



# VInfo

## FLUORO- QUINOLONES IN VETERINARY PRACTICE

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Fluoroquinolones (FQs) are bactericidal antimicrobial agents that inhibit two bacterial enzymes involved in DNA supercoiling and segregation.

Rather than being based on existing, naturally-derived antibiotics, FQs are completely synthetic molecules. FQs have many advantages over other antimicrobial drug classes such as beta-lactams including being

concentration-dependent (allowing once per day dosing intervals), exhibiting bactericidal activity against both replicating and dormant bacteria and achieving high concentrations in many difficult to penetrate sites within the body such as bone, prostate gland and CSF.

Unfortunately since their introduction in the late 1980s, FQs have been overprescribed in both human and veterinary medicine and resistance has emerged rapidly through a combination of chromosomal mutations and recently discovered plasmid-mediated mechanisms.

In human medicine, some countries report FQ resistance prevalence as high as 50% while Australia has one of the lowest rates of FQ resistance in the world (currently < 10%). There are restrictions on the ability of Australian doctors to prescribe FQs both in hospitals and the community.

Three FQs are currently registered for use in companion

animals in this country, enrofloxacin, marbofloxacin and orbifloxacin. The new generation FQ pradofloxacin is currently under review by the APVMA.



### When to use fluoroquinolones

FQs are regarded as broad-spectrum antibacterial agents. However, whilst currently registered veterinary FQs show excellent activity against staphylococci it is important to note **that they have little to no activity against strictly anaerobic bacteria, streptococci and enterococci.**

FQs are regarded in both human and veterinary medicine as second line therapies (ie. reserve agents for serious or life-threatening infections or when

resistance to first line drugs is suspected or confirmed by the results of culture and susceptibility testing).

All FQs should not be used in young, actively growing animals due to risks of adverse effects on growing cartilage. Care should be taken using enrofloxacin in cats as rare cases have developed permanent retinal damage.

I generally do not advocate the use of FQs in uncomplicated skin and soft tissue infections though FQs are certainly indicated in the management of deep pyodermas that also involve mixed infections with Gram-negative pathogens.

It is important to note that methicillin-resistant *Staphylococcus pseudintermedius*, which is now emerging as a significant problem in companion animal practice in Australia is usually resistant to FQs.

#### **How to use fluoroquinolones**

1) If you are going to use a FQ, choose the "best in class". Compared to orbifloxacin, enrofloxacin and marbofloxacin have much better activity at lower minimum inhibitory concentrations (MICs) for the majority of veterinary pathogens. Cost should not be a factor when prescribing a FQ-predicted efficacy and reduced opportunity for resistance emergence should be first and

foremost in every veterinarian's decision making process when choosing a drug to prescribe.

2) Nuke' em hard and early before they have a chance to mutate. If you're going to use a FQ, make sure that you provide it at the appropriate dosage i.e. make sure you are always at the high end of the recommended dose, particularly when calculating the required tablets for the weight of the animal. Killing bacteria quickly using the highest recommended dose is an essential requirement to preventing resistant populations from developing and expanding.

3) Where possible, be guided by MIC testing performed by your diagnostic laboratory in your decision making to choose a FQ. Analysis of isolate collections for FQ resistance shows a bimodal distribution of FQ MICs (ie. the isolates are either all sensitive "wild types" with no resistance mutations and MICs ranging from 0.06-0.12 µg/mL and or they are all highly resistant to FQs with MICs >8 µg/mL). If the isolates do happen to be between these ranges, they are on the way to developing resistance and it may be best to try another drug class to prevent further mutations occurring and complete resistance developing. Vetpath Laboratory Services now offers MIC testing on all veterinary pathogens.

4) Where possible, use registered FQs produced by veterinary pharmaceutical

companies. Except in special circumstances, using antimicrobials that are registered for companion animals offers veterinarians the best professional support in terms of adverse reactions, collegiality with the medical profession and support for continuing education.

5) Use surveillance data to guide therapeutic options. The University of Adelaide is collecting isolates from all 22 Veterinary Diagnostic Laboratories in Australia (3000 isolates in total). By the end of 2013, veterinarians will be able to access prevalence data for the major antimicrobial classes used in each animal species to help guide their therapeutic choices. Crucially, we anticipate that the rate of FQ resistance in companion animal pathogens will be the same or less than the prevalence already established for human pathogens.