A New Phase Transition of L-α-Dipalmitoyl Lecithin Monohydrate Leading to Uniform Head Group Conformation

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An important factor in the structure analysis of lipid-water systems is the characterization of the different phases as a function of temperature and water content (1-3). In this paper detailed information of a new phase transition of L-α-dipalmitoyl phosphatidylcholine monohydrate at 71°C is analyzed on a molecular level using infrared attenuated total reflection (IR ATR) spectroscopy. The phase transition originates in a drastic conformational change of the glycerophosphorylcholine moiety which as a consequence leads to complete alignment of the turn near the fatty acid ester group attached at glycerol C-2 position. This turn was found to be typical for all lecithin water phases described so far (4-5). IR ATR orientation measurements show that the conformation of the glycerol, phosphate and choline group is uniform in the new crystalline phase. However, each group assumes at least two different conformations in the other lecithin-water phases (5). In the biaxial phase (3) the choline head group was found to assume 90 % gauche, and 10 % trans and/or cis conformation, respectively.

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