

**Efficacy and safety of cefovecin in treating bacterial folliculitis, abscesses, or infected wounds in dogs**

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**Objective**—To evaluate the efficacy and safety of administration of cefovecin, compared with cefadroxil, for treatment of naturally occurring secondary superficial pyoderma, abscesses, and infected wounds in dogs.

**Design**—Multicenter, randomized, positive-controlled clinical trial.

**Animals**—235 client-owned dogs.

**Procedures**—Dogs with clinical signs of skin infection confirmed via bacteriologic culture were randomly allocated to receive a single SC injection of cefovecin (8 mg/kg [3.6 mg/lb]) followed by placebo administered PO twice daily for 14 days or cefadroxil (22 mg/kg [110 mg/lb]) administered PO twice daily for 14 days following a placebo injection. Two 14-day treatment courses were permitted. Treatment success was defined as reduction of clinical signs to mild or absent at the final assessment.

**Results**—Clinical efficacy achieved with cefovecin in dogs was equivalent to that observed with cefadroxil. At the final assessment, 14 days following the completion of treatment (on day 28 or 42), 92.4% (109/118) of the cefovecin group and 92.3% (108/117) of the cefadroxil group were treatment successes. There were no serious adverse events or deaths related to treatment.

**Conclusions and Clinical Relevance**—A single cefovecin injection (8 mg/kg) administered SC, which could be repeated once after 14 days, was safe and effective against naturally occurring skin infections in dogs and as effective as cefadroxil administered PO twice daily for 14 or 28 days. (J Am Vet Med Assoc 2008;233:433-439)

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**Abbreviations**

| ALP | Alkaline phosphatase |
| ATCC | American type culture collection |
| MIC | Minimum inhibitory concentration |
| MIC\(_{90}\) | Minimum inhibitory concentration for 90% of the isolates tested |

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Canine skin infections such as superficial pyoderma, abscesses, and infected wounds are common in companion animal veterinary practices. Most canine skin infections are caused by *Staphylococcus intermedius* including approximately 90% of pyoderma cases.\(^1,2\) This species is present on mucosal sites and may be resident or transient on skin.\(^3\) Disruptions in the skin-surface microenvironment allow resident flora to become pathogenic. Underlying conditions, such as atopy, promote bacterial adherence to the epidermis and subsequent colonization.\(^4\) Gram-negative bacteria, such as *Proteus* spp, *Pseudomonas* spp, and *Escherichia coli*, are often secondary invaders.\(^5\) Although treatment recommendations vary in association with underlying conditions, superficial pyoderma is generally treated for 7 to 14 days beyond clinical resolution of skin lesions.\(^5\)

Cephalosporins are frequently used to treat canine skin infections because of their broad antimicrobial spectrum and safety profile. Until the recent approval of cefovecin, only 2 cephalosporins, cefadroxil and cefpodoxime proxetil, were approved in the United States for the treatment of skin infections in companion animals.\(^6,7\) Cefadroxil, approved for the treatment of cellulitis, pyoderma, dermatitis, wound infections, and abscesses, is licensed for twice-daily administration, whereas cefpodoxime proxetil, approved for the treatment of wounds and abscesses, is licensed for once-daily administration.\(^6,7\) Treatment with cefadroxil or cefpodoxime proxetil is recommended for maximum treatment durations of 28 and 30 days, respectively.\(^6,7\) Generic cephalexin is often prescribed because of its cost-effectiveness, although the drug is not approved for use in veterinary medicine.\(^8\) To maintain adequate concentrations, cephalexin must be administered PO 2 or 3 times daily, often requiring multiple capsules for each 20 to 30 mg/kg (9.1 to 13.6 mg/lb) dose in large dogs.\(^9,10\) Cefadroxil and cephalexin are classified as first-generation cephalosporins, whereas cefpodoxime proxetil, because of its extended spectrum and stability against Gram-negative organisms with β-lactamase, is classified as a third-generation cephalosporin.\(^8,9,10\)

The in vitro activity of cefovecin sodium, a new third-generation extended-spectrum cephalosporin, is similar to that of cefpodoxime proxetil.\(^7,10\) Like other...
Materials and Methods

