Multiple-center study of reduced-concentration triamcinolone topical solution for the treatment of dogs with known or suspected allergic pruritus

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Objective—To determine the efficacy of triamcinolone acetonide topical solution (TTS) in dogs for use in reduction of clinical signs of pruritic inflammatory skin diseases of a known or suspected allergic basis and to evaluate adverse effects associated with TTS administration.

Animals—103 pruritic adult dogs with known or suspected allergic skin disease.

Procedure—Dogs were treated for 4 weeks with TTS or with vehicle solution (control dogs) in a multiple-center study. Clinical signs were scored by owners and by examining veterinarians before and after treatment. Blood samples obtained before and after treatment were subjected to routine hematologic and serum biochemical analyses.

Results—Treatment success, as defined by an improvement of at least 2 of 6 grades in overall clinical score, was evident in 35 of 52 (67%) TTS-treated dogs (mean improvement, 1.98) and 12 of 51 (24%) control dogs (mean improvement, 0.29). For several criteria, TTS was significantly more effective than vehicle in reducing clinical signs. Minor alterations in hematologic determinations in TTS-treated dogs were limited to slightly lower total leukocyte, lymphocyte, and eosinophil counts after treatment. Minor adverse effects were reported by owners in 6 of 52 (12%) TTS-treated and 9 of 51 (18%) control dogs.

Conclusions and Clinical Relevance—Triamcinolone used as a spray solution at a concentration approximately one-sixth the concentration of triamcinolone topical preparations currently available for veterinary use is effective for short-term alleviation of allergic pruritus in dogs. Adverse effects are few and mild and, thus, do not preclude prolonged treatment with the solution. (*Am J Vet Res* 2002;63:408–413)

Allergic skin diseases are common in dogs, and long-term relief of pruritus associated with allergy is a common therapeutic dilemma. The use of corticosteroids often is necessary to provide adequate relief for allergic patients. Systemically administered glucocorticoids frequently are used for this purpose; however, short- and long-term adverse effects of these medications (and owner aversion) make them unsatisfactory for long-term management of many dogs. Thus, there is a need for efficacious alternatives to systemically administered corticosteroids for treatment of dogs with allergic pruritus.

Various topical corticosteroid preparations are widely available for use in dogs and humans, and they frequently are used for treatment of localized inflammatory skin disease. Most commonly available topical corticosteroid products for dogs are lotions, ointments, or creams containing hydrocortisone, prednisolone, dexamethasone, or triamcinolone. These formulations are difficult or impractical to use over widespread areas of skin or in areas covered by hair. Currently marketed products suitable for use over larger areas of hair-covered skin include shampoos, sprays, and conditioners. These products are formulated with hydrocortisone, a glucocorticoid that may be of insufficient potency to produce clinical benefit in some dogs.

Commonly used ointment and cream products approved long ago for use in dogs as well as products for use in humans contain triamcinolone acetonide (a moderate-potency glucocorticoid), typically as a 0.025 to 0.5% (0.25 to 5 mg/ml) preparation. These products are indicated and effective for localized treatment of inflammatory skin lesions.[1] More recently, aerosol formulations containing triamcinolone have been reported as efficacious in humans for reduction of inflammation in respiratory epithelial surfaces, such as nasal mucosa in rhinitis (ie, hay fever)[2] or bronchial mucosa in asthma[3]; such products currently are marketed for use in humans. Aerosolized triamcinolone produces sustained therapeutic benefit with as little as 110 µg of

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drug delivered to the epithelial surface per day. This amount of triamcinolone is the equivalent of that contained in approximately 0.1 ml of a commonly used 0.1% triamcinolone topical lotion or cream. Thus, extremely small amounts of triamcinolone may have clinically beneficial anti-inflammatory actions when delivered directly to the target epithelial surface.

All currently approved topical triamcinolone products for veterinary use contain 0.1% triamcinolone acetonide. Topical triamcinolone formulations with a lower concentration have not been evaluated for clinical efficacy in reduction of cutaneous inflammation. Following initial encouraging results for use of a reduced-concentration **triamcinolone topical solution (TTS)** in dogs with experimentally induced skin inflammation,[4] we sought to determine whether TTS was therapeutically useful. The objective of the study reported here was to determine the efficacy of TTS in dogs for reduction of clinical signs of pruritic inflammatory skin diseases that have a known or suspected allergic basis and to evaluate safety of TTS in dogs during its use.

