

Master in Chemistry

Sujet de stage de Master 2 (1 page max.)

Laboratoire : Institut de Biologie Structurale

Directeur : Pr Winfried Weissenhorn

Intitulé de l'équipe : Groupe RMN Biomoléculaire, Equipe Résistance bactérienne aux antibiotiques

Responsable : Dr Jean-Pierre Simorre

Nom et Qualité du Responsable du Stage : Catherine Bougault, MCF **HDR** oui non

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Parcours de Master 2 (*Rayer la/les mention(s) inutile(s)*) :

Chemistry for Life Sciences (CLS)

Titre du sujet : Structural and dynamical study by NMR of the interactions between bacterial cell-wall components and L,D-transpeptidases in mycobacteria

Objectifs visés du stage (5 lignes max) :

The goal of this project is to provide structural and mechanistic insight into the interaction of peptidoglycan, and its covalently bound sugars and mycolic acids, with L,D-transpeptidases in order to develop alternative strategies to classical beta-lactam antibiotic therapies.

Intérêts pédagogiques et compétences visées (5 lignes max) :

Production and purification of samples of biomacromolecules - Acquisition of 2D and 3D NMR spectra on high resolution NMR spectra - Scientific interaction within an international team and group work

Résumé :

The mycobacterial cell wall contains many unique features when compared to other bacterial cell walls and there is an increasing amount of evidence that suggests that these modifications are involved in conferring antibiotic resistance. This is particularly concerning with the increasing multidrug resistance cases of the opportunistic human pathogen, *Mycobacterium tuberculosis*, causing around 2 million deaths each year. The aim of this study is to examine the interaction of L,D-transpeptidases, LdtMt1 and LdtMt2, with mycobacterial cell wall in order to gain insights into the role of this enzyme in the biosynthesis and maturation of the mycobacterial cell envelope in order to offer alternative strategies to address antibiotic resistance. Cell wall being a highly heterogeneous and NMR appears as one of the only method of study and liquid-state as well as solid-state NMR approaches will be considered for this purpose.

Approches & matériels utilisés (5 lignes max) :

The master student will take part in the production and purification of bacterial cell wall samples from non-pathogenic mycobacteria, the production and purification of isotopically labeled proteins, as well as liquid- and solid-state NMR data acquisition and analysis.

Domaines de compétences souhaitées du candidat (3 lignes max):

Purification and extraction methods - Basic computer skills (eventually with linux systems)
Biomolecule visualization softwares

Dates du stage : Début Janvier 2021 – Fin Juin 2021