

Giant unilamellar vesicles and fluorescence microscopy: an excellent tool to study membrane related phenomena

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Giant unilamellar vesicles (GUVs) have established themselves as one of the more versatile laboratories for studying lateral membrane structure under highly controlled conditions using a range of fluorescence microscopy techniques. Special fluorescent probes with distinct spectroscopic properties report back not only on lateral organization but also on structural properties of lipid domains. The GUVs can be formed both by simple lipid mixtures and by lipid and protein material from natural membranes, allowing for comparison between simple and more complex models of biological membranes. Some advances have been made recently regarding resolving issues of finite-size effects and to which extent GUVs can represent the thermodynamic state of membranes. A major challenge however is to take the study of GUVs beyond the stage of “pretty pictures.” In this talk I will summarize different applications to quantitatively studying lipid-lipid and lipid-protein interactions. This includes studies on membrane permeability, the action of lipases, and construction of phase diagrams using this approach.

L.A. Bagatolli and O.G. Mouritsen. "Giant unilamellar vesicles (GUVs) as a laboratory to study mesoscopic lipid domains in membranes" In Cell membrane nanodomains: from biochemistry to nanoscopy. A. Cambi and D. Lidke (Eds.) Taylor and Francis (2014) Chapter 1 pp 3-23.

L.A. Bagatolli and D. Needham. 2014. "Quantitative optical microscopy and micromanipulation studies on the lipid bilayer membranes of giant unilamellar vesicles", review article, *Chem. Phys. Lipids* 181:99-120.