Lipid and lyso-lipid effects on the behavior of liposome co-reconstituted MscS and MscL

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Bacterial *m*echanosensitive *c*hannels of *s*mall (MscS) and *l*arge (MscL) conductance have been proposed to play a major role in the protection of bacterial cells against hypo-osmotic shock. Although the genes of both channels have been cloned (Levina *et al*., 1999; Sukharev *et al*., 1994) and X-ray crystallographic analysis has revealed their 3D structure (Bass *et al*., 2002; Chang *et al*., 1998), much less is known about how lipids surrounding the channels in the bacterial cell membrane may influence mechanosensitivity of both channels. In this study, we examined the effects of various lipids and lyso-lipids on mechanosensitivity of MscS and MscL channels co-reconstituted into liposomes by the patch-clamp technique. Reconstitution into liposomes of different lipid composition such as phosphatidylethanolamine (PE), phosphatidylcholine (PC), phosphatidylglycerol (PG), and cardiolipin (CL) did not affect the pressure-threshold activation ratio of the channels. Addition of 5-30% cholesterol, which is known to affect the bilayer thickness (Mitra *et al*., 2004), led to a decrease of the threshold activation ratio. In contrast, application of micromolar concentrations of lysophosphatidylcholine (LPC), which has been known as a mechanosensitive channel activator (Perozo *et al*., 2002), led to an increase of the threshold activation ratio. These findings suggest that the cholesterol-induced difference in membrane thickness (hydrophobic mismatch) and the change in intrinsic lipid bilayer curvature induced by LPC affect mechanosensitivity of both channels to a different extent and by a different mechanism.

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