Marbofloxacin achieves high concentration in pig tonsils according to a dose dependent fashion

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Introduction

Actinobacillus pleuropneumoniae (APP) is the causative agent of porcine pleuropneumonia. Pigs can become asymptomatic carriers of the organism in their tonsils for long periods. Attempts to eradicate APP from pig herds have been made with antibiotics but there is a paucity of information about the penetration of antibiotics in tonsils. Marbofloxacin (MB) is a fluoroquinolone widely used in veterinary medicine to control APP under field conditions. The goal of this study was to quantify the MB penetration in tonsils after applying several MB regimen dosages.

Material and methods

Pigs were randomly divided in three groups (control, P1 and P2) of ten animals each one. The control group received 2 mL of serum saline. On the other hand, P1 group received a dose of 2 mg of MB/Kg every day for three consecutive days and P2 group received a dose of 4 mg of MB/Kg every 48 hours two times. The animals were sacrificed 24 hours after finishing the treatment to obtain tonsils and serum samples. The concentration of marbofloxacin in sera and tonsils was quantified by an HPLC analytical method. Finally, it was also calculated the ratio MB tonsil concentration versus APP MIC90 value (0.03 mg/mL,) determined following the CLSI recommendations (4, 7). This ratio is one of the PK/PD efficacy parameters described for fluoroquinolones (5).

Results

Average marbofloxacin serum concentration (AMSC) was 0.16 and 0.24 mg/mL for the P1 and P2 group, respectively. Average marbofloxacin tonsil concentration (AMTC) was 0.50 and 0.70 mg/gr for the P1 and P2 group, respectively (see figure). Thus, AMSC and AMTC increased in a dose-dependent fashion. However, the tonsil MB versus serum MB concentration ratio was close to 3 independently of the dose administered to animals.

Moreover, the MB tonsil concentration: APP MIC90 ratio was 16.6 and 23.3 for P1 and P2 groups, respectively.

Discussion

Marbofloxacin achieves a good penetration in tonsillar tissue, which compares favourably with tonsil/plasma mean concentration ratios reported for other fluoroquinolones (2, 3). However, tonsil/plasma ratio observed for MB was very similar to the described by Esposito et al. (2006) for moxifloxacin in humans.

A great deal of information is now available on the PK/PD relationships for fluoroquinolones. Ratios of 125 for AUC0—24:MIC and 10 for Cmax:MIC have been recommended to achieve high clinical efficacy for concentration-dependent antimicrobial drugs like MB. The MB tonsil:MIC ratio described is above the threshold value (10) that is associated with clinical efficacy for all the doses studied (6). Thus, all the posology regimens tested might be efficacious to eliminate APP from tonsils. Obviously, the information provided here paves the way to carry out studies whose main goal could be to detect APP in tonsils of animals receiving several posology regimens of marbofloxacin.

References

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