Sustained release of prindopril erbumine from its chitosan-coated magnetic nanoparticles for biomedical applications

ABSTRACT

The preparation of magnetic nanoparticles coated with chitosan-prindopril erbumine was accomplished and confirmed by X-ray diffraction, TEM, magnetic measurements, thermal analysis and infrared spectroscopic studies. X-ray diffraction and TEM results demonstrated that the magnetic nanoparticles were pure iron oxide phase, having a spherical shape with a mean diameter of 6 nm, compared to 15 nm after coating with chitosan-prindopril erbumine (FCPE). Fourier transform infrared spectroscopy study shows that the coating of iron oxide nanoparticles takes place due to the presence of some bands that were emerging after the coating process, which belong to the prindopril erbumine (PE). The thermal stability of the PE in an FCPE nanocomposite was remarkably enhanced. The release study showed that around 89% of PE could be released within about 93 hours by a phosphate buffer solution at pH 7.4, which was found to be of sustained manner governed by first order kinetic. Compared to the control (untreated), cell viability study in 3T3 cells at 72 h post exposure to both the nanoparticles and the pure drug was found to be sustained above 80% using different doses.

Keyword: Chitosan; Drug delivery; Prindopril erbumine; Superparamagnetic nanoparticles.