Influence of Maghemite in the Dissolution Profile of Cotrimoxazole Inserted into Nanocomposites of PLGA-PEG/Maghemite

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ABSTRACT

Targeted drug delivery system is one of the most important research field for development of pharmaceutical drugs [1]. Intending to reach that, the drug cotrimoxazole [2, 3] was combined to the synthesized copolymer PLGA-PEG and maghemite. The copolymer was synthesized through the polycondensation of lactic acid (84,5-85,5%v/v), glycolic acid (57%v/v) in an equimolar ratio and the commercial PEG (Mn= 6000) using sulfuric acid as catalyst. The nanoparticle used, maghemite, was synthesized through the co-precipitation method [4]. A sample of PLGA-PEG containing 1% of the drug cotrimoxazole was produced through fusion method to be compared to the system containing the nanoparticle. The PLGA-PEG synthesized was heated to 130ºC along 10 minutes. Thereafter, the cotrimoxazole was added to the molten material, being mechanically mixed to the copolymer. The composite containing the magnetic nanoparticle and the drug were prepared following the same experimental procedure. These materials were used to investigate the influence of maghemite into the dissolution profile of cotrimoxazol. The obtained copolymer was characterized by NMR, FTIR and SEC. In addition, the maghemite and the composite containing the drug were also characterized by FTIR, by WAXS and by magnetic force. This last test was performed according to the methodology developed by our group [5]. The NMR and FTIR analysis are consistent with the literature data [6,7] and the magnetic nanoparticles showed a superparamagnetic behavior that can be associated to their nanometric size, calculated using the WAXS data. The dissolution test was made following the USP method for cotrimoxazole tablets [8]. The dissolution was monitored and quantified using UV-Vis analysis. The dissolution profile can be described as "sustained" and the presence of the nanoparticles seems to not interfere into the dissolution profile of cotrimoxazole during the period of 6 hours. Further studies are being carried out to determine the exact time needed to the total polymer degradation associated with the complete release of the drug.

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