

Sphingosine Incorporation Into Negatively-Charged Lipid Bilayers Modifies Their Structural Properties

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Sphingosine [(2S, 3R, 4E)-2-amino-4-octadecen-1, 3-diol] is the basic building block of sphingolipids. In the last decade it has been shown to act as a potent metabolic signaling molecule, by activating a number of protein kinases. The present contribution intends to describe some physical properties of sphingosine in lipid bilayers. Sphingosine increases the permeability of phospholipid bilayers, giving rise to vesicle leakage. This effect is attributed to a peculiar property of sphingosine when interacting with certain lipid mixtures, namely the stabilization of high-melting domains. Since at the physiological pH sphingosine has a net positive charge, its interaction with negatively charged phospholipids (e.g. in bilayers containing phosphatidic acid together with phosphatidylethanolamine and cholesterol) gives rise to a fast release of vesicular contents. Moreover, sphingosine appears to be sensitive to lipid oxidation: only when bilayer lipids are partially oxidized does sphingosine elicit vesicle aggregation.