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Linking membrane structure and dynamics: insights from neutron scattering

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Life places extreme demands on the material properties of the membranes that surrounds cells. These thin bilayers must be both rigid enough to define the cell structure yet flexible enough to undergo dramatic changes in cell shape in processes like endocytosis and cell division. In turn, the properties of the biomembranes are determined by the unique characteristics of the thousands of chemically distinct lipid molecules that make up the membrane. A long-standing challenge in membrane biophysics is to link the complex and highly regulated lipid diversity to the membrane properties and ultimately cell function. This talk will highlight new insights from neutron scattering towards understanding the role of lipid diversity in tuning the properties of model biomembranes. We will demonstrate how subtle changes in lipid composition, such as mixed hydrophobic tail lengths or adding charged headgroups, can have significant and unexpected effects on the membrane dynamic properties. The results reveal the complex and interwoven relationship between lipid membrane composition, structure and dynamics.

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