BIOENGINEERING

SEMINAR

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MRDG Seminar Hall, 1st floor, Biological Sciences Building

Reduced mobility of E-cadherin is necessary for efficient junction formation

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E-cadherin mediated cell-cell junctions play an important role in the development and maintenance of tissue structure in multi-cellular organisms. Cooperative *trans*- and *cis*-interactions between the extracellular domains of E-cadherin are thought to give rise to the assembly of macromolecular structures. However, the location of these structures in the lateral membrane of adjoining cells does not readily allow detailed microscopic interrogation of the assembly process. Using artificially created membranes functionalized with the extracellular domain of E-cadherin (E-cad-ECD), we show that the assembly of E-cadherin-based adhesion in cells is fundamentally dependent on the reduced lateral fluidity of the membrane. Fluorescence Recovery After Photobleaching (FRAP), Fluorescence Correlation Spectroscopy (FCS) and Photon Counting Histogram (PCH) analyses showed that bilayer-bound E-cadherin molecules are mobile and present as a single oligomeric species. Human epithelial (MKN-28) cells seeded on the E-cadherin functionalized bilayers showed an enrichment of E-cadherin on the bilayer with time, indicating the formation of a hybrid E-cadherin-mediated junction. However, the number of cells forming an E-cadherin junction on fluid bilayers was low. In contrast, cells readily formed E-cadherin adhesions on partially fluid bilayers. Immunofluorescence staining of the adhering cells confirmed that the junctions formed on bilayers resemble adherens junctions in their composition, and phalloidin staining revealed remodeling of cell cortices. Thus, the supported lipid bilayer platform developed here uncovered the importance of reduced lateral mobility of E-cadherin for cell adhesion formation and will be useful in the future for studying other aspects of the process.

About the speaker:

Dr. Kabir H Biswas is interested in studying mechanisms by which cellular proteins are regulated. Working as a Research Fellow with Prof. Jay T Groves at the Mechanobiology Institute, Singapore, Dr. Biswas has initiated studies on the spatio-temporal regulation cellular proteins such as the adhesion protein E-cadherin or Eph family of receptor tyrosine kinases. He uses supported lipid bilayers functionalized with various proteins of interest as a synthetic platform to perform these studies employing state of the art spectroscopic, biophysical and cell biology techniques. As an Integrated PhD student at the Indian Institute of Science (IISc), Bangalore, he studied allosteric regulation of proteins involved in the cGMP signal transduction pathway under the mentorship of Prof. Sandhya S Visweswariah in the Department of Molecular Reproduction, Development and Genetics. He was awarded the CV Hanumantha Rao Medal by IISc for the year 2011-2012 for this PhD thesis describing research related to alleviating human suffering, which is of immediate value to the community.