ABSTRACT

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Title of thesis: A study of biodegradable polyesters based nanoparticles properties

Nanoparticles (NPs) are particles with a diameter size ranging between 1 – 500 nm. They are preferably used as drug delivery systems or imaging systems. NPs are able to encapsulate both hydrophilic and hydrophobic drugs and also macromolecules such as peptides or mRNAs.

The aim of this study was to specify selected properties of NPs prepared from poly (lactide-co-glycolide) polymer (PLGA) using polyvinyl alcohol as a surfactant. Nanoprecipitation was chosen as a preparation method. NPs were prepared from a branched PLGA copolymer and from a conventional linear PLGA polymer/oligomer. The main task was a stability study. The effect of the pH and the type of the used polymer of the nanoparticle suspension on the morphology of the nanoparticles was evaluated over one month period. The following parameters of nanoparticles with two model drugs (curcumin and procaine) were also monitored: encapsulation efficiency, drug loading and recovery yield. Dissolution tests were performer and the suitability of individual polymers for different types of drugs was evaluated.

The NP size ranged from 140 nm to 542 nm with a polydispersity index ranging from 0,057 to 0,254. The measured zeta potential was up to -16 mV. The NPs from both polymers in acidic pH showed the best-long therm stability; on the other hand, the least stable nanoparticles were from the branched polymer at a weakly basic pH, where the phenomenon of cyclic swelling was observed. The encapsulation efficiency ranged from 31 % to 100 % depending on the drug and polymer used. A branched PLGA copolymer was more suitable for dissolution of curcumin and no superiority of any of the polymers was observed for dissolution of procaine.

Key words: nanoparticles, biodegradability, stability, PLGA