

## Mechanotransduction at Cell-Cell Junction

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### Key Research Aims and Goals

- We try to advance our understanding of mechano-transduction in biology, and pave the way towards our long-term goals of identifying targeted therapies for leaky blood vessels, and of enhancing tissue regeneration and wound healing. Our main goals are:
  - **To discover parameters that modulates cadherin mechanosensing mechanism**
  - **To identify the key cytoskeletal components and molecular pathways in cadherin-mediated mechanosensing**

### Research Highlights and Results

- Although the role of cadherins in morphogenesis and different diseases such as cancer is extensively documented, the effect of mechanical forces on cadherin function and their effect on the mechanical properties of the cell remain unanswered. Although the central role of cadherin as an adhesive and an active mechanical link that regulates many biological behaviors is evident, the fundamental question that we are trying to address is whether cadherin, in a similar fashion to integrin, can feel their environment and proportionally respond in order to regulate cell function. Our preliminary confirmed our hypothesis that cadherin can act as mechanosensor. While we are trying to confirm the active mechanosensing capability of cadherin, our next step is to try to correlate signaling pathways which are involved in the cell's response to external forces, followed by studying the localization of different components at adherens junctions which is directed by tension
- Recently, our group demonstrated that cadherin complexes are tension sensors. With magnetic twisting cytometry (MTC), we showed cadherin junction reinforcement, in response to cadherin-specific, externally applied (exogenous) force. By using MTC and TFM I am investigating the role of alpha catenin in cadherin force sensing. I am also interested in the role of actin and other proteins in the cell-cell force transmission mechanism.

### Future Research Plans

- **To visualize spatiotemporal changes in subcellular organization during mechanotransduction.**
- **To investigate the role signaling molecules such as RhoA and Src in cadherin force modulation.**