

Master Student Project

Project Title: Deciphering molecular interactions during mechanotransduction using Proximity Ligation

The host lab:

The NSMB lab (livinglight.icfo.eu) is an interdisciplinary playground deeply rooted in scientific rigor and focuses on advancing fundamental knowledge on how the mind emerges from the behavior of individual molecules, neurons and brain networks. We primarily work in *Caenorhabditis elegans* but also zebrafish, fruit flies and tissue culture models. Our main goal is to understand how living systems measure and interpret mechanical forces and the importance of the material properties of neurons and other tissues for this process. In this project, we are looking for a master student with a background in molecular biology and biochemistry.

Project Description:

The goal of the thesis is to establish cutting edge proximity ligation methods in *Caenorhabditis elegans* to understand how ageing influences cytoskeleton interactions. We are specifically interested in the spectrin cytoskeleton and how animal age changes its integrity. During this project, the student will work with a post-doctoral scholar and generate a single copy integration of the TurboID biotin ligase directly at the endogenous, genomic locus of the host protein using CRISPR/Cas9. After successful screening of the candidates, the student will follow published protocols for proximity ligation and isolate the biotinylated target proteins using tandem affinity purification for subsequent mass spectrometry analysis. We expect to compare the interactome of the host protein at different adult stages of the animal. Your background should be in molecular biology and biochemistry with a prior experience in recombinant DNA technology (molecular cloning, PCR, gel electrophoresis) and protein biotechnology (western blotting). Experience with *C. elegans* is not a must, and we will provide ample opportunity to learn about this fascinating model organism.

Importantly, the thesis is open ended and is expected to provide ample material for follow-up studies, including the PhD thesis to characterize the most promising candidates from this screen. In addition, the NMSB lab and ICFO in general provide a lively, interdisciplinary environment for student interested in looking beyond the current state of the art and learn cutting edge microscopy and mechanobiology tools.

Starting date: as soon as possible

Ending date: 6-12 month duration

Weekly dedication: full-time

Previous experience: applicants with laboratory experience will be given favorable consideration

Specific previous knowledges: strong background in molecular biology, cell biology and protein biochemistry

Methods to be learned and applied: CRISPR/Cas9, *C. elegans* biology, Proximity labeling with TurboID, western blotting, protein purification

Application procedure:

Fellowships are available under <https://jobs.icfo.eu/?detail=941> (deadline for applications: Nov. 07, 2024)

Candidates may contact jobs@icfo.eu for informal enquiries regarding the application, as well as address scientific enquiries to Prof. Dr. Michael Krieg (michael.krieg@icfo.eu).