

Comprehensive Seminar

The Current Landscape of Membrane Fusion in Host–Pathogen Interaction

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Host–pathogen interactions are orchestrated through complex membrane remodelling events, often driven by virulence factors that exploit lipid diversity. Pneumolysin, a cholesterol-dependent cytolysin released via vesicle shedding from immune cells, is a key mediator of such processes. Despite its established cytolytic role, the molecular basis of its membrane remodelling activity remains poorly understood. Here, we employ coarse-grained molecular dynamics simulations to elucidate how vesicle-embedded pneumolysin drives membrane deformation. Our analysis reveals how sequence-dependent variations among serotypes influence lipid selectivity, structural determinants of membrane curvature, and the energetic barriers associated with remodelling. This integrative framework captures both large-scale deformation and local lipid–protein specificity, offering mechanistic insights into how immune-cell–derived vesicles regulate pneumolysin activity and contribute to pathogenesis.

Monday, Oct 10th 2025

14:30 Hrs (Tea / Coffee 14:15 Hrs)

Seminar Hall, TIFRH