



# Minocycline

**Jennifer L. Buur**, DVM, PhD, DACVCP  
Western University of Health Sciences

**Minocycline, a tetracycline antimicrobial agent, has good tissue penetration and broad-spectrum activity against a variety of infections in dogs and cats.**

## Clinical Applications



**Like other tetracyclines, minocycline is a broad-spectrum antimicrobial agent with activity against gram-positive and gram-negative bacteria, rickettsial organisms, and some protozoa.<sup>1</sup>**

- In dogs and cats, susceptible bacteria include *Bordetella* spp, *Listeria monocytogenes*, and *Pasteurella* spp; other susceptible organisms include *Giardia lamblia* and *Toxoplasma gondii*.



**Minocycline also has activity against most *Mycoplasma* spp, *Chlamydia* spp, *Chlamydophila* spp, *Leptospira* spp, *Brucella* spp, *Bartonella* spp, *Mycobacterium* spp, and methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) in both dogs and cats.<sup>2,3</sup>**



**Tetracycline or doxycycline resistance as reported on culture and susceptibility testing may not be accurate for nor applicable to minocycline.<sup>3,4</sup>**

- Minocycline is not affected by the common tetracycline resistance genes tetK and tetL.<sup>3</sup>
- Consider requesting specific testing at the diagnostic laboratory to confirm minocycline susceptibility.
- The Clinical and Laboratory Standards Institute (CLSI) guidelines for canine MRSP are <0.125 µg/mL, <0.25 µg/mL, and >0.5 µg/mL for susceptible, intermediate, and resistant organisms, respectively.<sup>3</sup>

## Pharmacokinetics & Pharmacodynamics



**Minocycline is highly lipophilic and has good tissue penetration into cerebrospinal fluid (CSF), aqueous fluid, synovial fluid, and the prostate, even in the absence of inflammation.<sup>1</sup>**



**Minocycline is bacteriostatic and inhibits bacterial protein synthesis through its interaction on the 30S ribosomal subunit.<sup>1</sup>**

- Efficacy is maximized in cases of actively growing pathogens with high metabolic demands.
- The mechanism of action may therefore be antagonized with bactericidal drug classes, such as  $\beta$ -lactam and aminoglycoside antimicrobial agents.

## Protocol



**The suggested dosage for dogs is 5 mg/kg PO every 12 hours for pathogens with a minimum inhibitory concentration (MIC) of  $\leq 0.25$   $\mu\text{g}/\text{mL}$  based on pharmacokinetic and pharmacodynamic (PK/PD) studies in healthy animals.<sup>2,3</sup>**

- A dose of 10 mg/kg PO every 12 hours is recommended for MRSP strains with a MIC value of  $\leq 0.5$   $\mu\text{g}/\text{mL}$ .<sup>3</sup> Of note, duration of treatment is highly variable and depends on infection location as well as pathogen load.



**The suggested dosage for cats is 8.7 mg/kg PO every 24 hours or 4.3 mg/kg PO every 12 hours for pathogens with a MIC of  $\leq 0.5$   $\mu\text{g}/\text{mL}$  based on PK/PD studies in healthy animals.<sup>5</sup>**

## Precautions



**Concurrent administration of sucralfate can impair minocycline absorption.<sup>2</sup>**

- If sucralfate or other aluminum-containing drugs are indicated, administer minocycline at least 2 hours *before* administration of sucralfate and other chelating agents.<sup>2</sup>



**After oral administration, the most commonly reported adverse effect is vomiting consistent with gastric irritation.<sup>3,5</sup>**

- This may be mitigated by administering the oral dose with a small amount of food. However, avoid foods with cations (eg, calcium), as they can chelate and reduce absorption.<sup>6</sup>
- Esophageal strictures have not been reported with use in cats.<sup>5,6</sup>



**Administer minocycline slowly when using IV route in dogs and cats.<sup>3,5</sup>**

- Although the most common and useful route of administration is PO, the IV route is sometimes used under very specific circumstances.

**Minocycline is highly lipophilic and has good tissue penetration into CSF, aqueous fluid, synovial fluid, and the prostate, even in the absence of inflammation.<sup>1</sup>**

CLSI = Clinical and Laboratory Standards Institute, CSF = cerebrospinal fluid, MIC = minimum inhibitory concentration, MRSP = methicillin-resistant *Staphylococcus pseudintermedius*, PK/PD = pharmacokinetic and pharmacodynamic

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- In dogs, rapid IV administration has been associated with severe hypotension.<sup>3</sup>
- In cats, IV administration has been associated with transient tachycardia that resolved once drug administration was concluded.<sup>5</sup>



**Although no specific cases have been reported, use in pregnant, nursing, or young animals may result in dental lesions consistent with other drugs of this mechanistic class.**

**REFERENCES**

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**Rapid IV administration has been associated with severe hypotension in dogs<sup>3</sup>; in cats, IV administration has been linked to transient tachycardia.<sup>5</sup>**

**JENNIFER L. BUUR, DVM, PhD, DACVCP**, associate professor of veterinary pharmacology at Western University of Health Sciences in Pomona, California, is currently involved in teaching evidence-based drug use to veterinary students. Dr. Buur received her DVM from University of Wisconsin-Madison, after which she worked in private practice, gaining clinical experience in small animal and exotic animal medicine, zoo medicine and wildlife rehabilitation, and shelter medicine. She also completed a PhD in comparative biomedical sciences (with a pharmacology emphasis) at North Carolina State University. Dr. Buur's current research interests are curriculum validation and evidenced-based teaching methods.



