

DOCTORAL FUNDING OPPORTUNITY

Conditioned at the admission of the candidate to the competition of the Normandy Integrative Biology, Health, Environment Doctoral School (EDN BISE 497) of the University of Caen Normandy

Research Unit

Name : COMETE – Mobilités : Vieillissement, Pathologie, Santé.

Recognition number : UMR-S 1075

Affiliations : Normandie Université - Université de Caen Normandie, INSERM, GIP CYCERON.

Address : Pôle de Formations et de Recherche en Santé, 2 rue des Rochambelles, 14032 Caen cedex 5.

Thesis topic

Project title : Motoric cognitive risk syndrome: a dysexecutive syndrome?

Keywords : aging; predementia syndrome; locomotion; posture; cognition; virtual reality; e-health applications.

Project summary :

The motoric cognitive risk syndrome (MCR), defined as subjective cognitive decline combined with slower gait speed, increases the risk of developing dementia by three. Understanding the etiology of this syndrome is important to improve its definition criteria and its predictive nature. A plausible origin is executive control dysfunction in close association with a brain disconnection syndrome of the central executive network. Indeed, on the one hand, individuals with subjective cognitive complaints as well as individuals walking more slowly than normal show an alteration of the integrity of white matter fibers connecting regions of the central executive network with each other but also with those of other large brain networks. This alteration seems to occur independently of the amount of amyloid plaques. On the other hand, recent studies have shown, from dual-task paradigms (i.e., concomitant execution of cognitive and motor control tasks), impaired executive control in patients with mild neurocognitive disorder or subjective cognitive decline. Therefore, the thesis project aims to test the hypothesis of executive control dysfunction affecting both the motor and cognitive spheres in MCR individuals, from its behavioral manifestations to its brain correlates. To this end, brain data (structural and functional connectivity; MRI) and behavioral data, experimental (executive control in dual-task situations; Kinematics, kinetics, and electromyography) and *in situ* (cognitive and motor skills at home over one week), will be collected in 80 MCR subjects and 80 control subjects, and then aggregated within multivariate and machine learning models. The candidate will be involved in the behavioral (experimental and *in situ*) dimensions of the project, as well as in neuroimaging developments. This project will be an opportunity for the candidate to work in a consortium of actors (UMR-S 1075 INSERM/UNICAEN, UMR 5525 CNRS/Université Grenoble Alpes, UMS 3408 CNRS/UNICAEN/CHU de Caen, UMR-S 1077 INSERM/EPHE/UNICAEN, EA 7478 UNICAEN, Cyceron Center, Interdisciplinary Center of Virtual Reality, Caen and Rouen University Hospitals, GÉrontopôle Seine Estuaire Normandy, Retirement and Occupational Health Insurance Fund Normandy, Secured Electronic Transactions Competitiveness Cluster, Caen

Normandie Development) with multiple skills (motor control, neuroscience, neuropsychology, neuroimaging, gerontology, neurology, *in situ* technologies, e-health, statistics and multimodal data fusion), gathered around a vast program of work on subclinical stages of dementia.

Candidate profile

- Holding a Master degree, with a background in neuroscience and/or human movement sciences and/or engineering sciences, with a very good ranking and, more generally, a very good academic record.
- A solid background in cognitive neuroscience, ideally perception and motor skills, with research experience in this(ese) area(s). Knowledge of neuroimaging approaches would be appreciated.
- Very good knowledge in signal processing and programming (Matlab, Python, etc.).
- Have the sense of teamwork and show organization and rigor in the work.
- Mastery of French and English languages.

Thesis direction

Thesis director : Leslie DECKER

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Recruitment calendar

Deadline for the submission of applications: June 17, 2019 before 5 pm.

E-mail address to which the candidate must send his/her application : leslie.decker@unicaen.fr

Competition of the Doctoral School (ED NBISE) : July 4-5, 2019 at the University of Caen Normandie.

Recruitment date : October 1, 2019.