

**Master 2 internship project  
Year 2021-2022**

**Laboratory/Institute:** Grenoble Institute of Neuroscience    **Director:** Frédéric Saudou  
**Team:** Cellular myology and pathologies    **Head of the team:** Isabelle Marty

**Name and status of the scientist in charge of the project:**

Dr Anne-Sophie Nicot, MCU, UGA

**HDR:** yes  no

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**Program of the Master's degree in Biology:**

Immunology, Microbiology, Infectious Diseases     Structural Biology of Pathogens  
 Physiology, Epigenetics, Differentiation, Cancer     Neurosciences and Neurobiology

**Title of the project: Proteomics of skeletal muscle triads**

**Objectives (up to 3 lines):**

The project aims at identifying proteins localized at skeletal muscle triads, which are essential structures for excitation-contraction coupling and are defective in several muscle genetic diseases. This will allow the identification of pathways potentially involved in the formation and maintenance of triads.

**Abstract (up to 10 lines):**

In skeletal muscle, triads are composed of an invagination of the plasma membrane, the transverse tubule, flanked by two terminal cisternae of the sarcoplasmic reticulum (SR) which are calcium storage sites. Action potentials transmitted by nerves activate channels at triads, leading to intracellular SR calcium release and sarcomere contraction. The mechanisms governing the dynamics of triads remain mysterious. To elucidate those mechanisms, the master student will identify proteins localized at triads using the recently developed technique of Turbo proximity-dependent biotinylation identification (TurboID). He/she will learn the technics and test proteins already known to be localized at triads as anchors for TurboID biotin ligase. The optimal fusion TurboID anchor protein will be expressed in cultured muscle cells (1) at different time points of differentiation, (2) in differentiated muscle cells stimulated or not to mimic nerve stimulation. Proteins biotinylated by the proximity of the TurboID anchor will then be identified by mass spectrometry.

**Methods (up to 3 lines):**

Methods used will include molecular biology, biochemistry, cell culture and microscopy in cell lines and primary cultures of mouse and human muscle cells.

**Up to 3 relevant publications of the team:**

- Sébastien et al. (2020) Dynamics of triadin, a muscle-specific triad protein, within sarcoplasmic reticulum subdomains. *Mol Biol Cell*. 31(4):261-272.
- Osseni et al. (2016) Triadin and CLIMP-63 form a link between triads and microtubules in muscle cells. *J Cell Sci*. 2016. 129(20):3744-3755.

**Requested domains of expertise (up to 5 keywords):**

molecular biology, biochemistry, cell biology