UFR CHIMIE & BIOLOGIE Université Grenoble Alpes

Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2026-2027

Laboratory/Institute: LBFA (H2M) **Director:** U. SCHLATTNER
Team: Interplay between metabolism, mitochondria, epigenetics and cell plasticity
Head of the team: A. Prola

Name and status of the scientist in charge of the project:
Alexandre PROLA, INSERM researcher **HDR: yes** ☐ **no** ☒
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Program of the Master's degree in Biology:

☐ Microbiology, Infectious Diseases and Immunology ☐ Biochemistry & Structure
☒ **Physiology, Epigenetics, Differentiation, Cancer** ☐ Neurosciences and Neurobiology

Title of the project: Metabolic Control of Muscle Stem Cell Regeneration in Duchenne Muscular Dystrophy: Deciphering the Role of the Pentose Phosphate Pathway

Objectives (up to 3 lines):

Recent work from our laboratory revealed that the pentose phosphate pathway (PPP) is strongly activated during muscle regeneration. This project aims to determine whether aberrant activation of the PPP contributes to disease progression in Duchenne muscular dystrophy (DMD).

*Abstract (up to 10 lines):

DMD is characterized by progressive muscle degeneration associated with defective regeneration. Increasing evidence indicates that metabolic alterations contribute to the progressive loss of MuSC function, yet the metabolic mechanisms driving this process remain poorly understood. Our laboratory recently developed a unique single-cell in situ metabolic profiling approach that enables measurement of metabolic pathway activities within their native tissue environment. Preliminary data reveal a strong activation of the PPP during muscle remodeling, suggesting a previously unrecognized role in skeletal muscle plasticity. The M2 project will investigate PPP activity at single-cell resolution in mouse models and human DMD biopsies to determine how this pathway is regulated in muscle stem cells and other cell populations involved in muscle regeneration. This work will establish the basis for targeting metabolic pathways to improve muscle regeneration in DMD.

Methods (up to 3 lines):

The student will analyze muscle samples using an innovative single-cell in situ metabolic profiling technology developed in the laboratory. The project combines quantitative metabolic histochemistry, immunofluorescence, image analysis, and integration with single-cell transcriptomic datasets.

Up to 3 relevant publications of the team:

https://pubmed.ncbi.nlm.nih.gov/33514709/

https://pubmed.ncbi.nlm.nih.gov/33400911/

https://pubmed.ncbi.nlm.nih.gov/33523852/

Requested domains of expertise (up to 5 keywords):

Metabolism / Muscle Stem Cells / Skeletal muscle /