

Abstract

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Title of thesis: Formulation and testing of branched polyesters siRNA-loaded nanoparticles

The progression of development increases demand for new and more effective drug systems formulations. This diploma thesis is focused on the preparation of nanoparticles from biodegradable branched polyesters based on PLGA, which are suitable for the transport of an oligonucleotide of a small interfering nucleic acid, siRNA. The theoretical part focuses on the characteristics of usable polymers, their possible modifications, the methods of preparation with closer look at the selected nanoprecipitation method, the important parameters such as particles size, zeta potential, and polydispersity. The main part is also characterization of siRNA in terms of structure, properties, modifications, and its function. A more extensive experimental part deals with the appropriate choice of type and concentration of polyester and stabilizer, methods of preparation and characterization of nanoparticles, and the possibility of analyzing encapsulated siRNA. Chapters results and discussion compares polyesters branched on tripentaerythritol, and polyacrylic acid in different concentrations in terms of size, polydispersity, zeta potential, and stability. The effect of added stabilizer, and encapsulation efficiency were also observed. The conclusions indicate compatibility of each component used in the preparation of nanoparticles, as well as the suitability of the method itself. With an increasing concentration of polyester, increase of particles size was observed. Important is, that stability of the nanosuspension was significant even without use of the stabilizer. Encapsulation increased with increasing concentration of polyester, the highest value was obtained using a polyester branched on polyacrylic acid.