Natural proteins as transporters of the drug tetracycline and efficient sensitization of Eu(III) emission in aqueous medium in ternary systems involving the proteins

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Abstract

The pharmacological properties of the conventional drugs may be improved by designing suitable drug delivery systems (DDS). The most recent development in designing DDS has been focused upon the protein-based nanomedicine platforms due to their biocompatibility and biodegradability coupled with low toxicity. This article deals with our work with two protein systems; Bovine β-lactoglobulin (BLG) and Apoferritin (Apo-Fe) and their interaction with the drug tetracycline hydrochloride (TC) in the form of its Eu(III) complex (Eu3TC) in aqueous medium. The choice of the drug TC, an antibiotic, has been made keeping in view the recent implications of its cytostatic and cytotoxic capacities on tumor cells, both in vitro and in animal models.

The BLG is a small globular protein and has a number of *β*-strands and *β*-sheets folded into a cone-shaped barrel forming a hydrophobic pocket . We found that the complex Eu3TC binds to BLGA in the interior of the barrel and may thus serve as a transporter of the drug TC [1]. Apoferritin, made from 24 protein subunits, is a cage like protein whose 24 subunits can be disassembled and then reassembled by slowly adjusting the pH of the medium. This disassembly - reassembly pathway has been successfully employed to encapsulate Eu3TC within the nanocavity of apoferritin [2]. Our study demonstrates that the biocompatible systems comprising of Eu(III)-TC-P (P= Protein) also exhibit efficient sensitized Eu(III) emission. Thus, the ternary systems may be used as an efficient targeted drug transporter, and at the same time, the sensitized Eu(III) emission may enable its use as a biosensor.

**References:**

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