UFR de Chimie et de Biologie
UNIVERSITÉ Grenoble Alpes

Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2020-2021

Laboratory/Institute: IBS
Director: Winfried Weissenhorn
Teams: IRPAS/MEM
Head of the teams: Nicole Thielens/Guy Schoehn

Name and status of the scientist in charge of the project: Jean-Baptiste REISER, Ph.D.
HDR: yes ■ **no** ☐
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Name and status of the scientist in charge of the project: Wai Li Ling, Ph.D.
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Program of the Master's degree in Biology:

■ Immunology, Microbiology, Infectious Diseases ■ Integrative Structural Biology
☐ Physiology, Epigenetics, Differentiation, Cancer ☐ Neurosciences and Neurobiology
☐ Planta International

Title of the project:

Characterization of the interaction between new recombinant Immunoglobulins M and the complement

Objectives (up to 3 lines):

The overall goal of the master internship is focused on the characterization of the interaction between the main activators of the classical complement pathway -- the Immunoglobulins M (IgM) and the C1 complex, the first molecule that initiates this pathway.

Abstract (up to 10 lines):

The project is part of a more general project to decipher the molecular mechanisms of the activation of the initiation complex of the classical complement pathway by its activator, a biological process that challenged immunologists for several decades. It will focus on the C1/IgM/antigen bindings by taking advantages of the new developments in the protein engineering, biophysics and structural biology. In particular, the internship project will address and answer the following points:
- routine expression, purification and control quality of recombinant native IgMs, as well as specific antigen templates
- development of biochemical and biophysical characterization of the interaction between C1q, IgMs and their cognate antigens
- development of structural characterization of IgM constructs (full length and Fc core)

Methods (up to 3 lines):

Cellular biology for IgM expression (HEK293 cells), biochemistry for purification and sample preparations (FPLC), Biophysics for interaction characterization (SPR/BLI), (Cryo)-Transmission Electron microscopy and single particle analysis for structural characterization

Up to 3 relevant publications of the team:

[1] Deciphering the fine details of C1 assembly and activation mechanism: "mission impossible"? Christine G, Ling WL, Thielens NM, Bally I, and Rossi V. *Frontiers in Immunology* (2014) **5**, 1-7.

[2] Transient pentameric IgM fulfill biological function-Effect of expression host and transfection on IgM properties. Hennicke J, Schwaigerlehner L, Grunwald-Gruber C, Bally I, Ling WL, Thielens N, Reiser JB, and Kunert R. *PLoS One* (2020) **15**(3):e0229992.

[3] Evaluation of C1q binding and complement activation of new recombinant human IgMs as quality production attributes. Reiser JB, Bally I, Chouquet A, Ling WL, Reinhart D, Altmann F, Kunert R, and Thielens N. *Molecular Immunology* (2019) **114**, 426.

Requested domains of expertise (up to 5 keywords):

Immunology, biochemistry, structural biology, transmission electron microscopy, computer skills