Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project

Year 2025-2026

Laboratory/Institute: Institut de Biologie Structurale (IBS) **Director:** W Weissenhorn

Team: Antibodies and Infectious Diseases **Head of the team:** P Poignard

Collaboration Bacterial pathogenesis team, I Attrée, IBS

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

P Poignard

HDR: yes X no ☐

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Program of the Master's degree in Biology:

X Microbiology, Infectious Diseases and Immunology ☐ Biochemistry & Structure

☐ Physiology, Epigenetics, Differentiation, Cancer ☐ Neurosciences and Neurobiology

Title of the project:

Human monoclonal antibodies against Pseudomonas aeruginosa virulence factors

Objectives (up to 3 lines):

To characterize human monoclonal antibodies against Pseudomonas aeruginosa virulence factors, such as the type 3 secretion system and the flagellum

Abstract (up to 10 lines): The AID team investigates antibody responses in infections. Its research focuses on two main areas: i) characterizing polyclonal antibody responses in natural infections and following vaccination; and ii) isolating and characterizing human monoclonal antibodies for infection prevention and treatment, as well as for vaccine antigen discovery and rational vaccine design.

In collaboration with the Bacterial pathogenesis team of I Attrée at IBS, we develop strategies to isolate and characterize human mAbs capable of neutralizing virulence factors of *Pseudomonas aeruginosa*, a major opportunistic pathogen with a high incidence of multidrug resistance, making treatment increasingly challenging. Targeting virulence factors, such as the type 3 secretion system and the flagellum, with monoclonal antibodies, represents a promising alternative therapeutic strategy to mitigate infection.

Methods (up to 3 lines):

Human monoclonal antibodies, isolated via single B cell sorting and immunoglobulin gene cloning,

will be produced by transfection and characterized for their specificity and their ability to inhibit Pseudomonas aeruginosa virulence.

Up to 3 relevant publications of the team:

Desveaux JM, Faudry E, Contreras-Martel C, Cretin F, Dergan-Dylon S, Amen A, Bally I, Tardivy-Casemajor V, Chenavier F, Fouquenet D, Caspar Y, Attrée I, Dessen A, Poignard P. Neutralizing human monoclonal antibodies that target the PcrV component of the Type III Secretion System of Pseudomonas aeruginosa act through distinct mechanisms eLife 2025 In press http://doi.org/10.7554/elife.105195.1

Amen A, Yoo R, Fabra-García A, Bolscher J, Stone W J.R., Bally I, Dergan-Dylon S, Kucharska I, de Jong R M., de Bruijni M, Bousema T, King C. R, MacGill R S., Sauerwein R W., Julien J-P, Poignard P, Jore M M. Target-agnostic identification of human antibodies to Plasmodium falciparum sexual forms reveals cross stage recognition of glutamate-rich repeats. eLife 202413:RP97865 https://doi.org/10.7554/eLife.97865.1

Landais E, Murrell B, Briney B, Murrell S, Rantalainen K, Berndsen ZT, Ramos A, Wickramasinghe L, Smith ML, Eren K, de Val N, Wu M, Cappelletti A, Umotoy J, Lie Y, Wrin T, Algate P, Chan-Hui PY, Karita E; IAVI Protocol C Investigators; IAVI African HIV Research Network; Ward AB, Wilson IA, Burton DR, Smith D, Pond SLK, Poignard P. HIV Envelope Glycoform Heterogeneity and Localized Diversity Govern the Initiation and Maturation of a V2 Apex Broadly Neutralizing Antibody Lineage. Immunity. 2017 Nov 21;47(5):990-1003.e9. doi: 10.1016/j.immuni.2017.11.002.

Requested domains of expertise (up to 5 keywords):

Immunology
Microbiology
Molecular biology
Biochemistry