

Bacteria and viruses infect organisms by using proteins that attach to molecules in the surface of the host. HIV-1 uses its envelope glycoprotein gp120 to attach to CD4 in the surface of T cell. Similarly, the bacterium *E. coli* uses an array of proteins called pilus for establishing mechanical anchoring to tissues. These proteins withstand mechanical forces that go from few to hundreds of picoNewtons. The effect of these forces in the structure and chemistry of the proteins is not understood but it may have implications in the infection process.

In the present **project**, we will investigate the role of mechanical forces in the structure and chemistry of the microbial attachment proteins as well as the infection process. We will use an array of techniques to study the nanomechanics of viral and bacterial infections progressively from single molecules to cells. We aim to establish new knowledge of the molecular aspects that drive the mechanical interaction of microbes with their targets.

Our **group** has accumulated vast experience in the study of protein mechanics using single-molecule techniques. We use atomic force spectroscopy to explore the effect of mechanical forces in microbial attachment proteins, human CD4 and *E. coli* pilus. This technique allows monitoring chemical reactions under force such as the reduction of disulfide bonds or the binding of peptides, small molecules and antibodies, processes which are known to be implicated in microbial infections and that may have a mechanical origin.

Application:

If you are a master student and you are interested in this project, please **get in touch with** the scientist in charge: **Raul Pérez-Jiménez** (r.perezjimenez@nanogune.eu)

To apply for a **master scholarship** fill in the form below and follow the instructions and recommendations of the general call open until 30 June 2021.

NOTES:

(i) All applicants will receive an answer after the end of the selection process; but please note that due to the large number of submissions that are expected, we cannot provide individual feedback.

(ii) Additional information about nanoGUNE's commitment towards HR excellence in Research and Gender Equality are available on our website.

(iii) We encourage you to subscribe to our HR mailing list to receive information related to nanoGUNE's open positions and open calls for different training and talent attraction programs.