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Quantitative Shape Analysis of Giant Unilamellar Vesicles as a Function of Cholesterol Content MICHAEL MLODZIANOSKI, University of Maine, MANASA GUDHETI, SAMUEL HESS — Giant unilamellar vesicles (GUVs) created from a ternary mixture of saturated lipids, unsaturated lipids, and cholesterol are a way to effectively model cell membranes. For specific concentrations of the constituent components, the model membranes separate into two distinct phases, liquid ordered and liquid disordered. The liquid ordered phase is sometimes referred to as a lipid raft, a region enriched in cholesterol and saturated lipid. This experiment offers an insight into the effects of cholesterol concentration on the physical properties of the membrane, which could alter protein distribution and cell function. We use confocal fluorescence microscopy to image GUVs created from egg sphingomyelin, dioleoylphosphatidylcholine, and cholesterol as well as trace amounts of two fluorescent probes, Bodipy-FL C12-sphingomyelin and lissamine rhodamine-B-DOPE. Shape tracing programs analyze the confocal images to determine dye partitioning, phase area fractions, meridional curvature, and line tensions at the phase boundary of GUVs. The differences resulting from changes in cholesterol concentration could significantly affect function in cellular membranes.

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