**PhD project: Dose-response relationship of focal vibration training and optimization of the vibratory load**

**Laboratory:**

Laboratoire Interuniversitaire de Biologie et de la Motricité (LIBM), Université Jean Monnet, Saint Etienne, France

**Phd supervisor:**

Thomas LAPOLE, LIBM (EA7424), Saint Etienne

thomas.lapole@univ-st-etienne.fr

**Co-supervisor:**

Charles-Etienne BENOIT, LIBM (EA 7424), Lyon

charles-etienne.benoit@univ-lyon1.fr

**PROJECT SUMMARY:**

The use of Focal Vibration (FV), involving a small vibratory device positioned directly on the muscle or its tendon, is emerging as a painless modality for rehabilitation that is easily accessible and capable of inducing long-term neural adaptations (Souron et al., 2017). However, suggesting optimal usage recommendations to maximize FV effects is currently challenging, limiting its clinical deployment. The primary objective of this PhD project is to determine parameters for optimizing vibrational load. We will examine sensorimotor cortical activation (EEG, fNIRS) during short periods of FV in healthy subjects and cerebrally impaired patients, refining parameters to optimize "vibrational load" and demonstrating how FV enhances neural circuit activation. The second objective is to explore the dose-response relationship of FV training in healthy subjects divided into three groups with different FV durations: short, moderate, or long. Our criteria include maximum isometric and concentric strength, as well as maximum electromyographic activity and voluntary activation level. Additionally, during each participant's first FV session, we will examine the effects of FV on brain activity recorded by EEG and the acute effects of prolonged FV on spinal (nerve stimulation) and cortical excitability (TMS, EEG). These results will correlate long-term adaptations with those during and after acute FV application, emphasizing the sought dose-response relationship. Furthermore, this approach will assist in identifying variability among responders and non-responders to FV interventions, a crucial step towards personalizing therapeutic approaches based on individual needs.

**APPLICANT PROFIL:**

The candidate should have research experience in human neurophysiology, with skills in evaluating and analyzing neuromuscular function (surface electromyography, transcutaneous electrical stimulation) being essential. Knowledge of transcranial magnetic stimulation and/or EEG or fNIRS will be appreciated. Proficiency in French is not mandatory but considered a plus. In any case, the candidate must be able to communicate in English.

Gross monthly salary: €2200.

**The complete application package must be submitted by email to both supervisors no later than March 31, 2024. The package should include a single PDF file containing the attached documents, a detailed CV, a letter of recommendation, and a letter of motivation. A first interview with the supervisors will take place via video conference between April 8 and April 12, 2024. A second interview by the doctoral school's evaluation committee will be conducted via video conference between May 13 and May 17, 2024.**

APPLICATION FORM, PhD Contract. Session 2024

Please do not overcome the number of pages indicated for each section.

Additional documents (academic results, copies of academic degrees, letters of recommendation) may be added

This form needs to be addressed to the PhD supervisor, using only one pdf file,

and forwarded by the PhD supervisor before May, 3th 2024 at 12H00 am to:

molimard@emse.fr

francois.royer@univ-st-etienne.fr

**FAMILY NAME, First name:**

**Email:**

**Title of the PhD subject:**

**Laboratory:**

**Name of the PhD supervisor:**

**When did you contact the PhD supervisor for the first time?:**

**Date of the meeting with the PhD supervisor:**

**How do you speak French : 1 🞏 2 🞏 3 🞏 4 🞏**

 **From “**1 = I do not speak French” **to** “4 = I speak fluently French”

CURRICULUM VITAE

 *(2 pages front maximum)*

1. **Civil status**

Family Name:

First name:

Nationality:

Date and place of birth:

Age:

Postal address:

Phone:

**b) Bachelor (Licence in France):**

University:

Year of diploma

Speciality:

Supervisor:

Academic transcript (please give a copy)

**c) Master (first year) :**University:

Year:

Name of the master:

Academic transcript (please give a copy)

Ranking / Number of students: (**the document has to be testified**)

**d) Master (second year)**University:

Year:

Name of the master:

Academic transcript (please give a copy)

Ranking / Number of students: (**the document has to be testified**)

*If the 2nd year of Master is in progress, please give information related to the completed semesters (generally september – february)*

**e) Final training period during the master**

Supervisor:

Laboratory:

University:

Dates of beginning and end of the final training period:

Scientific title of the training period:

Publications, participation to scientific meetings:

**Keywords defining your skills and knowledges in the context of your application.**

*Recommendation letters*

**PHD candidate interview form**

**PhD subject title:**

**Research laboratory :**

1. **What about** educational itinerary**?**
2. **What are your main motivations to enroll in a PHD thesis? Do you consider yourself to apply for an associate professor in future or you will continue as a researcher?**
3. **In your opinion, what are your main qualities for this job?**
4. **What are your future professional goals after the PhD? How do you think about it?**
5. **Do you have any plans to prepare your PHD thesis? Do you have any apprehension? What about your expectations?**
6. **Do you have some previous experiences that could be helpful for this position?**
7. **Is that a problem for you to move in another city?**
8. **Remarks?**