Internship proposition 2026-2027

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

Lab: CR2TI/UMR1064
Team: 1

Name and position of the supervisor: Dr Franck Halary, INSERM senior scientist

Email of the supervisor: franck.halary@univ-nantes.fr

Candidate (if internship filled): not determined yet

Title of the internship: Impact of mechanosensing on a virally-infected, human renal tubule on chip model

Summary of the internship proposal:
Mechanical forces play a critical role in organ development and regulation of physiological functions. Renal Proximal Tubule Epithelial Cells (RPTECs), the most abundant cell type in the human kidney, are known to experience a constant exposure to mechanical stimuli like Fluid Shear Stress (FSS) caused by the urine flow, thus modulating their functions. The sensing of FSS, as a part of the cellular mechanosensing machinery in RPTECs, mostly relies on the primary cilium (PC), a non-motile structure that extends into the lumen. The intraflagellar transport proteins (IFT) are major PC components. While there is a growing understanding of how the physical properties of biological matter governs the different steps of a viral infection, nothing is known about how a physiological mechanical constrain like FSS could impact viral infections of the human kidney, like the BK polyomavirus (BKPyV), a human-specific pathogen. To address this question, we developed a fully humanized, advanced in vitro model of the kidney tubule, a well-established reactivation site for the BKPyV in vivo, on a microfluidic chip endowed with several key functions of the renal tubule, in a tightly controlled environment. Our model has already been validated with drug-induced toxicity challenges (Lechtenberg, Chéneau et al., Tox In Vitro 2025). During his/her internship, after a careful review of the literature and mandatory technical trainings (BSL2 access), the candidate will operate our kidney tubule-on-chip model to compare the impact of the knock-down for multiple genes, ex: IFTs in immortalized RPTECs in comparison to unaffected cells, on the BKPyV infection. The candidate will be asked to design and conduct his/her experiments mainly using assays like RT-qPCR/qPCR, multiplexed IF, etc as well as cell culture in the two BSL2 labs in the CR2TI under the supervision of qualified labmates.

Profile(s) linked to the project:

X Experimental Biology *(Recherche expérimentale)*

☐ ~~Clinical Research *(Recherche clinique)*~~

☐ ~~Research in data analysis (Recherche en analyse de données)~~