

Colon-targeted celecoxib-loaded Eudragit(®) S100-coated poly-ε-caprolactone microparticles: preparation, characterization and in vivo evaluation in rats.

mina ibrahim tadros

Assistant Professor of Pharmaceutics and Industrial Pharmacy

Abstract

Context: Celecoxib suffers from low and variable bioavailability following oral administration of solutions or capsules. Recent studies proved that chemoprevention of colorectal cancer is possible with celecoxib.

Objective: This work aims to tailor colon-targeted celecoxib-loaded microparticles using time-dependant and pH-dependant coats. Estimation of drug pharmacokinetics following oral administration to fasted rats was another goal.

Methods: A 23 factorial design was adopted to develop poly-ε-caprolactone (PCL) celecoxib-loaded microparticles (F1 – F8). To minimize drug-percentages released before colon, another coat of Eudragit® S100 was applied. In vitro characterization of microparticles involved topography, determination of particle size and entrapment efficiency (EE %). Time for 50% drug release (t50%) and drug-percentages released after 2 hours (Q2h) and 4 hours (Q4h) were statistically compared. Estimation of drug pharmacokinetics following oral administration of double-coat microparticles (F10) was studied in rats.

Results: PCL-single-coat microparticles were spherical, discrete with a size range of $60.66 \pm 4.21 - 277.20 \pm 6.10 \mu\text{m}$. Direct correlations were observed between surfactant concentration and EE%, Q2h and Q4h. The PCL M.wt. and drug: PCL ratio had positive influences on EE% and negative impacts on Q2h and Q4h. When compared to the best achieved PCL-single-coat microparticles (F2), the double-coat microparticles (F10) showed satisfactory drug protection; Q2h and Q4h were significantly ($P < 0.01$) decreased from $31.84 \pm 1.98\%$ and $54.72 \pm 2.10\%$ to $15.92 \pm 1.78\%$ and $26.93 \pm 2.76\%$, respectively. When compared to celecoxib powder, F10 microparticles enhanced the bioavailability and extended the duration of drug-plasma concentration in rats.

Conclusion: The developed double-coat microparticles could be considered as a promising celecoxib extended-release colon-targeting system.

journal of Drug Delivery - 2011, January

