

Abstract

Immunosuppressive and cytostatic drugs have many serious side effects which are dose dependent. Local application of drugs prolongs and increases the concentration of drug in the target place and, therefore, may reduce their serious side effects. Polymeric fiber carrier could be used as drug delivery system for local application. Polylactide (PLA) micro/nanofibers containing hydrophobic drugs (immunosuppressive drug cyclosporine A and cytostatic drug paclitaxel) were prepared to study this potential medicinal application. Poly(ethylene)glycols (PEG) of various molecular weight (6, 20 and 35 kDa) were incorporated to the structure of fibers to improve compatibility of PLA-drug system and influence the release profiles of hydrophobic drugs. For the systematic development of these materials, it is important to describe the context of the preparation of nanofibers, their morphology and drug release profiles. Therefore, HPLC methods with tandem mass spectrometric or UV detection were optimized and validated to determine the influence of composition of nanofibers on release kinetics of drugs to different medium (phosphate buffer, hydrogels). The nanofibers with added PEG released significantly higher amounts of drugs and prolonged the release time, compared to the fibers containing only drugs. A multiple increase in the release of the drug into hydrogels compared with release into aqueous media was also observed. Therefore, PLA-PEG nanofibers can serve as an effective scaffold for the local suppression of inflammatory reaction or immune response or for local recurrence therapy.