Compositional characterization of biosynthetically prepared phospholipids for the development of improved model cell membranes

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Appropriate lipid bilayer models that are reproducible are necessary for the investigation of biomolecule interactions with cell membranes. Still, due to the complexity of native cell membranes with very diverse lipid compositions, the majority of studies are carried out on simple one- or two-component lipid mixtures. Characterization of total lipid extracts from deuterated and hydrogenated bacterial and yeast cells in combination with the refinement of deposition protocols has recently advanced the reconstitution process of biomimetic lipid bilayers on solid surfaces [1-3]. The use of deuterated lipid material is in this case essential for e.g. neutron experiments where the difference in contrast between deuterated and non-deuterated molecules is exploited.

Here we present the separation and characterization of lipids produced in a genetically modified strain of *E. coli* able to produce the most common mammalian phospholipid (phosphatidylcholine) in addition to its native lipids [4]. We show the effects of different growth conditions on the total lipid extracts as well as fatty acid composition of the obtained lipids.

Previous studies show that the membrane composition of supported lipid bilayers made by vesicle fusion does not always match the nominal composition of the vesicles while interactions between the lipids and the solid support can result in leaflet asymmetry [5]. In general, for supported lipid membranes that are made from total lipid extracts (either deuterated or non deuterated) it is not possible to assess the composition of the bilayer and compare it to the vesicle composition. Controlling the membrane composition while still using native lipids will allow for the studies of the bilayer structure and asymmetry in more accurate models of bacterial or mammalian cellular membranes or the mitochondrial membrane. Furthermore, the significance of a certain lipid e.g. in relation to binding of different biomolecules can be probed.

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