

Supervisor(s):

Jean-Baptiste Reiser, jean-baptiste.reiser@ibs.fr

Host laboratory:

IBS, <https://www.ibs.fr/>

Host group/team:

CAID: Complement, Antibodies and Infectious Diseases / CIRDis team

Title of the M2 research internship:

New antiviral IgMs for structural and biophysical studies in complex with their target

Project summary:

The overall objective of the internship will be the development of the recombinant production of Immunoglobulins M (IgMs), which have been identified as the main actors in the adaptive and humoral immune response against Polyomaviruses (PyVs). It will be part of a more general project to decipher the structural mechanisms of the interaction of IgMs and their antigens, and how they can drive the specific Ig immune responses. In particular, a question not answered yet is why some virus induce Ig memory responses dominated by IgM-expressing B cells. One hypothesis is that the particular array of epitopes of the PyV capsid might lead to the emergence of memory IgM response. Comprehensive studies, using biochemistry, biophysics and structural biology with high resolution cryo-electron microscopy techniques in complement to B-cell repertoire studies are necessary to fully apprehend the interaction mode between Ig repertoires and the viral capsid.

The internship project will address and answer the following points:

- Expression, purification and control quality of recombinant native IgMs, as well as specific antigen templates
- Biochemical and biophysical characterization of the interactions between IgMs and their cognate antigens using ELISA, SPR and/or BLI,
- Preliminary structural characterization of the antigen-IgM complexes using cryo-EM.

The student will be part of a large consortium that gathers immunologists, biochemists and structural biologists from different labs in France (CHU and University of Nantes; CHU, CNRS and University Grenoble-Alpes). In particular, he/she will be supervised by 2 teams : CAID (Reiser/Poignard) and MEM (Ling) groups of IBS.

Keywords:

immunoglobulins, biophysics, structural biology

Relevant publications of the team:

1. Bally, S. Ancelet, J.-B. Reiser, V. Rossi, C. Gaboriaud, N. M. Thielens, Functional recombinant human complement C1q with different affinity tags. *Journal of Immunological Methods*. 492, 113001 (2021).

2. A. Chouquet, A. J. Pinto, J. Hennicke, W. L. Ling, I. Bally, L. Schwaigerlehner, N. M. Thielens, R. Kunert, J.-B. Reiser, Biophysical Characterization of the Oligomeric States of Recombinant Immunoglobulins Type-M and Their C1q-Binding Kinetics by Biolayer Interferometry. *Frontiers in Bioengineering and Biotechnology*. 10 (2022) (available at <https://www.frontiersin.org/article/10.3389/fbioe.2022.816275>).

3. J. Hennicke, L. Schwaigerlehner, C. Grünwald-Gruber, I. Bally, W. L. Ling, N. Thielens, J.-B. Reiser, R. Kunert, Transient pentameric IgM fulfill biological function—Effect of expression host and transfection on IgM properties. *PLOS ONE*. 15, e0229992 (2020).