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Preparation and characterization of poly(e-caprolactone)–poly(ethylene glycol) – poly(e-caprolactone) nanoparticles for sustained release of tamoxifen

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Background and Amis: poly(e-caprolactone)–poly(ethylene glycol) – poly(e-caprolactone) (PCL-PEG-PCL) copolymers are important synthetic biomedical materials with amphiphilicity, controlled biodegradability,and great biocompatibility.This work reports synthesis,and characterization of PCL-PEG-PCL triblock copolymers, and their application as a novel nanocarrier for tamoxifen.
Methods: The PCL-PEG-PCL triblock copolymer was prepared by ring-opening polymerization of caprolactone in the presence of PEG as an initiator and stannous octoate as a catalyst. The nanoparticles were prepared by nanoprecipitation method.
Results: Synthesis of PCL-PEG-PCL copolymer was confirmed by various techniques. FTIR spectrum of the product exhibits peaks characteristic of both PEG and PCL.The absorption band at 1726 cm-1 and 1099 are attributed to the C=O stretching vibrations of the ester carbonyl group, and C–O–C stretching vibrations of PEG, respectively. The absorption band at 3414cm-1 is assigned to terminal hydroxy groups. H-NMR spectrum also shows Peaks at 1.42, 1.62, 2.34, and 4.09 ppm are assigned to methylene protons of –(CH2)3–, –OCCH2–, and –CH2OOC– in PCL units, respectively. The sharp single peak at 3.66 ppm is attributed to the methylene protons of homosequences of the PEG oxyethylene units. The very weak peak at 4.3 ppm is attributed to themethylene proton of PEG end unipoly(ethylene glycol).GPC analysis of PCL-PEG-PCL copolymer showed its molecular mass is equal to the 59122 g/mol .Tg of copolymer was studied by DSC and it was found that it is about 61°C.The size of nanoparticles were determined to be??? nm.The extent of tamoxifen loading was analysed directly. The results revealed that the nanoparticles have high loading efficiency and study on release profile of nanoparticles demonstrated the high potential of the nanoparticles for sustained release of tamoxifen a for long time.
Conclusions: The PCL-PEG-PCLtriblock copolymers were successfully synthesized and characterized by different techniques. Nanoparticles of PCL-PEG-PCL was also prepared and the results revealed their potential for sustained release of tamoxifen a for long time

Keywords: PCL-PEG-PCL; Nanoparticle; Tamoxifen