Materials and Methods

Animals—The multiple-center study was performed, using dogs that were clinical patients at 5 specialty dermatology practices (1 teaching hospital and 4 referral practices). Informed consent was obtained from each owner before dogs were entered into the study. Dogs were at least 6 months old at time of entry into the study. Entry into the study was not restricted on the basis of breed, body weight, or sexual status; however, only nonpregnant dogs were included in the study. The protocol for animal use was approved by the Animal Care Committee of the School of Veterinary Medicine at the University of Wisconsin-Madison.

Dogs were required to be in generally healthy condition. Dogs that had been referred for treatment of pruritic inflammatory skin diseases of known or suspected allergic origin were included in the study. Dogs with known seasonal remission of disease and those with untreated infectious or parasitic skin diseases were excluded from the study.

Prior to entry into the study, dogs underwent diagnostic evaluation to exclude bacterial or fungal infections and external parasites. Concurrent treatments or medications permitted during the study included allergen immunotherapy (only if ongoing for at least 6 months prior to entry into the study), antimicrobial shampoos or rinses, thyroid hormone supplements, heartworm preventatives, flea control measures, vitamin supplements, and anticonvulsants. Medications or treatments that were not permitted during the study included any type of systemically or topically administered corticosteroids, antihistamines, essential fatty acid supplements, antibiotics, tranquilizers or sedatives, or ketoconazole or other antifungal drugs. In dogs that had been receiving medications or treatments that were not permitted, those treatments or medications were discontinued for a minimum of 1 week prior to entry into the study, except for injectable betamethasone, triamcinolone, or methylprednisolone acetate, which were discontinued 6 weeks prior to entry into the study. Restrictive diets were permitted but only when they were initiated at least 3 months prior to entry into the study.

Study design—The study was designed as a multiple-center randomized double-blind placebo-controlled trial in which TTS was compared with vehicle-only spray. This study was conducted under guidance provided by the FDA-Center for Veterinary Medicine[5] and US federal regulations regarding new animal drugs for investigational use.[6]

Prior to entry, dogs were examined by use of flea combs to ensure they did not have flea infestations, or control measures for fleas were instituted to eliminate any fleas. As deemed necessary by the examining dermatologist, skin scrapings, empirical treatments for mites, dermatophyte culture, and cytologic evaluation of skin samples were performed. When gross or cytologic evidence of dermatitis attributable to bacteria or yeast was found, dogs with these infections were treated prior to entry into the study.

At the time of entry, historical information was recorded for each dog, and physical examination was performed. Each veterinarian performed a pretreatment evaluation, and scores were assigned for pruritus, erythema, papular-pustular eruption, and overall evaluation. Scores were determined on the basis of defined written criteria, using 6-point scales for each variable (0 to 5; 0 = normal, 5 = worst clinical condition). At the same time, each owner assigned a score for itching, redness-inflammation, and rashes, respectively, using similar 6-point scales and written criteria. The overall clinical score for each dog was assigned by a veterinarian, and an overall clinical score of ≥ 3 of 6 was needed to qualify for inclusion in the study.

A blood sample was obtained from each dog prior to treatment. Blood samples were submitted for routine hematologic and serum biochemical determinations.

Treatment solutions consisted of 0.015% triamcinolone acetonide solution in a proprietary vehicle[a] or the vehicle only (control solution). Triamcinolone and control solutions were packaged in identical 16-ounce spray bottles that were identified only by code numbers. Contents of each bottle were unknown to investigators and owners of dogs until after completion of the study. A computer-generated randomization schedule was supplied along with the solutions.

Owners were instructed to apply contents from the assigned bottle by spraying affected areas until the skin was uniformly and thoroughly wet. Owners also were instructed that, when necessary, they should don gloves and massage the liquid into the coat to ensure adequate skin contact. The first day of application was defined as day 0. Solutions were applied twice daily for 1 week, then once daily for 1 week, and then on alternate days for an additional 2 weeks. This schedule was used for all dogs, except those in which adverse effects were detected, the condition did not appear to have improved or was becoming worse, or when an owner requested that treatment be terminated because of perceived lack of efficacy.

