PhD Research Proposal Form
China Scholarship Council (CSC) - ENS Group

FIELD: Biology/Neuroscience

Thesis subject title:
Revealing the coordinated response of neural stem cells to adult brain injury using a cross-species comparisons.

Name of the French doctoral school : BIOLOGIE MOLÉCULAIRE INTÉGRATIVE ET CELLULAIRE (BMIC) – Molecular and Cellular Biology PhD Program

Name of the Research team: Spatio-Temporal Logic of Adult Neurogenesis
Website : https://igfl.ens-lyon.fr/equipes/zayna-chaker

Name of the Supervisor: Dr. Zayna Chaker
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Lab Language: English

Research Proposal Abstract :
Background:
Self-organization and crosstalk among stem cells during development or regeneration are emerging concepts in the field, but little is known about neural stem cells in the brain. In this project, we will investigate whether adult neural stem cell proliferation is synchronized across the two main brain niches (ventricular zone and dentate gyrus) upon injury, and which niche elements regulates such coordination.
Experimental strategy:
We will use ischemic stroke and traumatic brain injury models, in both highly regenerative amphibians, such as axolotls, and poorly regenerative mammals, such as mice, to extract common and distinct features of the two species. This cross-species comparison will be performed using cellular, molecular and imaging techniques *in situ*, but also bio-informatic analyses of OMIC data to infer stem cell lineage progression. This project is part of a starting collaboration with another laboratory at EPFL (École Fédérale Polytechnique de Lausanne).
Environment:
Our core team values are “Diversity, Respect and Challenge”. We aim to foster an open-minded, smart-working and fun-living environment where people from different scientific and cultural backgrounds try to find a common ground to communicate and work efficiently together. It is often in the grey zone of inter-disciplinarity where interesting findings emerge.

References :

1- Ceanga M, Dahab M, Witte OW, Keiner S. Adult Neurogenesis and Stroke: A Tale of Two Neurogenic Niches. **Front Neurosci.** 2021

2- Chaker Z*, Makarouni E*, Doetsch F. The Organism as the Niche: Physiological States Crack the Code of Adult Neural Stem Cell Heterogeneity. **Annual Reviews Cell Developmental Biology**. Volume 40, 2024.

3- Lust K, Maynard A, Gomes T, Fleck JS, Camp JG, Tanaka EM, Treutlein B. Single-cell analyses of axolotl telencephalon organization, neurogenesis, and regeneration. **Science**. 2022

Type of PhD :

1.Full PhD

- Joint PhD/cotutelle (leading to a double diploma) : NO
- Regular PhD (leading to a single French diploma) : YES

2. Visiting PhD (for students enrolled at a Chinese institution who will be invited to a French institution to carry out a mobility period) : NO