

PHD POSTION (M/F/X): OPTIMISATION OF THE FORMULATION AND PRODUCTION OF NON-VIRAL VECTORS TYPE LNP (LIPID NANOPARTICLE) FOR THE TREATMENT OF CANCER.

AREA: PHARMACEUTICAL TECHNOLOGY/NANOMEDICINE/GENE THERAPY

START DATE: 09/15/2024

DEADLINE OF APPLICATION: 04/22/2024

The University of Liège is the biggest French-speaking public university in Belgium. It employs more than 5,700 staff members across four campuses, including 3,600 active teachers and researchers in all fields of the human and social sciences, science and technology, and health sciences. It hosts nearly 27,000 students of 123 different nationalities in one of the most multicultural and dynamic cities in Europe, less than an hour from Brussels and Cologne, two hours from Paris, and three hours from London and Amsterdam.

Actively involved in the social and environmental transition, ULiège supports students to fulfil their roles as responsible citizens (training in sustainable development, Green Office, etc.) and promotes ethical, multidisciplinary and open research. ULiège is committed to the region in which it operates and contributes towards local socio-economic development. It has developed numerous partnerships, notably with the university hospital. International and united, it participates in the [European University of Post-Industrial Cities, UNIC](#) initiative and has one of the most extensive collaborative networks in the world.

ULiège offers attractive career prospects [in a high-quality working environment](#), promoting well-being, diversity and equality of opportunity. Since 2011, ULiège has been proud to display the European [Human resources strategy for researchers](#) (HRS4R) label, which reflects its commitment to open, transparent and merit-based procedures. In addition, it recognises the quality and diversity of research in line with the recommendations of the [Coalition for Advancing Research Assessment](#) (CoARA). ULiège encourages its academic staff to travel internationally and welcomes international researchers through its EURAXESS centre.

ABOUT THE RESEARCH PROJECT

Despite significant progress in the field of LNPs for siRNA delivery, achieving safe and effective delivery remains a major challenge. Available LNPs can only reach immune or hepatic targets. Moreover, they contain polyethylene glycol (PEG) that increases their stability and stealthiness but limits their effectiveness. Furthermore, PEG may induce immunogenicity, leading to production of anti-PEG IgM antibodies that results in accelerated blood clearance of LNP ("ABC effect") and even hypersensitivity reactions, including severe allergic reactions.

To effectively target tumor sites such as breast tumors without stimulating the immune system, the composition of LNPs need further improvements and must be optimized.

This PhD project aims **to optimize the formulation and production of non-viral LNP vectors to increase the efficacy of LNPs for breast tumors treatment.**

The PhD will be conducted in the Laboratory of Pharmaceutical Technology and Biopharmacy (LTPB) (https://www.ltpb.uliege.be/cms/c_6516505/en/ltpb) in collaboration with the CER Groupe (<https://cergroupe.be/>) and the Center for Education and Research on Macromolecules (CERM) (https://www.cesam.uliege.be/cms/c_5012552/fr/cerm?id=c_5012552) at ULiege.

This project is part of the GT4health program, funded by the Walloon Region as part of its Win4Excellence program, which aims to develop various disruptive technologies as solutions to major challenges in the gene therapy sector. This multidisciplinary project involves ten partners from five French-speaking Belgian universities (ULiège, ULB, UCL, UNamur and UMONS), as well as the CER Group research centre.

JOB DESCRIPTION

LTPB is searching for a motivated PhD student (Master in Pharmacy, Nanomedicine, Biomedical Sciences...) to contribute to this 4-year project.

The thesis will be carried out in collaboration with the CER Groupe for the *in vitro* and *in vivo* evaluation of LNPs.

The PhD candidate will play a pivotal role in the GT4health program by formulating and evaluating LNPs both *in vitro* and *in vivo*. The PhD candidate will be in charge of the:

1. Formulation and evaluation of physicochemical characteristics of LNP (size, surface charge, complexation efficiency and protein corona formation under conditions close to physiological conditions (LTPB).
2. Optimisation of the production method. Two production methods will be compared: microfluidics and supercritical fluids (LTPB).
3. Evaluation of LNP efficacy and toxicity (*in vitro*) (LTPB and CER).
4. Evaluation of biodistribution and immunogenicity (*in vivo*) (CER).

SPECIFIC DUTIES & ACTIVITIES

- ▶ Design and optimize LNP formulations for cancer treatment.
- ▶ Characterize LNP formulations (size, ζ potential, protein corona, encapsulation efficiency...).
- ▶ Optimize the production method in order to guarantee scalability.
- ▶ Evaluate the toxicity and the efficacy (*in vitro* and *in vivo*).
- ▶ Evaluate the biodistribution, PK and immunogenicity of LNP formulations.

- ▶ Collaborate closely with interdisciplinary teams to contribute to the overarching goals of the GT4health program.
- ▶ Present research findings at seminar, workshops and international conferences.
- ▶ Disseminate results through peer-reviewed publications.
- ▶ Assist in mentoring undergraduate students and junior lab members as needed.

