

学术报告会

时间: 2025年1月9日 10:00
地点: 电信群楼2-410会议室



Unpacking the membrane-sensing mechanisms at the inner nuclear membrane

Shoken Lee
Yale University

Abstract:

Lipid composition is a determinant of organelle identity. Emerging evidence suggests that the inner nuclear membrane (INM) has unique membrane properties driven by its lipid composition. We recently discovered that the resident nuclear envelope protein Sun2 contains a membrane-sensing amphipathic helix (AH) that associates with the INM and is regulated by lipid metabolism. AHs are peripheral membrane binding regions with preferences for distinct membrane properties (e.g. degree of saturation or curvature) depending on their amino acid compositions. Whether other nuclear envelope-associated proteins contain membrane-sensing AHs with a preference for the unique properties of the INM is not known. Here, we computationally screened for candidate AHs in a curated list of characterized and putative human INM proteins. Cell biological and in vitro experimental assays combined with computational calculations demonstrate that AHs detect lipid packing defects over electrostatics to bind to the INM, indicating that the INM is loosely packed under basal conditions. Membrane tension resulting from hypotonic shock further promoted AH binding to the INM, whereas cell-substrate stretch did not recruit membrane tension-sensitive AHs. Thus, distinct mechanical inputs enhance lipid packing defects at the INM to different degrees, which AHs in INM proteins may harness for downstream biochemical functions. Our work demonstrates the rules driving lipid-protein interactions at the INM, and its implications in nuclear response to different stimuli.

简介:

Dr. Lee is Associate Research Scientist in the lab of Dr. Bahmanyar from 2024 at Yale University, He was Postdoctoral Associate in the same lab from 2019 to 2024. He obtained PhD in Pharmaceutical Sciences in 2016 from the University of Tokyo, studying the role of phosphatidylserine in endosomal vesicular trafficking, and was business consultant and analyst in Tokyo Office of Boston Consulting Group from 2016 to 2019.