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## Generalized Demodicosis in a Golden Retriever

**PARIS, A 13-YEAR-OLD NEUTERED GOLDEN RETRIEVER**, presented with several areas of alopecia, erythema, scaling, and crusting on the forelimbs, posterior region, and hindlimbs with pruritus. Deep skin scrape detected numerous adult and immature *Demodex canis* mites, and superficial skin cytology revealed numerous cocci and some degenerate neutrophils. The dog was diagnosed with adult-onset generalized demodicosis and superficial pyoderma and prescribed cephalexin (27 mg/kg twice a day) and weekly baths with 3% chlorhexidine shampoo. Testing was negative for the *ABCB1-1Δ* gene defect (MDR1 mutation), and ivermectin was initiated at 50 µg/kg PO once a day and doubled every 3 days to reach 400 µg/kg once a day. Two days after the high dose was reached, the dog developed head tremors and mydriasis and appeared moderately depressed; ivermectin was stopped and neurologic signs disappeared. The dog was referred to a dermatologist for management of demodicosis. Skin scrape from lesional skin revealed numerous *D canis* mites. Skin cytology showed pyoderma was controlled. Cephalexin and weekly bathing were maintained for 3 weeks and gabapentin initiated at 10 mg/kg twice a day for management of pain from chronic osteoarthritis.

**Which of the following drugs would be appropriate in the management of this patient?**

Based on the information provided, how would you grade the following drugs and why?

Turn the page and compare your results ►

	 RED = do not use	 YELLOW = proceed with caution	 GREEN = safe
<b>Amitraz (topical)</b>			
	RED	YELLOW	GREEN
<b>Fluralaner</b>			
	RED	YELLOW	GREEN
<b>Ivermectin</b>			
	RED	YELLOW	GREEN
<b>Milbemycin oxime</b>			
	RED	YELLOW	GREEN
<b>Moxidectin–imidacloprid (topical)</b>			
	RED	YELLOW	GREEN
<b>Oclacitinib</b>			
	RED	YELLOW	GREEN
<b>Prednisone</b>			
	RED	YELLOW	GREEN
<b>Selamectin</b>			
	RED	YELLOW	GREEN



## Did you answer?

The following represents the best responses based on drug metabolism, pharmacokinetics, species, diagnostic differentials, clinical and laboratory data, and other pertinent findings.

### Amitraz (topical)

| CORRECT RESPONSE



Amitraz at 0.025% to 0.06% once a week is a good option for this dog.<sup>1</sup> The dip should be applied carefully with a sponge and the skin saturated and allowed to air-dry without rinsing. Hair clipping is recommended in dogs with a medium or long coat. Although probably less effective than ivermectin in dogs with adult-onset disease, amitraz can be used safely in dogs with the homozygous nt228(del4) mutation of the *ABCB1-1Δ* gene or with adverse reactions to ivermectin.<sup>1</sup> Adverse effects from amitraz include depression, sleepiness, ataxia, polyphagia, polydipsia, vomiting, and diarrhea.<sup>2</sup> Because amitraz is an  $\alpha_2$ -adrenergic receptor agonist, atipamezole can be used to treat adverse effects.

Clinical progression should be assessed monthly via deep skin scrape. Treatment should be continued for 1 month after obtaining 2 consecutive negative skin scrapes 1 month apart.<sup>1</sup> This can be a cumbersome treatment for a large dog with generalized lesions and arthritis and demands a dedicated and compliant owner.

### Fluralaner

| CORRECT RESPONSE



Recent data suggest that fluralaner is an effective treatment for generalized demodicosis.<sup>3</sup> In an open study, all 8 dogs with generalized demodicosis treated with a single oral dose of fluralaner (25 mg/kg) were parasitologically negative after 56 and 84 days, and 7 of 8 exhibited hair regrowth at the end of the study (day 84).<sup>3</sup> However, because no other controlled nor larger studies are available at this time, this drug should be considered only as an alternative to the other acaricidal treatments with more evidence of efficacy (eg, amitraz, moxidectin–imidacloprid).

