

**Master 2 internship project
Year 2026-2027**

Laboratory/Institute: Grenoble Institut Neurosciences- GIN **Director:** E. Barbier
Team: Brain Behavior Neuromodulation **Head of the team:** J. Bastin

Name and status of the scientists in charge of the project:
Brigitte Piallat, MCF UGA, **HDR**, and Audrey Kist, Postdoctoral researcher UGA

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Program of the Master's degree in Biology:

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

Title of the project:

Implication of the subthalamic nucleus in sleep/wake disturbances in Parkinson Disease

Objectives (up to 3 lines): In this study, we aim to characterize the sleep/wake disturbances in Parkinson's disease and the involvement of subthalamic nucleus in this behavior.

Abstract (up to 10 lines): Sleep, initially defined as a passive state, plays in fact a major role in many biological phenomena such as the elimination of toxic substances and metabolic waste from the brain by the glymphatic system (Xie et al., 2013). Interestingly, it has been shown that neurodegenerative disorders are strongly associated with a poor quality of sleep (Abbott & Videnovic, 2016). In Parkinson's Disease (PD), sleep is highly modified, but the disturbances have only been partially described.

In addition, the subthalamic nucleus, a common target for deep brain stimulation (DBS) for the treatment of PD, appears to play an important role in sleep behavior, but has not been fully studied (Barbe et al. 2026).

This study aims to characterize sleep/wake disturbances in Parkinson's disease. It will also enable us to monitor the activity of the subthalamic nucleus during wakefulness and sleep onset.

Methods (up to 3 lines):

This project is based on a clinical trial that will involve the neurology, neurosurgery and sleep laboratory departments of Grenoble University Hospital. The study will be based on preliminary data collected before, during and after DBS implantation surgery. The student will analyze data collected in patients, including EEG/sleep scoring, in the pre-implantation phase. In addition, the student will be asked to analyze the activity of the subthalamic nucleus for patients implanted during the period of their internship.

Up to 3 relevant publications of the team:

Davin, A., et al. (2022). Early onset of sleep/wake disturbances in a progressive macaque model of Parkinson's disease. *Scientific Reports*, 12(1), 17499. <https://doi.org/10.1038/s41598-022-22381-z>

Barbe, N., et al. (2026). Deep Brain Stimulation for Sleep-Wake Regulation: A Narrative Review. *Stereotactic and Functional Neurosurgery*. <https://doi.org/10.1159/000552944>

Barbe, N., et al. (2025). Toward an Automatic Classification of the Different Stages of Sleep: Exploring Patterns of Neural Activity in the Subthalamic Nucleus. *The European Journal of Neuroscience*, 61(7), e70107. <https://doi.org/10.1111/ejn.70107>

Requested domains of expertise (up to 5 keywords):

neurophysiology, sleep physiology, electrophysiology, Parkinson's Disease