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.¹

- 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, *Chlamyphila* spp, *Leptospira* spp, *Brucella* spp, *Bartonella* spp, *Mycobacterium* spp, and methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) in both dogs and cats.²,³

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

- Minocycline is not affected by the common tetracycline resistance genes tetK and tetL.³
- 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.³

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.¹
Minocycline is bacteriostatic and inhibits bacterial protein synthesis through its interaction on the 30S ribosomal subunit.\(^1\)

- 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 \(<0.25\ \mu g/mL\) based on pharmacokinetic and pharmacodynamic (PK/PD) studies in healthy animals.**\(^2,3\)

- A dose of 10 mg/kg PO every 12 hours is recommended for MRSP strains with a MIC value of \(<0.5\ \mu g/mL\).\(^3\) 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 \(<0.5\ \mu g/mL\) based on PK/PD studies in healthy animals.**\(^5\)

### Precautions

**Concurrent administration of sucralfate can impair minocycline absorption.**\(^2\)

- If sucralfate or other aluminum-containing drugs are indicated, administer minocycline at least 2 hours before administration of sucralfate and other chelating agents.\(^2\)

**After oral administration, the most commonly reported adverse effect is vomiting consistent with gastric irritation.**\(^3,5\)

- 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.\(^6\)
- Esophageal strictures have not been reported with use in cats.\(^5,6\)

**Administer minocycline slowly when using IV route in dogs and cats.**\(^3,5\)

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

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

**PEER REVIEWED**

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

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**


**Rapid IV administration has been associated with severe hypotension in dogs; in cats, IV administration has been linked to transient tachycardia.**³⁵

**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.**

**Dosage Schedule**

| Weight       | Body Milbemycin Lufenuron Praziquantel 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 |

**Causes**

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 *Ctenocephalides canis*; *Otodectes cynotis*; *Dipylidium caninum*); adult hookworm (*Anoplocephala perfoliata*); 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 0.25 mg/kg (0.5 mg/lb) 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.

**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 associated with severe tachycardia that resolved once drug administration was concluded. Initial treatment of these reactions is to remove adult heartworms. SENTINEL SPECTRUM is not effective against adult *D. immitis*. End, maximum hypersensitivity reactions, such as shock, laryngeal edema, vomiting, anaphylaxis, cardiac arrhythmia, respiratory distress, or death, have been associated with severe tachycardia that resolved once drug administration was concluded. Initial treatment of these reactions is to remove adult heartworms. SENTINEL SPECTRUM is not effective against adult *D. immitis*. Mortality, severe hypersensitivity reactions, such as shock, laryngeal edema, vomiting, anaphylaxis, cardiac arrhythmia, respiratory distress, or death, have been associated with severe tachycardia that resolved once drug administration was concluded. Initial treatment of these reactions is to remove adult heartworms. SENTINEL SPECTRUM is not effective against adult *D. immitis*.

**Advise Reaction**

The following adverse reactions have been reported in dogs after administration of minocycline: vomiting, anorexia, stridor, 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 various diseases (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 does not effectively reduce the development of disease 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 pretreatment 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. 1101-40 Box 100599, P. O. Box 76181, Fort Worth, TX 76181

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