

## **THE OLFACTORY SYSTEM AND ITS DEVELOPMENT**

### **Cajal Institute, CSIC**

**PI:** Laura López Mascaraque, PhD

**Internship type:** Basic research

**Internship Language:** English/Spanish

**Location:** The Cajal Institute is located at the Avenue of Dr. Arce 37, which is at 20 min. metro ride from the Foundation Ortega y Gasset-Gregorio Marañón. <http://www.cajal.csic.es/index.html>

### **Summary**

The general goal of our group is to reveal the lineage potential of single-neural cells and their clonally related-cell progeny during development and adulthood. More specifically, our team addresses the question to which extent a single-cell has a multi-lineage potential or whether a specific progenitors comprise several pools generating different neural types (neurons, astrocytes, oligodendrocytes and NG2 cells).

### **Methodology**

Our research employs a multidisciplinary approach by combining cutting-edge imaging techniques and conventional cellular/molecular methodologies: Immunohistochemistry; classical histology methods (the Golgi method); experimental embryology through ultrasound-mediated echography; electroporation after injection of transposable vectors, in utero and in early postnatal mice; advanced imaging techniques like confocal and time-lapse microscopy; cell and organotypic cultures; co-cultures of tissue explants in collagen matrices; genetic probe synthesis, in situ hybridization, and vector constructions; gene over-expression/repression through retro- and lenti-viral technology. In addition, we have developed a novel genetic tracing strategy, StarTrack, which gives to single-neural precursors a specific and unique color-code, driven by specific promoters. This strategy allows the tracking of the entire progeny among neuronal and glial lineages to further understand how ontogenetic relationships influence neural development.

### **Activities**

Depending on their previous experience/knowledge, curiosity and time dedication, students will have the opportunity to learn about, observe and/or participate in different activities of our laboratory. They will have a chance to attend and participate in our weekly and monthly scientific seminars; they will get familiar with some of the research techniques we use, with the concept of experimental design and with the process of acquiring and analyzing experimental data. Finally, they will learn how to evaluate the data and write short scientific reports.

### **Requirements**

Students should have passed an introductory biology/neuroscience course. Even though they will work on research questions formulated by the senior researchers, approaches and methods employed are feasible for students participating in research for the first time.