Postdoc in Medicinal / Organic Chemistry (CBMN, Bordeaux, France)

Chemotherapy is one of the major alternative to fight cancer today. If, ideally, the use of a chemotherapeutic agent should selectively kill cancer cells, unfortunately they also affect healthy tissues, inducing severe side effects and toxicity to different body organs (liver, heart, kidneys, etc.). Nano-vehicles revealed as promising solutions to improve the bioavailability and the therapeutic index of existing drugs or to reduce the low attrition rates striking the pharma industry today. The phospholipids-derived carriers are highly promising because of their enhanced biocompatible profile. However, despite its early discovery more than 60 years ago, this type of "magic bullet" still needs to be improved, only ~15 liposome-based delivery systems are used in clinics today. Conventional, stealth or targeted generations of liposomes tackled many delivery-related issues; however, solving the temporal constraint of the delivery process is still in its infancy: *the nano-carrier should be able to release its target only on demand*. The concept of stimuli-responsive liposomes emerged naturally from the need of controlling the cargo release. Among them, the exogenous-triggered systems have a better temporal control of the drug release and they are less prone to patients' variation compared to endogenous stimuli (pH, hypoxia, etc.). Formulations designed to be triggered by external stimuli include ultrasound-, magnetic-, thermo-, electric- or light-induced cargo release. Most of those require natural phospholipids, but also the use of additives that induce liposomal deteriorations in the presence of an external stimulus.

We are currently exploring an "additive-free" approach: photo-sensitive liposomes (PSL) build from photo-sensitive phospholipids (PSP). We already validated the proof of concept of such photo-sensitive liposomes: highly stable in the absence of irradiation but also highly permeable when stimulated by light. A patent was recently submitted in collaboration with SATT Aquitaine on this new methodology (*WO2024084096*). Preliminary results were recently published in *J. Colloid Interface Sci. 653 (2024) 1792*. This project is funded by the "Initiative of Excellence" – University of Bordeaux.

As the drug release profile is highly dependent on the photosensitive phospholipids composing the nanoparticles, we are currently interested in developing a library of PSPs. We intend to develop nano-delivery systems suitable for clinical applications in collaboration with the other partners of this project. These will be formulated and investigated for their ability to induce the desired cargo release. The design of the target PSPs is guided by molecular modelling studies (coarse-grained molecular dynamics to predict the self-assembling process and the properties of the generated nanoparticles).

The recruited fellow will mainly work on the synthesis of a library of photosensitive phospholipids. This will involve multi-step synthesis and trivial methods from organic chemistry. He/she is expected to work in collaboration with formulation/analytical scientists and modellers and to participate to reports and scientific articles writing.

Requirements: PhD in organic chemistry (0 - 3 years of experience)

Essential skills: multi-step organic chemistry on 10mg to 100g scale; air and moisture-sensitive chemistry. Previous experience in amphiphiles chemistry is not mandatory.

Salary: ~27 KEur – 32 KEur annual gross (~1972 – 2150 Eur monthly net) depending on the experience

Period: 13 months

Host institute: CBMN, University of Bordeaux (http://www.cbmn.u-bordeaux.fr/)
Host team: MMBE, department CBSC (http://www.cbmn.u-bordeaux.fr/28-chimie-biophysique-modelisation-de-biomolecules-et-imagerie-numerique.html#trombinoscope)

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