

The Cellular Nano-Machinery Involved in Surface Recognition and Adhesion

B Geiger¹, C. Luxenburg¹, R. Zaidel-Bar¹, T. Volberg¹, J. Spatz², L. Addadi¹, Z. Kam¹, A. Bershadsky¹.

¹The Weizmann Institute of Science, Rehovot 76100, Israel ² University of Heidelberg, Germany

Cell adhesion to the extracellular matrix is a complex process, regulated at multiple levels. Cells can differentially sense, and respond to chemical signals, induced by soluble molecules or by the “insoluble environment”, consisting of the extracellular matrix and neighboring cells. In addition, cells can sense a variety of physical signals, including external or internal forces, surface rigidity, topography and fine texture. In this presentation, I will address the role, and possible mechanisms underlying cellular responses to mechanical perturbations of cell adhesion in the nN range, and changes in adhesive ligand density in tens of nm range. I will address possible mechanisms involved in the effect of such environmental features on focal adhesion formation, dynamics and fate. Focusing on different cell types, including fibroblasts, endothelial cells and osteoclasts, different mechano-sensitive processes will be highlighted. The nature of the putative “mechanosensor” in cell adhesions will be discussed, as well as the mechanisms whereby it triggers signaling events within living cells. Particular attention will be devoted to signaling cascades involving phosphorylation and de-phosphorylation of a variety of target molecules. The mechanisms whereby such environmental information is acquired and interpreted will be discussed