Internship Proposition
(one page max)

Master 2 GP Immunology & ImmunoIntervention (I^3)
2026-2027

Lab: CR2TI
Team: 6

Name and position of the supervisor: Jeremie Poschmann CRCN Inserm

Email of the supervisor: jeremie.poschmann@univ-nantes.fr

Candidate (if internship filled):

Title of the internship: Multi-omics identification of molecular signatures associated with cardiovascular outcomes after hospital-acquired pneumonia

Hospital-acquired pneumonia (HAP) is a major complication in critically ill patients and can have long-term consequences beyond the acute infectious episode. Survivors of pneumonia frequently present persistent clinical alterations, including reduced quality of life, impaired organ function and increased cardiovascular risk. The European Homi-Lung project aims to understand these long-term trajectories by combining deeply phenotyped patient cohorts with multi-omics profiling during infection, recovery and follow-up.
The Master 2 internship will focus on the computational analysis of molecular data generated from patients with HAP, with comparison groups including community-acquired pneumonia, COVID-19, patients with stable cardiovascular disease and healthy controls. The student will curate and harmonize clinical metadata, including infection type, sampling time point, cardiovascular risk and outcome variables. The first objective will be to analyze single-cell RNA-seq data to define patient-level cellular and transcriptional features that vary across disease groups, recovery stages and cardiovascular trajectories.
The student will then integrate these single-cell-derived features with proteomic and metabolomic datasets generated from the same clinical framework. The analysis will aim to identify molecular signatures associated with adverse cardiovascular outcomes after pneumonia, including inflammatory, metabolic, vascular and tissue-repair pathways. Particular attention will be given to signatures that are robust across omics layers and that can distinguish patients with unfavorable long-term trajectories from those with favorable recovery.
The expected outcome is the identification of candidate multi-omics biomarkers associated with cardiovascular complications after HAP. These signatures will contribute to the Homi-Lung objective of defining clinically relevant endophenotypes of pneumonia survivors and prioritizing measurable biomarkers for patient stratification. The internship will provide training in clinical cohort analysis, single-cell RNA-seq processing, proteomics and metabolomics integration, statistical modeling, biomarker discovery and reproducible bioinformatics workflows.

Option(s) linked to the project:

☐ Clinical Research Profile (Recherche Clinique)
xData Analyst Profile (Recherche et Analyse de Données Omiques)
☐ Experimental Biology Profile (Recherche Expérimentale)

Form to be sent by email to : gpi3@univ-nantes.fr