

Fabrication and Evaluation of Human Serum Albumin (HSA) Nanoparticles for Drug Delivery Application

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Abstract

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Human Serum Albumin (HSA) Nanoparticles represent promising drug carrier systems. Particle size is a crucial parameter in particular for the in vivo behavior of nanoparticles after intravenous injection. The object of present study was to characterize the desolvation process of human serum albumin for the preparation of nanoparticles. Several process parameters were examined to achieve a suitable size of nanoparticles such as pH. The nanoparticle sample was purified by five cycles centrifugation (20000xg, 8 min) and redispersion of the pellet to the original volume water at pH values of 6 to 9 respectively and then analyzed by PCS.

Keywords: Human serum albumin, Nanoparticles, Drug delivery, Desolvation method

Introduction

Although, the drug delivery system (DDS) concept is not new, great progress has recently been made in the treatment of a variety of diseases. Targeting delivery of drug to the diseased tissue is one of the most important aspects of DDS. To convey a sufficient dose of drug to the target, suitable carriers of drugs are needed. Nano and microparticle carrier have important potential application for the administration of therapeutic molecules. The controlled drug delivery systems offer numerous advantages compared to conventional dosage forms, which include improved efficiency, reduced toxicity and improved patient compliance and convenience. Such systems often use macromolecules as carriers for the drugs [1]. Nanoparticles are already in use in several areas of drug delivery and cosmetics. Usually small than 100 nm, they are made by forming nanocrystals or drug-polymer complexes or by creating vesicles or liposomes that entrain drug molecules. Nanoparticles have several properties that can be exploited to improve drug delivery. Because of their fine size, they are often taken up by cells when larger particles would be excluded or cleared from the body. Small molecules, peptides, proteins and nucleic acids can be loaded in to nanoparticles that are recognized by the immune system and that can be targeted to particular tissue types [2]. The major advantage of colloidal drug carrier systems is the possibility of drug targeting by a modified body distribution [3] as well as the enhancement of the cellular uptake [4]. Among these colloidal systems, protein based nanoparticles play an important role. The benefits of protein nanoparticles are non-toxicity, stability for long duration, non-adsorption, also poor biodegradability [5, 6]. The body distribution of colloidal drug delivery systems is mainly influenced by two physicochemical properties, particle size and surface characteristics [7]. Basically 3 different methods preparation of such nanoparticles (protein nanoparticles) have been described based on emulsion formation, desolvation and coacervation. The disadvantage of the emulsion methods for particle preparation is the need for applying organic