

## FOCUS ON OTITIS

Over the past year, more than 20 journal articles addressing otitis in dogs and cats have been published worldwide. The following four abstracted articles provide useful preliminary data for practitioners on treatment of ear disease.

Multidrug resistance can present a challenge when treating otic infections, particularly those caused by methicillin-resistant staphylococci and *Pseudomonas* species. There is a need to identify both:

1. Therapeutic alternatives
2. Whether there is risk of iatrogenic bacterial transfer during treatment at home.
  - Boyen and colleagues showed that miconazole and polymyxin B have promising *in vitro* efficacy against methicillin-resistant staphylococci. This data suggest that Surolan (elanco.com) may be an effective topical treatment for methicillin-resistant staphylococci, as well as gram-negative bacteria and yeast.
  - The study by Bateman and colleagues demonstrated excellent *in vitro* efficacy and shelf stability of a novel solution (ticarcillin-clavulanic acid; Timentin, gsk.com) that may be compounded in-clinic for treatment of *Pseudomonas* otitis.
  - Steen and Paterson's study revealed good *in vitro* efficacy of commercial ear cleansers against *Pseudomonas* species and provided evidence that ear cleansers may have valuable adjunctive activity against drug-resistant pathogens.
  - Bartlett and colleagues found that bacterial contamination of ear cleansers used in the pet owner's home is rare. These findings may be used to develop recommendations for minimizing bacterial contamination.

Therefore, recent veterinary literature has provided several exciting articles regarding management of ear disease, particularly antimicrobial-resistant infections. Hopefully, future *in vivo* studies will build upon preliminary *in vitro* data.—Christine L. Cain, DVM, Diplomate ACVD, University of Pennsylvania

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### TICARCILLIN-CLAVULANIC ACID FOR *PSEUDOMONAS* OTITIS

*Pseudomonas aeruginosa* is a common cause of otitis externa and often challenging to treat due to its resistance to multiple antimicrobials. Ticarcillin-clavulanic acid (Timentin) has been used off-label topically for the treatment of *Pseudomonas* otitis, with few published studies on its stability and efficacy once reconstituted.

- This study investigated the efficacy and stability of Timentin stock concentrate solution and Timentin diluted in Methopt against 4 *P aeruginosa* isolates over various time periods and temperatures.
- Methopt (hypromellose, 5 mg/mL; benzalkonium chloride, 0.2 mg/mL; disodium edetate, 0.5 mg/mL) has been previously used clinically in place of sterile water to decrease maceration of the ear canal lining. Tears Renewed (akorn.com) and Isopto Plain (alcon.com) are similar ophthalmic solutions.
- Timentin powder (3.1-g vial; ticarcillin sodium, 3000 mg; potassium clavulanate, 100 mg) was diluted in 12.9 mL sterile water; then stored at 4°C (refrigerated) and -20°C (frozen) for the stock concentrate.
- A Timentin/Methopt solution was created with 12 mL of stock concentrate diluted 1:4 with sterile Methopt; then stored at 4°C (refrigerated) or 24°C (room temperature).

Efficacy of the stock concentrate and Timentin/Methopt solution following storage was tested by evaluating minimum inhibitory concentration (MIC) levels for all 4 *Pseudomonas* strains using the broth microdilution method. The stock concentrate remained stable when refrigerated for 4 to 6 months or frozen for 12 months. The Timentin/Methopt solution remained stable for 28 days when refrigerated or stored at room temperature.

This *in vitro* study suggests that a Timentin/Methopt solution is likely efficacious clinically for topical treatment of *Pseudomonas* otitis; anecdotal clinical evidence supports this conclusion although *in vivo* testing should be pursued. Repeated freezing and thawing effects are unknown for these solutions.

Bateman FL, Moss, SM, Trott, DJ, et al. Biological efficacy and stability of diluted ticarcillin-clavulanic acid in the topical treatment of *Pseudomonas aeruginosa* infections. *Vet Dermatol* 2012; 23:97-102.



## FOCUS ON OTITIS

## MICONAZOLE &amp; POLYMYXIN B FOR METHICILLIN-RESISTANT STAPHYLOCOCCI

Methicillin-resistant *Staphylococcus aureus* (MRSA) and methicillin-resistant *Staphylococcus pseudintermedius* (MRSP) infections are increasingly reported causes of canine otitis.

- This study aimed to determine the *in vitro* susceptibility of canine MRSA and MRSP isolates to various antimicrobial agents, including miconazole and polymyxin B, as single agents and in combination, and Surolan (polymyxin B/miconazole/prednisolone).
- Fifty MRSP isolates and 24 MRSA isolates were collected from North America and Europe. MICs were determined, using a broth microdilution assay, for 12 antimicrobial agents, polymyxin B, miconazole, polymyxin B/miconazole combination (1:43.5 ratio), and Surolan (polymyxin B, 0.53 mg/mL; miconazole, 23 mg/mL; 1:43.5 ratio).
- Results confirmed acquired resistance to all tested agents (macrolides, aminoglycosides, and fluoroquinolones, among others) *except* linezolid, polymyxin B, and miconazole.
- Two MRSP strains were exposed to the polymyxin and miconazole combination at concentrations below the MIC for 7 days, with no evidence of rapid development of resistance.



Miconazole had higher *in vitro* antimicrobial activity compare to polymyxin. There was no evidence of enhanced *in vitro* activity when combining polymyxin B and miconazole versus using them as single agents. These factors suggest that the antistaphylococcal activity of Surolan is mainly due to miconazole. Further studies *in vivo* are needed to confirm the effectiveness of Surolan in MRSA and MRSP otitis cases.

