… performing in Excellence

Current Research

In recent years, the group has increasingly focussed on translational research to try and bring the basic research results, obtained mostly in animal models, to a clinical application.

Methods and techniques

- in vitro organotypic retinal explant cultures
- in vivo animal models
- in vivo imaging and functional testing
- in situ biochemical assays
- deconvolution microscopy

Currently, we are developing in vivo application techniques, as well as in vivo visualization and in vivo functional testing methods. This concerns pharmacological neuroprotection based treatments (www.drugsford.eu) and AAV-mediated gene therapy (www.rd-cure.de). In this context, we are also studying the blood-retina-barrier (BRB) and the possibilities to use nanoparticle drug delivery systems to target new therapeutic compounds directly to the photoreceptors of the retina.

The work of the Paquet-Durand lab thus far has been a strong collaborative effort building on fruitful cooperation with national as well as international partners in Sweden, France, Italy, The Netherlands, Spain, Switzerland, Israel, and the USA. To forward clinical translation the lab is currently engaged in two major industry-academia consortia and is actively seeking out further industrial partners for translational and educational projects.

Contact

Institute for Ophthalmic Research
Cell Death Mechanisms

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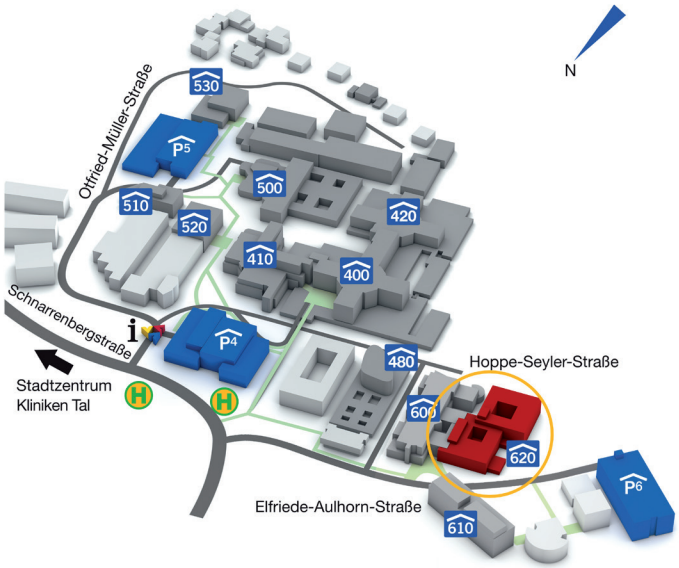

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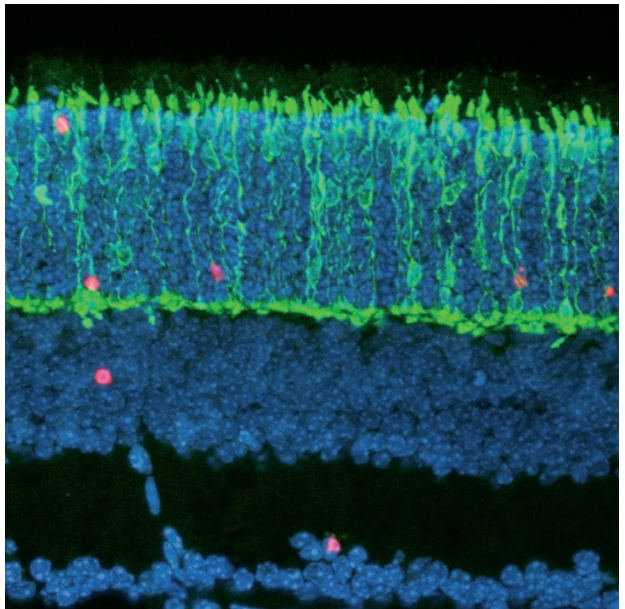
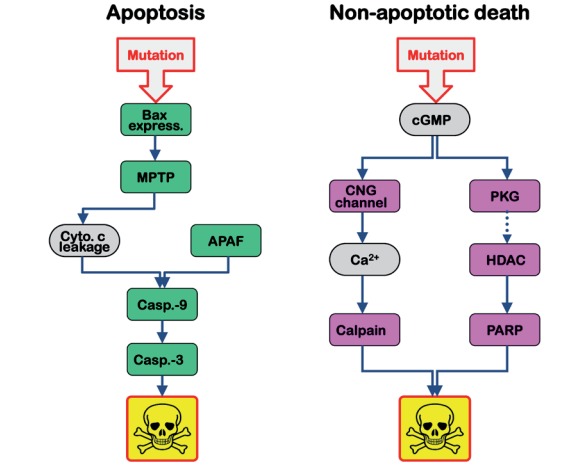


Cell Death Mechanisms

The Paquet-Durand Lab investigates the mechanisms of neuronal cell death, in particular in the context of inherited retinal degeneration (RD). This relates to a genetically and clinically heterogeneous group of neurodegenerative diseases of the retina grouped under different clinical terms such as Retinitis Pigmentosa (RP), Leber´s Congenital Amaurosis (LCA), and Achromatopsia (ACHM). All these diseases cause severe visual impairment and eventually blindness and to date are still untreatable.

Contrary to common belief, RD appears to be driven by alternative, non-apoptotic cell death mechanisms. This in turn has important consequences for future therapy developments and we hope that the improved understanding of the neurodegenerative mechanisms will over time be translated into novel clinical therapies for RD.

The aim of the Paquet-Durand Lab is to further knowledge on the degenerative mechanisms causing RD and to use this as a basis for the development of novel, rational treatment approaches.



Two routes to cell death: The Paquet-Durand group showed that dying photoreceptors typically activate a non-apoptotic cell death mechanism that is fundamentally different from classical apoptosis. Importantly, this alternative cell death mechanism highlights a number of novel targets for therapy development. Diagram taken from Arango-Gonzalez et al., PLoS One 9:e112142, 2014.

We have adapted and developed new biochemical assays that allowed quantitation of enzymatic activities in individual degenerating neurons. This provided for an important detection advantage over conventional tissue based methods and resulted in the identification of several new factors critical for neurodegeneration, including the enzymatic activities of calpain, protein kinase G (PKG), histone-deacetylase (HDAC), and poly-ADP-ribose-polymerase (PARP).

François Paquet-Durand

- Professor, Biochemist, Dr. rer. nat.
- Head of the Cell Death Mechanisms Lab

Norman Rieger

- Technician, in vivo testing unit

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.