HSA-interaction studies of some novel uranyl complexes of isothiosemicarbazone

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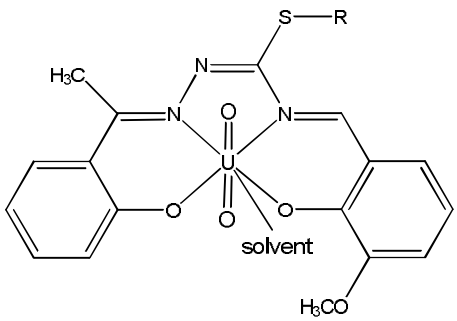
ABSTRACT

Human serum albumin (HSA) is the most abundant protein in plasma that displays an extraordinary ligand binding capacity. The main function of albumin is to transport broad range of drug molecules to its targets [1]. Its structure consisting of a single polypeptide chain with 585 amino acid residues, presents a three-dimensional structure described in terms of three homologous chains (I, II and III), each of them formed by two subdomains (A and B) [2].

There are several reports of biological properties of isothiosemicarbazones and their metal complexes. Among them, anticancer features are the most salient [3]. On the other hand, some isotopes of uranium especially ^{230}U are utilized in medicine because of their alpha emission properties. $^{230}U/^{226}Th$ is an effective novel alpha-emitter system for application in targeted alpha therapy (TAT) of cancer [4]. Based on the above expression, uranium complexes of isothiosemicarbazone with total combination of ligand with confirmed biological properties and metal with alpha emission feature could be an interesting candidate for more anticancer research.

Herein, the interaction of uranyl complexes of isothiosemicarbazones (Scheme) with HSA is investigated using UV-Vis, fluorescence and circular-dichroism spectroscopies. The results show that the complexes quench the fluorescence peak of HSA in static way. According to calculated thermodynamic parameters, hydrophobic interactions are the main forces of protein-ligand complex formation. However, the complexes disrupt the secondary structure of protein thorough changing a part of the α-helix to β-structures and random coil.



Scheme: The general structure of uranyl complexes (R: methyl, ethyl, allyl, buthyl, penthyl and benzyl)

Keywords: isothiosemicarbazone, uranyl complex, HSA-binding, circular dichroism

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