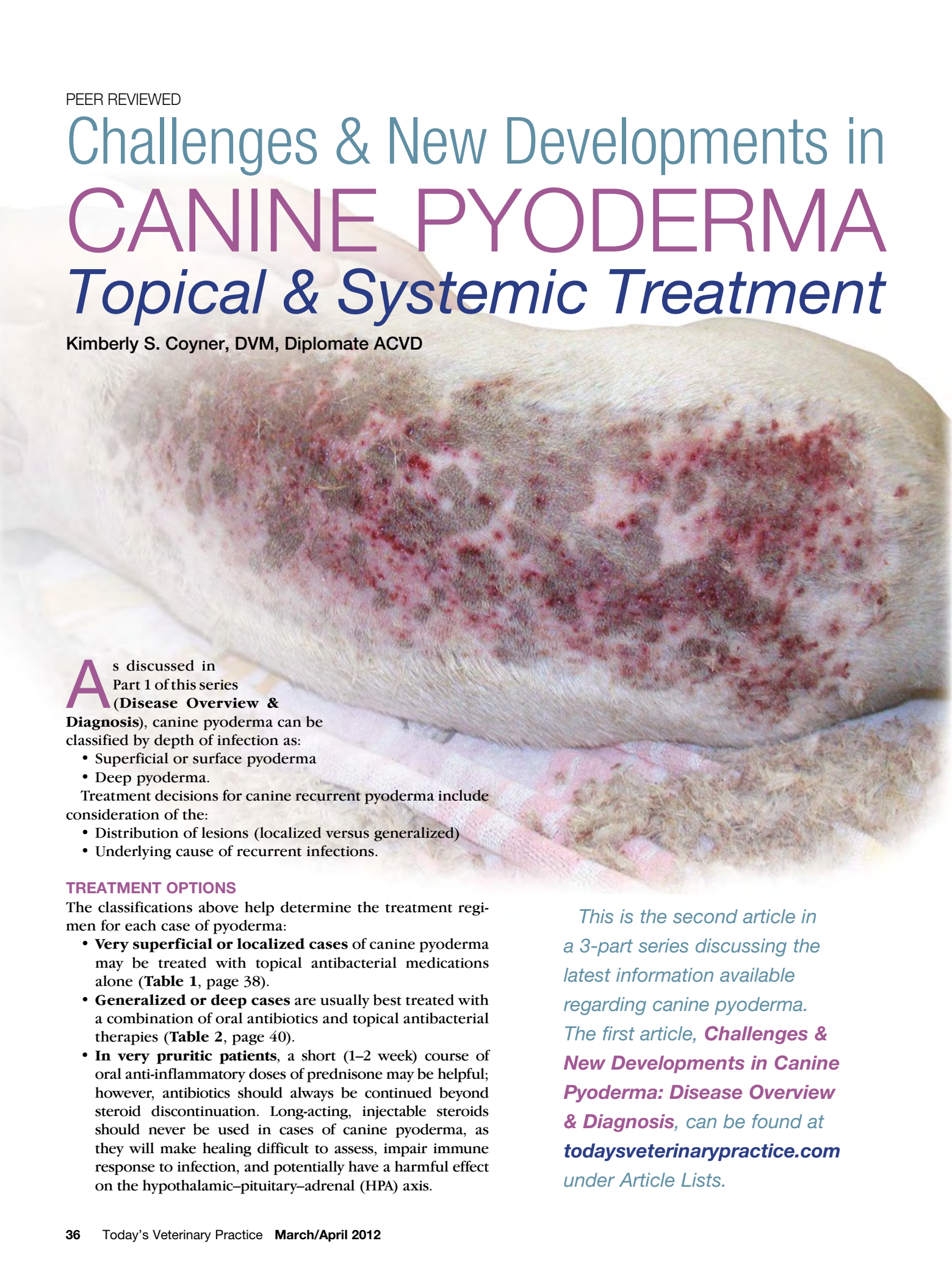


# Challenges & New Developments in CANINE PYODERMA *Topical & Systemic Treatment*

Kimberly S. Coyner, DVM, Diplomate ACVD



As discussed in Part 1 of this series (**Disease Overview & Diagnosis**), canine pyoderma can be classified by depth of infection as:

- Superficial or surface pyoderma
- Deep pyoderma.

Treatment decisions for canine recurrent pyoderma include consideration of the:

- Distribution of lesions (localized versus generalized)
- Underlying cause of recurrent infections.

## TREATMENT OPTIONS

The classifications above help determine the treatment regimen for each case of pyoderma:

- **Very superficial or localized cases** of canine pyoderma may be treated with topical antibacterial medications alone (**Table 1**, page 38).
- **Generalized or deep cases** are usually best treated with a combination of oral antibiotics and topical antibacterial therapies (**Table 2**, page 40).
- **In very pruritic patients**, a short (1–2 week) course of oral anti-inflammatory doses of prednisone may be helpful; however, antibiotics should always be continued beyond steroid discontinuation. Long-acting, injectable steroids should never be used in cases of canine pyoderma, as they will make healing difficult to assess, impair immune response to infection, and potentially have a harmful effect on the hypothalamic–pituitary–adrenal (HPA) axis.

