STUDIES OF THE INTERACTION BETWEEN ALBUMIN AND CONGO RED: APPLICATION FOR STUDIES OF AMYLOID-LIKE FIBRIL AGGREGATES

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Congo red (CR), one of the most commonly used dyes for the identification of amyloid fibril aggregates, is also a ligand of native bovine serum albumin (BSA). Induced circular dichroism (ICD) is a phenomenon observed when a chiral compound induces chirality in an achiral one. In this work we aimed to study the spectral properties and analytical applications of ICD in Congo red provoked by its interaction with BSA. The ICD studies were performed using a Jasco J-815 spectropolarimeter (Jasco, Japan). The spectra were accumulated in duplicate with 1 nm resolution. The ICD spectra were recorded at BSA concentration of 30 μM and 30 μM CR over the wavelength range of 350-600 nm at 25 °C. We found that the complex BSA:CR displays a strong ICD spectrum with a positive band at 412 nm and two negative bands at 356 and 490 nm. The use of site I and site II albumin ligands as warfarin and ibuprofen, respectively, provoked different alterations in the Congo red ICD spectrum. The thermal treatment of the BSA:CR complex (30-90°C) was monitored by ICD at 490 nm and showed a sigmoidal pattern typical of phase transition in proteins. The altered ICD spectrum is consistent with the formation of amyloid-like fibril aggregates in BSA, which was confirmed by Thioflavin T and Rayleigh scattering assays. In conclusion, the ICD provoked by the binding of Congo red to albumin may represent a new spectroscopic technique for studying alterations in the structure of albumin regarding its binding sites and the formation of amyloid aggregates.

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