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Centre for BioSystems Science and Engineering

BSSE Seminar

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Probing signaling crosstalk between NF-kappaB-activating pathway

Dr. Soumen Basak

Systems Immunology Laboratory, National Institute of Immunology, New Delhi

ABSTRACT

The NF-kB system consists of two signaling arms and coordinates innate and adaptive immune responses during pathogen infections. Microbial substances and inflammatory cytokines signal through the canonical NF-kB pathway, which triggers a transient NF-kB activity. Canonical NF-kB signaling directs the expression of genes encoding pro-inflammatory cytokines and chemokines. On the other hand, the noncanonical NF-kB pathway is typically activated during immune differentiation. Combining computational pathway modeling studies and experimental cell signaling analyses, we discovered stimulus-selective and cell type-specific crosstalks between these NF-kB-activating pathways that prolonged canonical NF-kB responses. Our mouse infection studies established the physiological significance of NF-kB crosstalks in modulating innate immune responses. Intriguingly, our on-going computational studies further suggested that NF-kB crosstalks would modulate the heterogeneity of responses of cells in a population. In sum, we propose that integration of diverse NF-κB activating signal provide for a mechanism to fine-tune NF-κB responses in complex physiological settings.

BIOGRAPHY

Dr. Soumen Basak carried out his doctoral studies from the Biochemistry Department of Calcutta University under the supervision of Professor Dhrubajyoti Chattopadhyay. As a PhD student, he elucidated the molecular mechanism underlying gene expressions by Chandipura virus, an emergent human pathogen. In 2003, he joined the laboratory of Prof. Alexander Hoffmann at University of California San Diego as a postdoctoral fellow. During his postdoctoral tenure, Dr. Basak began to use systems biology approaches for deciphering complex cell signaling mechanisms. He joined the National Institute of Immunology in 2010 and set up the Systems Immunology laboratory using funding support from The Wellcome Trust DBT India Alliance. Dr. Basak's group has been addressing how intricate immune signaling mechanisms, particularly those involving the NF-kB system, modulate inflammation in physiological settings, and how deregulated cell signaling pathways trigger aberrant inflammation in human ailments.