

Multi-dimensional molecular analysis of cell-matrix adhesions

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Abstract

Integrin adhesions, linking cells to the extracellular matrix (ECM), appear to be rather stable structures, located at the interface between the ECM outside the cell, and the cytoskeleton, at the cell's interior. Yet despite their apparent robustness, the diverse forms of integrin adhesions are highly complex, molecularly dynamic structures, acting simultaneously as tissue scaffolding structures, and as key transmembrane cell signaling sites. The main issue to be addressed in this lecture is how these two, apparently conflicting, forms of integrin adhesions are regulated. Given the structural diversity of focal adhesions, focal complexes, podosomes and invadopodia, we have addressed the various aspects of integrin adhesion biology, using a broad range of complementary multidisciplinary approaches, including correlated light and electron microscopies, live-cell imaging, and a multitude of physical approaches. In my talk, I intend to address recent insights into the molecular hierarchical structure of the different forms of integrin adhesions, and the mechanisms underlying their activities as chemical and mechanical sensors of the extracellular environment.