Abstract

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Title of diploma thesis: Polymeric nanoparticles: platform for antibiotic drugs delivery

Nanoparticles prepared from biodegradable polymer poly (lactide-co-glycolic acid) (PLGA) are useful for targeted drug therapy of bacterial infections. This increases poor cellular bioavailability of aminoglycosides. Optimal properties of these nanoparticles for passive targeting to macrophages are their hydrophobic character with negative surface charge ang size in the range of 100 nm to 300 nm, PDI under 0,1 or in the range of 0,2 – 0,3 PDI. We prepared gentamicin loaded PLGA nanoparticles by double emulsion solvent evaporation method. Acid terminated PLGA with equimolar lactic to glycolic acid ratio was used for preparation of nanocapsules. We evaluated the size, polydispersity index, drug loading capacity and encapsulation efficiency of the drug in the nanoparticles. Novel HPLC method with pre column derivatization was developed for this purpose. Organic solvents, a type and concentration of surfactants were tested in order to prepare suitable formulation. Size and PDI of prepared nanoparticles were ranging between 246,8 nm – 5,35 µm and 0,068 – 0,662 respectively. Optimal granulometric properties were achieved using organic solvents dichlormethan, ethylacetate or chloroform and surfactant PVA. The best encapsulation efficiency achieved was approximately 25,7 %.

Key words: nanoparticles, biodegradability, PLGA, double emulsion solvent evaporation method, gentamicin, intracellular bacteria, Fmoc-Cl, HPLC, spectrophotometry