

## **Project 1.9 Understanding the role of microglia in aging of the brain and depression**

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### **Background:**

Microglia are brain-residing immune cells that perform specific functions in a healthy and diseased brain. Single-cell transcriptomic studies can pinpoint different cell subpopulations and analyze their function. Our research results distinguished several functional microglia subpopulations in a healthy mouse brain and microglia activation and peripheral monocyte / macrophage influx in mouse gliomas (Ochocka et al., Nature Commun. 2021). We will investigate whether similar functional microglia subpopulations are restored after transient pharmacological microglial depletion and whether these processes are similar in the young and old murine brains. We will examine the role of microglia in the development of depression in mice and the role of microglia in behavioral therapy in depression.

### **Aim:**

The project will use modern molecular biology methods (single-cell transcriptomics - scRNA-seq) to study the function of microglial cells in the normal brain of young and old mice and in the development of depression. We have shown that during the development of depression in mice, the functionality of the microglia changes and its presence is necessary for the development of depression in mice. For this purpose, we will use scRNA-seq data from sorted myeloid cells (CD11b +) from the brains of young and old animals. We will study the mechanisms of microglia repopulation from the brain of mice after temporary pharmacological depletion. We expect that the reconstructed cell populations may have a permanently altered functional state and that the repopulation may deteriorate with age of mice. We will investigate how the microglia function changes in the development of depression and after behavioral therapy, and what effect the transient elimination of microglia has on depression.

### **Requirements:**

- Master degree in biology, biotechnology or pharmacy
- experience in molecular or cellular biology, neuroscience, behavioral neuroscience, pharmacology, immunology or embryology,
- interest in neurobiology and single cell omics,
- experience in animal experimentation preferable,
- fluency in written and spoken English.