Master Thesis Position (100%) in Precision Cancer Immunology (9-12 months)

Unravelling Macrophage Heterogeneity in AML and Harnessing Their Potential for Targeted Cancer Therapy

Group of Dr. med. Stefanie Kreutmair (UZH/ USZ) and Melanie Greter (UZH)

The project

Acute Myeloid Leukemia (AML) remains one of the most lethal blood cancers, with relapse rates of 30–80% and dismal outcomes once disease recurs. The immune system is a key player in controlling AML, yet to date research has primarily focused on adaptive immunity, while the innate immune system has been overlooked. Macrophages represent one such understudied population and are frequent components of the tumour microenvironment, where they can adopt diverse functional states and either promote tumour progression or support tumour eradication. Understanding their heterogeneity and spatial organisation may reveal opportunities to exploit their natural tumour-homing properties for targeted drug delivery.

Using patient cohorts and a state-of-the-art systems immunology pipeline inlcuding single-cell profiling using high-dimensional flow cytometry and multiplex tissue imaging for spatial characterization together with advanced computational analyses, the candidate will:

- **Expand and optimize a Lunaphore-based multiplex imaging panel** for the identification and spatial detection of distinct macrophage populations within primary patient AML bone marrow samples
- **Characterize the phenotypic, functional and spatial heterogeneity of Macrophages** and investigate their interactions with AML blasts and other immune populations within the AML microenvironment
- **Validate and extend the identified macrophage signatures using spectral flow cytometry** to further define macrophage heterogeneity and validate the spatially identified populations at single-cell resolution

The overarching goal is to uncover distinct macrophage signatures and their spatial organization within AML, and exploit their natural anti-tumor properties to develop novel targeted therapeutic strategies for AML.

Your profile

- Genuine interest in translational and basic cancer immunology and systems immunology
- High motivation and collaborative working style
- Experience with flow cytometry, cell culture, microscopy techniques and programming skills are a plus (candidates with a wet-lab or dry-lab focus are both encouraged to apply)

We offer:

- Translational research project linking basic immunological and clinical research, with close mentorship and guidance throughout your project
- A highly dynamic young and international team in a thriving research environment in the Institute of Experimental Immunology at the University Zurich, linked to the University Hospital Zurich
- Cutting-edge equipment (spectral flow cytometer etc.) and single-cell and computational pipelines
- Weekly group meetings, one to one meetings, journal flow, seminars etc

Application

Please apply to kreutmair@immunology.uzh.ch and describe your research interests and fit for the project (max 1 page). Please also include your CV and academic transcripts.