

MOLECULAR INTERACTION BETWEEN BACTERIAL ANTIGENS AND MACROPHAGE RECEPTORS STUDIED BY ATOMIC FORCE MICROSCOPY

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Atomic force microscopy (AFM) is a powerful high resolution imaging method for investigation of biological samples, which opens the possibility to study dynamical biological processes *in vivo* [1]. In addition to its microscopic capabilities, AFM allows for a direct probing of forces between biological molecules (e.g. antigen-antibody) [2,3] or between molecules and receptors on the surface of cell (e.g. ligand-receptor) [4,5].

In this work we studied interactions between bacterial antigen and receptors of macrophages surface. We used three types of bacterial antigens extracted from different groups of bacterial cells: lipopolysacchrides (LPS), peptidoglycan (PGN) and egzopolisaccharides (EPS). These bacterial antigens are located on the surfaces of both Gm(-) and Gm(+) bacteria and are responsible for inflammation processes. The strength of bond (interaction) between these antigens and receptors is crucial for the response of the immunological protection system.

Antigens were attached to the AFM tips with help of a chemical linker (APTES+glutaraldehyde) whereas the macrophage cells were fixed on the glass substrate. By measuring families of the force-distance curves we were able to determine directly the mean value of the unbinding force as well as of specific adhesion events in the antigen-receptor systems. The measurements were supported by the control experiment in which we used genetically modified cells with deactivated receptors responsible for the specific interactions.

Standard immunological methods provide information about ligand-receptor interactions by monitoring the products of these reactions on macroscopic scale. By using atomic force spectroscopy we could determine directly the strength of the interaction in the studied systems at the level of single molecules.

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