Internship proposition 2026-2027

Master 2 GP Medicine 4R (Repair, Replace, Regenerate, Reprogram)

Lab: Inserm U1229 Regenerative Medicine and Skeleton (RMeS)
Team: REJOINT team, Age-OA group

Name and position of the supervisor: Romain GUIHO – Professeur associé

Email of the supervisor: romain.guiho@univ-nantes.fr

Candidate (if internship filled):

Title of the internship: Impact of Senescent Nucleus Pulposus Secretome on Cartilaginous Endplates Calcification

Summary of the internship proposal:

Intervertebral disc degeneration (IVDD) is a leading cause of chronic back pain, characterized by cellular senescence within the Nucleus Pulposus (NP). Senescent NP cells develop a Senescence-Associated Secretory Phenotype (SASP). While the local effects of the SASP are well-documented, its distant impact on surrounding tissues remains poorly understood. Notably, IVDD is frequently associated with the pathological ossification of the cartilaginous vertebral endplates, which further impairs disc nutrition and accelerates degeneration. Preliminary data has identified specific pro-mineralization factors within the SASP of NPCytes, raising the question of a direct causal link between NP senescence and endplate calcification.

Objectives: The main objective of this 6-month internship is to investigate the cross-talk between senescent NP cells and surrounding endplates. Specifically, the student will determine whether pro-mineralization factors from the SASP directly drive the pathological ossification observed in IVDD.

To achieve this, the student will implement a translational ex vivo approach using rat tail disc explants:

- Ex vivo culture: Isolation of NP explants and generation of senescent-conditioned media (or indirect co-culture systems).
- Phenotypic and molecular characterization: Evaluation of NP explant and the endplates response using histology (chondrocyte hypertrophy, calcification/ossification; immunostaining for senescence markers…) and ELISA to track key protein secretion.
- Mechanistic Insights: High-throughput transcriptomic analysis via RNAseq to identify the signaling pathways triggered in endplate tissues by the SASP.

This project will provide a better understanding of the paracrine effects of cellular senescence in the disc ecosystem. Demonstrating that the SASP of NPCytes directly induces endplate mineralization could unveil new therapeutic targets to halt the vicious cycle of intervertebral disc degeneration.

Profile(s) linked to the project:

X Experimental Biology *(Recherche expérimentale)*
☐ Clinical Research *(Recherche clinique)*
☐ Research in data analysis (Recherche en analyse de données)