SANCTUARI

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Convenia® Use in Virginia Opossums

AT A GLANCE

- For treatment of pyoderma in Virginia opossums, we do not recommended Convenia® at this time. Data shows Convenia® to be less effective in marsupials than it is in placental mammals, and there is primary risk of breeding antibiotic resistance.
- More broadly deployed, lower-tiered antibiotics like amoxicillin, clindamycin, and first-generation cephalosporins such as cephalexin are recommended. These are likelier to resolve infection and have lower risk of breeding resistance if the first chosen antibiotic is unsuccessful.

This advisory examines the benefits and risks of Convenia®, a cephalosporin antibiotic, for treatment of bacterial infections in Virginia opossums in response to several recent questions about safety and efficacy.

Figure 1: Convenia® in its manufacturer packaging

https://www.zoetisus.com/products/dogs/convenia/index.aspx

Background

Cephalosporins, though possessing similar properties to penicillins, are a separate class of antimicrobial drugs which are more environmentally stable and which are classified according to generation. They are generally effective against bone and soft tissue infections caused by pathogens resistant to lower-tiered antibiotics.[1] Convenia®, generic name cefovecin, is a third-generation cephalosporin. It is FDA-approved for veterinary use in dogs and cats via subcutaneous injection at a concentration of 80 mg/mL. Convenia® is primarily prescribed to treat skin infections caused by susceptible strains of *Staphylococcus intermedius* and *Streptococcus canis* in dogs and *Pasteurella multocida* in cats.[2,3] Convenia® has questionable efficacy against common gram-negative bacteria such as *E. coli,* as it may not maintain free plasma concentrations high enough to combat bacteria of these

classes.[4,5] It is ineffective against *Pseudomonas* species or enterococci.[1,3] Convenia®'s one-time injectable administration makes it a favorite choice for veterinarians treating infections in animals, mostly cats, that become stressed when handled or are reluctant to oral dosing of medications. Because of its close relation to the penicillin drug class, Convenia® may cause an allergic reaction or anaphylaxis in animals allergic to either penicillins or cephalosporins and should not be used in either case.[1,2]

Dosing

The dosing instructions for Convenia®, according to its manufacturer label, are as follows:

Figure 2: Dosing for Convenia® use in dogs and cats at 8 mg/kg body weight

Weight of Animal	Volume of CONVENIA (3.6 mg/lb or 0.045 mL/lb)
5 lb	0.23 mL
10 lb	0.45 mL
15 lb	0.67 mL
20 lb	0.90 mL
40 lb	1.80 mL
80 lb	3.60 mL

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In dogs, a second injection may be administered if deemed clinically necessary, but this is not recommended in cats. Drug therapy should cease if no response is seen in 3-4 days.[2] Due to its high-affinity protein binding, Convenia® lingers in tissue for significantly longer than other drugs of its class.[1] A single dose may remain in the body for 65 days. The prolonged drug clearance period of Convenia®, while allowing for its convenient single injection administration, also means adverse reactions may require longer-term treatment. Depending on the targeted infectious pathogen, therapeutic concentrations of Convenia® may persist for either 7 or 14 days in the body (*S. intermedius* and *Pasturella multocida*, and *S. canis*, respectively). Convenia®'s manufacturers recommend culturing infected lesions prior to starting treatment to ensure susceptibility of the pathogen to cefovecin.[2]

Efficacy

Several studies have been conducted to investigate the suitability of cefovecin for species other than placental mammals. Based on studies in hens and green iguanas, researchers found a single injection of cefovecin unlikely to be suitable for use in any bird or reptile species, citing significantly shorter

plasma half-lives in these species when compared with dogs and cats, as well as discrepancies in pharmacokinetic action between reptile species.[6]

More relevant to use of cefovecin in Virginia opossums is a study performed to examine the drug's plasma protein binding and duration of antibiotic activity in the koala and select other Australian marsupials. Contrary to the drug's typical action in dogs and cats, researchers found cefovecin to have a lower degree of plasma protein binding, and therefore likely a shorter period of antibiotic activity, in marsupials versus cats or dogs. Cefovecin dosed at 8 mg/kg and administered subcutaneously to koalas in the same study confirmed a shorter duration of action, with plasma concentrations of the antibiotic only quantifiable for a span of hours.[7]

Safety

The most serious hazard associated with Convenia® is the risk of breeding antibiotic resistance. Third- and fourth- generation cephalosporins were designed to combat resistance acquired via bacterial production of β-lactamases, enzymes produced by bacteria to disable β-lactam antibiotics like penicillins and cephalosporins. Drugs like cefovecin are known to maintain efficacy in these cases. Consequently, certain bacteria have adapted to produce extended-spectrum β-lactamases (ESBLs) in the presence of third- and fourth- generation cephalosporins, which can ultimately lead to the target pathogenic bacteria acquiring multidrug resistance. This type of resistance is genetically transmitted among bacterial classes, making any future infections especially dangerous and challenging to treat.[4] Culture testing capable of showing susceptibility to clavulanic acid alongside resistance to the cephalosporin in question can determine whether ESBLs are present in an infection.[1]

There is no evidence that Convenia® is dangerous to use in opossums, though the threat of breeding multidrug bacterial resistance, and the experimental evidence of inefficacy in non-placental species, casts doubt as to its suitability. There is also a question of feasibility, as culture and susceptibility testing of the infectious agent before starting antibiotic therapy with third- or fourth- generation cephalosporins is imperative to successful treatment. Most rehabilitators are hard-pressed for the resources and time required to perform cultures when one of their opossums presents with an infection.

Recommendations

The use of Convenia® to treat pyoderma in Virginia opossums is not advisable. Lower-tiered antibiotics such as amoxicillin, clindamycin, and first-generation cephalosporins like cephalexin are recommended. Using such drugs ensures a better chance of resolving infection and much lower risk of breeding resistance if treatment with the first chosen antibiotic is unsuccessful. If another antibiotic is

needed, higher-tiered drugs may be safe as a second or third choice. As always, a knowledgeable and trusted veterinarian should be consulted when making choices about drug administration.

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