Université de Montréal

PhD position offer (Fall 2022 or Winter 2023)

Laboratory of Pharmaceutical Micro and Nanotechnologies
Faculty of Pharmacy,
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Design of nanoparticles for the genetic restoration of altered lipid metabolism

The recent approval of a phospholipid nanoparticle-based genetic medicine highlights the potential value of the approach. In this project, we will investigate its potential in the treatment of lipid metabolism-associated disorders, for which metabolic alterations are key factors contributing to the pathogenesis, by designing a new phospholipid-based pharmaceutical formulation. We will design nanoparticles consisting of biocompatible lipids and polymers loaded with genetic material of different classes to restore the loss of metabolic lipases, enzymes critically involved in lipid metabolism. Their deficiency generates an imbalance in lipid catabolism and accumulation of lysosomal cholesteryl esters and triglycerides, especially in hepatocytes and macrophages, leading to severe diseases. Advanced molecular biology, genetic engineering, biotechnology will be combined with nanotechnology and multi-omics analysis to identify the best performing nanoparticles and nucleic acid sequences on a potential improvement of lipid metabolism. Following a large molecular in vitro screening the best performing combinations will be evaluated in relevant animal models.

Internship objectives:

- Design, optimization, and characterization of nanoparticles of different classes
- Design of nucleic acid sequences for gene replacement and editing
- In vitro efficacy evaluation in relevant human cell lines
- Biodistribution, PK/PD in relevant animal models

Profile:

- MSc in chemistry, biology, pharmacy and all related fields
- Excellent oral and written communication skills (English)
- Excellent scholar record
- Independent and enthusiastic
- Previous experience in cell culture or recombinant DNA desirable

Supervisors:
Prof. Davide Brambilla,
http://www.recherche.umontreal.ca/la-recherche-a-ludem/la-vitrine-des-professeurs/informations/chercheur/15070/

Prof. Simon-Pierre Gravel

https://pharm.umontreal.ca/faculte/lequipe/corps-professoral/fiche/in/in29097/sg/Simon-Pierre%20Gravel/

Application process:

Provide updated CV, scholar records, motivation letter and up to two reference letters to davide.brambilla@umontreal.ca.