DBMR Research Conference

Langhans Auditorium
Murtenstrasse 31, 3008 Bern

Date: **Monday, June 3, 2024, 5 pm – 6 pm**

Title: **Focus on glial cells: New gene therapy approaches for retinal diseases**

Speaker: **Prof. Dr. rer. nat. Antje Grosche**
BioMedical Center (BMC), Department of Physiological Genomics, Ludwig-Maximillians University of Munich (LMU)

Bio (Personal Statement): Since my undergraduate studies, I have devoted my research life to the study of mechanisms of retinal development, retinal physiology, but especially also glial functions in the diseased retina and how these affect neuronal survival. To this end, I implemented live cell imaging protocols to study functional changes of the major retinal macroglia, the Müller cells. After having started my own research group, I developed and added methods to obtain expression profiles of Müller cells both at transcript and protein level as well as to target the cells for gene overexpression using AAV vectors. Consequently, my lab's expertise now covers the whole methodological spectrum from the identification of novel candidate genes via cell type-specific expression profiling using purified retinal cell types with subsequent bulk RNA sequencing or mass spectrometry, bioinformatic processing of big data sets (including scRNA seq data) to identify novel targets, super resolution microscopy (e.g. STED) to nail down subcellular colocalization of novel candidate genes, implementation of AAVs to target Müller cells in vivo and readouts evaluating correct Müller cell functions via live cell imaging (e.g., volume regulation, calcium response pattern, ROS formation or FLIM-based NADH imaging). To constantly improve our protocols and to keep updated on state-of-the-art interdisciplinary methodologies we collaborate and published with national (Diana Pauly, University of Marburg, Germany; Stefanie Hauck, HelmholtzZentrum Munich; Uwe Wolfrum, University of Mainz, Germany) and international research groups such as that of Dwight Stambolian (University of Pennsylvania), Frank Pfrieger (University of Strasbourg, France), Volker Enzmann (University of Bern, Switzerland), Peter Fuchs (University of Vienna, Austria) or Kristian Franze (University of Cambridge, UK).

Abstract: Our research aims to investigate the role of Müller cells, the major macroglia of the retina, in both healthy and diseased retinas. Müller cells extend their processes throughout the retinal tissue, reaching into the vitreous and subretinal space. Through myriads of specialized processes, they interact with virtually every cell type in the retina. These include neurons, blood vessels, and microglia, the resident tissue macrophages. In retinal diseases, Müller cells play a central role in coordinating the tissue immune response. However, not all changes that Müller cells undergo are beneficial for maintaining tissue function. In recent studies, we have been particularly interested in understanding the effects of AAV-mediated gene therapies that target these Müller cell changes and interactions, especially the coordination of the retinal immune response, for example by modulating retinal complement homeostasis or glucocorticoid receptor signaling. We demonstrate that our approach of delivering therapeutic gene expression to Müller cells can slow disease progression in models of diabetic retinopathy or ischemic stress, independent of the underlying cause of the disease, and thus may benefit patients who are not candidates for currently available treatment strategies, since most, if not all, retinal diseases involve Müller cell gliosis and inflammatory processes that potentially accelerate neuronal dysfunction.

Prof. Antje Grosche has been invited by Prof. Dr. Volker Enzmann, Experimental Ophthamlogy, Regenerative Neuroscience, Department for BioMedical Research, University of Bern.

The DBMR Research Conference takes place from 5 pm – 6 pm and will be followed by an apéro.

Next DBMR Research Conference **Monday, September 9, 2024, 5 pm – 6 pm**
Speaker: tba
Title: tba

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