

Master of Science Thesis Position

Duration: 9-12 months (start: as soon as possible)

Laboratory of Prof. Dr. Burkhard Becher, Institute of Experimental Immunology, University of Zürich.

Supervisor: Dr. Fernando Canale

Research Topic: The role of B cells and EBV-infection in Multiple Sclerosis

Multiple sclerosis (MS) is the most common inflammatory disease of the central nervous system. It is characterized by inflammatory lesions in the brain and spinal cord, leading to demyelination and neural activity disruption. Over time, patients may experience disability accumulation, loss of mobility, cognitive decline, and other neurodegenerative effects.

Immune cell invasion into the CNS is crucial for lesion formation, with therapies targeting immune cell migration or lymphocyte depletion being effective. B cell depletion therapies are particularly effective, highlighting the significance of B cells in MS. MS is also strongly associated with Epstein-Barr virus (EBV) infection, which has tropism for B cells, as almost all MS patients have antibodies against EBV, and infection has been shown to increase the risk to develop MS years later.

A possible mechanism is molecular mimicry, where immune responses to viral antigens target self-antigens. A different model focuses on the relationship between EBV and B cell biology, investigating how pathogenic B cell populations contribute to MS.

We will focus on the design, testing and application of complex and overlapping spectral cytometry antibody panels to perform a deep profiling of B cell subsets, as well as T-NK-Myeloid cells, in samples from MS patients and correlate our findings with clinical data as well as EBV-related parameters (EBV-specific antibodies, viral DNA load, detection of infected B cells).

Aims:

- Design, optimization and testing of panels to evaluate memory B cell subsets, T/NK and myeloid cells in samples from MS patients and humanized models.
- Set and establish assays for measurement of EBV-related parameters in plasma and PBMCs.
- Data analysis.

We offer:

- Becoming part of an exciting research project.
- A dynamic young and international team in a thriving research environment at the Institute of Experimental Immunology, University of Zurich.
- Training and application of cutting-edge methods (Spectral flow cytometry, in vitro analytical assays, data analysis, possibly scRNA-seq, etc.).
- Weekly group meetings, journal flow and scientific seminars.

Requirements:

- Interest in Immunology, oriented to human research.
- Highly motivated and open to flexibility regarding prioritization of project aims, tasks and objectives.
- Experience with multiparametric flow cytometry.
- Experience in spectral flow cytometry, BSL2 and data analysis in R, is a plus.

Applications:

Please send your CV and a brief statement of research interest to canale@immunology.uzh.ch