



SORBONNE
UNIVERSITÉ



6-month internship for MSc student

Multiparametric ultrasound imaging of the respiratory muscles

UMR-S 1158, Paris

Locations: UMR-S 1158 Hôpital Universitaire La Pitié-Salpêtrière, 47-83 boulevard de l'Hôpital, 75013, Paris, France with collaborators at BioMaps (Orsay), Institute of Myology (Paris), and eScopics (Saint-Cannat).

Starting date: January 2023.

Funded by: Agence Nationale de la Recherche (ULTRADIAPH project).

Project partners: UMR-S 1158, BioMaps Laboratory, Institute of Myology, eScopics.

Project summary: The overarching goal of the ULTRADIAPH project is to develop innovative ultrasound-based biomarkers for respiratory muscle structure and function. To fulfill this goal, we are aiming to develop an ultraportable solution relying on ultrafast ultrasound providing new tissue-level characterization and reducing operator-dependency of current methods. We intend to use this new tool to improve knowledge regarding respiratory muscle dysfunction induced by mechanical ventilation within the intensive care unit with the ultimate goal to improve the management of these patients. Within this internship, the MSc student will be involved in experiments in healthy volunteers and patients under mechanical ventilation within the intensive care unit. She/he will also be involved in the development of the device software and the validation of the developed tools.

Profile: The candidate must be an MSc student in a relevant discipline(s) (e.g. biomechanics, respiratory physiology, human movement sciences, rehabilitation sciences). Experience with relevant laboratory techniques is desirable but a strong willingness to learn and an inquisitive attitude is essential. Experience with image analysis/signal processing and computer-programing skills (Matlab, R) are also desirable. Although not mandatory, French speaking is desirable, as the candidate will work with healthy volunteers and patients.

Keywords: Ultrasound imaging, skeletal muscle physiology, respiratory physiology, biomarkers, diaphragm, mechanical ventilation, intensive care unit

Contact: Interested applicants should email directly Damien Bachasson (d.bachasson@institut-myologie.org) with a cover letter and a detailed CV. Applications in French and English will be reviewed.

References:

1. D. Bachasson, M. Dres, M. C. Nierat, J. L. Gennisson, J. Y. Hogrel, J. Doorduyn, 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/jappphysiol.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).
4. T. Poulard, D. Bachasson, Q. Fosse, M. C. Nierat, J. Y. Hogrel, A. Demoule, J. L. Gennisson, M. Dres, Poor Correlation between Diaphragm Thickening Fraction and Transdiaphragmatic Pressure in Mechanically Ventilated Patients and Healthy Subjects. *Anesthesiology* **136**, 162-175 (2022); published online EpubJan 1 (10.1097/ALN.0000000000004042).