**Master 2 internship project**

**Year 2023-2024**

**Laboratory/Institute:** IBS **Director:** Winfried Weissenhorn

**Team:** CAID **Head of the team:** Pascal Poignard

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

Jean-Baptiste REISER, Ph.D. – Chargé recherche CNRS **HDR: yes** ■ **no ☐**

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**Program of the Master’s degree in Biology:**

■Microbiology, Infectious Diseases and Immunology ■Structural Biology of Pathogens

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

**Title of the project: Biophysical and interaction characterization of recombinant IgM against PyVBK virus**

Objectives (up to 3 lines):

The aims of the internship will be to recombinantly produce a library of IgMs in eukaryotic system, to purify them, to quality control the samples using biophysics methods (SEC-MALLS, Mass photometry, negative staining EM…) and to develop IgM/antigen interaction protocols using SPR and/or BLI.

Abstract (up to 10 lines):

Although polyomaviruses such as PyVBK virus can cause mild to no symptoms, the persistent infection and reactivation in immunosuppressed hosts provoke sever pathologies such as neuphopathies, graft loses, leukoencephalopathies. Recently and thanks to new single cell sequencing, B-cell repertoires against PyVBK in such patients have been characterize and humoral immune responses have been showed to be dominated by memory type-M immunoglobulins (IgM). Because of the peculiar structure of the virus which belong to the superfamily of non-enveloped DNA viruses, we hypothesized a link between the regular array of epitopes presented by PyV capsids and the emergence of IgM response. To test this hypothesis, we gathered experts in immunology, cell biology, biochemistry, biophysics, structural biology and biocomputing. Goals of our IBS group are to produce a library of anti-PyVBK IgMs, to characterize their bindings to antigens and to determine the structure by cryo-EM of complexes between IgMs and viral particle.

Methods (up to 3 lines):

Protein engineering: eukaryote expression, biochemistry; Biophysics: SEC-MALLS, Mass photometry, SPR, BLI; Structural biology: Electron microscopy

Up to 3 relevant publications of the team:

Chouquet et al., Front. Bioeng. Biotechnol., 2022, 10:816275

Hennicke et al. PlosOne, 2020, 15:e022992

Requested domains of expertise (up to 5 keywords):

Immunology, antibodies, protein engineering, biophysics, structural biology