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INTERACTION BETWEEN A CAROTENOID PIGMENT – CANTHAXANTHIN AND LIPID MEMBRANES

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The polar carotenoid pigment canthaxanthin has been found to interfere with the organization of biological membranes, in particular of the retina membranes of primate eyes leading to pathologies. Canthaxanthin present in lipid membranes even at relatively low concentration modifies significantly the physical properties of the membranes. Few mechanisms of its action have been proposed such as: (1) restricting to the segmental molecular motion of lipid molecules both in the head group region and hydrophobic core of the bilayer, (2) promoting extended conformation of alkyl chains, (3) modifying the surface of lipid membranes and (4) in the case of the lipid phase transitions: a pronounced cooperativity change colligating with the formation of new thermotropic phases. Despite that it seems worthwhile to answer the question 'what is the part of hydrogen bonds in the canthaxanthin-lipid interaction?

The data obtained from the study on canthaxanthin dissolved in organic solvents indicate the possibility of formation of hydrogen bonds with canthaxanthin 'keto' groups. Moreover the FTIR absorption spectra of canthaxanthin dissolved in a highly hydrophobic CCl_4, in the presence of D_2O being the proton donors show the possibility of formation of intramolecular bond between O-D group and the π electron system of the canthaxanthin chromophore. This fact indicates the importance of the water molecules within the hydrophobic core of the membrane bonded directly to the canthaxanthin molecule. The role of such a hydrogen bonding and the canthaxanthin effects on the lipid membranes will be discussed.

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