Team: **Immunosurveillance of the Central Nervous System**
http://www.ciml.univ-mrs.fr/science/lab-rejane-rua/immunosurveillance-central-nervous-system
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Post-doctoral position in NeuroImmunology

'Unravelling the neuroprotective roles of macrophages at the brain surface'

3 to 5 years, starting July 2021

The surface of the Central Nervous System (CNS) is connected to the periphery by layers of highly vascularized membranes, the meninges. Although the brain has been considered immunoprivileged for decades, it has been recently shown by our team and others that the meninges are populated by a myriad of resident immune sentinels. Unexpectedly, immune cells specifically located in the meninges play a role in neuronal function, tissue homeostasis as well as infectious, inflammatory and age-related neurodegenerative diseases. Due to their strategic location at the interface between the periphery and the brain, the **meninges thus function as a nurturing tissue enveloping the CNS and also represent its first line of protection.**

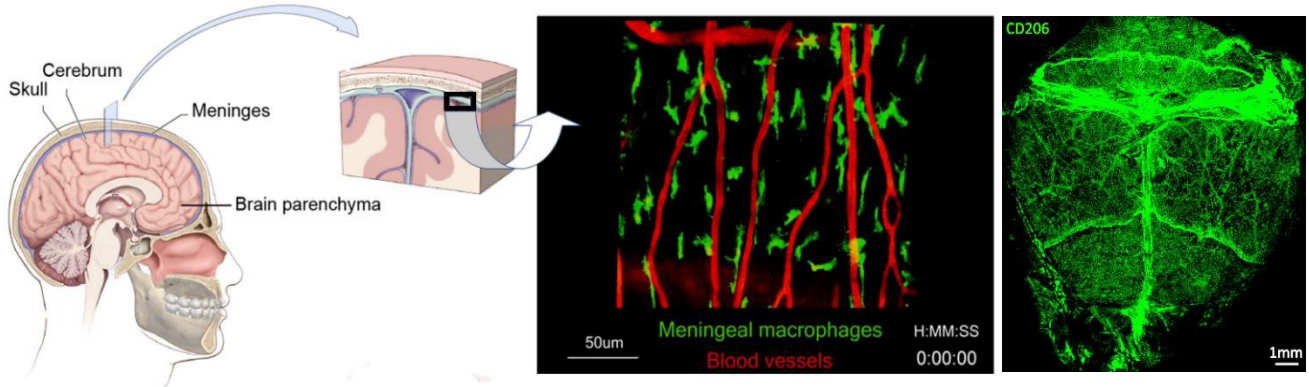

Figure 1. Location of the meninges at brain surface (left). Image extracted from an intravital movie of CX3CR1-GFP mouse showing a top-down view of meningeal macrophages (green) along the vasculature (red) (middle). Bone-in meningeal whole mounts showing the vast network of meningeal macrophages (identified by the mannose receptor CD206) covering the brain surface (right).

Even though meningeal macrophages represent the most promising candidates involved in CNS function and dysfunction due to their abundance and location, virtually nothing is known about their properties. **The objective of this project is to understand how macrophages at the brain surface maintain neuronal functions.**

We hypothesize that meningeal macrophages are heterogeneous and that distinct macrophage subpopulations differ in the magnitude and quality of their pro-neuronal functions. To address these questions, we will combine multiparametric flow cytometry, state-of-the-art single-cell transcriptomics, CRISPR-Cas9 technology, stereotactic injections and intravital imaging approaches to analyze the heterogeneity and functions of meningeal macrophages in wild-type and transgenic mouse models.

The candidate must have a PhD in immunology, virology or neuroscience. Experience with Crispr/Cas9 gene editing, AAV, stereotactic injections, neuronal tracing, nucSeq RNAseq and/or optogenetics is appreciated.

Applications should be sent to rua@ciml.univ-mrs.fr.

Selection of recent publications

1. **Rua R, et al.** *Infection drives meningeal engraftment by inflammatory monocytes that impairs CNS immunity*. **Nat Immunol. 2019**
2. **Rua R**, McGavern DB. Advances in Meningeal Immunity. **Cell Press Trends Mol Med. 2018**
3. Kwong B*, **Rua R*** et al. *T-bet-dependent NKp46+ innate lymphoid cells regulate the onset of TH17-induced neuroinflammation*. **Nat Immunol**. **2017**