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Dynamin-independent endocytosis, regulation of membrane tension, and fringe benefits.

Presented by

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Abstract

Plasma membrane tension regulates many key cellular processes, and in turn cells regulate their membrane tension by finely tuned mechanisms. Some of these mechanisms involve the regulation of exo-endocytic trafficking. We have found that among a number of endocytic processes operating simultaneously at the cell surface, a dynamin-independent endocytic pathway, the CLIC/GEEC (CG) pathway, is rapidly and specifically upregulated upon a sudden reduction of tension. Moreover, inhibition (activation) of the CG pathway results in lower (higher) membrane tension. However, alteration in membrane tension does not directly modulate CG endocytosis. In my talk I will discuss how vinculin, a mechano-transducer, recruited to focal adhesions in adherent cells, is required for this regulation. Vinculin acts by controlling the levels of a key regulator of the CG pathway, a GEF for ARF1 called GBF1, at the plasma membrane. Thus, the CG pathway directly regulates membrane tension and is in turn controlled via a mechano-chemical feedback inhibition, potentially leading to homeostatic regulation of membrane tension in adherent cells. I will end my talk by suggesting that understanding of endocytic trafficking has fringe benefits, having led us to discover that a FDA-approved drug which blocks endosomal acidification and the CG pathway, prevents SarsCov2 entry in vitro and controls infection in humans.

Biography

Prof Satyajit (Jitu) Mayor is the Director of the National Centre for Biological Sciences in Bangalore, India. The broad aim of Jitu's laboratory is to provide an understanding of the molecular mechanisms of endocytosis in metazoan cells and study this phenomenon across scales. Jitu is the recipient of several national and international awards and recognition such as induction into the National Academy of Science, USA, the Wellcome Trust International Senior Research Fellowship, the Infosys Prize, Swarnajayanti Fellowship, Shanti Swarup Bhatnagar Award, and the JC Bose Fellowship.

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