

# Theodor Kocher Institute (TKI)

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[www.tki.unibe.ch](http://www.tki.unibe.ch)



Prof. Britta Engelhardt  
Director and Research Group Leader



Prof. Ruth Lyck  
Research Group Leader



Dr. Urban Deutsch  
Research Group Leader



Dr. Gaby Enzmann  
Principal Investigator



Dr. Steven Proulx  
Research Group Leader

## Profile

- The TKI hosts 4 research groups studying central nervous system immunity in health and disease with a focus on multiple sclerosis, stroke, Alzheimer's disease, and brain metastasis of tumors by employing advanced in vitro and in vivo imaging approaches.
- Teaching bachelor and master students of the Medical, Science and Vetsuisse Faculties in lectures and practical classes in immunology, vascular and cell biology. Educating graduate students of the Graduate School for Cellular and Biomedical Sciences (GCB). Coordinating the national PhD programs "Cell Migration" and "Cutting Edge Microscopy".
- External partners: Anne Astier and Roland Liblau, INSERM, CNRS, Toulouse, France; Eric Thouvenaut, INSERM, CNRS, Montpellier, France; Renaud Du Pasquier, CHUV Lausanne; Katrine Qvortrup, Denmark Technical University, Lyngby, Denmark; Mette Rosenkilde, University of Copenhagen, Denmark; Doron Merkler, University of Geneva; Markus Schwanninger, University of Lübeck, Germany; Aaron J. Johnson, Mayo Clinic, Rochester, MN, USA; Mirjam Schenk, Institute of Pathology, University of Bern; Michael Detmar, ETH Zurich, Vartan Kurtcuoglu, University of Zurich; Bert Müller, University of Basel; Yann Decker, University of the Saarland; Germany; Paola Luciani, University of Bern; Eric Shusta, University of Madison Wisconsin, Madison, USA; James McGrath, University of Rochester, NY, USA; Anna Oevermann, Vetsuisse, University of Bern

## Grants

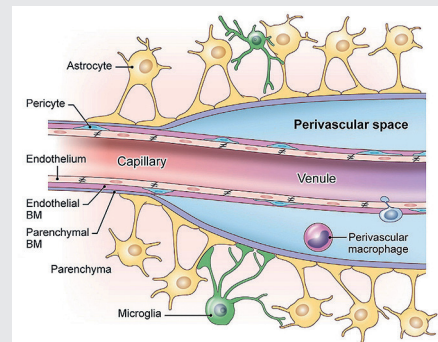
- NIH R61/R33, Fidelity Bermuda Foundation, Horizon 2020 ITN ENTRAIN, Swiss MS Society, CSL Behring, Novo Nordisk Foundation, ARSEP
- Stiftung Synapsis - Alzheimer Forschung Schweiz AFS, Heidi Seiler Stiftung
- SNSF (310030E\_189312; 310030\_189080; 310030\_189226; 4078PO\_198297)

## Highlights

### Defining the Perivascular Space in Neuroinflammation

This year we have contributed to a review article as part of a special issue of *Neuron* focused on Neuro-immune Interactions. Along with prominent neurologist Prof. Hans Lassmann of the University of Vienna, neuroradiologist Prof. Daniel Reich of the NIH and others, we have summarized the current state of knowledge regarding the role of perivascular spaces in the development of multiple sclerosis and other neuroinflammatory disorders.

[Ineichen et al, Neuron 110 \(21\), 3566-358.](#)



Scheme of the brain perivascular space

## Pushing the Limits of Neuroanatomy

In a collaboration with Prof. Vartan Kurtcuoglu, University of Zurich and Prof. Bert Müller, University of Basel, we have generated first-of-its-kind in vivo data of the mouse brain using the light source at ESRF - The European Synchrotron Radiation Facility in Grenoble, France. In a project now funded by a SNSF-Sinergia grant of 3.1 million CHF, we aim to define the anatomy of the cerebrospinal fluid spaces in mice from its source at the choroid plexuses to its routes of outflow along cranial nerves to lymphatic vessels. The research will have relevance for neuroinflammatory and neurodegenerative disorders.

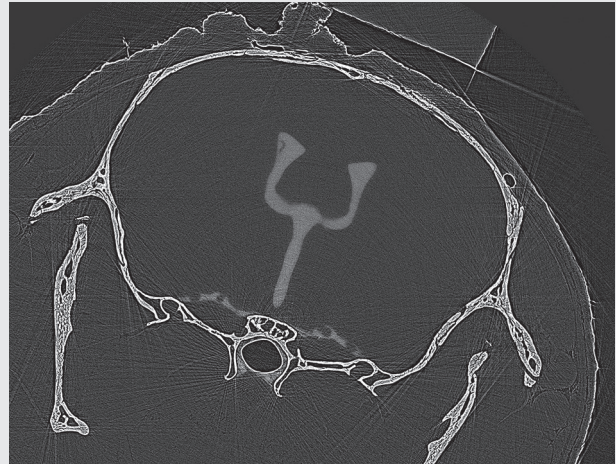
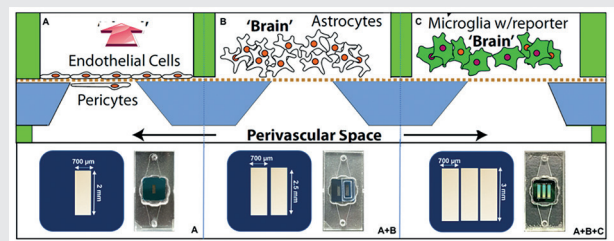


Image of a synchrotron brain scan

## A Human Blood-Brain Barrier (BBB) Platform to Study BBB Dysfunction in Neuroinflammation

Within an international consortium funded by the National Institutes of Health (USA; R61/R33) and coordinated by Prof. James McGrath (University of Rochester, NY, USA) we have developed the modular  $\mu$ SiM device which allows the establishment and validation of the entire pluripotent stem-cell derived neurovascular unit composed of brain microvascular endothelial cells, astrocytes and pericytes. The  $\mu$ SiM provides a new tool to study BBB dysfunction in MS.

[McCloskey et al. Adv Healthcare Mat, 2022, 20220804.](#)



The  $\mu$ SiM device

## Keynote Lecture of Prof. Britta Engelhardt at BBBelgium

Belgian researchers with a focus on the brain barriers have established a network to strengthen brain barriers research nationally but also internationally. Prof. Britta Engelhardt had the pleasure to give a Keynote Lecture on the role of the brain barriers in maintaining CNS immune privilege at the inauguration meeting of BBBelgium in Hasselt on 30 November 2022.



Steering Committee and Keynote Speakers of BBBelgium inauguration meeting