Interaction of diethylstilbestrol with model membranes and its location in the membrane bilayer

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Diethylstilbestrol (DES) is a synthetic form related to estrogens that can be localized in membranes, with antiestrogenic and antiadrogenic effects., used to treat some conditions, although its mechanism of action is not well understood. Our study indicated that DES tends to disorder the membrane, especially in the polar heads of phospholipids. Using DSC, we observed a decrease in the main transition ΔH and a shift toward lower temperatures of the onset of these transitions. SAXD diffractograms showed that DES tends to increase the thickness of the lipid bilayer of DMPC (MLV), whereas WAXD diffractograms illustrated the existing differences between the lipid phases of the different samples, according to the concentration of DES, which corroborates the data obtained by DSC; with higher concentrations of compound shifting the transition temperature (T_c) towards lower temperatures. ^{31}P-NMR spectroscopy showed different anisotropic spectra of DEPE and DMPC samples depending on the different molar ratios of DMPC/DES used. For samples with DEPE, we obtained a spectrum with two peaks, likely due to the existence of two lipid phases; bilayer phase and H_{II} phase. For DMPC spectra, as the temperature increases there is an increase in intensity of the center region of the spectrum. In the case of samples with DES, the same thing occurs. But comparing with the signals obtained for samples with pure DMPC, it was observed that increasing concentrations of DES caused an increase in the spectrum width. Regarding CSA values; the higher the concentration of DES was, the greater was the decrease in the values of CSA produced, indicating a certain disorder in the polar group of the lipid molecules in the presence of DES. Using ^{1}H-NOESY-NMR-MAS technique, different rates for different proton cross relaxation of DES were calculated. From this information, it was possible to deduce the location of DES in the POPC membrane, that it is most likely anchored to the lipid/water interface.