Synthesis of cationic pullulan-based copolymer for future application in controlled delivery systems for cancer therapy

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Polysaccharides gained growth attentional in biomedical area due to their biocompatibility and biodegradability. Cationic polysaccharides have been mainly used as carriers for different active ingredients such as nucleic acids, vaccines, and chemotherapeutics [1]. Besides, cationic copolymers based on biomaterials demonstrated a self-assembly capacity, which results in a core-shell nanomicelle, that can load hydrophobic antitumor drugs and polyanionic genes simultaneously for delivery systems [2]. In this work, a new cationic copolymer based on polysaccharide and polypeptide was synthesized, with the presence of a cationic molecule N,N-diethylethylamine groups (DEAE). Pullulan-DEAE-graft-poly(Z-L-lysine) (Pul-DEAE-g-PZLL) was synthesized in two steps as methodology adapted from Park *et al.* (2012): first by the modification of pullulan hydroxyl groups by nucleophilic replacement with DEAE was performed and then the remained hydroxyl groups was used as initiator for the ring opening polymerization (ROP) of the N-carbobenzyloxy-l-lysine N-carboxylic anhydride (Z-Lys-NCA). Many techniques were used to characterize the modified polysaccharide, such as ^{1}H and ^{13}C nuclear magnetic resonance (NMR), differential scanning calorimetry (DSC) and Fourier transform infrared spectroscopy (FTIR). NMR and FTIR results demonstrated the effectiveness of copolymer synthesis, while DSC analyses revealed the thermal properties of innovative materials. The cationic copolymer resulted from the chemical modification and ROP reaction is now available for further applications, such as encapsulation of chemotherapist drugs.

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References:

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