

NANO TRIBLOCK COPOLYMERS PREPARED BY ATRP FOR INSULIN DRUG DELIVERY

Hadi S Al Lami, Baqer A Al Mayyahi and Athir M Haddad

University of Basrah, Iraq

For controlled release applications requiring frequent injection, weight loss of the polymer matrix is the most important parameter of degradation. To avoid accumulation of polymer in the body, the matrix should disappear within a reasonable period of time (depending on the application). Novel triblock copolymers of different ration of L-lactide were prepared by atom-transfer radical polymerization (ATRP). They were characterized by FTIR, ¹H NMR, and micro elemental analysis. Triblock copolymers were used to prepare IPN's which had fiber characteristic due to presence of L-lactide in IPN's composition. Using the coated fiber, IPN's reduced the burst effects of insulin. Insulin release from fiber IPN's could be potentially controlled by changing the content of PEG, molecular weight of PEG, changing ratio of PLA/PEG-SC-PEG, presence of Pluronic F-127 with the composition of fiber IPN's, pH medium, crosslinked agent ratio, and the number of coated layers. The morphology of the uncoated fiber IPN's was performed using Scanning Electron Microscopy (SEM). All those polymer networks were loaded with 50 IU of insulin. In vitro release showed that the longer the PLA chain length, would be slower *in vitro* release rate of insulin due to decreasing the hydrophilicity which reflected the swelling of fiber IPN's and *in vitro* releasing rate of insulin. The obtained data showed that the release of insulin decreases within the first two hours for fiber IPN's of some triblock copolymers depending on the composition and molecular weights. The release rate of insulin can be designed by choosing the suitable conditions. The results simply support that loading of insulin with prepared fiber IPN's can be used for controlling insulin release and the fiber IPN's with triblock copolymer are suitable for insulin delivery system for the controlled administration of insulin.

hadisalman54@yahoo.com