosphere and access to advanced technical infrastructure.

Neurodevelopmental abnormalities, retinal degeneration, obesity, skeletal malformations and polycystic kidney disease, result in life-long disability and are a major feature of inherited ciliopathy disorders, caused by mutations in ciliary proteins. Cilia are evolutionarily conserved organelles found on most cell surfaces and play key signaling roles to regulate diverse cellular processes during development and to maintain tissue homeostasis. As an example, a specific subset of ciliary proteins that are involved in ciliopathies, are localized to the transition zone, a compartment at the proximal region of the cilium. The loss of these components can disrupt the control of protein entry and exit from the cilium. This affects the regulation of cellular signaling cascades and even the control of the cell cycle.

In addition, post-translational modifications like phosphorylation and ubiquitinylation influence cilia protein composition and function. Utilizing CRISPR/Cas mediated knockout or knockin cells, and ectopic expression of wildtype and mutant proteins, defects induced by protein dysfunction are investigated in our lab. In lab meetings and seminars, project plans and results are discussed. As several projects are available interested students might have the chance to choose between topics and will be closely supervised by the person responsible for the related project.

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