ABSTRACT

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Title of thesis: Study of physicochemical aspects influencing the properties of polymer particles

Polymeric biodegradable nanoparticles find application as carriers in targeted drug delivery, improve the pharmacokinetic profile of the drug and reduce its adverse effects. Macrophages are involved in the development of many inflammatory, autoimmune and other diseases and represent one of the potential therapeutic targets in the treatment of these diseases. For this reason, attention has been paid to the targeted delivery of anti-inflammatory drugs to macrophages using polymeric nanoparticles.

The passive targeting of nanoparticles to macrophages is dependent on their physicochemical properties. The use of nanoparticles with negative surface charge, hydrophobic character and size in the range of 100-300 nm is optimal.

In this work, dexamethasone-loaded nanoparticles were prepared by the nanoprecipitation method. Five different types of polymer based on polylactic-co-glycolic acid and five different initial concentrations of dexamethasone for each polymer were used to prepare the nanoparticles. The encapsulation efficiency, size, polydispersity and zeta potential were evaluated for the prepared nanoparticles. The effect of initial mass of dexamethasone and polymer type on the encapsulation of dexamethasone into nanoparticles was investigated.

It was found that the initial mass of dexamethasone affects its encapsulation into nanoparticles. The highest encapsulation efficiency was achieved at initial mass of 0.6 mg and the highest drug loading at initial mass of 1.5 mg of dexamethasone per 30 mg polymer. The best results of dexamethasone encapsulation were achieved using the branched polymer. The size and zeta potential of the prepared nanoparticles met the requirements for targeting to macrophages.