University of Basel

DBM Basel
Department of Biomedicine

MSC OPPORTUNITY IN CANCER NEUROIMMUNOLOGY – DISSECTING MENINGEAL NEURO-IMMUNE INTERACTIONS IN BRAIN METASTASIS

Start Date

September/October 2025

Background

Accumulating evidence indicates that the nervous system plays a critical role in modulating immune responses. This crosstalk is particularly relevant in the context of cancer where neurons infiltrate the tumour microenvironment (TME) and actively regulate anti-tumour immunity and tumou progression. An urgent but unanswered question is how neuronal signalling contributes not just to local tumour growth, but to the dissemination of tumour cells and the colonization of distant organs, such as the brain, a frequent and devastating site of metastasis. The brain is protected by the meninges, critical structures with a unique immune environment forming a first layer of immunological protection of the brain. Yet, its functional role during brain metastasis remains entirely underexplored. In this project, you will investigate how neuronal signals and neuropeptides regulate plasmacytoid Dendritic Cell (pDC) function within the meninges, and how this shapes immune responses during the formation of a premetastatic niche and brain colonization. This work bridges neuroscience, immunology, and oncology, aiming to uncover novel mechanisms by which the nervous system modulates tumour dissemination and immune evasion.

Project Outline

In this project you will:

- Investigate pDC activation and phenotype and how they modulate B and T cell activity in response to different neuropeptides using primary pDC cultures and spectral flow cytometry.
- Explore how pDCs modulate the meningeal immune landscape during brain metastasis, using spectral flow cytometry and confocal imaging of meningeal wholemounts.

Your profile

We are looking for a curious, motivated, and enthusiastic MSc student ready to immerse themselves in interdisciplinary cancer research. We greatly value eagerness to learn, critical thinking, and team spirit over prior expertise. Basic understanding of immunology and cancer biology is required and previous knowledge of neuroimmunology is welcome. The ideal candidate would have good communication skills and an openness to learning both wet lab techniques and data analysis.

Our contribution

We offer you an environment where you can network, be inspired and develop your own ideas. You will be able to interact and train with highly skilled experts in oncology, immunology, and cell biology and work with human material as well as with animal models. In addition, you will have the opportunity to learn to perform cell culture, flow cytometry, histology, in vivo techniques, bioinformatics, and more.

How to apply

Please send your full application consisting of a motivation letter and CV with 2-3 references by E-Mail to: karen.dixon@unibas.ch. Please specify in your email why you would like to work with us, what lab experience you already have, and which skills you would like to acquire.