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Structures in Membranes Induced by Membrane-active Peptides. Huey W. Huang, Dept. of Physics & Astronomy, Rice Univ,, Houston, Texas 77251, USA.

Antimicrobial peptides are known to induce pores in membranes. Fusion peptides are known to induce membrane fusion. In order to understand the molecular mechanisms of these events, we need to know the structures induced in the membranes. These structures are formed in a fluid lipid membrane; therefore they cannot be crystallized. What we want to know is the shape and size as well as the distribution of lipids and peptides from which we can understand the energetics of the structure formation. Electron microscopy and other structural tools have so far failed to resolve these structures. Surprisingly the diffraction method has proved to be very useful for this study. We started with the neutron in-plane scattering that detected the transmembrane pores and measured their size for the first time. By manipulating the hydration of multilayered samples, we found the pores falling into a crystal lattice. If we reverse the spontaneous curvature of the lipids, the pores turn into the membrane fusion intermediate states called stalks. We will discuss how we use neutron and X-ray diffraction to improve the resolution of pore and stalk structures.