

INVITED LECTURE T13

Dynamical Structural Images of Membrane-Associated Proteins and Peptides by NMR Spectroscopy

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Solving high-resolution structures and determining dynamics of membrane proteins are essential in completely understanding their biological functions. However, the intrinsic properties of membrane proteins pose major challenges to most commonly used biophysical techniques such as solution NMR spectroscopy and X-ray crystallography. Our recent research on the structural studies of membrane proteins and peptides using solid-state NMR spectroscopy in lipid bilayers and solution NMR spectroscopy in detergent micelles will be presented. Specifically, high-resolution structure and dynamics determination of cytochrome-b5 and its interaction with cytochrome-P450 in magnetically aligned bicelles and in bicelles under the magic angle spinning will be discussed. Also, our NMR structural studies on the structure, dynamics, topology, and mechanism of membrane disruption by a number of antimicrobial peptides (including a human antimicrobial peptide, LL-37, pexiganan, and analogs of naturally occurring antimicrobial peptides magainin) and amyloidogenic peptides (such as amylin or islet amyloid polypeptide related to type 2 diabetes, Abeta peptides related to Alzheimer's disease, and a human viral fusion peptide) in carefully chosen model membranes will be presented. A correlation between the biophysical results and biological functions of these systems will also be presented.