Title
Influence of sphingomyelin on lipid dynamics as detected by Laurdan fluorescence.

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Abstract

Sphingomyelin is a major constituent of cell membranes. In renal proximal tubular apical brush border membranes (BBM) sphingomyelin accounts for 40 to 60 mole % of membrane phospholipids. The purpose of this study was to determine the effect of sphingomyelin on lipid dynamics as determined by the Generalized Polarization of Laurdan (GP Laurdan) which reflects the relative water content of the lipid bilayer. In DOPC and in DOPC-DPPC (1:1) bilayers brain, egg, or milk sphingomyelin caused a dose-dependent blue shift in the emission spectra and an increase in the excitation GP, i.e. a decrease in lipid fluidity. The dose-dependent effect of sphingomyelin to cause a progressive increase in the GP was also seen in the presence of cholesterol (25 mole % CHOL) in CHOL-DOPC-DPPC bilayers. In contrast, in total lipid extract from the renal BBM, selective removal of sphingomyelin caused a red shift in the emission spectra and a decrease in the excitation GP, i.e. an increase in lipid fluidity. Alterations in shingomyelin content therefore plays an important role in modulating lipid molecular dynamics in model membrane systems as well as in biological membranes.