

**Center for Human Immunology Lausanne**  
**Laboratory of molecular immunology and vaccinology**



**Principal Investigator:**

Professor Laurent Perez

<https://www.unil.ch/fbm/home/menuinst/la-releve-academie/nominations--promotions/professeurs-a-a-z/l-p/perez-laurent.html>)

**Lab member:**

Rachel Schelling, PhD: Research associate

Victor Joo, PhD: Post-doc

Pauline Nortier: PhD student

**Research Focus**

Our laboratory focuses on the analysis and characterization of the humoral immune response in human. The main goal is to understand the molecular basis underlying B cells response in healthy and pathological conditions.

Specifically, we aim to:

- 1- Identify human monoclonal antibodies of interest, to be used as drugs for prophylaxis treatment against infectious diseases, diagnostic and tools for vaccine design.
- 2- Improve antibodies response to vaccine using nanoparticles and novel scaffold designed by computer-aided design. In contrast, we wish to specifically tune down abnormal B-cells response in pathological setting of autoimmunity.
- 3- Understand the molecular interaction between antigen and antibody using antibody based vaccine design and structural biology approach.
- 4- Follow the antibody repertoire response in case of chronic infections.

Our group is highly multidisciplinary and use immunological, cellular, biochemical and structural approaches (Cryo-EM) in combination with next generation sequencing and single cell transcriptomic methodologies.

## Current projects Covers

- 1- Identification of molecular switches for B lymphocyte activation or inhibition.
- 2- Mechanisms of HCMV mediated immune evasion.
- 3- Structural elucidation of antibodies mediating neutralization of SARS-CoV-2.
- 4- Computer-aided design of nanoparticles for next generation vaccine.
- 5- Cross neutralization of human Pneumoviridae.

## Selected Publications

Fenwick, C.\*, Turelli, P.\*, **Perez, L.\***, Pellaton, C., Esteves-Leuenberger, L., Farina, A., Campos, J., Lana, E., Fiscalini, F., Raclot, C., Pojer, F., Lau, K., Demurtas, D., Descatoire, M., Joo, VS., Foglierini, M., Noto, A., Abdelnabi, R., Foo, C., Vangeel, J N., Du, w., Bosch, J., Veldman, G., Leyssen, P., Thiel, V., LeGrand, R. Lévy, Y., Trono, D., Pantaleo, D. **2021**. A highly potent antibody effective against SARS-CoV-2 variants of concern. *Cell Report*.

### **\*equal contribution**

Perotti M., Marcandalli J., Demurtas D., Sallusto F and **Perez L.** Rationally designed Human Cytomegalovirus gB nanoparticle vaccine with improved immunogenicity. *PLoS Pathogens*. 2020;16(12): e1009169. [10.1371/journal.ppat.1009169]

<https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1009169>

Marcandalli J, Fiala B, Ols S, Perotti M, Snijder J, Hodge E, Lanzavecchia A, Sallusto F, Dubois P, Lee K, Velesler D, Stewart L, Baker D, Lore K, **Perez L\***, King NP\*. Induction of potent neutralizing antibody responses by a designed protein nanoparticle RSV vaccine. *Cell*, 2019. Mar 7;176 (6):1420-1431.e17. doi: 10.1016/j.cell.2019.01.046.

### **\*: equal contribution and corresponding authors**

<https://www.sciencedirect.com/science/article/pii/S0092867419301096?via%3Dihub>

Martinez-Martin N, Marcandalli J, Huang CS, Arthur CP, Perotti M, Foglierini M, Ho H, Dosey AM, Shriver S, Payandeh J, Leitner A, Lanzavecchia A, **Perez L\***, Ciferri C\*. An unbiased screen for Human Cytomegalovirus identifies Neuropilin-2 as a central viral receptor. *Cell*, 2018. Aug 23;174 (5):1158- 1171.e19. doi: 10.1016/j.cell.2018.06.028.

### **\*: equal contribution and corresponding authors.**

<https://www.sciencedirect.com/science/article/pii/S0092867418307967?via%3Dihub>

Kabanova A, Marcandalli J, Zhou T, Bianchi S, Baxa U, Tsybovsky Y, Lilleri D, Silacci-Fregni C, Foglierini M, Fernandez-Rodriguez BM, Druz A, Zhang B, Geiger R, Pagani M, Sallusto F, Kwong PD, Corti D, Lanzavecchia A and **Perez L**. Platelet-derived growth factor-alpha receptor is the cellular receptor for human cytomegalovirus gHgLgO trimer.

Nature Microbiology, 2016. Jun 6;1(8):16082. doi: 10.1038/nmicrobiol.2016.82.

<https://pubmed.ncbi.nlm.nih.gov/27573107/>