

Characterization of Amyloid-Like Fibril Aggregates of Albumin by Induced Circular Dichroism in Congo Red

Vasconcelos, D. N., Ximenes, V. F.

Departamento de Química, Faculdade de Ciências, Universidade Estadual Paulista, Bauru, SP, Brasil.

INTRODUCTION: Congo red (CR) is used for identification of amyloid fibril aggregates in proteins. CR is able to bind in bovine serum albumin in its native and denatured forms. The characterization of altered forms of BSA is an important issue regarding their efficacy as a drug carrier. Induced circular dichroism (ICD) is a phenomenon observed when a chiral compound induces chirality in an achiral one. **OBJECTIVES:** We aimed to study the spectral properties and analytical applications of ICD in CR provoked by its interaction with modified BSA. **MATERIAL AND METHODS:** The thermal treatment of the BSA:CR complex (30-90°C) was monitored by ICD at 490 nm using 30 μ M BSA and 30 μ M CR. Sodium dodecyl sulphate (SDS) was also used to denature the protein. The studies were performed using BSA (30 μ M) in 50 mM sodium phosphate buffer at pH 7.0 and 1.5 mM SDS at 25°C with gentle agitation for 12h. The oxidation of the protein was performed by hypochlorous acid, hypobromous acid and taurine bromamine. **RESULTS AND DISCUSSION:** By monitoring the ICD of the complex BSA:CR as function of the temperature, a typical sigmoidal pattern was obtained. We found that the ICD signal of CR may be useful for monitoring the phase transition in BSA. SDS was also able to induce the formation of aggregates, which also showed the amyloid pattern when analysed by conventional techniques as Thioflavin T and Rayleigh scattering assays and by the ICD of CR developed in this work. The oxidation of the protein using 30-fold excess of HOCl or HOBr provoked the depletion of tryptophan fluorescence and the ICD signal. These results are indicative that the ICD signal is also useful to monitor the denaturation of the protein by oxidants. **CONCLUSIONS:** The ICD provoked by the binding of CR to albumin may represent a new spectroscopic technique for studying alterations in the structure of albumin regarding alterations in its binding sites, alteration by oxidation and the formation of amyloid aggregates. **ACKNOWLEDGEMENTS:** Fapesp, Capes and CNPq. **KEYWORDS:** Amyloid aggregates; Congo red; induced circular dichroism.