Internship Proposal

Proposal By: Isabel Amaral | iamaral@i3s.up.pt

Proposal At: 2023-02-02

Contact: iamaral@i3s.up.pt

Project Title:
Development of biomaterials designed at the nanoscale for application in the nervous tissue and beyond

Level:

Master Student

Project Summary:

The following research projects are proposed at the NanoBiomaterials for Targeted Therapies (nBTT) group:

Design of innovative and versatile biodegradable dendrimers as carriers (nucleic acids/proteins/drugs/contrast agents) to develop nanotherapeutics and nanotheranostics for nervous system nanomedicine.

Development of engineered hydrogel coatings for electrode/brain interfacing.

Development of in vitro platforms for mimicking brain tissue in health and disease. Study the effect of the extracellular matrix on brain cells' behaviour.

Bioengineering of DNA nanostructures as drug delivery vehicles and design of DNA/RNA-based oligonucleotide therapeutics in neuro and cancer applications.

Assess the potential of polyamidoamine (PAMAM) dendrimers as carriers of mRNA to nucleus pulposus cells in the intervertebral disc (IVD).

Contact the group leader Ana Paula Pêgo (apego@i3s.up.pt) for more details on the proposed research studies.

Work to be developed by the student:

Join Our Dynamic Team at nBTT!

Are you an enthusiastic MSc student passionate about innovative research and teamwork? The NanoBiomaterials for Targeted Therapies (nBTT) group might be the perfect fit for you! We're dedicated to developing "smart" biomaterials—engineered at the nanoscale with controlled architectures and functionalities—to deliver precise, in situ signals that promote nervous tissue repair and restore function.

What We Do:

Innovative Research: We design and test advanced biomaterials aimed at targeted therapies.
Cutting-Edge Techniques: Our work spans a diverse range of state-of-the-art methods, including:
Physical & Chemical Analysis: DLS, rheology, FT-IR, NMR, MS, MPLC, HPLC, SEC
Surface Characterization: AFM, ATR-FT-IR, SEM, XPS
Biological Methods: Flow cytometry, molecular biology techniques, and bioimaging tools such as confocal microscopy, high content screening and imaging, micro CT, and IVIS lumina
Biological Models: From cell culture (including co-cultures and microfluidic systems) to ex-vivo and in vivo models (mice and zebra fish stroke models) to assess biomaterial performance

Why Join Us?

Interdisciplinary Collaboration
Team-Oriented Environment
Hands-On Experience

If you're eager to learn, collaborate, and contribute to groundbreaking research, we'd love to hear from you! For more details about our projects and the techniques we explore, please reach out to our group leader:

Ana Paula Pêgo
Email: apego@i3s.up.pt

References:

Rocha DN, Carvalho ED, Pires LR, Gardin C, Zanolla I, Szewczyk PK, Machado C, Fernandes R, Stachewicz U, Zavan B, Relvas JB, Pêgo AP. It takes two to remyelinate: A bioengineered platform to study astrocyte-oligodendrocyte crosstalk and potential therapeutic targets in remyelination (https://doi.org/10.1016/j.bioadv.2023.213429).

A.P. Spencer, V. Leiro, A.P. Pêgo. Unravelling the interactions of biodegradable dendritic nucleic acid carriers and neural cells (https://doi.org/10.1039/D2BM01114J).

Ana P. Spencer, Miguel Xavier, Sofia C. Guimarães, Adriana Vilaça, Ariel Ionescu, Rafael Santos, María Lázaro, Eran Perlson, Victoria Leiro, Ben M. Maoz, Ana P. Pêgo. Unveiling the potential of neuron-targeted dendriplexes for siRNA delivery using a PNS-CNS-on-Chip (https://doi.org/10.1101/2024.09.05.611457).

Moreno PMD, Cortinhas J, Martins AS, Pêgo AP. Engineering a Novel Self-Assembled Multi-siRNA Nanocaged Architecture with Controlled Enzyme-Mediated siRNA Release (DOI: 10.1021/acsami.2c15086).

Leiro V, Spencer AP, Magalhães N, Pêgo AP. Versatile fully biodegradable dendritic nanotherapeutics (DOI: 10.1016/j.biomaterials.2021.121356).

Barros D, Parreira P, Furtado J, Ferreira-da-Silva F, Conde-Sousa E, Garcia AJ, Martins MCL, Amaral IF, Pêgo AP. An affinity-based approach to engineer laminin-presenting cell instructive microenvironments. (DOI: 10.1016/j.biomaterials.2018.10.039).

INSTITUTO
DE INVESTIGAÇÃO
E INOVAÇÃO
EM SAÚDE
UNIVERSIDADE
DO PORTO

Rua Alfredo Allen, 208
4200-135 Porto
Portugal
+351 220 408 800
info@i3s.up.pt
www.i3s.up.pt