On day 28, each dog was returned to the veterinarian for a posttreatment evaluation. For each dog, the same veterinarian performed pre- and posttreatment evaluations. At the posttreatment evaluation, dogs again were examined, and scores were assigned by the veterinarian and owner, using the same 6-point scoring system and written criteria. In addition, each owner was asked to rate overall efficacy of the treatment as ineffective, slightly effective, moderately effective, or very effective (scores of 0, 1, 2, or 3, respectively). Adverse effects observed during the treatment period were recorded. Any dog in which treatment was terminated prior to day 28 because of perceived lack of efficacy by the owner was automatically assigned an overall evaluation score of 5 to indicate treatment failure.

Statistical analysis—The primary measure of efficacy in this study was treatment success, which was defined as improvement of 2 or more grades in overall clinical score assigned by the veterinarian during the treatment period. The 2 treatment groups were compared with respect to treatment success via application of the Mantel-Haenszel χ^2 test with stratification on the basis of site and multiple logistic regression analysis with treatment and site as main effects. Both analyses included and excluded interactions in the model.

From each of these procedures, **confidence intervals (CI)** were obtained for the difference between treatments in the percentage of treatment successes and the ratio of odds of treatment success. Data on prevalence of adverse effects reported by the veterinarians or owners were also evaluated, using the Mantel-Haenszel χ^2 test and multiple logistic regression analysis.

Data on each ordinal variable (eg, pruritus score) at the pre- and posttreatment evaluations as well as corresponding data on the change in scores from pre- to posttreatment evaluations were examined, using a mixed-model ANOVA procedure appropriate for a multiple-center study. The ANOVA included treatment as a fixed effect and site as a random effect, and the interaction of treatment-by-site was omitted from the final ANOVA model when it was found to be not significant ($P > 0.25$). The CI for the difference between treatments in mean improvement as determined by overall clinical score was based on the residual mean square error from the ANOVA. Data on each hematologic and serum biochemical variable prior to treatment and at the end of the study as well as corresponding data on the change in each variable were evaluated, using the same mixed-model ANOVA procedures.

Results

Animals—A total of 110 dogs were included in the study from all 5 sites. Seven dogs did not complete the treatment period or were otherwise disqualified because of owner noncompliance or reasons unrelated to treatment application or efficacy. The remaining 103 dogs consisted of 42 males and 61 females representing 38 breeds. Dogs ranged from 1 to 14 years old (mean, 6.2 years) and weighed from 3.7 to 52.7 kg. Diagnoses at time of entry included 83 dogs with atopic dermatitis, 5 dogs with pruritus of undetermined origin, and 15 dogs with unspecified allergic dermatitis. Of the 103 dogs that completed the study, 52 received TTS, and 51 received the control solution.

Treatment success—Treatment success was significantly ($P < 0.001$) greater for TTS-treated dogs, compared with control dogs. Treatment success was approximately 3 times greater in TTS-treated dogs (35/52 [67.3%]) than in control dogs (12/51 [23.5%]). Furthermore, the difference in treatment success between the 2 treatments did not vary significantly ($P = 0.88$) among the 5 study sites. Results of the Mantel-Haenszel χ^2 test revealed that the odds for treatment success was estimated to be 6.69 times greater for TTS-treated dogs than for control dogs (95% CI, 2.77 to 16.12. Results for multiple logistic regression analysis revealed that the odds ratio for treatment success associated with TTS treatment was estimated to be 6.87 (95% CI, 2.83 to 16.66).

Clinical scores—Clinical scores (pruritus, erythema, eruption, and overall) assigned by the examining veterinarians before and after treatment were summarized (**Fig 1**). Owner-assigned scores for itching, redness, and rashes before and after treatment also were summarized (**Fig 2**). Evaluation by use of ANOVA revealed that the treatment-by-site interaction was not significantly ($P = 0.95$) different for any of the veterinarian-assigned or owner-assigned scores before or after treatment; therefore, mean difference between treatments was based on ANOVA with the treatment-by-site interaction excluded from the model.

