Physics and MBI's researchers publish novel findings on cell-cell junction mechanosensing mechanism in Nature Communications

Collaborative research between Singapore and France scientists reveals how mechanical force fine-tunes a key molecular interaction at cell-cell junctions. In their latest findings to be published in Nature Communications, they reported that physiological level of mechanical force exerted on α-catenin activates its binding to a signaling protein vinculin and is subsequently locked in its activated conformation after force is released\(^1\). This finding provides the first direct proof to an important hypothesis that α-catenin is a mechanosensor through force-dependent interaction with vinculin. This research is led by Associate Prof Yan Jie of the Department of Physics and principal investigator at MBI, NUS, and Prof Rene Mege, principal investigator at the Institut Jacques Monod (IJM), University Paris Diderot & CNRS, in collaboration with colleagues from NUS and IJM.

**Biological Implications of the finding**

The organization of multicellular body as well as the maintenance and repair of adult tissues require fine tuning of cell adhesion and transmission of mechanical load from cell to extracellular matrix (ECM) and cell to cell. However, how do cells adapt and respond to mechanical properties of ECM or neighboring cells, transmit forces and transform mechanical signals, remain fully open questions. Their finding provides important new insights to these questions, as α-catenin and its binding with vinculin are key components involved in cell-cell mechanosensing. Together with their earlier finding on force-dependent talin-vinculin interaction\(^2\), these results revealed a general physical mechanism adopted by cells to sense mechanical cues in their micro environments that is crucial for controlling forms and functions of the organism.

![Diagram showing implications on regulations of cell-cell adhesions through force-dependent binding of talin and α-catenin to vinculin.](Picture credit: Chun Xi Wong and Steven Wolf from MBI)

**References:**
