Comparison of efficacy, safety, and convenience of selamectin versus ivermectin for treatment of *Trixacarus caviae* mange in pet guinea pigs (*Cavia porcellus*)

David Eshar, DVM, DAABVP, and Tali Bdolah-Abram, MS

**Objective**—To determine the efficacy and safety of topical administration of selamectin and to compare selamectin treatment with a common ivermectin protocol for the treatment of natural infestation with *Trixacarus caviae* in pet guinea pigs.

**Design**—Clinical trial.

**Animals**—17 mixed-breed pet guinea pigs with active mite infestation.

**Procedures**—Guinea pigs were randomly allocated to receive a single dose of selamectin topically (15 mg/kg [6.8 mg/lb]) or ivermectin (400 µg/kg [181.8 µg/lb]), SC every 10 days for 4 injections. Microscopic examination of skin scrapings from all animals was performed at 10-day intervals for 60 days, and the presence of mites or mite eggs was recorded. The efficacies of the 2 treatment protocols were compared at every time point.

**Results**—Pruritus resolved by day 10 in all animals. Animals were microscopically mite-free on days 30 and 40 in the selamectin and ivermectin treatment groups, respectively, but groups did not differ significantly in regard to the number of mite-positive animals at any time point. Recurrence of infection was not noted in either treatment group. No adverse reactions were observed in any of the treated animals.

**Conclusions and Clinical Relevance**—Results suggested that a single topical application of selamectin at a dose of 15 mg/kg or repeated SC injection of ivermectin at a dose of 400 µg/kg can eliminate *T caviae* mites from guinea pigs within 30 and 40 days, respectively. Although effectiveness did not significantly differ between the 2 treatments, the convenience associated with the single topical dose of selamectin made it a preferable treatment modality for both patients and owners. (*J Am Vet Med Assoc* 2012;241:1056–1058)

* Sarcoptiform mange, caused by the skin mite *Trixacarus* (*Caviacoptes*) *caviae*, is considered the most important ectoparasitic disease and the most common cause of pruritus in guinea pigs. 1–3 *Trixacarus caviae* mites burrow into the skin, creating epidermal tunnels and eliciting a cell-mediated immune response that causes intense pruritus. 4,5 The life cycle of the mite requires 10 to 14 days, and transmission is usually direct from carrier animals. 1,2 Self-trauma is elicited by the intense pruritus, and affected animals have dermal lesions of erythema, papules, scales, crusts, and hyperkeratosis. 1,5 Alopecia and lichenification appear in chronically infected animals. 1,5,6 Lesions are typically present on either the head, shoulders, dorsum, or flanks but can also be generalized. 1 Secondary bacterial infection is common. 7 Episodic seizure-like behavior elicited by the extreme pruritus may occur and will resolve following antiacaricidal treatment; however, in some animals, sedative or tranquilizer medication may be required to alleviate the dramatic clinical signs. 7,8 Abortion and fetal resorption have been observed in pregnant animals. 8 Affected guinea pigs can become thin and lethargic and may die. 6 Neutrophilia, monocytosis, eosinophilia, and basophilia may be present on CBCs. 9 Some guinea pigs can remain in a subclinical carrier state, despite being kept with severely affected cagemates, although some conditions (eg, concurrent disease, hypovitaminosis C, old age, crowding, and heat) may trigger clinical disease. 1,9 The disease is considered zoonotic because the mites can cause transient papular urticaria in humans. 7

Confirmation of diagnosis is made by microscopic examination of skin scrapings revealing eggs and mites that resemble *Sarcoptes scabiei* var *canis*; however, *T caviae* mites are smaller in size and have longer hair-like dorsal setae. 1,9 Species differentiation can be useful in the epidemiological investigation of the disease, given that *Sarcoptes* spp mites are not host specific, whereas *T caviae* are specific for guinea pigs. 1 Mites may not be found even with repeated scrapings and thus trial treatment with an antiacaricidal medication is often indicated for pruritic guinea pigs. 1

Currently, there is no country in which antiacaricidal drugs are licensed for use in guinea pigs. Recommended treatments for mite infestations in this species include fipronil washes, 10 permethrin 0.1% spray, 11 topically applied 0.15% trichlorfon, 12 0.1% gamma benzene hexachloride organochlorine insecticide baths, 13,14 lime sulphur dips, 15,16 and ivermectin. 1,9 Bathing can be difficult because of the stress-prone nature of guinea pigs and their...
dislike of water as well as clinical concerns including hypothermia and toxic effect from uncontrolled drug exposure.