(milbemycin oxime-lufenuron-praziquantel)

**Caution**

Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

**Indications**

SENTINEL SPECTRUM® (milbemycin oxime/lufenuron/praziquantel) is indicated for the prevention of heartworm disease caused by *Dirofilaria immitis*; for the prevention and control of flea populations (*Ctenocephalides felis*); and for the treatment and control of adult roundworm (*Toxocara canis*, *Toxascaris leonina*), adult hookworm (*Ancylostoma caninum*), adult whipworm (*Trichuris vulpis*), and adult tapeworm (*Taenia pisiformis*, *Echinococcus multilocularis* and *Echinococcus granulosus*) infections in dogs and puppies two pounds of body weight or greater and six weeks of age and older.

**Dosage and Administration**

SENTINEL SPECTRUM should be administered orally, once every month, at the minimum dosage of 0.23 mg/lb (0.5 mg/kg) milbemycin oxime, 4.55 mg/lb (10 mg/kg) lufenuron, and 2.28 mg/lb (5 mg/kg) praziquantel. For heartworm prevention, give once monthly for at least 6 months after exposure to mosquitoes.

**Dosage Schedule**

Body Weight	Milbemycin Oxime per chewable	Lufenuron per chewable	Praziquantel per chewable	Number of chewables
2 to 8 lbs.	2.3 mg	46 mg	22.8 mg	One
8.1 to 25 lbs.	5.75 mg	115 mg	57 mg	One
25.1 to 50 lbs.	11.5 mg	230 mg	114 mg	One
50.1 to 100 lbs.	23.0 mg	460 mg	228 mg	One
Over 100 lbs.	Administer the appropriate combination of chewables			

To ensure adequate absorption, always administer SENTINEL SPECTRUM to dogs immediately after or in conjunction with a normal meal.

SENTINEL SPECTRUM may be offered to the dog by hand or added to a small amount of dog food. The chewables should be administered in a manner that encourages the dog to chew, rather than to swallow without chewing. Chewables may be broken into pieces and fed to dogs that normally swallow treats whole. Care should be taken that the dog consumes the complete dose, and treated animals should be observed a few minutes after administration to ensure that no part of the dose is lost or rejected. If it is suspected that any of the dose has been lost, redosing is recommended.

**Contraindications**

There are no known contraindications to the use of SENTINEL SPECTRUM.

**Warnings**

Not for use in humans. Keep this and all drugs out of the reach of children.

**Precautions**

Treatment with fewer than 6 monthly doses after the last exposure to mosquitoes may not provide complete heartworm prevention.

Prior to administration of SENTINEL SPECTRUM, dogs should be tested for existing heartworm infections. At the discretion of the veterinarian, infected dogs should be treated to remove adult heartworms. SENTINEL SPECTRUM is not effective against adult *D. immitis*.

Mild, transient hypersensitivity reactions, such as labored breathing, vomiting, hypersalivation, and lethargy, have been noted in some dogs treated with milbemycin oxime carrying a high number of circulating microfilariae. These reactions are presumably caused by release of protein from dead or dying microfilariae.

Do not use in puppies less than six weeks of age.

Do not use in dogs or puppies less than two pounds of body weight.

The safety of SENTINEL SPECTRUM has not been evaluated in dogs used for breeding or in lactating females. Studies have been performed with milbemycin oxime and lufenuron alone.

**Adverse Reactions**

The following adverse reactions have been reported in dogs after administration of milbemycin oxime, lufenuron, or praziquantel: vomiting, depression/lethargy, pruritus, urticaria, diarrhea, anorexia, skin congestion, ataxia, convulsions, salivation, and weakness.

To report suspected adverse drug events, contact Virbac at 1-800-338-3659 or the FDA at 1-888-FDA-VETS.

**Information for Owner or Person Treating Animal**

*Echinococcus multilocularis* and *Echinococcus granulosus* are tapeworms found in wild canids and domestic dogs. *E. multilocularis* and *E. granulosus* can infect humans and cause serious disease (alveolar hydatid disease and hydatid disease, respectively). Owners of dogs living in areas where *E. multilocularis* or *E. granulosus* are endemic should be instructed on how to minimize their risk of exposure to these parasites, as well as their dog's risk of exposure. Although SENTINEL SPECTRUM was 100% effective in laboratory studies in dogs against *E. multilocularis* and *E. granulosus*, no studies have been conducted to show that the use of this product will decrease the incidence of alveolar hydatid disease or hydatid disease in humans. Because the prepatent period for *E. multilocularis* may be as short as 26 days, dogs treated at the labeled monthly intervals may become reinfected and shed eggs between treatments.

Manufactured for: Virbac AH, Inc.  
P.O. Box 162059, Ft. Worth, TX 76161

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