The study was conducted in support of new drug registration in the United States and in accordance with Good Clinical Practice guidelines. The study was conducted at 26 general veterinary practices in the United States where client-owned dogs were enrolled by the attending veterinarian with the written consent of the owner. Dogs were eligible for enrollment if they had clinical evidence of skin infection (eg, bacterial folliculitis, abscesses, or infected wounds) characterized by one or more of the following: pustules, papules, nodules, furuncles, erosion-ulceration, purulent discharge, erythema, swelling, or other evidence of skin or soft tissue infection. At least 1 clinical sign had to be classified as moderate or severe on day 0, the day on which the dog was first treated. In addition, the presence of pathogenic bacteria prior to treatment had to be confirmed by use of bacterial culture and identification. Because antimicrobial susceptibility results were not available immediately, dogs were enrolled irrespective of the susceptibility results for the pathogen identified before treatment. Although cytologic examinations were not stipulated in the protocol, they could have been performed as part of the routine dermatologic examination at enrollment to further characterize the infection. Dogs were not eligible for enrollment if they were younger than 8 weeks of age; intended for breeding during the study; known or suspected to be pregnant; lactating; allergic to penicillins or cephalosporins; treated for a skin or soft tissue infection within the previous month; treated systemically or topically with antimicrobials or short-acting corticosteroids within the previous month; treated with topical or systemic corticosteroids during the study; found to have an uncontrolled underlying disease requiring treatments that would exclude the dog from participation in the study; being treated with drugs that may have negatively influenced response to antimicrobial treatment (ie, immunosuppressive agents); known to have a foreign body not removed before the first treatment; or known or suspected of having sarcoptic or demodectic mange, dermatophytosis, or Malassezia dermatis. Clipping, drainage, or surgical debridement of wounds or abscesses was permitted; lesions could be cleaned topically with saline (0.9% NaCl) solution or water. The use of antiseptics or disinfectants (eg, iodine, chlorhexidine, or hydrogen peroxide) was not allowed. No topical preparations with antimicrobial or antifungal activity were permitted during the study; shampooing was not permitted during the study. All other concomitant treatments were allowed.

For each enrolled dog, blood and urine samples were collected before treatment and at final assessment for a CBC, serum biochemical profile, and urinalysis. Samples from skin lesions were collected for bacterial isolation, identification, and MIC testing. Samples for aerobic culture were obtained by swabbing the active margin or characteristic exudate of the affected area. Crusts could be lifted or pustules and abscesses opened to obtain samples. Samples were collected by each practitioner and sent to a designated reference laboratory.

Bacterial identification and susceptibility testing were confirmed by a second designated laboratory. Identification was made at the species level, if possible, on the basis of morphology, gram stain, growth characteristics, and results of standard individual biochemical tests. If the identification of an isolate could not be determined, identification was attempted by use of an identification system. Antimicrobial susceptibility testing against cefovecin sodium and cefadroxil was conducted in accordance with applicable standards published by the Clinical and Laboratory Standards Institute. The MICs were determined via broth microdilution with customized microdilution plates provided by the study sponsor. The following ATCC quality control organisms (Enterococcus faecalis ATCC 29,212, E coli ATCC 25,922 and ATCC 35,218, Pseudomonas aeruginosa ATCC 27,853, Staphylococcus aureus ATCC 29,213, and Streptococcus pneumoniae ATCC 49,619) were tested daily; the MIC results for cefovecin sodium and cefadroxil were consistently within the established quality-control ranges.

Treatment was started before the results of microbiologic analysis were known, but dogs could only continue in the study if the diagnosis was confirmed by the presence of bacteria in the pretreatment culture. Eligible dogs were allocated randomly to treatment according to a generalized random block design with 2 dogs/treatment in each block. Dogs were assigned to blocks by order of date of initial evaluation. Dogs received either a single SC injection of 8 mg/kg of cefovecin plus placebo tablets or suspension twice daily for 14 days or 22 mg/kg (10 mg/lb) of cefadroxil administered PO twice daily for 14 days plus a placebo injection. Cefadroxil drops were dispersed to dogs weighing ≤ 3.4 kg (7.5 lb) and cefadroxil tablets to dogs weighing > 3.4 kg. The placebo tablets, suspension, and injections were identical in
shape or color and thus allowed use of a double-masked study design in which neither examining veterinarians nor clients were aware of treatment allocations. Dogs were examined again on days 7, 14, and 28. On day 14, at the discretion of the examining veterinarian, treatment could be extended for an additional 14 days. The masking was continued, and the dog’s original treatment assignment of either cefovecin injection and placebo tablets or suspension or placebo injection and cefadroxil tablets or suspension was maintained. Final assessment was conducted on day 28 for dogs treated for 14 days and on day 42 for dogs treated for 28 days. The investigating veterinarian recorded any abnormal health event reported by the client during the course of the study.

