

## D - Dermatology

### NEW APPROACHES TO COMMON CANINE ECTOPARASITES

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#### Fleas and Flea Allergy Dermatitis

##### A. Introduction

1. Flea allergy dermatitis is not only the most common skin disease seen in small animal practice in most countries in the world; it is the most common disease of any organ system seen in small animal practice worldwide. Fleas parasitize animals in virtually every area on earth with the exception of locations above 1500 meters elevation and regions such as deserts with very low humidity.

2. The cat flea, *Ctenocephalides felis* is the primary flea species associated with flea infestation and flea allergy dermatitis in both the dog and the cat in most studies. The average cat flea life cycle involving development through egg, larvae, pupa and cocoon, and the adult and takes between 3 and 4 weeks. However the life cycle can be as short as 12 days or as long as 140 days. Adult cat fleas are obligate permanent ectoparasites, attracted to the host by warmth, movement, changes in light intensity, and respiratory carbon dioxide.

3. New advances in the understanding of the biology of the flea and new methodologies available to combat multiple life stages of the flea both on and off the animal have revolutionized our ability to deal with this disease. It is crucial to remember that the adult cat flea is an obligate parasite. However, since the bulk of the flea lifecycle (eggs, larvae, and pupa) occurs in the environment, environmental issues must always be addressed. Historically, flea control has required treating both the animal and the environment with a combination of insecticides and, more recently, insect growth regulators. Today, either topical or systemic anti-flea therapy may be the only management required. The new agents that have created this paradigm shift include imidacloprid, fipronil, selamectin, nitenpyram, lufenuron, methoprene, and pyriproxyfen.

4. Skin disease associated with fleas is a

complex group of hypersensitivity phenomenon involving at least four immunologic processes; immediate hypersensitivity, late-onset immediate hypersensitivity, delayed hypersensitivity, and cutaneous basophil hypersensitivity. Blood consumption by female averages 13.6 microliters/day (75 female cat fleas can consume 1 ml/day). The majority of blood is passed out as partially digested feces to feed flea larvae.

5. The management of flea allergy dermatitis requires the prevention of flea bites plus the disruption of the life cycle of the flea. New products that have become available over the past 15 years have exponentially increased our ability to initiate flea control and manage flea allergy dermatitis.

##### B. Modern Flea Control

1. New, considerably less toxic prescription products that also are much easier to use are available that kill adult fleas and disrupt the flea life-cycle. Most insecticides can effectively kill fleas; preventing reinfestation is the problem. Insuring long-term pet owner compliance is required for on-going flea control. The comparatively recent development of both insecticides and insect growth regulators with novel and convenient dosage forms (such as spot-ons, collars, and oral products) coupled with prolonged residual activity has dramatically improved pet owner compliance and hence prevented reinfestations. Although insecticidal resistance most often is suspected when flea control measures have failed, lack of control more often results from lack of understanding of flea biology, poor application technique, and too infrequent reapplication of the products.

2. The goals of flea control should be elimination of existing fleas on affected animals, continued elimination of fleas acquired from infested premises, and the prevention of reinfestation. In order to accomplish these goals, an integrated

flea control plan must be instituted. Effective residual adulticides must be used to kill fleas plus provide residual killing activity and insect growth regulators must be used to disrupt flea reproduction. In addition, mechanical control procedures such as cleaning pet's blankets, beds, pet carriers, and throw rugs and vacuuming or removing furniture that can house pre-adult fleas must be instituted. Preventions of pests that can carry fleas (rats, opossums, squirrels, raccoons, skunks, feral cats) from entering crawl spaces, foundation vents, porches and garages also is important.

### C. Modern Flea Control Products

1. New spot-on prescription products are excellent products with superior efficacy, safety, and residual activity. These products need to be applied directly to the skin, not to the haircoat. Our very strong clinical impression at UC Davis is that dogs and cats with severe flea hypersensitivity experience much better efficacy with these products applied every 3 weeks instead of monthly. Our clinical impression remains that either bathing or swimming degrades the efficacy of all of these products. Over-the-counter (OTC) competing products commonly are advertised as 'just as good as what you can get from your veterinarian' plus 'less expensive'. In general, these products contain concentrated permethrin or other synthetic pyrethroids. All indications are that these OTC products do not have either the efficacy, residual activity, or the safety profile of the spot-on prescription products

#### 2. Imidacloprid (Advantage<sup>®</sup>, Bayer)

- a. Advantages – larvicidal on the animal and kills/debilitates adult fleas on contact, ease of application
- b. Disadvantages – does not have repellent action, diminished efficacy after bathing or swimming, does not have activity against ticks, occasional application site reactions
- c. Bottom-line – Good narrow-spectrum product for fleas  
(Canada – Imidacloprid & Moxidectin - Advantage Multi<sup>®</sup>, Bayer)  
(Europe – Imidacloprid & Moxidectin - Advocate<sup>®</sup>, Bayer)

#### 3. Fipronil & S-Methoprene (Frontline<sup>®</sup> Plus, Merial), Fipronil (Frontline<sup>®</sup> Spray, Merial)

- a. Advantages – kills adult fleas, disrupts flea life cycle, ease of application, kills ticks, spray – rapid dispersion and coverage,
- b. Disadvantages – does not have repellent action, some diminished efficacy after bathing or swimming, occasional application site reactions, spray is labor-intensive

c. Bottom-line – Good broader spectrum product

#### 4. Imidacloprid & 44% permethrin (Advantix<sup>®</sup>, Bayer)

- a. Advantages – larvicidal on the animal and kills/debilitates adult fleas on contact, interrupts flea life cycle, repellent 'flushing' activity of permethrin, ease of application, also kills ticks and mosquitoes
- b. