

Internship Proposition
(one page max)

Master 2 GP Immunology & ImmunIntervention (I³)
2026-2027



Lab: Inserm UMR 1064, CR2TI

Team: 6

Name and position of the supervisor: Dr CREMET Lise / Pr ROQUILLY Antoine

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Candidate (if internship filled): H el ene GERARD

Title of the internship:

Analysis of the role of the pulmonary commensal bacterium *Veillonella atypica* in protecting against Gram-negative bacilli pneumonia.

Summary of the internship proposal:

Pneumonia remains a major global health burden and one of the leading infectious causes of morbidity and mortality. Hospital-acquired pneumonia is associated with high treatment failure rates (~40%) and significant mortality. Its management is increasingly challenged by the rapid rise of multidrug-resistant Gram-negative bacilli (GNB). Current strategies rely heavily on broad-spectrum antibiotics, which disrupt the respiratory microbiome, promote resistance gene expansion, and contribute to treatment failure. There is therefore an urgent need to move beyond pathogen-centered approaches and develop innovative strategies that preserve microbial ecosystems while controlling infection. Our team has recently highlighted a central role of respiratory dysbiosis in severe pneumonia, but the interactions between the lung commensal ecosystem and pathogenic bacteria have been little studied, and the effects of this microbiota on the lung mucosa warrant further investigation. During this internship, we will analyze in a mouse model, the effect of lung colonization by the commensal bacterium *Veillonella atypica* on the pulmonary mucosa and resident cell populations. We will study the consequences of this pulmonary colonization on the development of secondary infection by GNB (*Escherichia coli*, *Pseudomonas aeruginosa*) by measuring pulmonary bacterial loads, analyzing pulmonary immune populations, and measuring cytokines. Furthermore, using a transcriptomic approach, we will determine, through co-culture experiments, which biological processes regulate the interactions between *V. atypica* and other commensals (*Streptococcus mitis*, *Rothia mucilaginosa*, *Prevotella melaninogenica*) or pathogens (*E. coli*, *P. aeruginosa*). Our proposed work should provide a rationale for the development of a lung adapted Live Biotherapeutic Product (LBP) based on the enrichment of the respiratory microbiota, and aimed at restoring microbiome resilience, modulating host immunity, and targeting key pathogen virulence and survival mechanisms.

Option(s) linked to the project:

- Clinical Research Profile (Recherche Clinique)
- Data Analyst Profile (Recherche et Analyse de Donn ees Omiques)
- Experimental Biology Profile (Recherche Exp erimentale)

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