Indian Institute of Science
Centre for BioSystems Science and Engineering

BSSE Colloquium

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Caenorhabditis elegans - Bacteria Interactions: Neuronal Regulation of Innate Immune Responses

Speaker: **Anjali Gupta, BSSE**
Advisors: **Dr. Varsha Singh (MRDG) and Prof. Manoj Varma (CeNSE)**

ABSTRACT:

The survival of an organism depends on its ability to sense threats and execute appropriate defense mechanisms. C. elegans is a soil-dwelling nematode that feeds on bacteria in rotting vegetation. The nematode has few canonical pattern recognition receptors, yet it can mount pathogen-specific immune responses. Previous studies indicate that nematodes induce pathogen-specific responses but there is no evidence to suggest how nematodes sense and evoke specific responses. We set out to analyze the contribution of host sensing mechanisms on its immune response to gut colonizing bacteria Gram-positive bacterium Enterococcus faecalis and Gram-negative bacterium Pseudomonas aeruginosa. Using che-11, a mutant defective in sensory perception, we find that sensory perception is essential for immune response. We show that sensory neurons utilize neuropeptide dependent signaling mechanisms to optimize immune effector production. We created a set of Amphid sensory neuron ablation lines for C. elegans and delineated the role of 11 pairs of chemosensory neurons in pathogen-specific response and survival. We discovered that lack of ASK neurons, a specific pair of chemosensory neurons, upregulated immune response to bacteria and fungus via ZIP-1 transcription factor. In all, we show that Amphid sensory neurons have pathogen-specific as well as broad effects on the immune response to bacterial pathogens. Our study indicates an important role of host sensory perception in the regulation of pathogen-specific immunity.