

Master 2 internship project
Year 2026-2027

Laboratory/Institute: Grenoble Institut Neurosciences - GIN **Director:** E. Barbier
Team: Translational control in normal and pathological conditions **Head of the team:** S. Belin

Name and status of the scientist in charge of the project: Stéphane Belin, DR Inserm

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: Protein synthesis control of neuroprotection and regeneration in the nervous system

Objectives (up to 3 lines): Our lab seeks to understand mechanisms linked to axon regeneration and neuroprotection in order to rebuild circuit after traumatic or chronic injury of the central nervous system. We develop original research by focusing on ribosome and protein synthesis to control at large-scale molecular pathways require to promote regeneration. Our project combine cutting edge molecular/cellular biology with in-vitro/in-vivo model of regeneration/degeneration.

Abstract (up to 10 lines):

Unlike the peripheral nervous system, neurons from the central nervous system (brain, spinal cord) are not able to regrow axons after injury. Therefore, any lesion to the CNS leads to permanent motor and/or cognitive impairment. To this day, no treatment is available to overcome CNS injuries. It is now well established that modulating neurons themselves promotes axonal growth. The challenge now is to identify neuronal targets and molecular pathways that are required for axon regeneration. Our lab wants to understand how protein synthesis control and how ribosomes can directly impact axon regeneration. To do so, we are using a combination of in-vitro, in-vivo assay, molecular biology and biochemistry to characterized how translation is control during development and in adult after injury and how modulation of the ribosomes can contribute to the control of neuronal proteome and regeneration.

Methods (up to 3 lines):

Methods developed in the team are:

- In-vivo and ex-vivo model of central and peripheral nervous system injury,
- Complete panel of protein analysis (western blot immunofluorescence, mass spectrometry, click chemistry...),
- advance technics of imaging.

Up to 3 relevant publications of the team:

1- Proteomics-based characterization of ribosome heterogeneity in adult mouse organs. Brunchault MR, Hesse AM, Schaeffer J, Fröhlich A, Saintpierre A, Decourt C, Combes F, Nawabi H, Couté Y, Belin S. *Cell Mol Life Sci.* 2025 Apr 24;82(1):175. doi: 10.1007/s00018-025-05708-7.PMID: 40272563

2- Customization of translational complex regulates mRNA-specific translation to control CNS regeneration. Julia Schaeffer, Noemie Vilallongue, Beatrice Blot, Nacera El Bakdouri, Charlotte Decourt, Elise Plissonnier, Blandine Excoffier, Antoine Paccard, Jean-Jacques Diaz, Sandrine Humbert, Frederic Catez, Frederic Saudou, Homaira Nawabi*, Stephane Belin **Neuron**. 2023 Jul 7:S0896-6273(23)00465-8. doi: 10.1016/j.neuron.2023.06.005. PMID: 37442131

3 - The RSK2-RPS6 axis promotes axonal regeneration in the peripheral and central nervous systems Charlotte Decourt, Julia Schaeffer, Beatrice Blot, Antoine Paccard, Blandine Excoffier, Mario Pende, Homaira Nawabi, Stephane Belin. **PLoS Biol**. 2023 Apr 17;21(4):e3002044. doi: 10.1371/journal.pbio.3002044. eCollection 2023 Apr.

Requested domains of expertise (up to 5 keywords):

Neurology, translation, regeneration, neuroprotection, biochemistry