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(G*) POS-D22 – Effect of Lung Surfactant Protein B Fragment, SP-B1-9 on Model Lipid Bilayer.

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Effect of Lung Surfactant Protein B Fragment, SP-B1-9 on Model Lipid Bilayer.
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Lung surfactant is a mixture of protein and lipid that reduces surface tension at the air-water interface in the lungs and thus reduces the work needed to breathe. Two hydrophobic proteins, SP-B and SP-C, are thought to facilitate the re-spreading of fresh and recycled surfactant material from bilayer and multilayer reservoirs. In an earlier deuterium NMR study of bilayer model membranes containing either the SP-B fragment SP-B(1-25, 63-78) or the fragment SP-B(8-25, 63-78), it was found that lipid acyl chain orientational order was perturbed more strongly by SP-B(1-25, 63-78). Both fragments contain the first and last SP-B helices but differ in whether or not the insertion motif, SP-B1-7, is present, suggesting that the insertion motif might play a role in the capacity of SP-B to promote the bilayer reorganization implicit in lung surfactant function. To gain more insight into the interaction of the insertion motif with surfactant lipids, we have studied the effect of SP-B1-9 on lipid acyl chain order in DPPC-d62 /POPG(7:3) bilayers using deuterium NMR and GROMACS molecular dynamics simulations.
Using deuterium NMR at a peptide: lipid ratio of 0.065, we find that the peptide tends to disorder acyl chains in the liquid crystalline bilayer phase suggesting that it promotes an increase in average lipid headgroup separation. MD simulation of a bilayer model containing SP-B1-9 at a peptide: lipid ratio of 0.031 also shows a decrease in chain orientational order. The MD simulations also provide information about the average peptide orientation and conformation. These findings may provide a better understanding of the extent to which the insertion motif may contribute to the capacity of SP-B to promote reorganization of bilayer surfactant material.

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