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NANOPARTICLES FOR MEDICAL APPLICATIONS MADE OF BIODEGRADABLE AMINO ACID-BASED POLYMERS: PREPARATION AND MODIFICATION

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Polymeric nanoparticles (NPs) are of high interest for numerous applications in medicine, including targeted drug to a considerable potential for treatment of many human diseases. The important technological advantages of NPs usage as drug carriers are their high stability, high carrier capacity, feasibility of encapsulation of both hydrophilic or hydrophobic substances, as well as a high variety of possible administration routes. Various degradable and non-degradable polymers of both natural and synthetic origin have been used for NPs construction. One of the most promising for the design of NPs are amino acid-based biodegradable polymers - poly (ester amide) s (PEAs) which will be cleared from the body after the fulfilment of their function. The used PEAs are composed of naturally occurring and non-toxic building blocks such as α-amino acids, fatty diols and dicarboxylic acids. In our previous research we have performed a systematic study for the preparation of biodegradable NPs by cost-effective nanoprecipitation method using PEAs. The present work deals with the fabrication of the surface modified biodegradable NPs that includes the PEGylation (coating with polyethylene glycol, PEG) and imparting positive charge to the particulates. The PEGylation of NPs is important for improving their biocompatibility whereas positive surface charge (zeta-potential) is necessary for enhancing permeability through the biological barriers. The PEA composed of L-leucine, 1,6-hexanediol and sebacic acid (8L6) was used as a basic polymer for fabricating the NPs, and the arginine based cationic PEA composed of L-arginine, 1,6-hexanediol and sebacic acid (8R6) was employed for imparting them the positive charge. An originally designed comb-like PEA, containing lateral PEG-2000 chains along with 8L6 anchoring fragments, was used as a PEGylating surfactant. It has been established that depending on the fabrication conditions a size and zeta-potential of the NPs could be tuned within 78÷161 nm and +7.5÷+23.2 mV, respectively.

Biography

Tem Kantaria has his expertise in the preparation and characterization of nanoparticles based on amino acid based biodegradable poly(ester urea)s. Currently he is pursuing his PhD degree and engaged in the preparation, modification and characterization of new biodegradable nano and microparticles on the bases of amino acid-based ester polymers (poly(ester amide)s and poly(ester urea)s).

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