

Postdoctoral Position in a Joint collaborative project between URCA (BIOS) and UL (IMoPA)

Senescence is a stress response process and characterized by a decay in cellular proliferation, a resistance to apoptosis and the secretion of proinflammatory factors. This condition results in increased cellular damage and death of neighboring cells and plays an essential role in the aging process, significantly limit the tissue regeneration. On the other hand, ferroptosis is a systemic cell death pathway characterized by excessive iron accumulation followed by the generation of reactive oxygen species (ROS). Oxidative stress is a common trigger of this condition and may be induced by various factors such as inflammation. In bone regenerative medicine, rather than directly stimulating osteoblastic differentiation, utilizing scaffolds with antioxidant and immunomodulatory properties has emerged as a new approach. While Wharton's jelly (WJ) matrix has demonstrated to possess an immunomodulatory function, its practical use as a scaffold in clinical settings is hindered by weak mechanical properties and chemically instability to ROS. Our group selected polyphenols to enhance the properties of WJ hydrogel/scaffold through collagen-phenolic chemistry. Functioning as biocompatible carrier for the delivery of polyphenols to damaged tissues, the scaffold also displayed excellent antioxidant activities, limiting the excessive mitochondrial accumulation of reactive oxygen species in H₂O₂-stimulated fibroblasts and neutrophils. In vivo, the scaffold demonstrated excellent tissue compatibility (antifibrotic properties) and significant bone regeneration in critical-sized rat parietal bone defect. This project aims at deciphering the mechanism involved in the tissue regeneration through the polyphenol delivery. Both senescence and ferroptosis are complex pathways that are still not fully understood. We expect that polyphenols induce ferroptosis by inhibiting ferrochelatase. Recent studies demonstrate a higher expression of ferrochelatase in senescent cells compared to non-senescent cells. The work of the postdoctoral researcher will focus on establishing an *in vitro* senescent environment characteristic of damaged bone tissue and investigate the expression of ferrochelatase and the effect of WJ-polyphenol scaffolds in ferritinophagy.

Requirements & application:

The position is expected to start in Autumn 2025 at Reims University and Lorraine University. The contract is proposed for 12 months with a possibility of extension up to 24 months.

The candidate should hold a PhD degree (PhD defense after 2023) with strong interest in immunology, mitochondria and molecular biology. The candidate should have a strong knowledge in senescence and mitochondria.

The candidate should be rigorous, systematic with good organizational skills and be willing to evolve in an interdisciplinary project and gain skills in immunology. He/she should be able to report his/her progress and data in a concise and precise manner and be able to work independently.

Application must include at least a one-page cover letter explaining why you wish to work on this project and a detailed CV with the contact information of at least two references.

Contacts :

Pr. Halima KERDJOUJ
Université de Reims Champagne Ardenne, UFR d'Odontologie de Reims.
UR Biomatériaux et Inflammation en Site Osseux (BIOS)
Email: halima.kerdjoudj@univ-reims.fr

Pr Natalia DE ISLA
Université de Lorraine, Faculté de Médecine
IMoPA, UMR CNRS-UL 7563
Email : natalia.de-isla@univ-lorraine.fr