*This is the second article in a 3-part series discussing the latest information available regarding canine pyoderma. The first article, **Challenges & New Developments in Canine Pyoderma: Disease Overview & Diagnosis**, can be found at [todaysveterinarypractice.com](http://todaysveterinarypractice.com) under Article Lists.*

- **In recurrent cases** of canine pyoderma it is essential to identify and treat the underlying cause. Depending on clinical presentation, age of onset, seasonality, and other clinical signs, this may include:
  - » Stringent flea control
  - » Deep scrapings for *Demodex*
  - » Trial treatment for scabies
  - » Hypoallergenic diet trial
  - » Intradermal allergy testing and desensitization
  - » Laboratory analysis to identify endocrinopathies
  - » Skin biopsy for keratinization disorders.

## TOPICAL THERAPY

### Localized or Superficial Infection

For localized areas of infection, topical antimicrobial ointments or creams containing 2% mupirocin or silver sulfadiazine applied twice daily can be very helpful.

- Although helpful in some cases for short-term therapy, sprays and ointments that contain combinations of steroids and antibiotics are NOT recommended for long-term use due to potential for cutaneous atrophy (Figures 1 and 2).
- Neomycin has more potential for allergic sensitization compared to other topical antibiotics, and susceptibility is variable for gram-negative organisms.
- Polymyxin B and bacitracin in combination may be effective for both gram-negative and gram-positive organisms; however, they are rapidly inactivated by organic debris, including pus, and do not penetrate well.<sup>1</sup>

### Generalized or Deep Infection

Unless skin infection is very mild or shampoo therapy is done every 1 to 2 days, topical therapy alone is unlikely to resolve a more generalized or severe pyoderma, but it can be very helpful in abbreviating infection when used in combination with systemic antibiotics.

- Most clinicians prefer chlorhexidine products as first-line therapy.
- Antibacterial shampoos need contact with the skin for 5 to 15 minutes to provide the desired therapeutic effect (label recommendations should be followed and clients should receive specific instructions on use).
- In dogs with deep pyoderma or heavily crusted lesions, clipping of lesions or whirlpool therapy may be beneficial.

### Shampoo Therapy

Shampoo frequency depends on severity of infection:

- **In severe cases or in cases of methicillin-resistant pyoderma**, shampoo therapy every 1 to 2 days is recommended.
- **In milder pyoderma cases**, twice weekly shampoo therapy may be sufficient.
- **For maintenance prophylactic therapy**, minimum once weekly antibacterial shampoo therapy is recommended; leave-on antibacterial conditioners are also very helpful.

## Other Therapy

Vetericyn All Animal Wound and Infection Treatment (vetericyn.com), an oxychlorine compound, has had anecdotal success and safety in the treatment of canine pyoderma. See [todaysveterinarypractice.com/resources.asp](http://todaysveterinarypractice.com/resources.asp) to view and download a comprehensive table outlining **Topical Antibacterial Products**.

## SYSTEMIC ANTIMICROBIAL THERAPY

Systemic antibiotics are used for bacterial skin infections that may not be treatable with topical therapies alone. Antibiotic choice for a particular case is dependent on multiple factors, including:

- Depth of infection
- Culture and sensitivity results (if applicable)
- Potential drug side effects (ie, avoiding cephalosporin-induced gastrointestinal adverse effects in a dog with a historically sensitive stomach or sulfa drugs in a dog with pre-existing dry eye or keratoconjunctivitis sicca)
- Age- or breed-related predisposition for side effects
- Drug cost
- Frequency of administration, which affects client compliance.<sup>2</sup>

## Antibiotic Action

Antibiotics are either time dependent or concentration dependent in their action.



*Figure 1. Cutaneous atrophy and milia formation secondary to chronic topical administration of a spray containing betamethasone*



*Figure 2. Cutaneous atrophy and tearing secondary to chronic administration of a spray containing triamcinolone*



- **Time-dependent antibiotics** must be given at their specified dosing interval for maximal efficacy, as the duration of time that the antibiotic level remains above the minimum inhibitory concentration (MIC) is essential. These antibiotics include:
  - » Cephalosporins
  - » Beta-lactam-resistant penicillins
  - » Macrolides
- » Lincosamides.
- **Concentration-dependent antibiotics** include fluoroquinolones and aminoglycosides. With these drugs, the rate and extent of the bacterial killing increases as the antibiotic concentration increases. The peak serum concentration, not the time above MIC, is correlated with treatment efficacy; the drugs are best given at a higher dose once daily.<sup>2,3</sup>

