

Evaluation of ceftiofur-PHBV microparticles in rats

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Despite the high number of antibiotics used for the treatment of infectious disease in animals, the development of slow release formulations presents a significant challenge, particularly in using novel biomaterials with low cost. In this report, we studied the pharmacokinetics, toxicity, and therapeutic activity of ceftiofur-PHBV (ceftiofur-poly(3-hydroxybutyrate-co-3-hydroxyvalerate)) in rats. The pharmacokinetic study demonstrated a sustained release of ceftiofur into the bloodstream, with detectable levels over the minimum inhibitory concentration for at least 17 days after a single intramuscular injection of ceftiofur-PHBV (10 mg/kg weight). In addition, the toxicological evaluation of biochemical, hematological, and coagulation blood parameters at the therapeutic dose demonstrated the safety of ceftiofur-PHBV, with no adverse effects. In addition, ceftiofur-PHBV exhibited a therapeutic effect for a longer time period than the nonencapsulated ceftiofur in rats challenged with *Salmonella Typhimurium*. The slow release of ceftiofur from the ceftiofur-PHBV, its low toxicity in the blood parameters evaluated, and the efficacy in the rats infected with *Salmonella Typhimurium* make ceftiofur-PHBV a strong candidate for biotechnological applications in the veterinary industry. © 2014 Vilos et al.

Blood parameters

Drug delivery

Microparticles

Rat infection model

Salmonella typhimurium

ceftiofur

copolymer

poly(3 hydroxybutyrate co 3 hydroxyvalerate)

unclassified drug

ceftiofur

cephalosporin derivative

poly(3-hydroxybutyrate)-co-(3-hydroxyvalerate)

polyester

animal experiment

animal model

area under the curve

article

controlled study

drug efficacy

drug half life

drug safety

drug synthesis

encapsulation

male

maximum plasma concentration

minimum inhibitory concentration

nonhuman

rat

Salmonella typhimurium

salmonellosis

sustained drug release

time to maximum plasma concentration

toxicity testing

animal

disease model

dose response

drug effects

erythrocyte

intramuscular drug administration

microbial sensitivity test

microbiology

Salmonella enterica serovar Typhimurium

Salmonella Infections

Sprague Dawley rat

structure activity relation

Animals

Cephalosporins

Disease Models, Animal

Dose-Response Relationship, Drug

Erythrocytes

Injections, Intramuscular

Male

Microbial Sensitivity Tests

Polyesters

Rats

Rats, Sprague-Dawley

Salmonella Infections

Salmonella typhimurium

Structure-Activity Relationship