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Cross-linked and neutralized hyaluronic acid-based drug delivery systems

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This work demonstrates the preparation, characterization and drug dissolution of different hyaluronic acid (HyA)-based colloidal drug delivery systems containing hydrophobic ketoprofen (KP), a non-steroidal anti-inflammatory drug (NSAID), as the model drug molecule. Because of the highly hydrophilic character of HyA, the cross-linked derivatives at cross-linking ratio of 50, 75 and 100% have been synthesized to potentially encapsulate a hydrophobic drug. In addition, to achieve the above-mentioned goal, the hydrophobized variants of HyA have also been produced by modifying the structure with positively charged cetyltrimethylammonium bromide (CTAB) surfactant at different HyA monomer/CTAB mass ratios. It was established that the original coherent gel-like structure of the HyA changes into an incoherent colloidal system due to modifications that were verified by rheological investigations. Increase in the cross-linking ratio results in the formation of polydisperse nanoparticles (NPs) in the range of ca. 40-110 nm, while an average diameter of ~100-120 nm was obtained for HyA/CTAB particles. These modified HyA carriers are able to bind KP molecules to varying degrees depending on their chemical structure. Taking into account, the release profiles of the different systems, it can be concluded that nearly 70% of the encapsulated KP molecules dissolve from the totally cross-linked HyA systems but the release rate of KP is about 20% (after 8 h) from the CTAB-modified colloidal system at HyA monomer/CTAB 1:0.8 mass ratio. It was also established that increasing the amount of CTAB, the release of KP turns to diffusion and erosion-controlled way.

Biography

Adam Juhasz has completed his graduation in Chemistry from the University of Szeged, Hungary, and started working in the MTA-SZTE Biomimetic Research Group, Department of Medical Chemistry, University of Szeged, Hungary. Currently, he is a PhD candidate. He has published more than 15 papers in reputed journals.

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