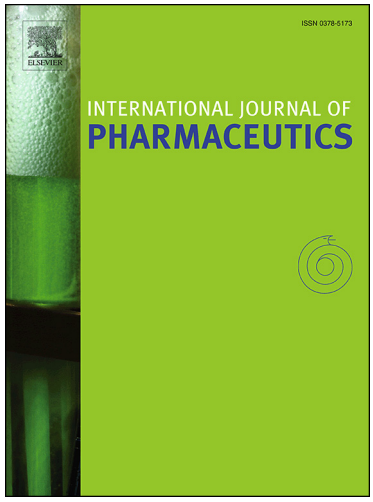

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Dual-responsive drug delivery systems prepared by blend electrospinning

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Abstract:

To prepare temperature and pH dual-responsive drug delivery systems, the thermosensitive polymer poly(N-isopropylacrylamide) (PNIPAAm) was first synthesized by free-radical polymerization. It was then co-dissolved with the pH-sensitive polymer Eudragit® L 100-55 (EL100-55) and processed into fibers using electrospinning. Ketoprofen (KET), a model drug, was also incorporated into the composite fibers, and fibers based on a single polymer additionally prepared. The fibers had smooth cylindrical morphologies, and no obvious phase separation could be seen. Using X-ray diffraction, KET was determined to be present in the amorphous state in the fiber matrix. FTIR spectroscopy also indicated the successful incorporation of amorphous KET in the fibers. *In vitro* drug release studies in media at different pH (4.5 or 7.4) or temperature (25 and 37 ºC) showed that the release of KET from the blend PNIPAAm/EL100-55 fibers was dependent both on environmental temperature and pH, reflecting the dual-responsive properties of the fibers. The MTT assay was used to explore the biocompatibility of the PNIPAAm/EL100-55 composite fibers towards L929 fibroblasts. Viability was always found to be > 80 %, even at polymer concentrations of 100 mg/mL. Therefore, the fibers prepared here could lead to the development of multi-responsive fibers for drug