

# A Joint Effect of Cationic and Anionic Amphiphilic Compounds on the Desorption of Calcium Ions from Lecithin Liposome Membranes

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The aim of the work was to determine the synergism and antagonism of mixtures of the cationic amphiphilic compounds: N-benzyl-N,N-dimethyl-N-tetradecylammonium chloride (BDTA), N-benzyl-N,N-dimethyl-N-dodecylammonium chloride (BDDA), N-methyl-N-tetradecyl-morpholinium bromide (MTM), N,N,N-trimethyl-N-tetradecylammonium bromide (TMTA) and those of tripropyltin chloride in a mixture with amphiphilic anionic compounds (a homologous series of sodium alkylsulfonates with  $n = 2, 4, 6, 8, 10, 12$  and 14 alkyl carbon atoms) in the process of calcium ion desorption from liposome lecithin membranes. Radioactive labels and spin labels were used in the investigations.

All compounds studied caused an increase in the kinetic rate constant of calcium ion desorption from liposome membranes with increasing concentration. In case of mixtures containing cationic and anionic compounds both synergism and antagonism were observed. It was shown that the regulatory effect depended on the properties of both cationic and anionic compounds. A mixture of the most effective cationic compound (BDTA) with each of the anionic compounds decreased the effect. Mixtures of the remaining ammonium compounds with sodium alkylsulfonates produced both synergism and antagonism. Anionic compounds with short chains increased, and with longer chains decreased efficiency, while compounds with comparable chains caused totally blocked desorption. A mixture of an organometallic compound having three short chains with anionic compounds gave a reversed effect: short-chain compounds caused a decreased and those with long-chains – increased efficiency of tripropyltin chloride.

Studies with spin labels supported the conclusion that the most important factor responsible for the regulatory effect is the molecular shape of the complexes formed in a mixture of both groups of compounds – a factor that determines membrane packing density.

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