Table 1: Canine Superficial or Surface Pyoderma: Clinical Signs & Treatment

Pyoderma	Clinical Signs	Treatment
<b>SURFACE PYODERMA</b>		
<b>Impetigo</b>	<ul style="list-style-type: none"> <li>• Nonpruritic pustules not associated with follicles</li> <li>• On sparsely haired areas of the skin, such as inguinal area</li> <li>• Pustule results in epidermal collarettes and scaling</li> <li>• Often seen in young puppies<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Apply topical antibacterial therapy (ie, chlorhexidine)</li> <li>• Rarely, refractory lesions may require oral antibiotics for 10 to 14 days<sup>1</sup></li> </ul>
<b>Intertrigo (Fold Dermatitis/Pyoderma)</b> <i>(Figure 3)</i>	<ul style="list-style-type: none"> <li>• Dermatitis occurs in areas of skin folding, such as face, lip, and tail folds and vulvar area</li> <li>• Lesions are areas of moist, inflammatory dermatitis with surface bacterial overgrowth<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Cleanse area every 1 to 3 days with antibacterial wipe, flush, or shampoo</li> <li>• Apply topical antibiotic cream or solution daily for 5 to 7 days</li> <li>• Refractory cases may require surgical excision of excessive folds<sup>2</sup></li> </ul>
<b>Mucocutaneous Pyoderma</b> <i>(Figures 4–6)</i>	<ul style="list-style-type: none"> <li>• Dermatitis occurs on lip margins, eyelids, nares, or anus<sup>2</sup></li> <li>• Erythema, inflammation, and crusting +/- depigmentation</li> </ul>	<ul style="list-style-type: none"> <li>• Apply topical antibacterial therapy (ie, mupirocin Q 12 H for 14 days)</li> <li>• For severe cases, systemic antibiotics should be administered for 3 to 4 weeks<sup>2</sup></li> </ul>
<b>Pyotraumatic Dermatitis (Acute Moist Dermatitis)</b> <i>(Figure 7)</i>	<ul style="list-style-type: none"> <li>• Areas of acute, painful, moist, exudative, inflammatory dermatitis created by self trauma</li> <li>• Often occurs in thick-coated dogs with underlying flea allergy or atopic dermatitis</li> <li>• Peripheral papules/pustules or thickened lesions indicate pyotraumatic folliculitis<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• May need sedation to clip/clean</li> <li>• Follow with a 1- to 2-week course of oral steroid and topical astringents/antibacterial products +/- topical steroids or pramoxine; avoid products containing alcohol</li> <li>• If peripheral papules/pustules noted or lesion is thickened, a 2- to 4-week course of systemic antibiotics is indicated.<sup>1</sup></li> </ul>
<b>SUPERFICIAL PYODERMA</b>		
<b>Bacterial Folliculitis</b> <i>(Figures 8–10)</i>	<ul style="list-style-type: none"> <li>• Primary lesions: Papules (1–2 mm raised and/or crusted, pink or red bumps) and pustules</li> <li>• Secondary lesions: Expanding areas of alopecia; surrounding scaling (epidermal collarettes), crusts, hyperpigmentation, and lichenification<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Apply antibacterial shampoos, conditioners, and/or sprays</li> <li>• Administer 3-week minimum course of systemic antibiotics<sup>1</sup></li> </ul>
<b>Bacterial Overgrowth Syndrome</b> <i>(Figure 11)</i>	<ul style="list-style-type: none"> <li>• Erythema, scaling, lichenification, hyperpigmentation, odor, pruritus, and eventual alopecia</li> <li>• Often present on ventral trunk, axillary, and inguinal areas</li> <li>• No papules, pustules, or epidermal collarettes present<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Apply antibacterial shampoos, conditioners, and/or sprays</li> <li>• Administer 3-week minimum course of systemic antibiotics<sup>3</sup></li> </ul>

**Note:** All oral antibiotic treatment should be continued 1 to 2 weeks past clinical resolution; a recheck visit is needed prior to discontinuation of therapy.

**References**

1. Scott DW, Miller WH, Griffin CE. *Muller and Kirk's Small Animal Dermatology*, 6th ed. Philadelphia: WB Saunders, 2001, pp 291-296.
2. Medleau L, Hnilica KA. *Small Animal Dermatology: A Color Atlas and Therapeutic Guide*. Philadelphia: WB Saunders, 2001.
3. Pin D, Carlotti DN, Jasmin P, et al. Prospective study of bacterial overgrowth syndrome in eight dogs. *Vet Rec* 2006; 158:437-441.