Although clinical experience has shown that injectable ivermectin is an effective miticide in guinea pigs, the inconvenience and costs of making several visits to a veterinary hospital for treatment can reduce owner compliance and the signs of pain associated with repeated injections make this treatment modality a less appealing option. Reported adverse reactions to ivermectin administration in guinea pigs include cardiac arrhythmias and dermal inflammation and necrosis at the site of the SC injection. To lessen the discomfort associated with injection, some clinicians administer ivermectin topically or orally, however, studies have shown that ivermectin is incompletely absorbed following oral administration in guinea pigs.

Selamectin is a macrocyclic lactone of the avermectin subclass. A study of dogs and cats showed that once the drug is applied topically, there is rapid percutaneous absorption and plasma and tissue concentrations persist for several weeks. A major advantage of selamectin is that the topical application of a single dose is effective against a variety of ectoparasites in dogs and cats, and when used in an extralabel manner, in several exotic pet species.

Anecdotal extralabel use of topical selamectin as a treatment for T caviae infestation in guinea pigs has been reported, with doses including 6 mg/kg (2.7 mg/lb), 15 mg for guinea pigs < 800 g, and 30 mg for guinea pigs > 800 g. These arbitrary doses are higher than those reported for other exotic pets treated for mange. Another anecdotal report describes 13.6 to 18.75 mg/animal given as single dose or a 5.0 to 7.5 mg/animal dose given 28 days apart. Therefore, the purpose of the study reported here was to determine the efficacy and safety of a single dose of topical selamectin for the treatment of T caviae in naturally infested guinea pigs and to compare these parameters with those achieved via the more standard protocol of ivermectin administered by the SC route.

Materials and Methods

Guinea pigs—Seventeen sexually intact male and female guinea pigs from a single privately owned pet collection, naturally infested with T caviae, were used in the study. The owners gave their informed consent for their animals to participate in the study. The guinea pigs represented a heterogeneous population of breeds, ages, and body weight. Most animals appeared to be mature (> 1 year of age). All animals had an initial physical evaluation and showed typical clinical signs of T caviae infestation, including pruritus, scaling, and alopecia, and were positive for T caviae on skin scraping. Animals were given their usual diet and were checked on daily by the owners, and their health was evaluated by a veterinarian (DE) at every 10-day time point.

Experimental design—The animals were randomly allocated to the 2 treatment groups evenly by number and sex. The groups were physically separated with no contact for the duration of the trial. The 2 groups were randomly allocated to their treatments by a double-blinded assignment. A person who was not otherwise involved in the study with no clinical background and no prior or later contact with the animals was given 2 folded notes of paper marked with either S (for selamectin) or I (for ivermectin) and was asked to enter the room where the animals were kept and randomly place one of the notes on each of the 2 cages. All animals were accurately weighed on a digital gram scale before being given their treatment. On day 0, 9 animals were treated with a selamectin product (15 mg/kg [6.8 mg/lb]) applied to the base of the neck. A selamectin vial was emptied with a 22-gauge needle attached to a 1-ml syringe and the appropriate volume calculated according to the body weight of each guinea pig was administered. Eight animals were treated with ivermectin (400 µg/kg [181.8 µg/lb], SC) every 10 days for 4 injections. No other treatment was instituted. In the periods between the scheduled examinations, the animals were monitored by an experienced animal caretaker (blinded to the treatment protocol) who recorded the presence of clinical signs (eg, pruritus, and inappetence or anorexia). Each guinea pig was clinically examined by one of the authors (DE) and tested for the presence of mites at 10-day intervals until day 60 by microscopic evaluation of 2 to 3 skin scrapings taken from obvious epidermal lesions. Skin scrapes were considered deep because capillary bleeding was noted and confirmed by the microscopic appearance of RBCs in the slide. The presence of even a single mite or egg per animal was considered positive for infection.

