

## A FULL-TIME DOCTORAL POSITION IN BIOMEDICAL FIELD

UNIVERSITE LIBRE DE BRUXELLES

### Job description

We are seeking a highly motivated candidate with a Master degree in Biology; Chemistry; Biomedical; Biophysical Sciences (or equivalent) to conduct research in a starting Télévie project entitled: “Unravelling the open questions in FLASH preclinical radiotherapy for an optimal clinical translation”. The proposal is focusing on FLASH radiotherapy, an emerging cancer treatment modality that has the potential to revolutionize radiation oncology by reducing the induction of adverse events in irradiated patients. The project aims at overcoming limitation of this technology to faster its clinical translation. The research program will deal with the establishment of robust dosimetry, the assessment of various *in vitro* biological endpoints (toxicity, activity assays ...) and *in vivo* validation (irradiation, animal handling ...). The project will be carried out on ULB's ERASME campus (Anderlecht, Brussels) in close collaboration between the medical physics laboratory of the Institut Jules Bordet (the Belgian reference center for cancer treatment) and the Institut de Recherche Interdisciplinaire en Biologie Humaine et Moléculaire (IRIBHM). More information on the laboratories can be found on the websites:

- <https://cvchercheurs.ulb.ac.be/Site/unite/ULB836UK.php> (Supervisor: S. Penninckx)
- <https://iribhm.org/> (Supervisor: V. Wittamer)

### Description of the research profile

Increasing the therapeutic ratio is one of the most significant challenges of clinical oncology. To achieve this, there has been increasing interest in novel therapies, with the aim of selectively killing cancer cells whilst sparing normal tissues. FLASH radiotherapy (RT) is an emerging technology that involves the delivery of ionizing radiations at dose-rates several thousand times higher than the ones currently used in routine practice. While a similar tumor cell killing efficacy was reported in both conventional and FLASH-RT, *in vivo* studies have shown that the latter limits radiation-induced damage in healthy tissues. Therefore, it has the potential to revolutionize radiation oncology field by becoming a standard in future clinical practice.

The clinical transition of this technology is slowed down by several open questions including the mechanism responsible for the effect, the beam parameters to be used to observe an optimal

effect or the possibility to implement it in clinical protocols that split the dose delivered to the patient in fractions. In this project, we will study in a zebrafish embryo model, the influence of the pulsed beam structure on the occurrence of the FLASH effect. The results will be rationalized using numerical simulation tools and cellular and molecular biology experiments to study our mechanistic hypothesis related to the induction of ferroptosis. Moreover, they will allow to define a parameter space for which an optimal FLASH effect can be observed. Finally, the FLASH effect will be validated in a mouse model by studying the impact on tumor control and on the induction of adverse events on skin (alopecia, ulceration, ...). The latter will be validated by IHC analysis. Finally, the model developed will allow to study the question of dose fractionation at constant BED, a usual practice in clinic. This project lays the foundations of the FLASH program at the Institut Jules Bordet and paves the way to the first phase II clinical trial.

## Qualifications

We are looking for a highly self-motivated, pro-active and creative PhD student who can work in transdisciplinary environment composed of physicist, biologist, chemist and physician. The candidate must be able to work independently, as well as demonstrate a strong commitment to the team-based work with strong organization skills.

### The ideal candidate should:

- Hold a Master of Science degree in one of following disciplines: Biomedical sciences, chemistry, biotechnology, biochemistry, biology, biophysics or equivalent;
- Show proof of proficiency in French or English (or both), both in oral and written communication;
- Be a team player who can work autonomously and who is able to meet deadlines;
- Be willing to spend part of her/his time abroad for research activities and participation in workshops and conferences;
- Be willing to step out of their comfort zone by learning concepts outside of their initial scientific background (physics, chemistry, biology, clinics);
- Agree to participate in promotional activities organized by FNRS/Télévie (grant funder).

A good knowledge of radiobiology, numerical simulation and a certificate in laboratory animal experimentation (FELASA B) will be considered as an asset.

## Procedure

The position is for an initial duration of two years, renewable once (max: 48 months in total). The project will start October 1<sup>st</sup> 2023. Soon to be graduating master students are welcome to apply provided that they will have graduated before the start of the position. The candidates already in possession of a PhD are not eligible.

Further information on the project can be obtained by contacting:

- Dr Sébastien Penninckx (ULB / Institut Jules Bordet): [sebastien.penninckx@bordet.be](mailto:sebastien.penninckx@bordet.be)  
Radiobiology Project Manager; Institut Jules Bordet

## Interested?

The application will provide a motivation letter, curriculum vitae, a summary of previous research work / master thesis and the name and e-mail addresses of two reference persons by e-mail to Dr. Sébastien Penninckx ([sebastien.penninckx@bordet.be](mailto:sebastien.penninckx@bordet.be)) by **July 28, 2023 at the latest**. Selected candidates will then be interviewed in the following week.