# PhD project No. 28, Prof. Hengel

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| **Scientific Area** | Immune-related diseases |
| **Two project titles** | A) Modulation of B cell activation by cytomegalovirus<br>B) Modulation of B cell activation in COVID-19 |
| **Host country** | Germany |
| **Supervisor, institution** | Prof. Hartmut Hengel, Medical Center, University of Freiburg, Germany |
| **Co-Supervisor, institution** | A) Prof. Tobias Derfuss, University of Basel, Switzerland<br>B) Prof. Tobias Derfuss, University of Basel, Switzerland |
| **Mentor, institution** | A) and B) Prof. Marta Rizzi, Medical Center, University of Freiburg, Germany |
| **Secondment institution** | A) and B) Medical Center, University of Freiburg, Germany-University of Basel, Switzerland |

**Short description of the supervisor's lab with introduction to the topic**

The Hengel lab has a long standing research interest in the immunobiology and pathogenesis of viruses and particularly viral immune evasion strategies. Recently, we have identified several human cytomegalovirus (HCMV)-encoded genes that counteract antibody mediated effector functions and manipulate memory B cell activation. Moreover, we have developed a new platform of reporter cell based assays that allow convenient detection of a large variety of Fc-Receptor ligands.

**Topic description, including techniques to be used**

**Project A)**

Based on recombinant HCMV mutant viruses and recombinant HCMV proteins which were shown to interact with constant parts of the human B cell receptors (BCR), we will study molecular and cellular consequences for BCR signalling and immunoglobulin secretion of B cells. Moreover, intervention strategies aiming at restoring of BCR function will be developed and molecularly characterized.

Techniques: Flow cytometry, protein biochemistry, reporter cell assays, construction of recombinant viruses.

**Project B)**

Soluble multimeric immune complexes and increased levels of C-reactive protein (CRP) were identified as biomarkers for severe courses of COVID-19 disease, but also autoimmune disease like systemic lupus erythematosus (SLE). In this project we will study how these ligands of distinct Fc-γ Receptors modulate the activation and function of naïve and memory human B cells.

Techniques: Primary immune cell cultures, flow cytometry, protein biochemistry, reporter cell assays.

**Recommended applicant's training (technical expertise and knowledge)**

Techniques: Cell culture, DNA cloning, virus culture, flow cytometry, immune-precipitation.
Knowledge: Immunology, virology, cell biology and signalling cascades.

**Maximum two relevant publications**

Kolb et al., 2020, bioRxiv: Human Cytomegalovirus antagonizes activation of Fcγ receptors II and III by distinct and synergizing modes of IgG manipulation

Chen et al., 2020, bioRxiv: Immune complex solubility and size govern Fc-gamma receptor responses

The EURIdoc programme has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement number 101034170.

# Ethics description

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| **1. Humans** | |
| This research involves human participants. | YES ☐ / NO ☒ |
| This research involves physical interventions on the study participants. | YES ☐ / NO ☒ |
| **2. Human Cells /Tissues** | |
| This research involves human cells or tissues, such as blood. | YES ☒ / NO ☐ |
| **3. Personal Data** | |
| This research involves personal data collection and/or processing. | YES ☐ / NO ☒ |
| This research involves further processing of previously collected personal data (secondary use). | YES ☐ / NO ☒ |
| **4. Animals** | |
| This research involves animals, such as mice. | YES ☐ / NO ☒ |

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