

Amphiphilic derivatives of 3,7-diazabicyclo[3.3.1]nonane as perspective modifiers of lipid bilayer.

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The development of the new drug delivery systems is nowadays a worldwide trend because they allow to decrease the drug dosage and to eliminate some side effects. Spherical lipid vesicles (liposomes) are considered as a promising tool for drug delivery since the liposome can encapsulate water-soluble bioactive compounds in the inner water cavity and carry them to affected areas. The technologies where the liposomes are being used for the delivering the active molecules are considered to be the most advanced ones for this purpose. The modification of bilayer of the liposomal membrane by the inclusion of different compounds into it can lead to either stabilization or destabilization (under the influence of external factors) of liposomes depending on the included components. Thus, the targeted release of the substances encapsulated in the internal volume of liposomes could be reached.

This report discusses the synthesis of lipid-like compounds based on 3,7-diazabicyclo[3.3.1]nonanes capable of incorporating into the lipid bilayer and further undergoing to the conformational reorganization, this is accompanied by formation of defects in the lipid packing and a drastic increase in the permeability of liposomal membrane. It was shown that 3,7-diacyl-3,7-diazabicyclo[3.3.1]nonan-9-ones could be incorporated into liposomal membranes and potentially could change the stability of the liposomes modified in this way under the influence of external factors; liposomes with 3,7-dialkyl-3,7-diazabicyclo[3.3.1]nonan-9-ones can increase their permeability upon addition of bivalent copper salts; 1,5-dinitro-3,7-dialkyl-3,7-diazabicyclo[3.3.1]nonane, incorporated into the liposomal membrane, increases the liposome permeability upon decreasing pH from 9 to 5. It was shown that 1,5-diphenyl-, 1,5-dibenzoyl-derivatives of 3,7-diazabicyclo[3.3.1]nonane could be incorporated into liposomal membranes.

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