

RIFAMPICIN-LOADED NANOPARTICLES ON THE BASIS OF POLYMER

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Polymers were used as materials for the preparation of nanoparticles which meet the requirements for medical products: such as biocompatibility, biodegradability and low toxicity. Various methods for obtaining of nanoparticles based on this polymer and encapsulation of medicinal substances have been invented. One of the widely used method is the emulsion method, based on which the interaction of the organic phase (polymer solution) with the aqueous phase (solution of the stabilizer). For this purpose, anti-tuberculosis drugs Rifampicin was immobilized in the matrix of PLGA by emulsion evaporation method.

The preparation of nanoparticles is influenced by factors such as the nature of the solvent and stabilizer, the concentration of the stabilizer, the rate of the homogenizer, and so on. That is why, in this research work two compositions were studied: Composition 1 (Rifampicin 0,59 g; PLGA 5 g; Stabilizer-Tween-80 (5%) 20 ml; Organic phase – chloroform 25 ml; Water 100 ml) and Composition 2 (Rifampicin 0,59 g; PLGA 5 g; Stabilizer-PVA 0,826 g; Organic phase – dichloromethane 25 ml; Water 100 ml).

In the system where the tween-80 was used as an emulsifier, the average particle size was 651 nm, with polydispersity equal to 0,231. The peaks of nanoparticles indicate the existence of two group of particles nanometric size in the dispersion. But in another system, where PVA was used, the average size was 116 nm, and polydispersity – 0,049. The yield of polymer nanoparticles containing the drug was 55.4%.

The rate of drug release from the matrix of PLGA nanoparticles was studied under simulating biological conditions by the spectrophotometric method ($\lambda = 475$ nm) method using UV-1800 SHIMADZU two-beam scanning spectrophotometer. The kinetics of drug release of Rifampicin from PLGA nanoparticles immobilized by the direct emulsion method is relatively high. For the first phase of the process (59,4% in 30 minutes), the highest release rate of Rifampicin is characteristic, apparently due to the adsorption of some part that was not immobilized into the nanoparticle. Further, the kinetics of Rifampicin release is determined by second process: diffusion of nanoparticles from the volume and hydrolysis of the nanoparticle matrix. 81.6% of the antibiotic is released, after 6 hours.