Figure 3. Facefold intertrigo



Figure 4. Mucocutaneous pyoderma



Figure 5. Nasal mucocutaneous pyoderma secondary to atopy

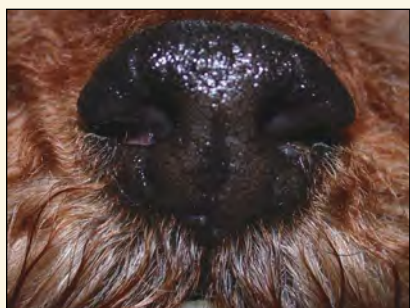


Figure 6. The same dog in Figure 5 after 3 weeks of oral and topical antibiotic therapy



Figure 7. Pyotraumatic folliculitis secondary to atopy

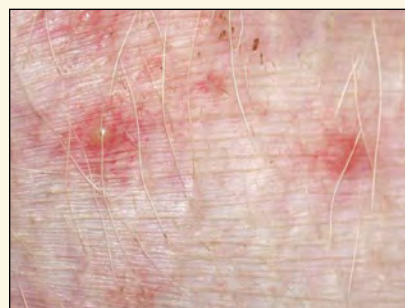


Figure 8. Papules and pustules in an atopic dog



Figure 9. Epidermal collarettes in an atopic dog



Figure 10. Superficial pyoderma in a hypothyroid dog

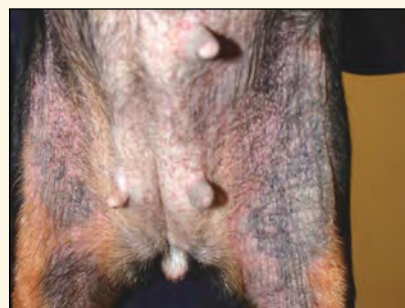


Figure 11. Bacterial overgrowth secondary to atopy

### Antibiotic Selection

When choosing empiric antibiotics, it is first important to *avoid* antibiotics to which staphylococcal bacteria are usually intrinsically resistant, including amoxicillin, ampicillin, penicillin, tetracycline, and nonpotentiated sulfonamides.

- **Antibiotic classes** that are usually effective for canine pyoderma include:
  - » Cephalosporins
  - » Macrolides
  - » Lincosamides
  - » Potentiated sulfonamides
  - » Beta-lactamase-resistant penicillins
  - » Fluoroquinolones
  - » Aminoglycosides
  - » Chloramphenicol.<sup>2</sup>
- **For first-line therapy** for canine pyoderma, most veterinary dermatologists use:
  - » Cephalosporins
  - » Clavulated penicillin
  - » Potentiated sulfonamides.
- **For second-line therapy** for deep, fibrotic infections and/or *Pseudomonas* infections and when no other reasonable antibiotic choices are available, fluoroquinolones are used when indicated by culture and sensitivity. Veterinary-labeled fluoroquinolones (which have near complete bioavailability<sup>4</sup>) are preferred over generic ciprofloxacin due to marked variability of ciprofloxacin absorption in dogs.<sup>5</sup>
- In one study, the oral absorption of generic ciprofloxacin tablets in dogs ranged from 98% to 29% and even at a high oral dose of 20 to 30 mg/kg, the area-under-the-curve (AUC) did not attain a high enough level for bacteria considered “susceptible.” This may result in therapeutic failure and increased selection of resistant bacteria, particularly when low doses are used.<sup>5</sup>