YOUR PROFILE

○ REQUIRED SKILLS :

- ▶ The candidate must hold or is about to complete (before 1st July 2024) a Master's degree in Pharmaceutical Sciences, Nanomedicine, Biomedical Sciences or equivalent strongly focused on pharmaceutical formulation and evaluation.
- ▶ Strong motivation to contribute to nanomedicine formulation at the service of cutting-edge developments in gene therapy.
- ▶ Excellent communication skills.
- ▶ Excellent level of spoken and written English (ability to communicate effectively with colleagues and present research findings with clarity).
- ▶ Ability to write scientific reports and publications in English.

○ DESIRABLE SKILLS :

- ▶ Experience and knowledge in nanotechnologies, nanoparticles, nanomedicine, are highly welcome.

○ SOFT SKILLS :

- ▶ Excellent organizational skills.
- ▶ Ability to work independently and collaboratively in a multidisciplinary team environment.

○ LANGUAGES :

- ▶ Excellent level of spoken and written English is necessary. Ability to communicate effectively and fluently with colleagues and present research findings with clarity.
- ▶ French knowledge is a plus but is not mandatory.

TERMS OF EMPLOYMENT

- ▶ Type of contract : PhD position
- ▶ Work schedule : 5 days/week, 38h/week
- ▶ Contract duration : 48 months
- ▶ Start date : 15th September 2024

OUR OFFER

With your career path and personal details, ULiège Human Resources Department can assess the gross monthly salary. Employment benefits such as reimbursement of public transportation fees and access to a [variety of training](#) opportunities are also included.

► WORK ENVIRONMENT

The PhD thesis will take place in the Laboratory of Pharmaceutical Technology and Biopharmacy (LTPB) and in the CER Groupe.

The LTPB takes part of the Center for Interdisciplinary Research on Medicines (CIRM) and is renowned for its expertise in the non-viral nanoparticle's development and evaluation. LTPB is composed of about 15 members.

LTPB's main objective is to design new pharmaceutical systems for controlled drug delivery and administration of drugs. LTPB is made up of researchers from different disciplines (pharmacists, chemists, biologists, biomedical sciences graduates), which allows it to consider not only the formulation but also the physicochemical characterization and biological evaluation of medicines. With its multidisciplinary approach, the LTPB has considerable assets to address different research themes around drug formulation. LTPB offers a collaborative, stimulating and supportive research environment with ample opportunities for networking (participation to local, regional, national and international research networks).

CER Groupe is a non-profit organization active in several life sciences sectors in a regulated environment (ISO, GLP). CER Groupe is also providing preclinical in vivo testings in different topics (oncology, bone remodeling, immunisation,...) and could be supported by its bioluminescence/fluorescence imagery equipment to track labelled products. The in vivo team involved in the thesis granted by GT4Health Win4Excellence program is composed of 5 technicians/preclinical assistants, 3 project managers, one referent DVM and one preclinical manager.

The PhD thesis will be carried out under the supervision of Prof. Geraldine PIEL (LRPB) and Gaëtan Thirion (CER Groupe). The PhD thesis will be performed in close collaboration with Dr. Antoine Debuigne (CERM, ULiège), Prof. J. Douxfils (UNamur), and Prof. V. Flamand (ULB).

HOW TO APPLY

Please send the following documents in pdf Geraldine.piel@uliege.be by April 22th 2024: a cover letter outlining research interests and career goals, a detailed CV, contact information for professional references. Please ensure that all documents are submitted in English.

SELECTION PROCEDURE

- Application submission: Geraldine.piel@uliege.be by April 22th 2024.
- Initial Screening: to assess candidate qualifications, research experience, and alignment with the position requirements.

- ▶ Interview Stage: face-to-face or by Teams by Prof Géraldine Piel
- ▶ Final Selection: selected candidate will be notified of its acceptance in May-June

CONTACT DETAILS

Informal inquiries about the project are welcome. Please feel free to contact Prof. Geraldine Piel: Geraldine.piel@uliege.be

Release date: 02/04/2024

Privacy policy

Personal data collected following your application will be processed by Dr. Antoine Debuigne of the University of Liege for the sole purpose of recruitment.

The data will be processed within the framework of pre-contractual measures (art. 6-1, b. of the General Data Protection Regulation) and kept for up to 9 months after the publication of the vacancy. Your personal data will not be passed on to any third parties.

In accordance with the provisions of the GDPR (EU 2016/679), you may exercise your data protection rights (right of access, rectification, erasure, restriction, and portability) by contacting ULiège Data Protection Officer (dpo@uliege.be - Mr. Data Protection Officer, Bât. B9 Cellule "GDPR", Quartier Village 3, Boulevard de Colonster 2, 4000 Liège, Belgium). You may also lodge a complaint with the Data Protection Authority (<https://www.autoriteprotectiondonnees.be> , contact@apd-gba.be).