



# Clindamycin

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**Clindamycin is an orally bioavailable antibiotic effective against many infections in dogs and cats.**

## Clinical Applications

- **Clindamycin, a lincosamide antibiotic, is labeled for oral treatment of bacterial infections of the skin, soft tissue, periodontal tissue, and bone.**
  - **Dogs & cats:** Dental and soft tissue infections; skin infections (wounds and abscesses) caused by susceptible organisms
    - Dogs:** 5.5–33 mg/kg PO q12h<sup>1</sup>
    - Cats:** 11–33 mg/kg PO q24h<sup>1</sup>
  - **Dogs only:** Osteomyelitis
    - 11–33 mg/kg PO q12h<sup>1</sup>
      - In one study of canine posttraumatic osteomyelitis, 11 mg/kg q12h appeared more effective than a lower dose of 5.5 mg/kg q12h.<sup>2</sup>
      - In a more recent study, in vitro resistance was documented in 59% of organisms cultured from dogs with osteomyelitis (predominantly posttraumatic and staphylococcal).<sup>3</sup>
- **Clindamycin is also used for treatment of toxoplasmosis in cats.**
  - 25 mg/kg PO q24h or divided q12h<sup>4</sup>
    - Except for ocular lesions, which typically require adjunct therapy, clinical signs resolve in most cats.<sup>4</sup>
- **Inducible resistance to clindamycin may occur in methicillin-resistant staphylococci (even those reported sensitive in vitro) and is mediated by ribosomal modification.<sup>5</sup>**
  - Cross-resistance can occur between macrolides and lincosamides.
    - When strains of methicillin-resistant staphylococci are reported resistant to erythromycin, inducible clindamycin resistance (not detectable by standard susceptibility methods) should be suspected.<sup>5,6</sup>
    - In one study, 47% of MRSA and 74% of MRSP isolates from dogs and cats were reportedly resistant to clindamycin.
      - More testing showed that 58% of isolates initially reported as erythromycin-resistant but clindamycin-sensitive had inducible clindamycin resistance.<sup>6</sup>

## Mechanism & Spectrum of Action



### As a lincosamide, clindamycin inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit.

- Because they share the same mechanism of action, lincosamides and macrolides (eg, azithromycin) may interfere with each other's antibacterial activity when used together.



### Spectrum of action includes gram-positive organisms and anaerobes, as well as *Mycoplasma* spp and some protozoa.

- Susceptible organisms include
  - Gram-positive aerobes: Streptococci, coagulase-positive staphylococci
  - Anaerobes: *Clostridium perfringens*, *C tetani*, *Bacteroides* spp (eg, *B fragilis*), *Peptococcus* spp, *Peptostreptococcus* spp, *Fusobacterium* spp, *Prevotella* spp, *Actinomyces* spp
    - One study showed that some strains of *Bacteroides* spp (17% of veterinary isolates) and *Clostridium* spp (20%) may be resistant.<sup>7</sup>
  - Protozoa: *Toxoplasma* spp, *Neospora* spp

## Pharmacokinetics



### Oral absorption in dogs and cats is rapid.<sup>1</sup>

- FDA-approved veterinary use: PO formulation (ie, tablets, capsules, oral liquid)
- Extralabel use: Anecdotally, injectable formulation marketed for humans has been used in dogs and cats.
  - Generally used for patients that cannot be medicated orally or when GI disease may limit oral absorption
  - Parenteral dosing is similar to PO formulation because of high bioavailability by all routes studied.
    - **Dogs:** Bioavailability at least 87% after IM administration<sup>8,9</sup> and 73% after PO administration<sup>10</sup>
  - Rapid IV injection of undiluted clindamycin has been associated with cardiac arrest and hypotension in humans, so dilution and slow IV administration is advised in animals.



### Clindamycin undergoes hepatic metabolism and is excreted primarily in bile (less in urine).<sup>1</sup>

- Half-life after PO administration<sup>1</sup>
  - Dogs:** 5 hours
  - Cats:** 7.5 hours
- Prolonged half-life may be seen in patients with significant hepatic or renal dysfunction.

**Because clindamycin undergoes hepatic metabolism and is primarily excreted in bile, prolonged half-life may be seen in patients with significant hepatic or renal dysfunction.**

MRSA = methicillin-resistant *Staphylococcus aureus*, MRSP = methicillin-resistant *Staphylococcus pseudintermedius*

**MORE ►**



**Clindamycin is well distributed into respiratory tissue, skin, other soft tissue, bone, and joints and can be found in pancreatic and prostatic secretions.**

- Although high concentrations are not found in the cerebrospinal fluid of healthy cats, clindamycin does penetrate brain tissue<sup>11</sup> and may more easily cross inflamed meninges.

