

Influence of phenothiazine molecules on the interactions between positively charged poly-L-lysine and negatively charged DPPC/DPPG membranes.

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Streszczenie

Phenothiazines are very effective antipsychotic drugs, which also have anticancer and antimicrobial activities. Despite being used in human treatment, the molecular mechanism of the biological actions of these molecules is not yet understood in detail. The role of the interactions between phenothiazines and proteins or lipid membranes has been much discussed. Herein, fourier-transform infrared (FTIR) spectroscopic studies were used to investigate the effect of three phenothiazines: fluphenazine (FPh); chlorpromazine (ChP); and propionylpromazine (PP) on the structures of a positively charged poly-L-lysine (PLL) peptide, a negatively charged dipalmitoylphosphatidylcholine/dipalmitoylphosphatidylglycerol (DPPC/DPPG) membrane, and on the mutual interactions between electrostatically associated PLL molecules and DPPC/DPPG membranes. Phenothiazine-induced alterations in the secondary structure of PLL, the conformational state (*trans/gauche*) of the hydrocarbon lipid chains, and the hydration of the DPPC/DPPG membrane interface were studied on the basis of amide I' vibrations, antisymmetric and symmetric stretching vibrations of the CH₂ groups of the lipid hydrocarbon chains (ν_s CH₂), and stretching vibrations of the lipid C=O groups (ν C=O), respectively. It was shown that in the presence of negatively charged DPPC/DPPG membranes, the phenothiazines were able to modify the secondary structure of charged PLL molecules. Additionally, the effect of PLL on the structure of DPPC/DPPG membranes was also altered by the presence of the phenothiazine molecules.

Słowa kluczowe

Fluphenazine, Chlorpromazine, Propionylpromazine, Fourier-transform infrared (FTIR) spectroscopy, Structure of poly-L-lysine (PLL), Trans/gauche conformation of lipid chains

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