Post-doctoral Position in Ultrasound Imaging

ULTRADIAPH - PREVENTING DIAPHRAGM DYSFUNCTION IN THE INTENSIVE CARE UNIT WITH INNOVATIVE ULTRASOUND BIOMARKERS
BIOMAPS – Université Paris-Saclay, CNRS, INSERM, CEA

Locations: CEA SHFJ 4 Place du Gal Leclerc 91401 Orsay
and with collaborators at Institut de Myologie, Paris, Hôpital La Pitié Salpetrière, Paris and eScopics, Saint-Cannat.

Opening: November 2021 funded by ANR (for 18 months), Deadline February 1st, 2022.

Salary: up to ~2800 € gross monthly (depending on experience).

Partners of the project: Dr. Jean-Luc Gennisson (jean-luc.gennisson@universite-paris-saclay.fr, BIOMAPS), Dr. Damien Bachasson (Institut de Myologie), Dr. Martin Dres (Hôpital La Pitié Salpetrière), Dr. Claude Cohen-Bacrie (eScopics).

Summary of the project:

Goal of the project

This research project **ULTRADIAPH** aims to develop an ultraportable solution relying on ultrafast ultrasound (US) providing innovative biomarkers of respiratory muscle function and improving the reliability of existing biomarkers. We intend to use this new tool to improve knowledge regarding respiratory muscle structure and function within the Intensive Care Unit (ICU) with the ultimate goal to improve the management of these patients. Three different aims will be addressed:

Aim 1: To develop a handheld ultraportable ultrasound device for assessing the respiratory muscles within the ICU.

Aim 2: To develop innovative ultrasound-based biomarkers for the assessment of respiratory muscle structure and function.

Aim 3: Improving the assessment of the respiratory muscles using ultrasound within the ICU, improving patient-ventilator interaction.

Skills needed and information:

The successful candidate will hold a Ph.D and will be mostly in charge to build and implement new US sequences on an ultraportable ultrafast US device. These new US sequences should be implemented to speed-up the acquisition rate and to optimize the setup sensibility and efficiency. Then implementation of new algorithms to build new biomarker maps should be also developed. This project requires a good knowledge of the physics of US as well as some programming facilities (Mainly Matlab but some C++ capacities are desirable). Skills in Artificial intelligence would be greatly appreciated, as well as skills in biomechanics and biophysics. More specifically knowledge in elastography methods or Doppler methods would be welcome. Candidate should be skilled to interact with radiologists, physicists, industry and engineers: a clear taste for interdisciplinary research is needed. Financial conditions are based on the Paris-Saclay University postdoctoral grants, and depend on the years of experience of the candidate.

Contacts: Applicants interested in this project can send a CV with references, motivation letter, and eventually recommendation letters to Dr. Jean-Luc Gennisson: jean-luc.gennisson@universite-paris-saclay.fr.

REFERENCES

1. **D. Bachasson, M. Dres**, M. C. Nierat, **J. L. Gennisson**, J. Y. Hogrel, J. Doorduin, **T. Similowski**, Diaphragm shear modulus reflects transdiaphragmatic pressure during isovolumetric inspiratory efforts and ventilation against inspiratory loading. J Appl Physiol (1985) 126, 699-707 (2019); published online EpubMar 1 (10.1152/japplphysiol.01060.2018).

2. Q. Fosse, T. Poulard, M. C. Nierat, S. Virolle, E. Morawiec, J. Y. Hogrel, T. Similowski, **A. Demoule**, **J. L. Gennisson, D. Bachasson, M. Dres**, Ultrasound shear wave elastography for assessing diaphragm function in mechanically ventilated patients: a breath-by-breath analysis. Crit. Care 24, 669 (2020); published online EpubNov 27 (10.1186/s13054-020-03338-y).

3. T. Poulard, **M. Dres**, M. C. Nierat, I. Rivals, J. Y. Hogrel, **T. Similowski, J. L. Gennisson, D. Bachasson**, Ultrafast ultrasound coupled with cervical magnetic stimulation for non-invasive and non-volitional assessment of diaphragm contractility. J. Physiol. 598, 5627-5638 (2020); published online EpubDec (10.1113/JP280457).