Vesicles considering as novel drug delivery agent were formulated using SLC in combination with non conventional amphiphile, IPA with 30 mol% cholesterol. Formulations were investigated to understand the role of IPA in SLC bilayer. The physicochemical properties of SLC/IPA bilayer was depend on the amount of IPA. However unsaturation of hydrocarbon chain also plays a crucial role. In SLC/IPA mixed monomolecular film, chain mixing was associative upto 30 mol% of IPA. Fairly monodispersed vesicles formulations were stable over a period of 100 days and hydrodynamic sizes (d_h) were in the range of 200-300 nm. Z. P. of the formulations was decreased with increasing amount of IPA that contain neutral head group. Vesicles morphological properties was investigated by electron microscopic (normal TEM as well as FF-TEM) studies and the formation of spherical vesicles were confirmed. Thermotropic behaviours of SLC/IPA bilayers were analysed and the point of chain melting was negligibly hampered by IPA. By providing additional hydrophobic effect it helps to packed or rigidifies the SLC bilayer more efficiently. However presence of IPA must affect the bilayer and the structural changes were scrutinized by fluorescence anisotropy measurement using 1, 6-diphenyl-1, 3, 5-hexatriene (DPH) and 7-hydroxycoumarin (7HC). Anisotropy or micro viscosity was found to be higher for SLC/IPA vesicles in comparison to SLC vesicle and hence confirmed the role of IPA to rigidify the bilayer was conclude. Entrapment efficiency (E.E.) of the vesicles using cationic dye methylene blue (MB) was also evaluated and found to be dependent of IPA content. Such systems are expected to have superior properties as potent vectors for drug delivery.

As cell membranes are negatively charged, cationic vesicles could serve as an excellent drug delivery vehicle. Three set of SLC/IPA vesicles were used with a motive to formulate hybrid cationic vesicles using bi-tail cationic surfactants with varying hydrocarbon chain length (bis-C_{12} to C_{18}). Incorporation of piroxicame (Px), a NSAID and its subsequent

impact on the hybrid cationic bilayer was investigated. Optimised Px encapsulated formulations were analysed for biological activity. Mutual miscibility among the components was studied by way of the surface pressure – area measurements. Both DDDAB and DHDAB bring associative type interaction in SLC/IPA monolayer as compared to DTDAB and DODAB. Expanded monolayer was the outcome when Px was incorporated into the mixed monomolecular film of SLC/IPA/DxDAB. Z. P. for each set of formulations was found to be increased with increasing cationic surfactant chainlength. Px certainly resides into the bilayer and thereby enhances the hydrodyanamic size of the vesicles. Accumulation of Px into the spherical shape vesicles were observed via TEM studies and AFM studies further confirms such incorporation of Px into the bilayer. The process of chain melting for SLC/IPA/DXDAB vesicles was hampered which confirms the presence of DXDABs into the bilayer creates some heterogeneity. The heterogeneity mainly associated with hydrocarbon chain and was further confirmed through FTIR studies. Entrapment efficiency and the release kinetics of Px from the hybrid cationic vesicles were found to be good for all the formulations except DTDAB comprising vesicles. Within 25 hr formulations show sustains release. Both blank and drug loaded vesicles were hemocompatable and hence show the novelty. Finally the toxicity and biocompatibility of the drug loaded formulations were assessed. It was non-toxic to normal human blood lymphocytes however becomes toxic to Neuroblastoma cell line. Such formulations could shed light in the development of drug delivery systems in the treatment of brain – tumors targeted drug delivery.

Physico-chemistry between the interaction of cationic vesicles and PAMAM succinamic acid, 1, 4-diaminobutane core dendrimer generation 5 (G5-SA) which is negatively charged. Previously prepared cationic vesicle comprised of SLC, IPA and DHDAB in three different combinations was taken to investigate the impact of dendrimer. Increasing hydro dynamic size and reduced Z. P. measurement suggests the formation of

vesicle/dendrimer aggregates. Morphological state of the vesicles with and without dendrimer was analysed via TEM studies which confirmed the adsorption of dendrimer on the vesicle surface. The effect of dendrimer on solid supported cationic bilayer was further scrutinized via AFM studies that confirmed the hole formation on the bilayer at higher concentration of dendrimer. Vesicles disintegration kinetics measurement also has been done to understand the pattern of interaction using varying concentration of dendrimer. A surface pressure – time isotherm developed due to the vesicle disintegration upon the inclusion of dendrimer. The rate kinetics of such disintegration process was found to be depending on the dendrimer concentration. Finally DSC studies was performed which specifically enlighten the features of bilayer in presence of dendrimer; it describes the point of dendrimer attack on the bilayer. Overall interaction studies put IPA on the map as it tries to restore the bilayer morphology by providing hydrophobic interaction. Dendrimer certainly modulates the bilayer structure depending on its concentration. Initial adsorption of dendrimer restrict hydrocarbon chain movement and that was reflected fro anisotropy measurement. Although at higher dendrimer concentration, formation of dendrimer/vesicle complex, also known as dendriosome was noticed. Such complexes could be useful in encapsulation of drug molecules and subsequently cytotoxicity studies.