Efficacy was assessed on the basis of clinical signs (papules, pustules, nodules, furuncles, erythema, erosion or ulceration, purulent discharge, and swelling), which were scored by the examining veterinarian as being absent, mild, moderate, or severe as defined by protocol. Treatment success was defined as all clinical signs reduced to mild or absent at final assessment; on the basis of these definitions, dogs were considered a treatment success even if no complete resolution of all clinical signs was achieved. Dogs with negative results of pretreatment cultures were withdrawn from the study as soon as the microbiologic results were known and were not included in the efficacy analysis. The examining veterinarian could withdraw dogs at any time if response to treatment was considered inadequate; these dogs were considered treatment failures in the efficacy analysis but were included in the safety evaluation.

The primary determinant of efficacy was the binary response variable based on the number of dogs that were evaluable for analysis on days 28 or 42. A noninferiority test was conducted to determine whether the efficacy of cefovecin was no worse (ie, noninferior) compared with the efficacy of cefadroxil; a 15% noninferiority margin was selected as being a clinically acceptable difference. For the noninferiority test, the difference between the 2 percentages (cefovecin value – cefadroxil value) was calculated with a 90% 2-sided confidence interval. If the lower confidence limit was > −15%, then noninferiority was demonstrated. Because noninferiority is inherently 1-sided, a 90% 2-sided confidence interval results in a significance level of 5% for the 1-sided test. The noninferiority analysis was also performed by use of the protocol-defined population but excluding positive control dogs that had missed 3 or more orally administered doses.

As a secondary assessment, the examining veterinarian was asked to assess the overall clinical outcome of each case on study day 28 (single administration) or 42 (2 administrations) as cured, improved, or failed. The 3 criteria were defined as follows: cured = clinical signs subsided in a reasonable period of time with no evidence of an ongoing infection, improved = clinical signs subsided in a reasonable period of time but were not completely resolved, or failed = no apparent or inadequate response to therapy. These overall clinical outcomes were summarized to provide an additional clinical perspective of efficacy.

Results

Three hundred twenty dogs (157 in the cefovecin group, 163 in the cefadroxil group) were enrolled at 26 clinics in 13 states. Cefovecin-treated dogs ranged in age from 0.2 to 19 years, and the cefadroxil-treated dogs ranged in age from 0.2 to 15 years. Weights for the cefovecin-treated dogs ranged from 2.3 to 59.5 kg (5 to 131 lb) and the cefadroxil-treated group ranged from 2.3 to 62.7 kg (5 to 138 lb). Of the cefovecin-treated dogs, 49 were sexually intact males, 39 were neutered males, 18 were sexually intact females, and 51 were spayed females. Of the cefadroxil-treated dogs, 35 were sexually intact males, 42 were neutered males, 29 were sexually intact females, and 57 were spayed females. Fifty pure and 24 mixed breeds were represented in the cefovecin group; 54 pure and 22 mixed breeds were represented in the cefadroxil group. The 10 most common breeds were Labrador Retriever (n = 48; 30 received cefovecin, 18 received cefadroxil), Walker Fox Hound (17; 7 received cefovecin, 10 received cefadroxil), Golden Retriever (16; 6 received cefovecin, 10 received cefadroxil), Cocker Spaniel (16; 6 received cefovecin, 10 received cefadroxil), Rottweiler (12; 7 received cefovecin, 5 received cefadroxil), Pit Bull Terrier (9; 4 received cefovecin, 5 received cefadroxil), Poodle (9; 3 received cefovecin, 6 received cefadroxil), German Shepherd Dog (8; 4 received cefovecin, 4 received cefadroxil), Dachshund (8; 4 received cefovecin, 4 received cefadroxil), and Lhasa Apso (7; 4 received cefovecin, 3 received cefadroxil).

