PhD proposition
Fully funded 3-yr PhD scholarships (2019-2022)
Le Mans Université -France

Title
Neuromuscular fatigability and functional capacity of breast cancer patients: mechanisms and prediction of the cancer-related fatigue.

Lab
Laboratoire « Motricité, Interactions, Performance » (MIP, EA4334)
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Beginning
September 1st, 2019

Keywords
Fatigue ; Cancer ; Neuromuscular ; Longitudinal study; Modelling

PROJECT CONTEXT

Cancer-related fatigue (CRF) is one of the most common and challenging side effects of the disease and associated treatments. This fatigue not only disrupts the quality of life of patients at the time of the disease, but for many of them the effects extend up to several months/years after remission. Despite its deleterious effects, the CRF is still very little managed. Researchers and clinicians have identified two main parameters that limit progress in this area: the lack of consensus on methods for assessing fatigue and a misunderstanding of its underlying mechanisms. Although multiple physiological and behavioural factors may have been associated with the development and persistence of this fatigue, the methodologies of the studies carried out so far do not clearly identify the mechanisms. The multifactorial nature of the phenomenon studied suggests complex and systemic interactions between biological, psychological and social dimensions.

BACKGROUND

The main purpose of this project is to determine objective parameters of the cancer patient fatigability using neurophysiological methods and functional abilities assessment. This analysis will be based on the latest advances in assessing the neuromuscular fatigue etiology. The second aim will be to validate a biopsychosocial model of CRF. The experimentations focused on providing measurements related to human motion (e.g., functional abilities, spontaneous physical activity, exercise fatigability). These data will be complemented by psychological and social measures carried out elsewhere in the framework of the BIOCARE FActory project. The latter, by crossing approaches from different scientific fields (biology, psychology and sociology) aims to consider the individual in his or her entirety to understand how the CRF installs and then persists.

METHODS

The project is based on longitudinal monitoring of neuromuscular fatigability to exercise and functional abilities of a cohort of 200 breast cancer patients. Each patient will be screen at the time of her diagnosis and then 6, 12 and 18 months after. An experimental session will include an Astrand-Rhyming test, a measure of neuromuscular fatigabilty of the plantar ankle flexor muscles as well as postural control measures. Spontaneous physical activity, sleep and heart rate variability will be recorded using the Bodyguard 2 measuring system during the week following the experiment. Participants will also complete questionnaires assessing their quality of life and CRF.

OBJECTIVES

1) To characterize the neuromuscular fatigability of breast cancer patients through biomechanical and neurophysiological measurements in regard to their CRF status.
2) To predict the onset, persistence, and mechanisms of CRF for each individual. This will allow individualized support care in order to anticipate and optimize responses to the disease and its treatment.

APPLICANT PROFILE

The candidate should have a Master degree and a strong background in neuromuscular function analysis. Knowledge of surface electromyography and electrical stimulation is an asset. Experience with programming (e.g. Matlab) will be appreciated. Since a clinical transfer is expected, experience in the health domain will be considered. This project is part of the BIOCARE FAtory project (*BIOpsychosocial approach of the Cancer RElated FAtigue*), thus the candidate will have to interchange with clinicians and reseachers in biomechanics, physiology, psychology and sociology and should be open minded to these approaches. The candidate must be must be able to communicate in English. French is not mandatory but the candidate must be willing to learn French during her/his PhD (the candidate will lead experimentations with french-speaking patients in the short or medium term).

APPLICATION PROCEDURE

Full application must be sent in pdf format (gathered in one file) to the PhD supervisor and Cc to the co-supervisor. Deadline is May 21th, 2019. The application must include a detailed curriculum vitae, a motivation letter and an explanation of the suitability of the candidate according to the project. Interviews will be conducted in Le Mans, France on May 28th (a videoconference will be planned if necessary).