Vesicles in Drug Encapsulation Studies

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Introduction
Vesicles can be formed spontaneously by mixing solutions of anionic and cationic surfactants, with either one in excess. Traditional vesicles are formed by ultrasonication or extrusion. The curvature of the mixed surfactant bilayers controls size and shape of the vesicles. These systems can be used to mimic drug-delivery systems, in which the encapsulated “drugs” can be carried to the target, and released upon breaking down of the vesicles into micelles.

Materials and Methods
In this study, unilamellar vesicles (Figure 1) have been prepared using both synthetic detergent mixtures, such as anionic sodium octyl sulphate (SOS) and cationic Cetyltrimethylammonium Bromide (CTAB) and natural surfactants such as zwitterionic 1,2-Dimyristoyl-sn-Glycero-3-Phosphocholine (DMPC) and anionic 1,2-Dimyristoyl-sn-Glycero-3-[Phospho-rac-(1-glycerol)], Sodium Salt (DMPG) mixtures.

Figure 1: Schematic representation of a unilamellar vesicle

Results and Discussion
Initially, hydrophilic protein cytochrome-C incorporated into these vesicles. The solutions were subject to a series of ultrafiltration to get rid of any free protein outside the vesicles. It was observed that the protein could be encapsulated by the vesicles only if cholesterol was also added to the system. The release of cytochrome-C was observed spectrophotometrically upon vesicle-breakdown. A similar work was carried out with hydrophobic drugs, and their release is also being observed upon vesicle-break down.

References