As may be expected, TTS-treated and control dogs did not differ significantly ($P = 0.748$) with regard to mean overall clinical score prior to initiation of treatment (3.56 and 3.53, respectively). At the end of the 28-day treatment period, mean overall clinical score for TTS-treated dogs (1.56) was significantly ($P < 0.001$) less than that for control dogs (3.21). Dogs treated with TTS had a mean improvement in overall clinical score (ie, change in overall clinical score between pre- and posttreatment evaluations) of 1.98, compared with a mean improvement of 0.29 for control dogs. Results of statistical evaluation of scores assigned by veterinarians for pruritus, erythema, and eruption were similar to those assigned for overall clinical score. Specifically, there was not a significant ($P = 0.30$) mean difference between groups prior to treatment, and mean scores for TTS-treated dogs were significantly ($P \leq 0.002$) less than those for TTS-treated dogs at the end of the 28-day treatment period.

Consistent with results for scores assigned by veterinarians, scores assigned by owners for itching, redness, and rashes did not differ significantly between the 2 treatments prior to initiation of treatment (Fig 2). However, although mean scores for each category decreased for both treatment groups from the start of the treatment period until the end of the study, mean change for TTS-treated dogs was significantly ($P < 0.001$) greater than for control dogs with respect to the owner-assigned score for

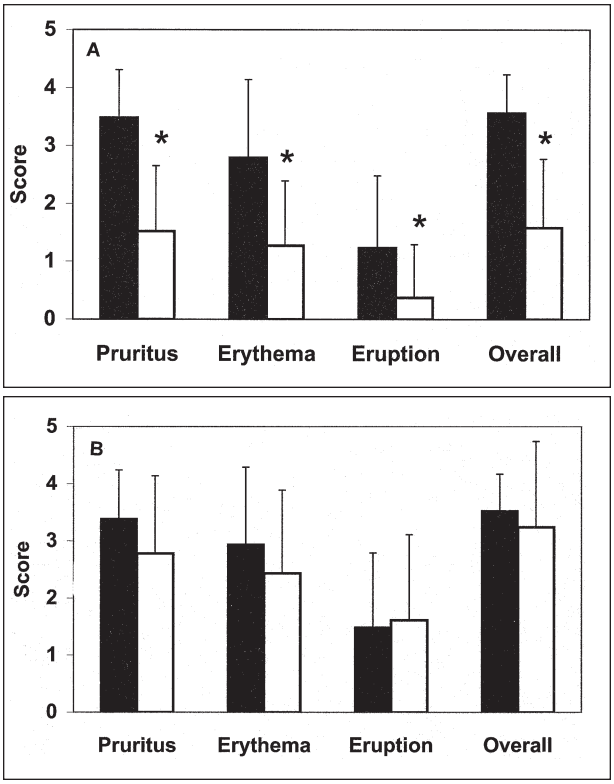

Figure 1—Mean ± SD clinical scores assigned by veterinarians before (black bars) and after (white bars) treatment in dogs with known or suspected allergic pruritus that were treated with reduced-concentration triamcinolone topical solution (TTS; A) or a solution that contained only vehicle (control dogs; B) for 4 weeks. Scores were assigned, using a 6-point scale and written criteria. *Value differs significantly ($P \leq 0.002$) from value determined before treatment.

rashes, but it was not significantly greater with respect to scores for itching and redness ($P = 0.613$ and $P = 0.275$, respectively). Owners were asked at the posttreatment evaluation to estimate the effectiveness of the solution for controlling their dog's clinical signs. Using the 4-point scale (0 = not effective, 3 = very effective), mean score assigned by owners for effectiveness was significantly ($P < 0.001$) greater for TTS-treated dogs (2.34), compared with control dogs (1.23).

Adverse effects—Adverse effects reported by owners and veterinarians were summarized (**Table 1**). Prevalence of adverse effects reported by the examining veterinarians was greater for control dogs than for TTS-treated dogs (9/51 and 5/52, respectively), yielding an odds ratio of approximately 0.6 for veterinarian-detected adverse effects that were attributed to treatment with TTS. Correspondingly, prevalence of adverse effects reported by owners of TTS-treated dogs was also less than that reported by owners of control dogs (6/52 and 9/51, respectively), yielding an odds ratio of approximately 0.8 for owner-detected adverse effects that were attributed to treatment with TTS. However, neither the difference between the 2 treatments in the prevalence of adverse effects reported by the examining veterinarians nor the difference between the 2 treatments in the prevalence of adverse effects reported by the owners was significant ($P > 0.40$), using the Mantel-Haenszel χ^2 test and multiple logistic regression analysis. In all dogs, the adverse effects were considered harmless or mild, were tolerated by the dogs and owners, and did not result in withdrawal of any dogs from the study.