Sixty-four medications were administered concomitantly to 92 dogs that received cefovecin, and 55 were administered concomitantly to 88 dogs that received cefadroxil. The medications used concomitantly in the cefovecin-treated group included heartworm preventatives, flea-control products, nonsteroidal anti-inflammatories, vaccines for the prevention of infectious diseases, fluid therapy (electrolytes, sodium chloride), acepromazine, atropine, isoflurane, butorphanol, hydroxyzine, and dietary supplements.

Of the 320 dogs enrolled in the study (157 cefovecin-treated dogs, 163 cefadroxil-treated dogs), 85 dogs were not included in the analysis for efficacy. The main reason for exclusion from the efficacy analysis was failure to isolate a bacterial pathogen from the infected site before treatment (n = 37 dogs; 18 cefovecin-treated dogs, 19 cefadroxil-treated dogs); an additional 10 dogs (3 cefovecin-treated dogs, 7 cefadroxil-treated dogs) were excluded because antimicrobial susceptibility data could not be generated because pathogens were no longer viable. Nine dogs (6 cefovecin-treated dogs, 3 cefadroxil-treated dogs) were excluded for owner noncompliance (ie, failure to return for required follow-up visits), and 9 (4 cefovecin-treated dogs, 5 cefadroxil-treated dogs) were excluded for owners’ scheduling deviations for the final assessment. Another 20 dogs (8 cefovecin-treated dogs, 12 cefadroxil-treated dogs) were excluded for either development of unrelated medical conditions, not fulfilling all inclusion criteria, having some of the exclusion criteria, or other reasons; this included 14 dogs (7 in each treatment group) for which the skin infections were classified as other, including moist pyoderma, pustular dermatitis, cellulitis, and furunculosis. Thus, 235 dogs (118 cefovecin-treated dogs, 117 cefadroxil-treated dogs) were included in the efficacy analysis, which included data for 8 dogs (4 in each group) that were withdrawn from the study because of apparent lack of efficacy or inadequate im-
Table 1—Success rates at final assessment point via noninferiority analysis for all evaluable cases and by clinical diagnosis in dogs with bacterial folliculitis, abscesses, or infected wounds.

<table>
<thead>
<tr>
<th>Clinical diagnosis</th>
<th>Cefovecin*</th>
<th>Cefadroxil*</th>
<th>Difference in success rates</th>
<th>SE of the difference</th>
<th>90% confidence interval</th>
<th>P value</th>
<th>Noninferiority criteria met</th>
</tr>
</thead>
<tbody>
<tr>
<td>All clinical diagnoses</td>
<td>109/118 (92.4)</td>
<td>108/117 (92.3)</td>
<td>0.07</td>
<td>3.47</td>
<td>-5.64 to 5.77</td>
<td>&lt; 0.001</td>
<td>Yes</td>
</tr>
<tr>
<td>Bacterial folliculitis</td>
<td>57/62 (91.9)</td>
<td>60/67 (89.6)</td>
<td>2.38</td>
<td>5.09</td>
<td>-5.99 to 10.76</td>
<td>0.001</td>
<td>Yes</td>
</tr>
<tr>
<td>Single treatment</td>
<td>45/50 (90)</td>
<td>44/47 (89.6)</td>
<td>-0.90</td>
<td>6.12</td>
<td>-10.97 to 7.18</td>
<td>0.024</td>
<td>Yes</td>
</tr>
<tr>
<td>2 treatments</td>
<td>12/12 (100)</td>
<td>16/20 (80)</td>
<td>-3.41</td>
<td>6.38</td>
<td>-13.91 to 7.09</td>
<td>0.035</td>
<td>Yes</td>
</tr>
<tr>
<td>Abscess</td>
<td>27/29 (93.1)</td>
<td>24/25 (96.0)</td>
<td>0.90</td>
<td>2.36</td>
<td>5.99 to 7.18</td>
<td>0.001</td>
<td>Yes</td>
</tr>
<tr>
<td>Single treatment</td>
<td>24/25 (96.0)</td>
<td>20/21 (95.2)</td>
<td>-0.90</td>
<td>6.12</td>
<td>-10.97 to 7.18</td>
<td>0.024</td>
<td>Yes</td>
</tr>
<tr>
<td>2 treatments</td>
<td>3/4 (75)</td>
<td>4/4 (100)</td>
<td>1.00</td>
<td>0.00</td>
<td>-0.10 to 0.10</td>
<td>1.0</td>
<td>Noninferiority</td>
</tr>
<tr>
<td>Wound</td>
<td>25/27 (92.6)</td>
<td>24/25 (96.0)</td>
<td>-0.90</td>
<td>6.12</td>
<td>-10.97 to 7.18</td>
<td>0.024</td>
<td>Yes</td>
</tr>
<tr>
<td>Single treatment</td>
<td>0/1 (0)</td>
<td>2/2 (100)</td>
<td>2.00</td>
<td>0.00</td>
<td>0.50 to 0.50</td>
<td>0.49</td>
<td>Noninferiority</td>
</tr>
<tr>
<td>2 treatments</td>
<td>0/1 (0)</td>
<td>2/2 (100)</td>
<td>2.00</td>
<td>0.00</td>
<td>0.50 to 0.50</td>
<td>0.49</td>
<td>Noninferiority</td>
</tr>
</tbody>
</table>

