2-year Post-doctoral Position with Prof Yves Dauvilliers' Laboratory[1] and Takeda Pharmaceuticals[2]

[1]Centre Hospitalier Universitaire [CHU] Montpellier, France
[2]Cambridge, MA, USA

Research project description

The postdoctoral associate will work with CHU Montpellier and Takeda to achieve two goals: 1) to mine CHU databases to better characterize clinical measures of sleep, particularly in Central Disorders of Hypersomnolence (CDH) and 2) to perform advanced EEG analysis to characterize signals impacted by CDH. The postdoctoral associate will benefit from working at a leading academic sleep research center and will gain experience with translational research in the pharmaceutical industry.

In goal 1, the associate will mine the Somnobank database at CHU (NCT03998020) to address questions of interest and to better frame the research questions to be answered in year 2 of the position. Specifically, the associate will mine clinical data for NT1, NT2 and IH, including baseline characteristics of the population and longitudinal data including clinical assessments. Questions of interest include:

- What clinical characteristics are associated with time to diagnosis and age of diagnosis?
- What clinical characteristics are associated with disease severity?
- How to characterize phenotype distributions within IH and NT2 (e.g., fraction of long sleepers, measures of sleep inertia)
- How do clinical and neurophysiological measures, such as MWT latencies, NSS, IHSS, and PGI/CGI, change over time? How are these measures correlated (or not) with each other?
- What are the effects of currently available treatments on clinical endpoints?

In goal 2, the associate will extend prior Takeda analysis of CHU data, which focused mainly on standard EEG bandpower analysis as well as standard and AI-derived measures of sleep architecture, and also including ECG-derived measures of autonomic function. In particular, the associate will employ (and as needed, develop) robust means of labeling sleep spindles, REM without atonia events, and tonic vs. phasic REM, and will statistically quantify how these differ in CDH populations, as well as explore possible associations with demographic factors such as age and sex. In this work, the associate will also leverage CHU's longitudinal patient recordings to test recent ideas including the following:

- Development of patient-specific EEG "fingerprints"
    - to allow for a more nuanced view of within-subject disease phenotype and progression,
    - to better identify biomarkers of disease, disease severity, and response to treatment
- Development of objective markers of sleep inertia and sleep "drunkenness" in patients with IH
- Analysis of EEG-derived wakefulness measures, and their correlation with cognitive data

We envision that these EEG biomarkers can be combined with the clinical endpoints identified under goal 1 to discover patient subgroups (see for example Gool *et al*., 2022, DOI 10.1212/WNL.0000000000200519). These markers may additionally be expanded to include genetic information.

Position logistics

The project PI is Prof. Yves Dauvilliers, who will provide scientific oversight, supported by Dr. Lucie Barateau (CHU) and as well as Takeda staff (from Neuroscience, Translational Neuroscience, and SQS Quantitative Sciences teams). During year 1, the postdoctoral associate will spend 4-5 months (negotiable) at Takeda in Cambridge, MA USA, being trained on EEG analysis and statistical modeling and beginning work to expand Takeda's current suite of EEG analysis tools. From Takeda side, she/he will be co-supervised by Drs. Melissa Naylor, Neuroscience (for Goal 1) and Brian Tracey, Quantitative Sciences (for Goal 2). During the remainder of year 1 and for all of year 2, the associate will be based at CHU Montpellier, with several trips to Boston envisioned for extended training.