

PhD Position in Psychology

REM Sleep Microstates in Older Adults: Associations with Alzheimer's Disease Biomarkers, Cognition, and Psychoaffective Symptoms

Duration: 3 years (full-time)

Location: Inserm UA20, GIP Cyceron, Caen, Normandy, France

Doctoral School: ED 556 HSRT – Hommes, Sociétés, Risques, Territoires

Host Institution: Inserm UA20 Neuropresage Unit (<https://neuropresage.fr>)

Supervision: Co-supervised by Dr Claire André (Postdoctoral Researcher) and Dr Géraldine Rauchs (Inserm Research Director).

Salary: According to the standard salary scale at the University of Caen Normandy for a doctoral contract (Funding from the Normandy Region already secured).

Starting Date: October 1st, 2026.

Project description:

By 2050, the World Health Organization predicts that the global population aged over 60 will double, reaching 2.1 billion people. This demographic shift will be accompanied by a major increase in age-related neurodegenerative diseases, particularly Alzheimer's disease (AD). AD is characterized by a long preclinical phase during which amyloid and tau pathologies gradually accumulate before the onset of the first cognitive symptoms. From these earliest stages, neurodegenerative processes are associated with specific alterations in sleep quality. However, rapid eye movement (REM) sleep remains largely unexplored. Representing approximately 20–25% of total sleep time, REM sleep plays a central role in memory consolidation, emotional regulation, and synaptic plasticity. Recent studies suggest that REM sleep is already altered in cognitively unimpaired older adults and is associated with early AD biomarkers. REM sleep is nonetheless a heterogeneous state composed of two distinct microstates: tonic REM sleep, characterized by more regular EEG activity, and phasic REM sleep, characterized by rapid eye movements and increased cortical and limbic activation. Their respective alterations during aging and in the preclinical stages of Alzheimer's disease, in relation to early neurodegenerative processes, remain largely unknown. The aim of this PhD project is therefore to investigate the relationships between phasic and tonic REM sleep microstates and early Alzheimer's disease biomarkers, as well as their associations with cognitive performance and psychoaffective symptoms in initially healthy older adults.

The project will rely on data already collected as part of the Age-Well study, which included 137 participants aged over 65 years who were cognitively unimpaired at inclusion. All participants underwent extensive cognitive and behavioural assessments, polysomnography, and multimodal neuroimaging examinations (MRI and PET). Participants were followed for nearly five years. We will analyse cross-sectional associations between the duration or ratio of phasic and tonic REM sleep microstates and AD biomarkers, and explore both cross-sectional and longitudinal relationships between these REM sleep indices and cognition on the one hand, and psychoaffective symptoms (e.g., anxiety and depression) on the other.

The PhD student will be involved in the analysis of sleep and neuroimaging data, interpretation of the results, scientific paper writing, and presentation of the findings at national and

international conferences. The successful candidate will also contribute to the acquisition of new data as part of ongoing clinical research protocols and collaborate with a research team based in Brussels, providing a stimulating interdisciplinary environment and excellent opportunities for scientific and international development.

The Neuropresage laboratory is housed within the Cyceron neuroimaging platform (<https://www.cyceron.fr/index.php/fr/>), which offers a highly stimulating research environment bringing together several research units and cutting-edge facilities, including a cyclotron, a 7T MRI scanner, PET and PET-MRI systems for animal studies, as well as a 3T MRI scanner and a PET camera for human studies. The laboratory is located in the charming historic city of Caen, Normandy, France, only two hours by train from Paris and fifteen minutes from the English Channel coast.

Profile and Required Skills

- Master's degree (5 years of higher education) in Neuroscience, Cognitive Science, Psychology, or a related field (or currently enrolled in the second year of a Master's program).
- Strong interest in sleep research and in normal and pathological aging.
- Candidates must be fluent in French, as they will be required to collect data from participants.
- Good written and oral communication skills in English.
- Strong statistical skills and proficiency in R are required.
- Good organizational and teamwork skills, as well as autonomy, rigor, and scientific curiosity.

Application Procedure

Interested candidates are invited to send their application exclusively by email to Dr Géraldine Rauchs (rauchs@cyceron.fr) and Dr Claire André (claire.andre@inserm.fr).

The application file must include the following documents:

- A detailed CV
- A cover letter (maximum 2 pages)
- Academic transcripts and class rankings for all degrees
- A copy of the Master's thesis or internship reports from the first and second year of the Master's degree (if available)
- Contact details and a recommendation letter from one or two academic referees

Application deadline: May 31st, 2026

Candidates will be informed by email whether they have been shortlisted for an interview, which will take place in Caen or online during June.