A FULL-TIME DOCTORAL POSITION IN BIOMEDICAL FIELD

UNIVERSITE LIBRE DE BRUXELLES & UNIVERSITE DE NAMUR

Job description

We are seeking a highly motivated candidate with a Master degree in Biology; Chemistry; Biomedical Sciences (or equivalent) to conduct research in a starting Télévie project entitled: “Development of personalized neutron capture therapy using theranostic carriers”. The proposal is focusing on the boron neutron capture therapy (BNCT), an emerging cancer treatment modality that has the potential to revolutionize radiation oncology by positioning itself as a selective and targeted radiotherapy. The project aims at developing innovative boron compounds that could address the current limitation of BNCT and bring it into the era of personalized medicine. The research program will deal with the chemical synthesis of new compounds, the assessment of various in vitro biological endpoints (toxicity, activity assays ...) and in vivo validation (irradiation, biodistribution kinetics ...).

- Laboratory of Biochemistry and Cell Biology, Faculty of Sciences, NARILIS - UNamur : www.urbc.be

Description of the research profile

Boron neutron capture therapy (BNCT) is an emerging radiation therapy based on the interaction between a non-radioactive boron-10 labelled compound and low-energy thermal neutrons. This interaction leads to the production of α-particles, known to be more effective in inducing cell death than conventional X-rays. Due to their short range in tissue, the induced cell damage remains confined to cells containing boron atoms. Thus, BNCT has the potential to revolutionize radiation oncology by positioning itself as a selective and targeted radiotherapy. However, the concentration of boron in the target tissue cannot be determined at irradiation time, limiting the optimal use of this technology in the clinic. In this project, we propose to modify BPA, a clinically approved boron-compound by grafting MRI contrast agents ($^{15}$Gd and $^{19}$F) onto it. This creates a theranostic vector that opens the door to personalized medicine in BNCT. We will study the toxicity and internalization of our compounds in in vitro systems. The biodistribution kinetics of the
compounds and their accumulation in the target tissues will be studied in murine models already available in the laboratory. The obtained MRI images will be used for the implementation of a personalized treatment plan that will guide irradiation experiments. Irradiation of our biological systems will be performed to evaluate tumor control, additive or synergistic effect of Gd or F moieties and the radiobiological responses (DNA damages, ...) using cellular and molecular biology analyses. Finally, the damage to healthy tissues will be assessed by ex-vivo histological analyses. All the information collected will lay the foundation for clinical trials that will start at the end of this project.

Qualifications

We are looking for a highly self-motivated, pro-active and creative Master 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 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 open to share its research time between Brussels and Namur (Belgium);
- 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 (funder).

Candidate with a good knowledge of radiobiology, MRI contrast agents 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 1st 2022. 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
  BNCT Project Manager; Radiophysics and MRI physics laboratory, Department of Medicine
- Prof. Carine Michiels (UNamur): carine.michiels@unamur.be
Laboratory of Biochemistry and Cell Biology (URBC), Department of Biology.

Interested?

The application will provide a motivation letter, curriculum vitae, a summary of its master research work / master thesis and the name and e-mail addresses of three reference persons by e-mail to Dr. Sébastien Penninckx (sebastien.penninckx@bordet.be) AND Prof. Carine Michiels (carine.michiels@unamur.be) by August 1, 2022 at the latest. Selected candidates will then be interviewed in the following weeks.