*Number of cases assessed as success/number of cases evaluable for analyses (% success).

Table 2—Minimal inhibitory concentrations of cefovecin and cefadroxil for bacterial isolates cultured from pretreatment samples obtained from dogs with bacterial infections.

<table>
<thead>
<tr>
<th>Bacterial pathogen*</th>
<th>No.</th>
<th>Cefovecin</th>
<th>Cefadroxil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Range (µg/mL)</td>
<td>MIC&lt;sub&gt;50&lt;/sub&gt; (µg/mL)</td>
</tr>
<tr>
<td>Staphylococcus intermedinis</td>
<td>117</td>
<td>≤ 0.06 to &gt; 32</td>
<td>0.12</td>
</tr>
<tr>
<td>Streptococcus canis (group G, β-hemolytic)</td>
<td>37</td>
<td>≤ 0.06†</td>
<td>≤ 0.06</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>30</td>
<td>0.5 to 2</td>
<td>0.5</td>
</tr>
<tr>
<td>Coagulase-negative Staphylococcus spp</td>
<td>38</td>
<td>≤ 0.06 to 8</td>
<td>0.12</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>15</td>
<td>0.12 to 0.25</td>
<td>0.25</td>
</tr>
</tbody>
</table>

*Neither cefovecin nor cefadroxil had any in vitro activity against Enterococcus spp (n = 15 isolates) or Pseudomonas spp (12). †Same value for all isolates. MIC<sub>50</sub> = Minimum inhibitory concentration for 50% of the isolates.
In both the cefovecin-treated dogs (n = 157) and cefadroxil-treated dogs (163), gastrointestinal-related events were the most commonly observed abnormal clinical signs, including vomiting (6 cefovecin-treated dogs, 12 cefadroxil-treated dogs), diarrhea (6 cefovecin-treated dogs, 7 cefadroxil-treated dogs), blood in feces (1 cefovecin-treated dog, 2 cefadroxil-treated dogs), increased borborygm (1 cefovecin-treated dog), and flatulence (1 cefovecin-treated dog). Other abnormal clinical signs included anorexia (5 cefovecin-treated dogs, 8 cefadroxil-treated dogs) and lethargy (2 cefovecin-treated dogs, 7 cefadroxil-treated dogs). There were no abnormal injection-site observations for dogs treated with cefovecin; 2 cefadroxil-treated dogs administered cefovecin-placebo (sterile water) had mild injection-site reactions.

There were 4 deaths (2 cefovecin-treated dogs and 2 cefadroxil-treated dogs) during the course of the study; none of which were considered to be treatment related. One dog in the cefovecin-treated group died 5 weeks after treatment from signs attributed to distemper virus. The second cefovecin-treated dog died 1 day after receiving a second course of treatment with signs attributed to an unspecified preexisting disease (the dog was in poor body condition with approx 9% body weight loss over the 18 weeks prior to study enrollment). One cefadroxil-treated dog had clinical pathology results before enrollment indicative of chronic renal disease. This dog was removed from study after 3 days but died 14 days later; histologic examination of renal tissue obtained at necropsy confirmed the initial diagnosis. The second cefadroxil-treated dog died after being struck by an automobile 14 days after enrollment.

