

Mechanosensing at cell-cell and cell-matrix junctions

Nearly all metazoan cells are bound either to other cells or to extracellular matrices. These contacts are not only adhesive, they are also focal points for concentrating signaling proteins and lipids and help organize the architecture of the plasma membrane and the cytoskeleton. At the center of such contacts is one of several large classes of transmembrane proteins, bound at the outside to the matrix or to another cell and at the inside to a number of cytosolic proteins that bind either cytoskeletal elements or signal transduction intermediates. Forces generated at or applied to sites of cell-cell or cell-matrix contacts have large effects on cell structure and function. Several examples using endothelial cells and cardiac myocytes show that mechanosensing through cell-cell and cell-matrix adhesion complexes are distinct processes that are mediated by distinct subsets of proteins and respond to different levels of force, displacement, or stiffness. A few examples of mechanosensing will be discussed in an effort to suggest unifying themes that might reveal the mechanism of these processes.