

The effect of membrane-active peptides on membrane dynamics and molecular order

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The results of solid-state NMR studies aimed at determining the orientation and location of antimicrobial peptides obtained from Australian tree frogs and amyloid peptides in phospholipid membranes will be discussed. The detailed structure of these peptides in membranes is difficult to determine as they disrupt the phospholipid bilayer. Solid-state NMR techniques are being used to determine the conformation and mobility of these pore-forming peptides in order to understand the mechanisms by which they exert their biological effect that leads to the disruption of biological membranes. Both static and magic angle spinning techniques have been applied to antimicrobial peptides in a range of model membranes, which reveal that the peptide activity is strongly dependent on the lipid composition of the bilayer and correlate with the selectivity for bacterial membranes. Similarly, the membrane interactions and structural changes of A β (1-42) and A β (1-40) from Alzheimer's disease are dependent on the presence of cholesterol and metal ions, which have been implicated in the disease. The data from both the amyloid and antimicrobial peptides reveal the importance of using appropriate membranes systems for studying membrane-active peptides.