Table 2. Deep Pyoderma: Clinical Signs & Treatment

Deep Pyoderma	Clinical Signs	Treatment
<b>Acral Lick Dermatitis</b> (Figure 12)	<ul style="list-style-type: none"> <li>• Alopecic, firm, raised, thickened plaque or nodule that may become ulcerated</li> <li>• Often found on the dorsal carpus or dorsolateral metatarsus</li> <li>• Multifactorial, self-inflicted (by licking) disorder often associated with underlying atopic dermatitis, food allergy, trauma, endocrinopathy, bone pain, neuropathy, or behavioral causes</li> <li>• Perpetuated by secondary deep pyoderma<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Administer 8-week minimum course of systemic antibiotics</li> <li>• Prevent licking with Elizabethan collar or bandaging</li> <li>• Identify and treat underlying cause(s)<sup>1,2</sup></li> </ul>
<b>Bacterial Furunculosis</b> (Figure 13)	<ul style="list-style-type: none"> <li>• Focal to multifocal areas of thick crusting, alopecia, inflamed bullae, and/or ulcerative draining skin lesions, often pruritic and/or painful</li> <li>• Often associated with underlying atopic dermatitis, food allergy, endocrinopathy, demodicosis, etc<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Administer 6- to 12-week course of systemic antibiotics</li> <li>• Apply antibacterial shampoos/sprays frequently</li> <li>• Identify and address underlying cause(s)<sup>1,2</sup></li> </ul>
<b>Callus Furunculosis</b>	<ul style="list-style-type: none"> <li>• Inflammation, swelling, ulceration, and draining tracts affecting pressure points, such as lateral elbows/ hocks or sternal callous in deep-chested breeds</li> <li>• Most commonly affects giant breeds<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Treat infection with mupirocin Q 12 H and 6-week minimum course of systemic antibiotics</li> <li>• Use hydrotherapy (see <b>Physical Rehabilitation for Veterinary Practices</b>, page 14) and bandaging for open lesions</li> <li>• Ensure dog lays on padded bedding or has padded dressings placed over wound (ie, DogLeggs, dogleggs.com)<sup>1,2</sup></li> </ul>
<b>Canine Acne</b> (Figure 14)	<ul style="list-style-type: none"> <li>• Nonpainful/nonpruritic papules, pustules, bullae +/- draining tracts on the chin or muzzle</li> <li>• More common in large, young, short-coated dogs</li> <li>• May be induced by friction or trauma to the chin, which pushes the short hairs under the skin<sup>1,2</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Administer mupirocin Q 12 H or benzoyl peroxide gel Q 24 H until lesions resolve; then 1 to 2 times weekly as needed for maintenance</li> <li>• For severe cases, administer a 4-week minimum course of systemic antibiotics<sup>1,2</sup></li> </ul>
<b>Pedal Folliculitis/ Furunculosis</b> (Figures 15 and 16)	<ul style="list-style-type: none"> <li>• Interdigital erythema, pustules, bullae, nodules, fistulas, alopecia, and swelling; variably painful and pruritic</li> <li>• Often seen in large, short-coated dogs</li> <li>• May be associated with regional lymphadenopathy and/or swelling of associated metacarpus or metatarsus</li> <li>• Often associated with underlying atopic dermatitis, food allergy, endocrinopathy, demodicosis, etc<sup>1,2</sup></li> <li>• In some cases isolated lesions are associated with abnormal weight bearing and formation of interdigital cysts, often between P4 and P5<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Administer 6- to 12-week course of systemic antibiotics</li> <li>• Apply antibacterial shampoos/sprays frequently</li> <li>• Identify and address underlying cause(s)</li> <li>• Focal areas of scarring/interdigital cyst formation may be amenable to surgical resection or laser ablation<sup>1,3</sup></li> </ul>
<b>Post-Grooming Furunculosis</b> (Figure 17)	<ul style="list-style-type: none"> <li>• Usually occurs within 24 to 48 H after grooming</li> <li>• Areas of intense localized erythema and swelling that evolve into punctuate foci of erythema, erosion, painful hemorrhagic bullae, and drainage</li> <li>• Lesions are usually on the dorsal trunk and occur more commonly in short-coated dogs. Affected dogs may be lethargic or febrile.</li> <li>• <i>Staphylococcus pseudintermedius</i>, <i>Pseudomonas</i>, <i>Proteus</i>, and <i>Escherichia coli</i> have been grown in pure or mixed culture from lesions.</li> <li>• Causal factors include contaminated shampoos or grooming apparatus and over-zealous scrubbing of short hairs “against the grain”<sup>4,5</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Obtain swab or biopsy for culture/sensitivity and, pending culture results, use cytology to determine initial systemic antibiotic therapy:                         <ul style="list-style-type: none"> <li>» Fluoroquinolone if rod bacteria are found</li> <li>» Cephalosporin if cocci are found</li> </ul> </li> <li>• Sedation usually needed for clipping and cleaning of lesions</li> <li>• Pain control with opioids may be needed +/- IV fluids and supportive care for severely affected or systemically ill dogs<sup>5</sup></li> </ul>

**Notes:** • In deep pyoderma, all oral antibiotic treatment should be continued 2 to 3 weeks past clinical resolution; a recheck visit is needed prior to discontinuation of therapy.  
 • Ideally, antibiotic selection should always be based on culture and sensitivity for any case of deep pyoderma.

**References**

1. Scott DW, Miller WH, Griffin CE. *Muller and Kirk's Small Animal Dermatology*, 6th ed. Philadelphia: WB Saunders, 2001, pp 291-296.
2. Medleau L, Hnilica KA. *Small Animal Dermatology: A Color Atlas and Therapeutic Guide*. Philadelphia: WB Saunders, 2001.
3. Duclos DD, Hargis AM, Hanley PW. Pathogenesis of canine interdigital palmar and plantar comedones and follicular cysts, and their response to laser surgery. *Vet Derm* 2008; 19(3):134-141.
4. Gross TL, Ihrke PJ, Walder EJ, Affolter VK. *Skin Diseases of the Dog and Cat, Clinical and Histopathologic Diagnosis*, 2nd ed. Oxford: Blackwell Science Ltd, 2005, pp 427-429.
5. Hillier A, Alcorn JR, Cole LK, et al. Pyoderma due to *Pseudomonas aeruginosa* in dogs: 15 cases. *Proc AAVD/ACVD Meeting*, 2003, p 222.



- Due to side effects and toxicity potential, aminoglycosides and chloramphenicol are only used, based on culture/sensitivity data, as a last resort and with careful laboratory monitoring in cases of methicillin-resistant infections.

### Antibiotic Administration

After an antibiotic has been selected, it should be dispensed at the correct dosage, administered at the correct dosing interval, and used for a sufficient period.<sup>1</sup> Underdosing an antibiotic due to client concerns about cost will only be more expensive in the long run due to increased time to cure and increased chance of inducing bacterial resistance, necessitating more expenses, such as cultures and additional antibiotic courses.