Boyen F, Verstappen K, De Bock M, et al. *In vitro* antimicrobial activity of miconazole and polymyxin B against canine methicillin-resistant *Staphylococcus aureus* and methicillin-resistant *Staphylococcus pseudintermedius* isolates. *Vet Dermatol* 2012; 23:381-385.

## EAR CLEANSERS EFFICACIOUS AGAINST PSEUDOMONAS SPECIES

Approximately 10% to 20% of dogs presented to veterinary practices have otitis externa and/or otitis media. As otitis becomes more chronic, *Pseudomonas* species are often grown from canine ears and can display a wide spectrum of innate resistance to several classes of antimicrobials.

- Otic swabs were collected from client-owned dogs with clinical evidence of otitis and submitted for bacterial culture and susceptibility testing.
- All culture plates with confirmed *Pseudomonas* species had 8 sterile wells cut into the agar; each well was filled with 200 mcg/L of a commercial ear cleanser. The diameter of the zone of inhibition around each well was measured after 15 to 18 hours of incubation.
- Three cleansers consistently inhibited growth of the test organism in 50/50 (100%) of cases:
  - » Sancerum (lactic acid 2.5%, salicylic acid 0.1%; msd-uk.com)
  - » MalAcetic Otic (acetic acid 2%, boric acid 2%; dechra.com)
  - » Otodine (propylene glycol, chlorhexidine gluconate 0.15%, Tris EDTA; vetruus.com).
- Three cleansers consistently failed to inhibit the growth of *Pseudomonas* in 50/50 (100%) of cases:
  - » CerumAural (squalene in isopropyl myristate, liquid petroleum; dechra.com)
  - » Cleanaural (propylene glycol, isopropyl alcohol, citric acid, L-menthol, chlorothymol, thomethamine; dechra.com)
  - » Surosolve® (salicylic acid, tris EDTA, chlorxylenol, sodium docusate, propylene glycol; fidavet.com).

This study demonstrates variability among ear cleansers regarding their antimicrobial activity against different *Pseudomonas* isolates. It also demonstrates that *Pseudomonas* does not appear to be a pH-dependent bacterium. Ototoxicity needs to be taken into account with certain active ingredients; some ingredients may work better *in vivo*.

Steen SI, Paterson S. The susceptibility of *Pseudomonas spp.* isolated from dogs with otitis to topical ear cleaners. *J Small Animal Pract* 2012; 53:599-603.

## FOCUS ON OTITIS

**BACTERIAL CONTAMINATION OF EAR CLEANSERS**

Commercial ear cleansers contain a wide variety of antimicrobial ingredients. These ingredients not only help prevent recurrent otitis but also prevent contamination of the solution. Studies in human medicine have shown that topical drops and cleansers can be iatrogenically contaminated, which can lead to continued or resistant infections in patients.

- A total of 140 ear cleanser bottles were examined for cleanliness, purchase date, expiration date, amount of solution remaining, and bottle size. The applicator tip and remaining solution in each bottle was aseptically cultured.
- Bacteria were cultured from 17 bottles (12.1%); 14 (10%) bottles had bacterial growth from the applicator tip, while 3 (2.1%) had solution contamination.
- There were no significant differences in contamination rates regarding time since purchase or last use, frequency of use, whether the bottle touched the ear canal or was cleaned after use, visual dirtiness of bottle at time of culture, or recurrence of ear infections and bottle use.
- Factors that contributed *significantly* to contamination were:
  - » Expiration status of the solution
  - » Size of bottle
  - » Tris EDTA as active ingredient.

Pathogenic bacterial contamination of routine home ear cleansers is relatively low. However, risk may be increased if ear cleansers are used past their expiration date, if a large bottle is selected, or if Tris EDTA is an active ingredient. Clients should be encouraged to dispose of expired cleansers, use smaller bottles, and practice strict hand hygiene.

Bartlett SJ, Rosenkrantz WS, Sanchez S. Bacterial contamination of commercial ear cleaners following routine home use. *Vet Dermatol* 2011; 22:546-553.

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**INTERACTING WITH DOGS LIKE A DOG**

Veterinary staff, other dog professionals, and pet owners benefit from watching the body language of dogs as they interact with other dogs or people, but the greatest benefit is to the dogs themselves. It is advisable to be seated in the examination room, for example, as the client and patient are led in, thereby avoiding the “threat” of the doctor’s entrance and frontal approach.

If there is a dog park in your neighborhood, visit with a cup of coffee and folding chair (but perhaps without your dog) to just watch the way dogs greet and interact with each other, including the way they acknowledge the arrival of other dogs. By watching, we can become more fluent in their rich vocabulary.

***Taboo’s owners decided to “reboot” their interactions with him by turning their bodies to the side as he came when called. If he rolled onto his back or even slowed, they turned and trotted away while continuing to call him. Within days, Taboo was running all the way up to his owners with an expression of relief on his face. ■***

**Suggested Reading**

Kelley LC. Unified dog theory VIII: Understanding your dog’s calming signals. *My Puppy, Myself Blog*, December 29, 2010, psychologytoday.com/blog/my-puppy-my-self/201012/unified-dog-theory-viii-understanding-your-dogs-calming-signals.

Rugaas T. *On Talking Terms with Dogs: Calming Signals*, 2nd ed. Wenatchee, WA: Dogwise Publishing, 2005.

**Web Resources**

Canine body language: Keeping families safe. Doggone Safe: doggoneseafe.com.  
Pet Professional Guild: petprofessionalguild.org/DogBodyLanguage.



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