Hematologic and serum biochemical analyses—In TTS-treated and control dogs, a few test results slightly outside reference ranges were observed at time of entry into the study and after treatment; however, a single test was not consistently increased for either group of dogs (data not shown). Mean values of selected tests (including those typically altered with glucocorticoid administration) were calculated (**Table 2**).

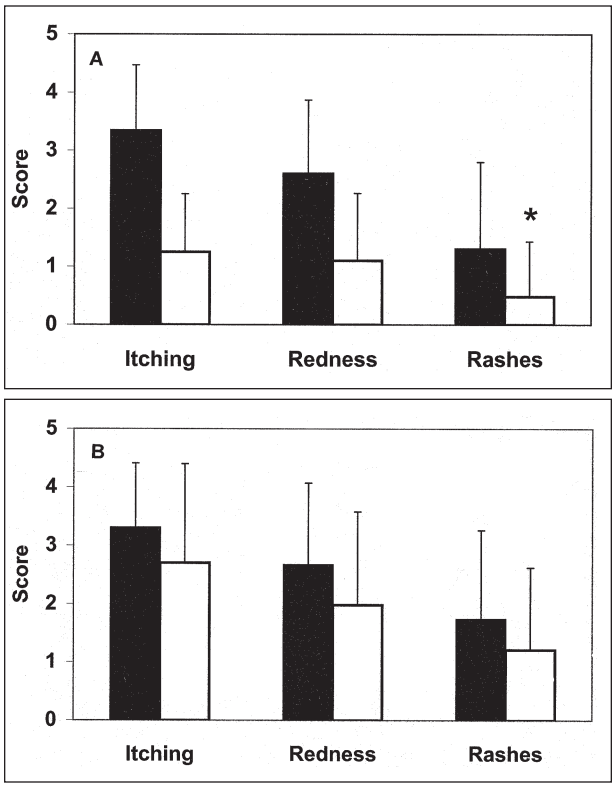

Figure 2— Mean ± SD clinical scores assigned by owners before (black bars) and after (white bars) treatment in dogs treated with TTS (A) or a solution that contained only vehicle (control dogs; B) for 4 weeks. Scores were assigned, using a 6-point scale and written criteria. *Value differs significantly ($P < 0.001$) from value determined before treatment.

Table 1—Number of adverse effects reported in 103 dogs with known or suspected allergic pruritus that were treated with reduced-concentration triamcinolone topical solution (TTS) or a solution that contained only vehicle (control dogs)

	TTS		Control	
Adverse effect*	**Reported by veterinarian**	**Reported by owner**	**Reported by veterinarian**	**Reported by owner**
Increased thirst, urination, or appetite	2	3	3	3
Improvement only for more-frequent application rates	0	0	1	0
Gastrointestinal tract disorder (loose stool, diarrhea, vomiting, inappetence)	1	1	3	3
Discomfort during or immediately after application (lacrimation, vocalizing, rubbing face, apparent fear)	0	1	1	2
Increased scaling or shedding	2	1	0	0
Demodicosis	0	0	1	1
Total	**5**	**6**	**9**	**9**

*Per FDA recordkeeping requirements, includes any occurrence listed by the owner or veterinarian as an adverse effect.

Table 2—Results (least-squares means) of selected hematologic or serum biochemical analyses performed on samples obtained from dogs treated with TTS or a solution that contained only vehicle (control dogs)

	TTS		Control	
Variable	**Before treatment**	**After treatment**	**Before treatment**	**After treatment**
Total leukocytes (No. of cells/µl)	10,070	9,430*	9,420	9,910
Segmented neutrophils (No. of cells/µl)	7,071	6,788	6,475	6,842
Monocytes (No. of cells/µl)	627	513	638	631
Lymphocytes (No. of cells/µl)	1,820	1,698*	1,724	1,853
Eosinophils (No. of cells/µl)	477	362*	436	529
Alanine transaminase (U/L)	51.8	61.1	45.2	43.7
Aspartate transaminase (U/L)	28.2	26.1	27.4	27.2
Alkaline phosphatase (U/L)	109.7	119.2	110.8	104.2
Glucose (mg/dl)	101.9	98.9	100.4	98.3

*Within a group, value differs significantly ($P < 0.05$) from value obtained before treatment.