Statistical analysis—The presence or absence of mites was compared between the 2 treatment groups at each 10-day time point and, within treatment groups, between sexes. Because of the small sample size, all comparisons were performed via the Fisher exact test with statistical software. Values of P < 0.05 were considered significant.

Results

Allocation of the 17 guinea pigs into treatment groups resulted in the following distribution: selamectin, 4 males and 5 females; ivermectin, 3 males and 5 females. Median body weight was 634 g (range, 376 to 872 g) for guinea pigs in the selamectin treatment group and 613 g (range, 382 to 823 g) for guinea pigs in the ivermectin treatment group. Age was not provided for most animals and was not incorporated into analysis.

Pruritus resolved in all 17 guinea pigs within 10 days after initiation of treatment. Epidermal healing and hair regrowth were present in all animals by day 40. Animals were free of mites on day 30 and day 40 for the selamectin and ivermectin, respectively. At day 20, only 2 of 9 animals in the selamectin treatment group were infected, compared with the ivermectin treatment group (6/8 animals). However, there was no significant difference (P = 0.057 and P = 0.206 for times 20 and 30, respectively) between treatment groups in terms of the number of guinea pigs positive for mites at any evaluation date. None of the treated animals were mite positive at days 40 through 60. No significant difference between the infestation rates between males and females was present within either treatment group (P = 0.143 and P = 0.429 for days 20 and 30, respectively). No adverse reactions to either treatment were observed during the study.

Discussion

The results of the present study suggested that a single topical application of selamectin at a dose of 15 mg/kg is both effective and safe in eliminating mites from guinea pigs.
naturally infested with *T. caviae*. Mites were absent in skin scrapings from all selamectin-treated animals by day 30 after administration. In comparison, mites were identified until day 40 in animals administered SC doses of ivermectin on days 0, 10, 20, and 30. Although there were no significant differences in numbers of guinea pigs positive for mites at each of the assessment periods, there were fewer positive animals in the selamectin group at each time interval up until the elimination of the parasites from both groups. The present study evaluated microscopic presence of infection; however, subclinical infection is common1 and long-term monitoring is often indicated.29 At 19 months following the last treatment, all animals that participated in the present study appeared to be disease free.

Limitations to this study include the small number of participating animals, the unknown age of the animals, and that no mites or eggs were counted. If a larger number of animals had been used in the present study, we may have been more likely to demonstrate treatment efficacy and have a significant result at day 20, when 2 of 9 selamectin-treated animals were infected, compared with the ivermectin treated group (6/8 animals). With the small study population, the *P* value was just slightly higher (*P* = 0.057) than the 0.05 cutoff value. Age is considered a risk factor in development of clinical signs,1,9 so future trials should include different age groups. For the present study, the presence of even 1 mite or egg was enough to identify infection and no efforts were made to quantify the level of infection; future trials should investigate the difference in level of infection in response to any of the treatment protocols. Additionally, animals in the present study were subjectively assessed in response to any of the treatment protocols. Additional trials should investigate the difference in level of infection; future trials should include the difference in level of infection; future trials should include the difference in level of infection; future trials should include the difference in level of infection; future trials should include the difference in level of infection.

On the basis of these results, a single topical dose of selamectin appears to be a simple, safe, and effective means of treating guinea pigs infested with *T. caviae*. The need for repeated visits to the veterinarian and the risk of poor owner compliance are thus reduced in comparison with more traditional treatment protocols involving repeated doses of ivermectin. Decreased handling, less stress, and fewer signs of pain for the animal are additional benefits. Given that selamectin is not currently approved for use in guinea pigs, veterinarians must ensure that they are compliant with appropriate regulations regarding extra-label use of medications in exotic pet species.

References