1052-Pos/B175. Structure of fully hydrated fluid phase lipid bilayers with monounsaturated chains

Norbert Kucerka, Stephanie Tristram-Nagle, John F. Nagle.
Carnegie Mellon University, Pittsburgh, PA, USA.

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Quantitative structures are obtained at 30C for the fully hydrated fluid phases of palmitoyloleoylphosphatidylcholine (POPC), with a double bond on the sn-2 hydrocarbon chain, and for dierucoylphosphatidylcholine (di22:1PC), with a double bond on each hydrocarbon chain. The form factors |F(q)| for both lipids are obtained using a combination of three methods. (1) Volumetric measurements provide F(0). (2) X-ray scattering from extruded unilamellar vesicles provides |F(q)| for low q, (3) Diffuse X-ray scattering from oriented stacks of bilayers provides |F(q)| for high q. Also, data using method (2) are added to our recent data for DOPC using methods (1) and (3); the new DOPC data agree very well with the recent data and also with (4) older data obtained using liquid crystallographic X-ray method. We use hybrid electron density models to obtain structural results from these form factors. The result for area per lipid A for DOPC 72.4+/-0.5A squared agrees well with our earlier publications and we find A=69.3+/-0.5A squared for di22:1PC and A=68.3+/-0.5A squared for POPC. We obtain the values for five different average thicknesses: hydrophobic, steric, head-head, phosphate-phosphate, and Luzzati. Comparison of the results for these three lipids and for our recent DMPC determination provide quantitative measures of the effect of unsaturation on bilayer structure. Our results suggest that lipids with one mono-unsaturated chain have quantitative bilayer structures closer to lipids with two mono-unsaturated chains than to lipids with two completely saturated chains.
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