ABSTRACT

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Title of thesis: Polymeric nanoparticles as a platform for delivery of poorly water-soluble drugs

Polymer nanoparticles can be used as drug carriers due to their beneficial properties. One of the advantages of polymeric nanoparticles is, for example, to increase the solubility of drugs in water. They have great potential in the therapy of inflammatory diseases such as Crohn's disease or in shifting cancer pharmacotherapy.

The main objective of this thesis was to prepare polymeric nanoparticles with encapsulated curcumin as model active ingredient. Four types of poly(lactic-co-glycolic acid) (PLGA) copolymer were used to prepare the nanoparticles. Nanoprecipitation and emulsion evaporation methods were employed. The parameters evaluated were encapsulation efficiency, drug loading, particle size and polydispersity. Both the water phase, where two different surfactants were employed, and the organic phase were varied during the experiment. The experimental part also used a dissociation method where two types of PLGA copolymer were compared and during the dissociation, samples were taken at predetermined times to determine the total amount of curcumin released.

The results of the experimental part show that the measured nanoparticle sizes are in the range of 100-300 nm needed for targeted distribution to the inflammatory tissues. The results also show that the nanoprecipitation method is a more suitable method for the preparation of polymeric nanoparticles, where the encapsulation efficiency (EE) reaches higher values than the emulsion evaporation method. The highest EE values were achieved by PLGA A2 using the surfactant Pluronic® F127. The dissolution profiles showed that curcumin release was faster in PLGA E 5/5, with up to 67% of curcumin released after 72 hours.

Key words: polymeric nanoparticles, curcumin, targeting, encapsulation