



## MASTER 2 Fundamental and Clinical Neurosciences

### Internship proposal 2024-2025

(internship from January to June 2025)

**Host laboratory:** MELIS, Université Lyon 1 - CNRS UMR 5284 - INSERM U1314

**Host team :** Genetics and neurobiology of *C. elegans*, PI : Jean-Louis Bessereau, Faculté de Médecine et de Pharmacie, 3ème étage, aile D, 8 avenue Rockefeller, 69008 LYON  
<https://www.inmq.fr/bessereau/?lang=en>

**Internship supervisors :** Bérangère Pinan-Lucarré, Chargée de recherche INSERM,  
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**Project title :** Characterization of new synaptic regulators in *C. elegans*

#### Project summary :

**Background:** The synapse is an evolutionarily ancient structure. Using the worm *Caenorhabditis elegans*, we seek to elucidate new molecular mechanisms involved in synapse formation and function, potentially conserved in human. We recently identified novel interactions in the synaptic cleft between two IgLON family cell adhesion molecules and the ortholog of the human alpha7 acetylcholine receptor. Strikingly, this IgLON is the first extracellular protein found to interact directly with this class of acetylcholine receptors.

**Aim:** Recent biochemical data identified novel neuronal binding partners of the IgLONs. This project aims to analyze *in vivo* the synaptic function of these novel IgLONs interactors, and to decipher their molecular interactions with the IgLONs and acetylcholine receptor. This project will be conducted in close collaboration with a team studying an IgLON-related disease.

**Technologies used:** The trainee will implement skills in molecular biology, formal and molecular genetics (CRISPR gene editing), imaging (spinning disk microscopy, image analysis by Fiji), and structural prediction tools (AlphaFold).

#### 3-5 recent publications :

- (1) Pinan-Lucarre, B.\* , ..., and Bessereau, J.L. (2014). *C. elegans* Punctin specifies cholinergic versus GABAergic identity of postsynaptic domains. **Nature** 511, 466-470.
- (2) Tu, H.\* , Pinan-Lucarre, B\*....and Bessereau, J.L. (2015). *C. elegans* Punctin Clusters GABA(A) Receptors via Neuroigin Binding and UNC-40/DCC Recruitment. **Neuron** 86, 1407-1419.
- (3) Zhou, X., ..., Pinan-Lucarre, B.\* and Bessereau, J.-L.\* (2020) The netrin receptor UNC-40/DCC assembles a postsynaptic scaffold and sets the synaptic content of GABA<sub>A</sub> receptors. **Nature Communications**; 11(1).