Team: **Immunosurveillance of the Central Nervous System**
Group leader: **Rejane RUA**
Centre d'Immunologie Marseille-Luminy
163 avenue de Luminy 13288 Marseille Cedex9
Mail: rua@ciml.univ-mrs.fr
Phone: +33 6 67 80 04 91

M2 INTERNSHIP PROJECT

Title : Influence of early-life infection on neurocognitive deficits

The central nervous system is protected from the rest of the body by a tissue called the meninges, which harbors diverse immune populations, such as macrophages. In recent years, studies on meningeal immunity have uncovered revolutionary roles of those cells on neurocognition and neuroinflammation (Rua et al, 2019; Kwang, Rua et al., 2017). Because of their localization at the interface between the brain and the periphery, we hypothesize that meningeal macrophages can relay and amplify inflammation to the brain, leading to long-term neurological disorders. Such disorders are seen for instance after congenital infection with cytomegalovirus, in both humans and mice.

The aim of this internship will be to study the role of meningeal macrophages on cognition, in neonatal mice with perinatal inflammation (e.g. cytomegalovirus infection). Using innovative techniques such as spectral immunohistochemistry, spectral flow cytometry, and intravital imaging, we will investigate the changes occurring in the brains and meninges of these mice during infection, with or without macrophage manipulation. In parallel, we will perform behavioral tests to study neurological deficits.

This study should allow a better understanding of the immune and virological parameters involved in cognitive deficits and might pave the ground to target meningeal macrophages in the clinic.

References :

1. Rua, R. *et al.* Infection drives meningeal engraftment by inflammatory monocytes that impairs CNS immunity. *Nat Immunol* **20**, 407–419 (2019).
2. Kwong, B. *et al.* T-bet-dependent NKp46+ innate lymphoid cells regulate the onset of TH17-induced neuroinflammation. *Nat Immunol* **18**, 1117–1127 (2017).