REGIONAL CENTRE FOR BIOTECHNOLOGY
Seminar series

Design of Stress Signaling Pathways in Bacteria

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Bacteria are the most abundant forms of life and can survive in multiple environments. Understanding the features of stress response pathways that facilitate bacterial survival in rapidly changing environments is of great importance. Towards this goal, I studied the design of the Envelope Stress Response (ESR), an essential, intercompartmental stress response pathway that enables *E. coli* to respond effectively to stress in its envelope. I elucidated the construction features that enable the ESR to exhibit rapid, graded, and buffered response. Importantly, I showed that robust activation of the ESR requires dual signals indicating that the ESR is controlled by an AND gate. This work is the first quantitative *in vivo* analysis of a transmembrane signaling pathway and serves as a prototype for intercompartmental communication in all kingdoms of life. Furthermore, I have identified a regulatory component of Multiple Antibiotic Resistance (Mar) in *E. coli*, that enables this pathway to respond effectively to its inducing cues. In my own laboratory I will work at the interface of systems biology and mechanistic molecular biology to uncover new networks in stress response pathways in bacteria and follow up these connections to study both their design and signaling mechanisms.