Results were evaluated via the mixed-model ANOVA procedure with treatment as a fixed effect and site as a random effect; interaction of the 2 main effects were included and excluded in various models. Because the treatment-by-site interaction was not significantly ($P = 0.30$) different for any hematologic or serum biochemical value before or after treatment, mean difference between treatments was tested by use of the ANOVA with treatment-by-site interaction excluded from the model. None of the results for the 13 serum biochemical variables differed significantly between the 2 treatment groups before initiation of treatment or after the 28-day treatment period. None of the 13 hematologic variables differed significantly between the 2 treatment groups before initiation of treatment; however, after the 28-day treatment period, TTS-treated dogs had significantly lower mean values, compared with control dogs, for total WBC count (9,430 and 9,910 cells/µl, respectively), lymphocytes (1,698 and 1,853 cells/µl, respectively), and eosinophils (363 and 529 cells/µl, respectively).

Discussion

Results of the study reported here document that TTS is an effective treatment in many dogs to reduce clinical signs of inflammatory skin disease associated with allergy. During posttreatment interviews, several owners remarked that they believed efficacy of TTS was comparable to, or even better than, prior treatments with systemically administered corticosteroids. Therapeutic benefit was achieved in most dogs without observable adverse effects and without remarkable changes in hematologic or serum biochemical variables. Overall, many owners were extremely pleased with treatment outcome during this study.

Not all dogs benefited from treatment with TTS, and a few dogs had minor adverse effects or minor changes in hematologic or serum biochemical values consistent with changes seen with systemically administered glucocorticoids. In examining data from this study, we could not find an obvious reason or single patient characteristic that could explain this variability. Variation in observed efficacy and changes in laboratory test results with treatment may have been related to several factors that would vary under conditions of typical use, including volume of solution applied, site or technique of application, degree to which applied solution was ingested, inherent characteristics of disease in each dog, owner compliance with treatment schedule, and disease-related compromise of epidermal barrier function.

Efficacy of topically administered corticosteroid products intended for use over large body regions has not been extensively studied in dogs, in part because of the relative scarcity and recent introduction of these products. Reports[b,c] of the use of 0.01% fluocinolone acetonide shampoo for treatment of dogs with pruritic skin disease suggested that therapeutic effects could be achieved without systemic effects. Additionally, a 1% hydrocortisone leave-on conditioner has been evaluated; minor serum biochemical abnormalities and evidence for some adrenocortical suppression was reported, but efficacy was not studied.[7] To our knowledge, the study reported here provides the first description of efficacy of a topical corticosteroid solution in dogs with pruritic skin disease and suggests that effective topical treatment may be achieved by use of corticosteroids at concentrations substantially below those in currently available products.

Observed abnormalities in hematologic and serum biochemical variables after TTS treatment of dogs were minor. Small mean decreases in total leukocyte, lymphocyte, and eosinophil numbers were seen in the TTS-treated group, but these results remained within reference ranges. Results consistent with systemic administration of glucocorticoids, such as increased activity of serum alkaline phosphatase, were not observed with TTS treatment. In fact, a few dogs that had increased activity of serum alkaline phosphatase at the time of entry into the study because of prior systemic treatment with glucocorticoids had lower serum alkaline phosphatase activity at the end of the study despite TTS treatment. This suggests that systemic effects of TTS treatment are less than those that would be seen with systemic administration of glucocorticoids.

Adverse reactions reported during the study were mild and tolerated well by the dogs. Because the reactions generally were seen in equivalent numbers in TTS-treated and control dogs, these effects seemingly were not related to drug administration. In several instances, owners had previously reported polyuria and polydipsia (sometimes severe) with systemic administration of corticosteroids; these dogs did not have the same clinical signs with TTS treatment.

