Structural characterization of clear human lens lipid membranes by near-infrared Fourier transform Raman spectroscopy.

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Streszczenie

Regional differences in human lens membrane lipid composition have been documented and could be responsible for alterations in the function of lens membranes. The phospholipid composition of epithelial membranes of human lenses has been shown to be different from that of fiber membranes. To establish lipid composition-membrane structure relationships, we have examined spectroscopically the structure of lipid membranes from human lens epithelium, cortex and nucleus. Near-infrared Fourier transform Raman spectroscopy was used to obtain the lipid structure of membranes in which the lipid composition was determined previously by 31P-NMR. The disorder (fluidity measured structurally) of the epithelium was evaluated to be 80%, whereas that of the lipids from the cortical and nuclear regions was 55%. The large size of the band at 1650 cm-1 arising from sphingolipids supported the compositional studies which indicate that the major component of human lens membranes is a sphingolipid. Sphingolipids probably account for the high degree of lipid order found in lens membranes. Epithelial membranes were found to contain more glycerolipids and less sphingolipids than fiber cell membranes. This compositional difference would be expected to disorder the epithelial membrane.