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Interactions of hemin with bovine serum albumin and human hemoglobin: a fluorescence quenching study

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Abstract

The binding interactions between hemin (Hmi) and bovine serum albumin (BSA) or human hemoglobin (HHb), respectively, have been examined in aqueous solution at pH=7.4, applying UV-vis absorption, as well as steady-state, synchronous and three-dimensional fluorescence spectra techniques. Representative results received for both BSA and HHb intrinsic fluorescence proceeding from the interactions with hemin suggest the formation of stacking non-covalent and non-fluorescent complexes in both the Hmi-BSA and Hmi-HHb systems, with highly possible concurrent formation of a coordinate bond between a group on the protein surface and the metal in Hmi molecule. All the values of calculated parameters, the binding, fluorescence quenching and bimolecular quenching rate constants point to the involvement of static quenching in both the systems studied. The blue shift in the synchronous fluorescence spectra imply the participation of both tryptophan and tyrosine residues in quenching of BSA and HHb intrinsic fluorescence. Depicted outcomes suggest that hemin is supposedly able to influence the physiological functions of BSA and HHb, the most important blood proteins, particularly in case of its overuse.