UFR de Chimie et de Biologie
UNIVERSITÉ Grenoble Alpes

Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2024-2025

Laboratory/Institute: LIBM **Director:** Christophe Hautier
Team: Mental Processes, Cerebral Plasticity and Motor Performance **Head of the team:** Aymeric Guillot

Name and status of the scientist in charge of the project: Arnaud Saimpont, Maître de conference

HDR: yes ☐ no x

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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 x Neurosciences and Neurobiology

Title of the project:

SMILES (Sleep, Motor Imagery, Learning, EEG, Sequence) / Effects of sleep on gross motor sequence learning by motor imagery in young and older adults.

Objectives (up to 3 lines):

This project will focus on four research questions: (1) Does acquisition of a gross motor task supported by MI training differ between young and older adults? (2) Do the effects of sleep versus wakefulness on consolidation after MI training differ between age groups? (3) How does EEG activity (mu rhythm; 7-13Hz) during MI of a gross motor task differ from rest, and does it change after learning in the two populations? (4) How is EEG activity (sleep spindle, slow wave activity) during sleep associated with the consolidation process of the motor task in the two age groups?

Abstract (up to 10 lines):

Motor sequence learning requires repeated practice, which may be exhausting for older adults, especially during rehabilitation. Among less physically demanding interventions to preserve/enhance motor functions in elderly people, motor imagery (MI) training has gained attention. However, we do not know whether MI training might benefit from sleep in older adults, as shown in young adults.

Methods (up to 3 lines):

We are testing 80 young (20-35yrs) and 80 older adults (65-80yrs). Their sleep-wake cycle is monitored with sleep logs and actigraphy for one week. Polysomnography is recorded during an adaptation night and during the night following training. A new whole-body task (WBT) is used. Within each population (young, older) participants are randomly assigned (four groups) to one training condition (MI training, no-training) and times of the day (AM, PM). Training is either followed by a first consolidation interval of 11-12h containing sleep then a second interval of 11-12h without sleep (PM groups) or a first consolidation interval of 11-12h of wakefulness then a second interval of 11-12h containing sleep.

Up to 3 relevant publications of the team:

Saimpont, A., Métais, A. & Collet, C (2023). Learning by motor imagery in older adults. Aging (Albany NY). 2023 Oct 13;15(19):9894-9895. https://doi.org/10.18632/aging.205185

Metais, A., Muller, C.O., Boublay, N., Breuil, C., Guillot, A., Daligault, S., di Rienzo, F., Collet, C., Krolak-Salmon, P. & Saimpont, A. (2022). Anodal tDCS does not enhance the learning of the sequential finger-tapping task by motor imagery practice in healthy older adults. Frontiers in Aging Neuroscience, Dec

9;14:1060791. https://doi.org/10.3389/fnagi.2022.1060791

Debarnot, U., Metais, A., Digonet, G., Freitas, E., Blache, Y. & Saimpont, A. (2022). Sleep dependent consolidation of gross motor sequence learning with motor imagery. Psychology of Sport and Exercise 61, 102216. https://doi.org/10.1016/j.psychsport.2022.102216

Requested domains of expertise (up to 5 keywords):

Sport Sciences, Neurosciences, Psychology, Motor learning, Sleep