### Ivermectin

| CORRECT RESPONSE



Considered the most effective treatment for adult-onset generalized demodicosis, ivermectin use is limited by the severe neurologic effects observed in some patients.<sup>1</sup> Dogs with the *ABCB1-1Δ* gene defect are extremely sensitive to ivermectin and can experience severe toxicity at dosages of 100  $\mu\text{g}/\text{kg}$  once a day<sup>4</sup>; other mutations may have similar effects.<sup>5</sup> Other canine

## What Did You Say?

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populations (eg, neonatal, senior, dogs on concurrent treatment with other P-glycoprotein substrates or inhibitors [spinosad, azole antifungals, erythromycin]) are also sensitive to macrocyclic lactones.<sup>4</sup> Although this dog is not affected by the *ABCB1-1Δ* gene defect, his age and genetic background likely make him more sensitive than the general population.<sup>4</sup> Use of systemic macrocyclic lactones should be avoided in this patient.<sup>2,4</sup> If ivermectin is the only available alternative, it should be used at a lower dose (eg, 300 µg/kg PO every 2 days) under careful veterinary supervision and stopped immediately on detection of any clinical signs suggestive of toxicity (eg, hypersalivation, depression, tremors, mydriasis, blindness, ataxia).<sup>5</sup>

### Milbemycin oxime

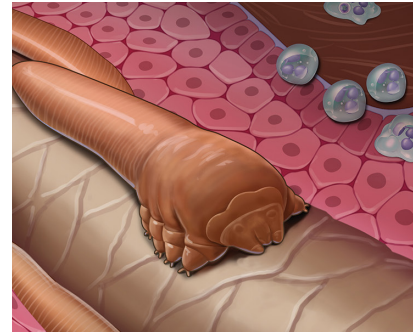
CORRECT RESPONSE

Milbemycin oxime, initially licensed as a heartworm preventive, is approved in some countries for treatment of demodicosis. A dosage of 1-2 mg/kg PO once a day was shown to be efficacious treatment of canine generalized demodicosis.<sup>1,6</sup> Milbemycin is considered safe, even in dogs with the *ABCB1-1Δ* gene defect; however, 2 dogs with the mutation reportedly developed adverse neurologic effects with milbemycin administration.<sup>7</sup> This dog has shown sensitivity to ivermectin and may be at risk for similar signs with milbemycin. Additionally, milbemycin is not available in most countries as a sole agent and is very expensive if used long-term as needed for generalized demodicosis. Thus, this is not a practical alternative for this patient.

### Moxidectin–imidacloprid (topical)

CORRECT RESPONSE

Recent studies have demonstrated that topical application of 2.5% moxidectin–10% imidacloprid is effective against canine generalized demodicosis.<sup>8</sup> Although oral ivermectin was shown to be more effective, weekly application of moxidectin–imidacloprid can be an effective treatment of canine generalized demodicosis without the potential toxicity associated with ivermectin and is likely the best option for this dog. It is also safe in dogs with the *ABCB1-1Δ* gene mutation.<sup>9</sup> This dog should be treated weekly and examined monthly, along with skin lesion scrapings. Treatment should be maintained for 1 month after obtaining 2 consecutive negative skin scrapings 1 month apart, after which the product should be applied every 4 weeks to prevent relapses (anecdotal).



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## Oclacitinib

CORRECT RESPONSE

Although this dog is pruritic, oclacitinib is contraindicated. In clinical trials, some dogs developed demodicosis when treated with oclacitinib at 3 times the label dose.<sup>10</sup> This may be a consequence of the immunomodulating activity of oclacitinib. Therefore, oclacitinib is contraindicated in patients with demodicosis or a history of demodicosis.

## Prednisone

CORRECT RESPONSE

Glucocorticoid treatment has frequently been associated with the development of demodicosis in dogs and other species.<sup>11</sup> It is hypothesized that steroids can inhibit the immune mechanisms that control mite proliferation in the skin and are essential for reaching a clinical cure for demodicosis.<sup>12</sup> Thus, prednisone should not be used in dogs with demodicosis or a history of demodicosis.

## Selamectin

CORRECT RESPONSE

Selamectin, a macrocyclic lactone, has shown very low efficacy as a treatment of canine generalized demodicosis. High doses of oral selamectin (24-48 mg/kg once a week) produced discouraging results (only 9/44 dogs went into remission).<sup>13</sup> It is therefore not a good alternative for the treatment of canine generalized demodicosis.

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