Master de Sciences et Technologies
Mention Biologie Intégrative et Physiologie
Parcours : Neurosciences
Responsable : Professeur Régis Lambert

Internship Proposal
Academic Year 2019-2020

1. Host team :

Research Unit (e.g. Department or Institute): Institut de la Vision
Research Unit Director : José-Alain Sahel
Research Team Director : Alain Chédotal
Team name: Rôle des Molécules de Guidage Axonal

Address: 17 rue Moreau 75012 Paris

Supervisor of the Research Intern for this project: Kim Nguyen-Ba-Charvet
Telephone: 01 53 46 25 22
E-mail : Kim.Charvet@inserm.fr

2. Internship project title:

Role of PlexinB1 and PlexinB2 in the development of the visual system

3. Internship Description:

The retina is a layered structure comprising five types of neurons, all generated from the same precursor, the retinal progenitor cells (RPCs). At the beginning of retinal development, RPCs proliferate then differentiate into neurons that would then migrate to their final layer. To date, neurobiologists are still trying to decipher the regulation of RPCs differentiation. In the central nervous system, Plexin-Bs (B1-B3) are a family of Semaphorin receptors involved in the regulation of neural development. PlexinB1 knock out mice displays developmental migrating defects of Gonadotropin-releasing hormone-secreting neurons. PlexinB2 is involved in the proliferation of progenitor cells in the cerebellum and the cortex. Recently, we have found that these two transmembrane proteins are both expressed in the mouse developing retina in particular in the Retinal Ganglion Cells (RGCs) the only neurons projecting in the brain. During the first postnatal week, they were also detected in interneurons. Besides, Plexin B2 has also been detected around the optic nerve and the ciliary marginal zone. In order to study the function of these molecules in the retina, we have generated conditional knock out mice to suppress their expression specifically in the retina.
During his internship, the student will characterize the phenotype of these mice using immunostaining with various markers of retinal cells on sections but also different technics established in the lab. For instance, we have developed a protocol for whole-tissue clearing of pigmented eyes, "EyeDISCO" applicable after immuno-staining, which allows us to observe the entire retina using Light Sheet Microscopy. The visual projections will also be characterized using a fluorescent tracer (Cholera Toxin ß-subunit), followed by transparisation and light sheet microscopy on the whole brain. Moreover, the student will also try to identify if any of the known ligands for PlexinB1 and PlexinB2, the class 4 Semaphorins could be involved.