Discipline : cardiovascular physiology and space medicine
Sujet : Evaluation non invasive de la pression veineuse centrale par échographie vasculaire de compression
Acronyme : ENIVAC
Direction de thèse : LANEELLE Damien
Unité de recherche : UMR-S 1075 COMETE « Mobilités : Vieillissement, Pathologie, Santé
Etablissement : Université de Caen Normandie
Type de financement : Contrat doctoral Normandie Recherche 50% (sous condition suspensive d'obtention du financement)
Contact : damien.laneelle@unicaen.fr; amir.hodzic@unicaen.fr

L'objectif général de ce projet est de développer puis de valider une méthode échographique universelle (c'est-à-dire indépendante d'un constructeur échographique), non invasive, permettant d'estimer la pression veineuse centrale par compression contrôlée d'une veine périphérique.

Offer Description

We are offering a 3-year PhD position within the INSERM U1075 COMETE laboratory (University of Caen, France), focused on cardiovascular physiology and space medicine.

Project overview:
In microgravity, fluid redistribution profoundly alters venous return, cardiac preload, and cerebral drainage. These changes are thought to play a key role in cardiovascular adaptation and in Spaceflight-Associated Neuro-Ocular Syndrome (SANS), a major concern for long-duration space missions. However, direct measurement of central venous pressure (CVP) remains challenging in both space and clinical settings.
This PhD project aims to develop and validate a non-invasive ultrasound-based method to estimate venous pressure using controlled compression techniques. The project will explore both internal and external jugular veins as accessible and reliable markers of central venous pressure.

Research objectives:
The PhD candidate will contribute to a multi-phase translational project, including:
-Experimental validation using in vitro vascular models
-Non-invasive measurements in human volunteers under simulated microgravity conditions
-Clinical validation in patients undergoing right-heart catheterization
The project combines physiology, biomedical engineering, ultrasound imaging, and space research.

Expected outcomes:
The project aims to deliver a reproducible and ultrasound system-independent

method for venous pressure assessment for applications for both space missions and terrestrial clinical practice.

Environment:
The PhD will be conducted at INSERM U1075 COMETE, a leading research unit in cardiovascular physiology and space medicine, with strong collaborations with CNES and clinical departments at Caen University Hospital.

Where to apply

E-mail

amir.hodzic@unicaen.fr

Requirements

Research Field

Medical sciences

Education Level

Master Degree or equivalent

Skills/Qualifications

Master’s degree (or equivalent) in physiology, biomedical sciences, medicine, biomedical engineering, or a related field

Strong interest in cardiovascular physiology and/or medical imaging

Skills in data analysis, processing, and statistics

Languages

Advanced English
Basic French (non-mandatory)

Specific Requirements

The candidate must be eligible for PhD registration in France

Willingness to participate in experimental protocols involving human subjects

Interest in translational research combining experimental, clinical, and technological approaches

Commitment to complete the PhD project within a 3-year timeframe

Experience

-Physiology and/or biomedical engineering : 3-5 years
-Statistics : 1-2 years
-Basic programming skills will be valuable

Additional Information

Benefits

Fully funded 3-year PhD position (salary according to French doctoral funding standards)
Opportunity to work on an innovative project at the interface of cardiovascular physiology, biomedical engineering, and space medicine
Multidisciplinary research environment at INSERM U1075 COMETE and Caen University Hospital
Opportunities for scientific publications and conference presentations
Strong collaborations with the French national space agency (CNES)

Eligibility criteria

Applicants must meet the requirements for PhD enrollment at the University of Caen Normandy

Selection process

Candidates are required to email their CV to amir.hodzic@unicaen.fr and damien.laneelle@unicaen.fr

Applications will be reviewed based on academic excellence, relevance of the candidate’s background, and motivation for the project.

Selected candidates will be invited to an interview (online or on-site) with the PhD supervisors.