## Adverse Reactions & Cautions



**Adverse effects in dogs and cats include vomiting, diarrhea, and inappetence.<sup>1,8,12</sup>**



**In cats, capsules have been associated with esophageal strictures.<sup>13</sup>**

- Avoid dry-pilling<sup>13</sup>



**Because clindamycin has neuromuscular-blocking properties, use with caution in the presence of anesthetics or other neuromuscular-blocking agents.<sup>1</sup>**



**Administer with caution in patients with very severe renal disease and/or hepatic disease accompanied by severe metabolic aberrations.<sup>1</sup>**

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**Oral Suspension for Cats  
Veraflox (pradofloxacin) Oral Suspension for Cats  
25 mg/mL**

For the treatment of skin infections (wounds and abscesses) in cats.  
Do not use in dogs.

**BRIEF SUMMARY:**  
Before using Veraflox Oral Suspension for Cats, please consult the product insert, a summary of which follows:

**CAUTION:**  
Federal law restricts this drug to use by or on the order of a licensed veterinarian. Federal law prohibits the extra-label use of this drug in food-producing animals.

**PRODUCT DESCRIPTION:**  
Pradofloxacin is a fluoroquinolone antibiotic and belongs to the class of quinolone carboxylic acid derivatives. Each mL of Veraflox Oral Suspension provides 25 mg of pradofloxacin.

**INDICATIONS:**  
Veraflox is indicated for the treatment of skin infections (wound and abscesses) in cats caused by susceptible strains of *Pasteurella multocida*, *Streptococcus canis*, *Staphylococcus aureus*, *Staphylococcus felis*, and *Staphylococcus pseudintermedius*.

**CONTRAINDICATIONS:**  
**DO NOT USE IN DOGS.** Pradofloxacin has been shown to cause bone marrow suppression in dogs. Dogs may be particularly sensitive to this effect, potentially resulting in severe thrombocytopenia and neutropenia. Quinolone-class drugs have been shown to cause arthropathy in immature animals of most species tested, the dog being particularly sensitive to this side effect. Pradofloxacin is contraindicated in cats with a known hypersensitivity to quinolones.

**HUMAN WARNINGS:**  
**Not for human use. Keep out of reach of children.** Individuals with a history of quinolone hypersensitivity should avoid this product. Avoid contact with eyes and skin. In case of ocular contact, immediately flush eyes with copious amounts of water. In case of dermal contact, wash skin with soap and water for at least 20 seconds. Consult a physician if irritation persists following ocular or dermal exposure or in case of accidental ingestion. In humans, there is a risk of photosensitization within a few hours after exposure to quinolones. If excessive accidental exposure occurs, avoid direct sunlight. Do not eat, drink or smoke while handling this product. For customer service or to obtain product information, including a Material Safety Data Sheet, call 1-800-633-3796. For medical emergencies or to report adverse reactions, call 1-800-422-9874.

**ANIMAL WARNINGS:**  
**For use in cats only.** The administration of pradofloxacin for longer than 7 days induced reversible leukocyte, neutrophil, and lymphocyte decreases in healthy, 12-week-old kittens.

**PRECAUTIONS:**  
The use of fluoroquinolones in cats has been associated with the development of retinopathy and/or blindness. Such products should be used with caution in cats. Quinolones have been shown to produce erosions of cartilage of weight-bearing joints and other signs of arthropathy in immature animals of various species. The safety of pradofloxacin in cats younger than 12 weeks of age has not been evaluated. The safety of pradofloxacin in immune-compromised cats (i.e., cats infected with feline leukemia virus and/or feline immune-deficiency virus) has not been evaluated. Quinolones should be used with caution in animals with known or suspected central nervous system (CNS) disorders. In such animals, quinolones have, in rare instances, been associated with CNS stimulation that may lead to convulsive seizures. The safety of pradofloxacin in cats that are used for breeding or that are pregnant and/or lactating has not been evaluated.

**ADVERSE REACTIONS:**  
In a multi-site field study, the most common adverse reactions seen in cats treated with Veraflox were diarrhea/loose stools, leukocytosis with neutrophilia, elevated CPK levels, and sneezing.

**ANIMAL SAFETY:**  
In a target animal safety study in 32, 12-week-old kittens dosed at 0, 1, 3, and 5 times the recommended dose for 21 consecutive days. One 3X cat and three 5X cats had absolute neutrophil counts below the reference range. The most frequent abnormal clinical finding was soft feces. While this was seen in both treatment and control groups, it was observed more frequently in the 3X and 5X Kittens. U.S. Patent No. 6,323,213  
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NADA141-344, Approved by FDA  
Made in Germany  
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17928  
GH6041015  
Bayer HealthCare LLC  
Animal Health Division  
Shawnee Mission, Kansas 66201, U.S.A.

MRSA = methicillin-resistant *Staphylococcus aureus*,  
MRSP = methicillin-resistant *Staphylococcus pseudintermedius*



## THERAPEUTICS SNAPSHOT

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## WORDS OF CAUTION

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## RED LIGHT, GREEN LIGHT

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