The duration of antibiotic therapy depends on several factors, including depth of pyoderma, underlying diseases, and use of concomitant topical therapies.

- In general, superficial pyodermas usually resolve with a 3-week course of an antimicrobial; treatment should continue 1 to 2 weeks beyond healing/resolution of cutaneous lesions.
- For deep pyoderma, a 6- to 12-week course of treatment (3 weeks beyond resolution of cutaneous lesions) or even longer may be required to resolve deep pockets of infection.<sup>1</sup>
- Regular rechecks are important to determine response to therapy and need for medication refills or therapy modifications.

See [todayveterinarypractice.com/resources.asp](http://todayveterinarypractice.com/resources.asp) to view and download a comprehensive table outlining **Commonly Used Antibiotics for Canine Pyoderma**.

### IMMUNOSTIMULANTS

When an underlying cause cannot be found in cases of canine recurrent pyoderma, use of immunostimulants may be of benefit. Two commercial bacterins are currently available.

#### Staphage Lysate

Staphage lysate (SPL, delmont.com) is derived from lysed-killed *S aureus* and is given subcutaneously. In one study of 21 dogs with idiopathic superficial recurrent pyoderma treated with either bacterin or placebo (and an initial 6-week course of oral antibiotics), dogs given antibiotics plus the bacterin ( $n = 13$ ) had a significantly better response after 18 weeks of treatment than those given antibiotic plus placebo.<sup>9</sup>

Although there is no published supportive data, staphage lysate may also be helpful as adjunctive therapy in atopic dogs that continue to develop recurrent pyoderma despite appropriate management of their atopic dermatitis.

#### ImmunoRegulin

ImmunoRegulin (neogen.com) is an immunostimulant derived from killed *Propionibacterium acnes* and administered IV. In one study, dogs with chronic recurrent pyoderma were treated with antibiotics plus IV injections of either *P acnes* or placebo. Eighty percent (12/15) of the dogs treated with antibiotics and *P acnes* responded with significant improvement or complete remission of lesions at the end of the 12-week treatment schedule compared with 38% (5/13) of the dogs treated with antibiotics and placebo.<sup>10</sup>



Figure 12. Acral granuloma secondary to atopy



Figure 13. Deep pyoderma secondary to atopy



Figure 14. Canine acne in a pug



Figure 15. Pedal furunculosis secondary to atopy



Figure 16. Deep pyoderma secondary to Demodex



Figure 17. Post-grooming furunculosis

**FLUOROQUINOLONES:  
USE WITH CAUTION**

Use of fluoroquinolones should be carefully assessed in view of associations found between:

- Fluoroquinolone use in hospitals and methicillin resistance in *S aureus*
- Fluoroquinolone use in communities and fluoroquinolone resistance in *Escherichia coli* in hospitals.<sup>6</sup>

Additionally, studies have found that, although fluoroquinolones may not act as primary mutators for induction of methicillin-resistant *S aureus* (MRSA) resistance, when they are used in cases of heteroresistant MRSA, they can select for high-level methicillin resistant mutants (which are not only resistant to fluoroquinolones but also to most other antibiotics).<sup>7,8</sup>

**Other Immunostimulants**

A more recent, blinded study of an autogenous *S intermedius* (*pseud-intermedius*) bacterin (prepared by culturing the individual dog's pyoderma lesions) compared the bacterin versus placebo in 10 dogs with idiopathic recurrent pyoderma; all were initially treated with a 4-week course of oral antibiotics. After 5 weeks, clinical scores were not significantly different between groups; however, at week 10, the placebo treated group had statistically higher lesion scores compared to the treatment group.<sup>11</sup> Unfortunately, this product is not commercially available.

Finally, genome sequencing technology and proteomic approaches to identify surface-exposed staphylococcal bacterial proteins may lead to development of vaccines to induce protective immunity; the entire genome sequence of *S pseudintermedius* has recently been determined, and this may lead to new and effective approaches for the prevention and treatment of canine pyoderma.<sup>12</sup> ■

NADA #141-177. Approved by FDA.

**MOMETAMAX®  
(GENTAMICIN SULFATE, USP;  
MOMETASONE FUROATE  
MONOHYDRATE;  
AND CLOTRIMAZOLE, USP,  
OTIC SUSPENSION)**

**VETERINARY  
For Otic Use in Dogs Only**

**BRIEF SUMMARY** (For full Prescribing Information, see package insert.)  
**CAUTION** Federal law restricts this drug to use by or on the order of a licensed veterinarian.

Keep this and all drugs out of the reach of children.

**INDICATIONS** MOMETAMAX Otic Suspension is indicated for the treatment of otitis externa in dogs caused by susceptible strains of yeast (*Malassezia pachydermatis*) and bacteria (*Pseudomonas* spp, including *P. aeruginosa*), coagulase-positive staphylococci, *Enterococcus faecalis*, *Proteus mirabilis*, and beta-hemolytic streptococci).

