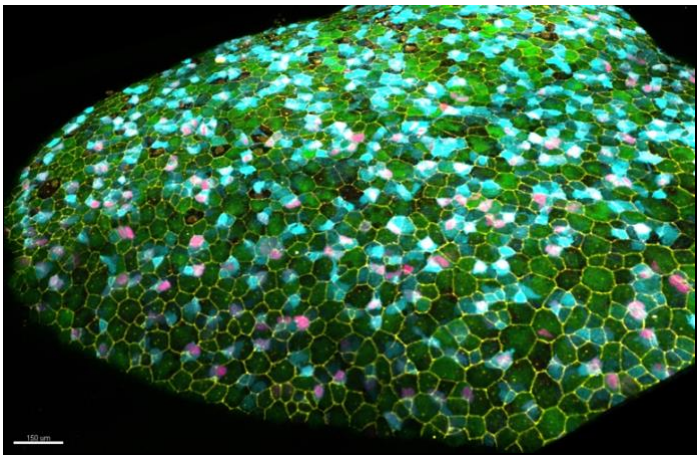
External seminars – Laure Bally-Cuif
Director of the Developmental Biology and Stem cell Department
Pasteur Insitute, Paris



Laboratory of the speaker
Pasteur Institute, Paris

Invited by
Zayna Chaker

Date
05/05/2025, 11am, Salle Condorcet

Title of the presentation
Individual cell heterogeneities and population dynamics for adult neural stem cell maintenance

Short abstract
Neural stem cell (NSC) populations ensure the production of neurons and astroglial cells in the vertebrate adult brain. NSC activity persists at long-term in zebrafish, but exhausts rapidly in mouse from the young adult stage. Using long-term genetic clonal tracing and intravital imaging in the zebrafish adult pallium (dorsal telencephalon), we revealed that two distinct NSC sub-populations cooperate to ensure population maintenance and neurogenesis. These sub-populations are endowed with self-renewal vs neurogenesis capacity and are organized in a functional hierarchy. Using sc-omics, we and others observed that these sub-population are themselves molecularly heterogeneous. The biological significance and regulation of these heterogeneities are unknown, as well as how they remain balanced in time and space over a lifetime. I will show our latest results on these questions, showing how we are taking *in situ* approaches and readouts of Notch3 signaling to decipher individual NSC trajectories and their coordination within the transcriptomic and physical spaces.

Short CV

Laure Bally-Cuif is a former student of the École Normale Supérieure (ENS) of Paris. Interested in the development of the nervous system, she completed a doctorate at the Pitié-Salpêtrière Hospital and then at the ENS, in the lab of Alain Prochiantz. Her thesis focused on the mechanisms of establishing organizing boundaries within the neural tube of mammalian and avian embryos. She then turned to an emerging model, the zebrafish, which allows for the combination of experimental embryology and genetics. She completed her first postdoctoral fellowship with Robert Ho at Princeton University in the US, then joined the CNRS in 1996. After a second postdoctoral fellowship at the Helmholtz Center in Munich, Germany, she established her own research group in Munich in 2000 and developed a program to study the molecular and cellular mechanisms of maintaining neural progenitors, or "neural stem cells," in the embryonic and adult zebrafish brain. Laure Bally-Cuif moved back to France in 2009 as a research director and established her team with the support of an excellence chair from ANR and the Paris School of Neurosciences (ENP), as well as the “Grand Prize” from the Schlumberger Foundation for Education and Research. For her work, Laure received many awards, among which her recent nomination at the French academy of science in December 2022 within the section Molecular and Cellular Biology/Genomics.