No clinically important treatment-related clinical pathology abnormalities were identified between the treatment groups. Categoric assessments of urinalysis values before and after treatment were similar between groups. Arithmetic means of hematologic and serum biochemical values before and after treatment were within reference ranges except for serum ALP activity. Mean value for pretreatment ALP activity for cefovecin (130 U/L) and cefadroxil (141 U/L) groups was greater than the upper limit of the reference range (21 to 125 U/L) used by the laboratory. Twenty cefovecin-treated and 16 cefadroxil-treated dogs had high ALP activities before and after treatment. Four cefovecin-treated dogs had serum ALP activities within reference range before the study and increased activities after the study (range, 136 to 144 U/L), and 3 cefadroxil-treated dogs had the same findings with posttreatment activities ranging from 228 to 515 U/L. After treatment, the mean value of the cefadroxil group was within the reference range, whereas that of the cefovecin group remained greater than the reference range in the absence of any clinical signs.

**Discussion**

Both cefovecin and cefadroxil were well tolerated by the treated dogs. There were no significant differences between treatment groups in the number of adverse events. In both treatment groups, the mean values for serum biochemical variables remained within reference range, with the exception of pretreatment ALP activities, which were greater than the upper limit of the reference range (> 125 U/L) for both treatment groups. Although there are many possible causes for high serum ALP activity and individual dogs should be fully assessed for underlying causes, the population of dogs studied may have been predisposed to treatment with corticosteroids. Although no clinical significance was determined, a few dogs in both groups had ALP values that were higher after treatment.

The bacteria isolated from pretreatment samples taken from dogs enrolled in this study were those typically associated with canine skin infections. As was expected, *S intermedius* was the most common isolate followed by *S canis* (group G, β-hemolytic) and *E coli*. The cefovecin MIC₉₀ values reported here were similar to reported values; the MIC₉₀ values were markedly lower than those of cefadroxil, which were similar to values reported for cephalaxin. Thirty-eight coagulase-negative *Staphylococcus* isolates were obtained during the study, against which cefovecin had good activity; 3 of those isolates were identified as *S schleiferi* with MICs ranging from 0.12 to 0.25 µg/mL. Normand et al reported that the prevalence of cephalosporin resistance for *E coli* and *Staphylococcus* spp within a small animal referral hospital did not increase despite wide use of antimicrobials of several classes. Ganiere recently confirmed this observation specifically for *S intermedius*.

In the present study, conducted for regulatory approval of cefovecin in the United States, the clinical efficacy rates for treating canine bacterial folliculitis, abscesses, or infected wounds ranged from 89.6% to 96.0% and 91.9% to 93.1% for cefadroxil and cefovecin, respectively. Good clinical efficacy of cephalosporins has also been reported in a study where 42 of 45 dogs had a good to excellent response after a 3-week treatment period; in another uncontrolled study with 30 dogs with pyoderma, a good to excellent response was reported for 29 dogs after treatment for 21 to 30 days. Equally good efficacy in the treatment of pyoderma has been reported for fluoroquinolones, ormetoprim potentiated sulfonamide, and amoxicillin-clavulanic acid.

Successful resolution of the clinical signs associated with canine skin infections depends on many factors, including the metabolic and immunologic condition of the dog, severity of the lesion, and type of medical intervention. Dogs with superficial pyoderma generally require a minimum of 3 weeks of antimicrobial treatment. In the study reported here, a single course of antimicrobial treatment (1 SC injection of cefovecin or 14 days of orally administered cefadroxil) for the treatment of bacterial folliculitis was administered to 80.6% (50/62) of cefovecin-treated and 70.1% (47/67) of cefadroxil-treated dogs, with a clinical success rate ≥ 90% for both treatment groups. Thus, duration of antimicrobial administration for the treatment of bacterial folliculitis was shorter than recommended in current literature. Possible explanations are that the second treatment was administered at the veterinarian's discretion (and not necessarily until resolution of clinical signs) and that no treatment beyond resolution of clinical signs was recommended by protocol. The re-
sults should not be used to suggest that a 14-day antimicrobial administration in general is sufficient for successful treatment of bacterial folliculitis. Efficacy results from Europe for cefovecin with a similar study design as described here indicate the necessity of an additional course of treatment in approximately 85% of dogs treated with cefovecin or the positive control drug, amoxicillin–clavulanic acid, to achieve clinical success rates > 90%. The label approved in the United States for the use of cefovecin in dogs recommends that if a second injection is needed, it should be administered 7 to 14 days after the first administration at a dose of 8 mg/kg. The decision of whether and when to administer a second dose should take into consideration such factors as progress to clinical resolution, the susceptibility of the causative organism, and the integrity of the dog’s host-defense mechanism. The readministration interval in the study reported here was always 14 days and substantiated the effectiveness of cefovecin for the treatment of skin infections in dogs at the longest approved administration interval.

