Title:	Liquid Crystal Unveiled Interactions between Melittin and Phospholipids at Aqueous-Liquid Crystal Interface
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Abstract:	The interaction of honeybee apitoxin (melittin) with phospholipid membrane is very crucial to unveil the mechanistic details of the interaction of peptide with phospholipid membrane. In this regard, herein, our paper advances the design of a liquid crystal (LC)-based sensor for precise and quantitative imaging of melittin–phospholipid interaction through interfacial ordering transition. Micrometer-thick films of nematic 4-cyano-4'-pentylbiphenyl (5CB) LC undergo easily visualized ordering transitions in response to melittin at 1,2-didodecanoyl-sn-glycero-3-phosphocholine (DLPC) laden aqueous-LC interfaces. This observation implies strong interaction of DLPC with melittin at those interfaces. Our experiments also reveal that Ca2+ plays a crucial role for faster dynamic response of the LC during the interaction. The presence of Ca2+ towards kinetics of melittin-DLPC interaction has been found to be highly specific compared to other alkaline earth metal ions. In addition, these interactions were conveniently quantified by measurement of both light intensity (transmitted through the LC under crossed polars) and optical retardance of the LC. Finally, we have investigated the conformational behavior of the melittin in solution as well as in presence of DLPC vesicles using circular dichroism (CD) and vibrational circular dichroism (VCD) spectroscopy. This sensing system significantly outweighs the conventional biological and sepctrscopic assays in terms of robustness, sensitivity, easy sample preparation and clear optical read out. Overall, this paper demonstrates a promising approach in designing a simple LC based biosensor to study and quantify the interaction of melittin with phospholipid membrane at aqueous-LC interfaces.
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