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Hydrophobic matching between melittin and phosphocholine lipid bilayers having different thicknesses[1] WILLIAM HELLER, SHUO QIAN, Oak Ridge National Laboratory — The lipid bilayer of the cellular membrane is more than a simple medium that houses proteins with specific function. Instead, it is an elastic medium that plays an active role in the function of the membrane and that both drives the function of membrane proteins and alters its properties in response to their presence. The conceptual simplicity of membrane active peptides makes them attractive model systems for studying membrane-protein interactions. Melittin, a 27 amino acid cationic peptide having a helix-hinge-helix motif, is one of the most extensively studied examples. Small-angle neutron scattering (SANS) measurements of melittin associated with lipid bilayer vesicles having different hydrocarbon thicknesses showed that the bilayer thickness stretches to match the thickness of the peptide in a manner consistent with a rigid, extended melittin having its helical axis oriented parallel to the bilayer normal. This behavior is surprising considering the helix-hinge-helix motif of the peptide and in contrast to studies indicating that transmembrane helices tilt with respect to the bilayer normal to accommodate differences in hydrophobic thicknesses. Possible sources of the discrepancy will be discussed and explored.

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