**CONTRAINDICATIONS** If hypersensitivity to any of the components occurs, treatment should be discontinued and appropriate therapy instituted. Concomitant use of drugs known to induce ototoxicity should be avoided. Do not use in dogs with known perforation of eardrums.

**WARNINGS** The use of these components has been associated with deafness or partial hearing loss in a small number of sensitive dogs (eg, geriatric). The hearing deficit is usually temporary. If hearing or vestibular dysfunction is noted during the course of treatment, discontinue use of MOMETAMAX Otic Suspension immediately and flush the ear canal thoroughly with a nonototoxic solution.

Corticosteroids administered to dogs, rabbits, and rodents during pregnancy have resulted in cleft palate in offspring. Other congenital anomalies including deformed forelegs, phocomelia, and anasarca have been reported in offspring of dogs that received corticosteroids during pregnancy.

Field and experimental data have demonstrated that corticosteroids administered orally or parenterally to animals may induce the first stage of parturition if used during the last trimester of pregnancy and may precipitate premature parturition followed by dystocia, fetal death, retained placenta, and metritis.

**PRECAUTIONS** Before instilling any medication into the ear, examine the external ear canal thoroughly to be certain the tympanic membrane is not ruptured in order to avoid the possibility of transmitting infection to the middle ear as well as damaging the cochlea or vestibular apparatus from prolonged contact.

Administration of recommended doses of MOMETAMAX Otic Suspension beyond 7 days may result in delayed wound healing.

If overgrowth of nonsusceptible bacteria or fungi occurs, treatment should be discontinued and appropriate therapy instituted.

Avoid ingestion. Adverse systemic reactions have been observed following the oral ingestion of some topical corticosteroid preparations. Patients should be closely observed for the usual signs of adrenocorticoid overdose which include sodium retention, potassium loss, fluid retention, weight gain, polydipsia, and/or polyuria. Prolonged use or overdose may produce adverse immunosuppressive effects.

Use of corticosteroids, depending on dose, duration, and specific steroid, may result in endogenous steroid production inhibition following drug withdrawal. In patients presently receiving or recently withdrawn from corticosteroid treatments, therapy with a rapidly acting corticosteroid should be considered in especially stressful situations.

**ADVERSE REACTIONS**

**Gentamicin:** While aminoglycosides are absorbed poorly from skin, intoxication may occur when aminoglycosides are applied topically for prolonged periods of time to large wounds, burns, or any denuded skin, particularly if there is renal insufficiency. All aminoglycosides have the potential to produce reversible and irreversible vestibular, cochlear, and renal toxicity.

**Mometasone:** ALP (SAP) and ALT (SGPT) enzyme elevations, weight loss, anorexia, polydipsia, polyuria, neutrophilia, and lymphopenia have occurred following the use of parenteral, high-dose, and/or prolonged or systemic synthetic corticosteroids in dogs. Cushing's syndrome in dogs has been reported in association with prolonged or repeated steroid therapy.

**Clotrimazole:** The following have been reported occasionally in humans in connection with the use of clotrimazole: erythema, stinging, blistering, peeling, edema, pruritus, urticaria, and general irritation of the skin not present before therapy.

**MOMETAMAX Otic Suspension:** In field studies following once-daily treatment with MOMETAMAX Otic Suspension, ataxia, proprioceptive deficits, and increased water consumption were observed in less than 1% of 164 dogs. In a field study following twice-daily treatment with MOMETAMAX Otic Suspension, inflammation of the pinna and diarrhea were observed in less than 1% of 141 dogs.

U.S. Patent No. 6,127,353.

Schering-Plough Animal Health Corp., Summit, NJ 07901

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**POSATEX®  
OTIC SUSPENSION  
(ORBIFLOXACIN, MOMETASONE  
FUROATE MONOHYDRATE AND  
POSACONAZOLE, SUSPENSION)  
ANTIBACTERIAL,  
ANTI-INFLAMMATORY,  
ANTIFUNGAL**

**For Otic Use in Dogs Only**

**BRIEF SUMMARY  
(For full Prescribing Information,  
see package insert)**

**CAUTION:** Federal law restricts this drug to use by or on the order of a licensed veterinarian.

**Federal law prohibits the extralabel use of this drug in food-producing animals.**

**INDICATIONS**

POSATEX® OTIC SUSPENSION is indicated for the treatment of otitis externa in dogs associated with susceptible strains of yeast (*Malassezia pachydermatis*) and bacteria (coagulase positive staphylococci, *Pseudomonas aeruginosa*, and *Enterococcus faecalis*).

**CONTRAINDICATIONS**

POSATEX® Otic Suspension is contraindicated in dogs with known or suspected hypersensitivity to quinolones, mometasone furoate monohydrate, or posaconazole. Do not use in dogs with known tympanic perforation (see PRECAUTIONS).

**PRECAUTIONS**

The use of POSATEX® Otic Suspension in dogs with perforated tympanic membranes has not been evaluated. The integrity of the tympanic membranes should be confirmed before administering this product.

