Effect of alkan-1-ols on the structure of DOPC model membrane

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We studied the effect of general anesthetics alkan-1-ols (CnOH, where n=10, 12, 14, 16 and 18 is the number of carbon atoms in molecule) on the structure of a model membrane system by small-angle neutron scattering (SANS) and diffraction (SAND). Extruded unilamellar liposomes for SANS measurements were prepared in excess of 100 % D_2O at the CnOH:DOPC=0.3 molar ratio. The data were evaluated by the Kratky-Porod plot $\ln[I(Q)Q^2]$ vs. Q^2 in the range of scattering vector Q corresponding to interval 0.001 $A^{-2} \leq Q^2 \leq$ 0.006 A^{-2}. The value of bilayer thickness parameter d_g has shown the trend in which the shorter alcohols (n=10, 12) decreased the thickness of DOPC bilayers while the longer ones (n=16) caused its increase. The results were corroborated with SAND measurements performed on the aligned multilayers that were utilized to eliminate the effect of bilayer curvature. Hydrated aligned fluid bilayers were prepared again from dioleoylphosphatidylcholine (DOPC) and samples at CnOH:DOPC=0.3 molar ratio were deposited on quartz plates by a „rock and roll method“. The samples were used for measurements at slightly dehydrated conditions (rel. humidity 98%, contrasts 8%, 20% and 50% D2O) for improving the resolution of obtained results. From the scattering length density profile we found the similar trend to that of SANS results. Our results support the notion of the importance of lipid bilayer thickness and the possible mechanism of its modulation by the other membrane components, while this is unaffected by the bilayer geometry nor its hydration level.

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