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Pharmacokinetics/pharmacodynamics modeling of cyadox against *Clostridium perfringens* in pigs

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The objective of this study was to evaluate the antibacterial activity of cyadox against 60 pig *C. perfringens* and optimize the dosage regimens using *ex vivo* pharmacokinetics-pharmacodynamics (PK-PD) modeling. The ileum fluid contained free fraction cyadox of pigs after oral administration of 30 mg/kg body weight were collected by utilizing the implanted ultrafiltration probes. The C_{max} of free cyadox in the ileum fluid was 23.66 μg/mL and significantly higher than total concentration of 0.031 μg/mL in plasma. The mean values of T_{max}, AUC_{24h}, and CL/F in ileum fluid were 1.96 h, 106.40 μg·h/mL, and 0.27 L/kg/h, respectively. The minimum inhibitory concentration (MIC) of cyadox against 60 clinical isolates ranged from 0.5 to 8 μg/mL with MIC_{50} and MIC_{90} of 2 and 4 μg/mL. The MIC of cyadox against pathogenic *Clostridium perfringens* CPFK122995 was 2 μg/mL in broth and ileum fluids. Cyadox displayed a concentration-dependent kill action with mutant prevention concentration (MPC) of 12 μg/mL. According to the inhibitory sigmoid E_{max} modeling, the AUC_{24h}/MIC ratios of ileum fluid required to achieve the bacteriostatic, bactericidal, and virtual bacterial elimination effect were 26.72, 39.54, and 50.69 h, respectively. Monte Carlo simulations for the 90% target attainment rate (TAR) predicted population daily doses to achieve bacteriostatic, bactericidal, and elimination actions over 24 h were 29.30, 42.56, and 54.50 mg/kg, respectively. These results suggested cyadox is a promising antibacterial agent to treat *C. perfringens* infections and provided a sound guidance for the usage.

Biography

Lingli Huang is a Professor in the Department of Veterinary Medicine, and a research member in National Reference Laboratory of Veterinary Drug Residue at Huazhong Agriculture University in China. She received PhD in Agricultural Products Processing and Storage from Huazhong Agriculture University in 2005. Her current research aims at pharmacokinetics, metabolism and food safety evaluation of veterinary drug in food animals. She has published more than 45 papers in reputed international journals.

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