The development of antimicrobial resistance of pathogens of canine and feline origin has been well documented. Most of the resistant pathogens are multidrug resistant and therefore suggest resistance can emerge by exposure to any class of antimicrobial. Given this circumstance, it is important that use of all antimicrobial agents, including cefovecin, be consistent with guidelines for appropriate use, with emphasis on accurate diagnosis, understanding of the integrity of the host-defense mechanism, and determination of pathogen susceptibility. The development of resistance of pathogens to cefovecin has not been studied; however, the likelihood of resistance in target pathogens is expected to be low for cefovecin given the long period of continuous exposure of target pathogens to free drug (7 to 14 days following dose administration). The single-dose formulation enhances the ability of the veterinarian to ensure administration of a full course of treatment and provides drug concentrations that are optimal (greater than the MIC threshold of the target pathogens) for 7 to 14 days. This eliminates the fluctuation of drug concentrations to values less than the MIC of target pathogens typically associated with daily antimicrobial administration, thereby reducing the opportunity for development of resistance.

The double-masked design of this study did not allow owners to experience the convenience of a single injection administered by the veterinarian. However, evidence from clinical practice would suggest that in many cases, owners fail to comply with oral administration regimens in which medications are dispensed for administration outside the veterinary clinic; Grave and Tanem found that only 44% of owners questioned by telephone survey complied with treatment regimens as instructed. Adams et al reported similar compliance issues and identified several factors that could be used to maximize compliance; results suggested that administration regimen substantially influenced owner compliance, with greater compliance observed with once-or twice-daily regimens, compared with 3-times daily regimens. The American Animal Hospital Association guideline for appropriate use of antimicrobials states that an appropriate dose form is critical for reliable application of the drug; administration of cefovecin by the veterinarian ensures that the full course of therapy is properly administered and that dogs receive a full dose. This optimal compliance should enhance therapeutic efficacy. In the present study, a single cefovecin injection (8 mg/kg) administered SC and that could be repeated once, 14 days after the first injection, was safe and effective against naturally occurring bacterial folliculitis, abscesses, and infected wounds in client-owned dogs and was as effective as cefadroxil administered orally twice daily for 14 or 28 days.

References

3. Harvey RG, Lloyd DH. The distribution of Staphylococcus intermedius and coagulase-negative staphylococci on the hair, skin surface, within the hair follicles and on the mucous membranes of dogs. Vet Dermatol 1994;5:75–81.
Selected abstract for JAVMA readers from the American Journal of Veterinary Research

Development of a technique for quantification of reticulocytes and assessment of erythrocyte regenerative capacity in birds
Jennifer L. Johns et al

Objective—To develop a reticulocyte classification scheme, optimize an avian reticulocyte staining protocol, and compare the percentages of reticulocyte types with polychromatophil percentage in blood samples from birds.

Sample Population—Blood samples from a red-tailed hawk and 31 ill birds.

Procedures—A single blood sample obtained from a red-tailed hawk (Buteo jamaicensis) was used to optimize the staining protocol. For optimization of the staining protocol, 4 dilutions of whole blood with new methylene blue stain and 4 incubation times were evaluated. From samples submitted for avian CBCs, EDTA-anticoagulated whole blood samples from 31 ill birds were randomly selected and examined to compare polychromatophil and reticulocyte percentages. Reticulocyte staining was performed in all samples by use of a 1:3 (whole blood to new methylene blue) dilution with incubation for 10 minutes at room temperature (approx 22°C), reticulocytes were assessed as a percentage of 1,000 RBCs by 2 independent observers. In Wright-Giemsa–stained blood smears, a polychromatophil percentage was similarly determined.

Results—4 avian reticulocyte types were defined: ring-form reticulocytes, aggregate reticulocytes, and 2 subcategories of punctate reticulocytes. A reticulocyte-staining protocol was optimized. Interobserver and intraobserver variations in assessment of reticulocyte and polychromatophil percentages were not significant. A strong positive correlation (Spearman coefficient of rank correlation \( \rho = 0.978 \)) was identified between the percentage of polychromatophils and the percentage of ring-form reticulocytes.