Systemic effects of triamcinolone acetonide administered parenterally or topically, and other glucocorticoids in dogs have been widely reported. Triamcinolone administered parenterally to dogs induces adrenocortical suppression that lasts from 2 to 4 weeks after a single injection.[8] When topically administered corticosteroid products (containing triamcinolone, fluocinonide, or betamethasone) are applied to the skin of healthy dogs once daily for only 5 days, the pituitary-adrenal axis reportedly is suppressed in all dogs as early as the second day of administration. The suppression lasts approximately 3 weeks in dogs that receive topical 0.1% triamcinolone and lasts longer in dogs given the other drugs.[9] Similar adrenocortical suppression has been reported in healthy dogs receiving otic preparations containing 0.1% triamcinolone[10] and in dogs receiving prednisolone ophthalmic solution.[11,12] Mild transient increases in hepatic enzymes (alkaline phosphatase, γ-glutamyltransferase, and alanine transaminase) have been reported in healthy dogs administered otic medications that contain 0.1% triamcinolone twice daily for 21 days; serum biochemical values returned to reference ranges within 14 days after cessation of administration.[13]

Triamcinolone acetonide solutions that are delivered via inhalation provide microgram quantities of drug to target tissues and are effective for treatment of respiratory tract diseases in humans.[2,3] When administered via an aerosol inhaler, triamcinolone has beneficial effects in humans with asthma, in many cases without substantial systemic absorption.[14] Systemic effects of this drug are minimal. In fact, patients with

signs of iatrogenic hyperadrenocorticism related to prior oral administration of prednisone often have remission of these signs when they switch to use of an inhaled corticosteroid.[14,15] Long-term use (1 to 3 years) of such medications has revealed a lack of adrenal suppression and a lack of histologic alterations in the bronchial mucosa.[16] Triamcinolone spray, when administered intranasally to children at a rate of up to 0.44 mg/d, did not have a measurable effect on adrenocortical function, and pharmacokinetic data revealed a rapid decrease in plasma concentrations of the drug after administration.[17]

Many studies that suggest long-term safety and a lack of systemic effects of inhaled corticosteroid solutions stand in contrast to those documenting systemic effects of higher-concentration preparations applied to the skin. Conflicting information in the literature regarding adrenocortical suppression in relation to topical administration of corticosteroids and changes in hematologic and biochemical test results may reflect differences among studies in drug potency, total dose, carrier vehicle, target species, tissue, method and site of application, and absorption. Thus, it would be important for each potential product to be tested for such effects under conditions simulating actual use.

The study reported here was designed primarily to address efficacy and did not examine suppression of the adrenocortical axis by TTS. On the basis of reports[9-12] of adrenal suppression by other topical formulations of triamcinolone acetonide, it is likely that TTS has adrenosuppressive effects. In fact, these effects were evaluated separately in a controlled study[d] in which TTS was applied to the skin of healthy dogs for 5 days. In that study, adrenocortical suppression, as evidenced by blunted results for ACTH stimulation tests, was detected regularly with application of TTS or a commercially available triamcinolone cream. Under conditions of actual use, it is likely that TTS is absorbed percutaneously in sufficient amounts to affect the pituitary-adrenal axis. Long-term consequences of such effects of TTS or other topical preparations of corticosteroids in dogs are unknown, although it was suggested in a case report[18] that overt iatrogenic hyperadrenocorticism is possible. In addition, concern exists regarding possible cutaneous adverse effects of topically administered corticosteroids. Cutaneous atrophy induced by topical administration of corticosteroids is common after prolonged use in humans; however, this effect is rare in dogs.[19]

Although effective for many dogs with allergic skin disease, corticosteroid treatment has potential hazards and should be reserved for patients whose signs are not controllable by other means. When glucocorticoid treatment becomes necessary, these drugs should be used cautiously with attention to potential long-term adverse effects. In the future, judicious use of topical products may prove to be a safer method of treatment than long-term systemic administration of glucocorticoids.

[a]Triamcinolone topical solution, Sparhawk Laboratories, Lenexa, Kan.

[b]Trettien A. The effects of a topical corticosteroid shampoo on adrenocortical function and hepatic function in normal dogs (abstr), in *Proceedings*. Annu Meet Am Academy Vet Dermatol Am Coll Vet Dermatol 1988;10:1.

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