

# Master of Science Thesis in Neuroimmunology

**Duration:** 9-12 months (start: spring 2023)

In the laboratory of Dr. Sarah Mundt, Institute of Experimental Immunology, University Zurich ([www.neuroimmunology.ch](http://www.neuroimmunology.ch))



**Research Topic:** CNS specific immune tolerance: what's the role of dendritic cells ?

In contrast to the traditional view of the central nervous system (CNS) being a site of “immune privilege” there is now consensus on the presence of an immune cell landscape, in particular at the so-called border regions of the brain and the spinal cord. In fact, the dynamic interaction of the CNS and the immune system is a critical feature of tissue integrity and homeostatic immune surveillance<sup>1,2</sup>. Recent findings suggest an important role for brain conventional dendritic cells (cDCs) in licensing CNS invading T cells in the context of autoimmunity<sup>3</sup>, yet, our knowledge on brain DCs is still very limited. In the proposed project we will characterize brain DCs and disentangle their function in the steady state and disease. We use novel cutting-edge multi-omics and algorithm-guided analysis based on single-cell techniques to gain fundamental insights into the biology and function of CNS cDCs. Moreover, we will employ genetically modified mouse models to fatemap and specifically manipulate DCs *in vivo*.

## Tasks/aims:

- Establish/adapt methodological approaches (e.g. designing high-dimensional flow cytometry panels, determining targeting efficiency of knockout strains)
- Characterize CNS DCs in mice (and humans) by spectral flow cytometry, immunofluorescence and computational data mining of publicly available scRNAseq data sets (e.g. by Seurat)
- Determine the role of CNS DCs in the regulation of CNS patrolling T cells using conditional knockout mice at steady state and in mouse models of neuroinflammation

## We offer:

- Exciting research project addressing major knowledge gaps in the field of immunology
- Dynamic young and international team in a thriving research environment
- Cutting-edge research technologies
- Regular group meetings and seminars discussing ongoing research projects in immunology

## Requirements:

- Genuine interest in immunological research
- High intrinsic motivation
- good communication skills and fluency in English
- Experience in working with animals (mice) in flow cytometry (FlowJo) or programming skills are a plus

Please send your application including a CV with a brief statement of research experiences to: [mundt@immunology.uzh.ch](mailto:mundt@immunology.uzh.ch)

## References

1. Mundt, S., Greter, M., Flügel, A. & Becher, B. The CNS immune landscape from the viewpoint of a T cell. *Trends Neurosci.* **42**, 667–679 (2019).
2. Mundt, S., Greter, M. & Becher, B. The CNS mononuclear phagocyte system in health and disease. *Neuron* **110**, 3497–3512 (2022).
3. Mundt, S. *et al.* Conventional DCs sample and present myelin antigens in the healthy CNS and allow parenchymal T cell entry to initiate neuroinflammation. *Sci. Immunol.* **4**, (2019).