Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Assembly of Membrane Protein Pores for Nanobiotechnology

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Membrane protein pores have demonstrated applications in nanobiotechnology. Most previous studies have focused on β-barrel protein pores, whereas α-helix-based pores are rarely explored. Here, we developed a synthetic transmembrane peptide pore, pPorA, built entirely from short synthetic α-helical peptides based on the porinACj of the Corynebacterium jeikeium. Using single-channel electrical recording, we define the structural properties of the pore and elucidate its assembly pathway. The peptide pore is ion-selective, functional and capable of conducting ions & binding blockers. We determined the kinetics of differently charged peptides binding and translocation through the pPorA at single-molecule resolution. Further, we show that unnatural D-amino acids can be incorporated by chemical synthesis into the peptides to build stable transmembrane mirror-peptide pores. Our findings will shed light on the mechanism of action of antimicrobial peptides and aid the design of sophisticated pores in biotechnology. Additionally, we focus on the molecular basis of substrate translocation across a specialised specific bacterial membrane pore CymA, which has the 15-residue segment inside the pore barrel, restricting its diameter, generating a sophisticated architecture. We elucidated the molecular mechanism of cyclic and linear carbohydrate polymer translocation through CymA and defined the dynamics of substrate transport through the pore.

Wednesday, Sep 7th 2022

04:00 PM (Tea/Coffee at 3:45 PM)

Auditorium, TIFR-H