Presentation Abstract

Session: 9-4-Physical properties of a membrane-cytoskeleton coupled system
Presentation: Force regulation of interactions between the E-cadherin-catenin complex and actin filaments
Location: 306
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Abstract: Adherens junctions (AJ) are mechano-sensitive protein complexes essential for many multicellular processes including tissue morphogenesis and homeostasis. Genetic studies identified the AJ cell-cell adhesion complex of E-cadherin, beta-catenin, and the actin-binding protein alpha-catenin as components of a minimal ternary complex required for interactions with the actin cytoskeleton. However, attempts to reconstitute in vitro a direct linkage between the ternary complex and actin filaments in bulk pelleting assays have been unsuccessful. To test the hypothesis that force regulates the interaction between the ternary complex and actin cytoskeleton, we developed an optical trap-based single-molecule assay that for the first time allows us to directly probe the interaction of the E-cadherin/catenin complex with filamentous actin as a function of applied mechanical load. We find that the E-cadherin/catenin complex binds directly to actin in the presence of load. Further, multiple complexes work in concert to sustain attachments to actin against substantial, >10 pN forces, consistent with the proposal that the complex transmits force between the cytoskeleton and the AJ. To our knowledge these are the first data showing direct binding between the cadherin ternary complex and actin filaments, and that moreover this interaction is robust to mechanical load. These results provide essential support to models proposing that the AJ is a
mechano-sensitive complex.

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