

**Internship project Master 2
Year 2018-2019**

Laboratory/Institute: Institut de Biologie Structurale
Team: GSY/icOS

Director: Winfried Weissenhorn
Head of the team: Antoine Royant

Name and status of the scientist in charge of the project:

Jérôme Dupuy – Maître de Conférences

HDR: yes no

Janek Bzdrenga – Research associate

HDR: yes no

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Program of the Master's degree in Biology:

Neurosciences and Neurobiology

Immunology, Microbiology, Infectious Diseases

Integrative Structural Biology

Physiology, Epigenetics, Differentiation, Cancer

Title of the project:

NADPH oxidase: study of biological function in prokaryotes.

Objectives (up to 3 lines):

Determination of the biological function of prokaryotic NADPH oxydases, by phenotypic and transcriptomic approaches.

Abstract (up to 10 lines):

Transmembrane NADPH oxidase (NOX) enzymes have been so far only characterized in eukaryotes. In most of these organisms, they reduce molecular oxygen to superoxide. Reactive oxygen species (ROS) have been traditionally considered accidental toxic by-products of aerobic metabolism. ROS like $O_2^{\bullet-}$ and H_2O_2 are key players in complex signaling networks and defense. A well-studied example is the production of $O_2^{\bullet-}$ during the bactericidal respiratory burst of phagocytes. NOX enzymes have recently been reported in bacteria. After a thorough computational and experimental studies to provide the first characterization of a prokaryotic NOX, we initially selected, cloned and overexpressed several of them. We focused on *Streptococcus pneumoniae* and *Pseudomonas aeruginosa*, which share many characteristics with human NOXes. If the function is quite well described regarding human NOXes. their biological function(s) in the prokaryotic kingdom may wildly differ, as pointed out by the different bacterial genomic context.

Methods (up to 3 lines):

Phenotypic analyses (growth, shape, ...)

Virulence factor expression screening (biofilm, proteolytic activity, ...)

Transcriptional study by qPCR.

Up to 3 relevant publications of the team:

Hajjar C, Cherrier MV, Dias Mirandela G, Petit-Hartlein I, Stasia MJ, Fontecilla-Camps JC, Fieschi F, Dupuy J. The NOX Family of Proteins Is Also Present in Bacteria. MBio. 2017 Nov 7;8(6).

Requested domains of expertise (up to 5 keywords):

Microbiology, infectiology, biochemistry, molecular biology