Avoid prolonged or repeated use of POSATEX® Otic Suspension. Long-term use of topical otic corticosteroids has been associated with adrenocortical suppression and iatrogenic hyperadrenocorticism in dogs (see ANIMAL WARNINGS).

The safe use of POSATEX® Otic Suspension in dogs used for breeding purposes, during pregnancy or in lactating bitches, has not been evaluated. The systemic administration of quinolones has been shown to produce cartilage erosions of weight bearing joints and other signs of arthropathy in immature animals of various species.

**WARNINGS:**

**Human Warnings:** Not for use in humans. Keep out of reach of children.

**Animal Warnings:** Do not administer orally. Immediately discontinue use of POSATEX® Otic Suspension if hearing loss is observed during treatment (see ADVERSE REACTIONS).

**ADVERSE REACTIONS**

In the field study, 143 dogs were treated with POSATEX® Otic Suspension. Of those, 1 dog with bilateral otitis externa developed transient hearing loss.

POSATEX® Otic Suspension treatment was discontinued and the condition resolved after one week.

**HOW SUPPLIED**

POSATEX® Otic Suspension is available in 7.5 g, 15 g, and 30 g plastic bottles.

Made in Germany

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01/10



The final article in this series will focus specifically on methicillin-resistant canine pyoderma.

HPA = hypothalamic-pituitary-adrenal; MIC = minimum inhibitory concentration



**Kimberly S. Coyner, DVM, Diplomate ACVD,** received her DVM from Colorado State University. After a private referral practice internship and a year practicing emergency medicine, she completed a 2-year teaching position and then a 3-year residency position in dermatology at the University of Georgia. Dr. Coyner has authored several book chapters in the field of dermatology—Morgan’s Handbook of Small Animal Practice, 4th edition (2002) and Small Animal Dermatology Color Atlas and Therapeutic Guide (2001 and 2006)—as well as articles in Veterinary Dermatology, Veterinary Medicine, and The Compendium on Continuing Education for the Practicing Veterinarian. She is currently in private practice at the Dermatology Clinic for Animals of Las Vegas.

**Correction**

In this series’ first article, **Disease Overview & Diagnosis**, a reference was missing from the text. Visit [todaysveterinarypractice.com](http://todaysveterinarypractice.com) to view the corrected article and references.

**References**

1. Scott DW, Miller WH, Griffin CE. *Muller and Kirk’s Small Animal Dermatology*, 6th ed. Philadelphia: WB Saunders, 2001, pp 291-296.
2. White SD. Review article: Systemic treatment of bacterial skin infections of dogs and cats. *Vet Derm* 1996; 7:133-143.
3. Aucoin D. *Target: The Antimicrobial Reference Guide to Effective Treatment*, 4th ed. Port Huron; North American Compendiums, Inc, 2011, ii-xv.
4. Papich MG, Riviere JE. Chapter 38: Fluoroquinolone antimicrobial drugs. In Riviere JE, Papich MG (eds): *Veterinary Pharmacology and Therapeutics*, 9th ed. Ames, IA: Wiley-Blackwell Publishing, 2009.
5. Papich MG. Ciprofloxacin pharmacokinetics and oral absorption of generic tablets in dogs. *Am J Vet Res* (Accepted and in press).
6. Maccougall C, Powell P, Johnson C, et al. Hospital and community fluoroquinolone use and resistance in *Staphylococcus aureus* and

*Escherichia coli* in 17 US hospitals. *Clin Infect Dis* 2005; 41:435-440.

7. Dalhoff A, Schubert S. Dichotomous selection of high-level oxacillin resistance in *Staphylococcus aureus* by fluoroquinolones. *Int J Antimicrob Agents* 2010; 36:216-221.
8. Venezia RA, Domaracki BE, Evans AM, et al. Selection of high level oxacillin resistance in heteroresistant *Staphylococcus aureus* by fluoroquinolone exposure. *J Antimicrob Chemo* 2001; 48:375-381.
9. DeBoer DJ, Moriello KA, Thomas CB, Schultz KT. Evaluation of a commercial staphylococcal bacterin for management of idiopathic recurrent superficial pyoderma in dogs. *Am J Vet Res* 1990; 51(4):636-639.
10. Becker AM, Janik TA, Smith EK, et al. Propionibacterium acnes immunotherapy in chronic recurrent canine pyoderma. An adjunct to antibiotic therapy. *J Vet Intern Med* 1989; 3(1):26-30.
11. Curtis CF, Lampert AI, Lloyd DH. Masked, controlled study to investigate the efficacy of a *Staphylococcus intermedius* autogenous bacterin for the control of canine idiopathic recurrent superficial pyoderma. *Vet Derm* 2006; 17(3):163-168.
12. Fitzgerald JR. The *Staphylococcus intermedius* group of bacterial pathogens: Species re-classification, pathogenesis and the emergence of methicillin resistance. *Vet Derm* 2009; 20:490-495.

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