Poster

ADHESION FORCE SPECTROSCOPY OF LIVING DENDRITIC CELLS BY MANNOSYLATED PROBES

E. Martines, I. Garcia, S.Penadés
CIC BiomaGUNE-Ciber BBN, Parque Tecnológico de San Sebastián, paseo Miramón 182, 20009, San Sebastián, Spain
emartines@cicbiomagune.es

The dendritic-cell specific molecule DC-SIGN is a membrane receptor for the highly mannosylated HIV-1 envelope glycoprotein gp120 and is essential for the dissemination of HIV-1. Dendritic cells (DCs) constitute a specific group of antigen-presenting leukocytes, also located in mucosas and blood. DC-SIGN, like other C-type lectins, recognizes pathogens by binding to carbohydrate groups in a Ca^{2+}-dependent manner. As a pathogen-recognition receptor, DC-SIGN binds HIV gp120 thus facilitating the transport of HIV from mucosal sites to lymph nodes where infection of T lymphocytes occurs [Geitenbeek, 2000].

Atomic Force Microscopy is currently introduced in every domain of life sciences, including studies of animal cells, bacteria and tumour cells. Exploring the forces and the dynamics of the interaction between ligands and receptors requires attaching specific molecules on AFM probes and measure the unbinding forces using adhesion force spectroscopy (i.e. the grid-like mapping of probe-surface interactions) with sub-nanoNewton sensitivity. The measurement of the binding properties on whole cells provides direct access to receptor dynamics on living cell surfaces [Lee, 2007].

We used adhesion force spectroscopy on living dendritic cells to quantify the specific unbinding forces between the surface receptor DC-SIGN and mannose-functionalized probes. This work aims at quantifying the binding kinetics between cell surface receptors and antigens that is critical to HIV-1 spreading and infection. Moreover, we explored the possibilities of an increasingly popular approach for interrogation of receptors or other molecules presented at the cell surfaces. The technique is limited chiefly by the capacity to functionalize probe surfaces with active biomolecules, and results are presented that illustrate different kinds of covalent probe functionalization.

References:

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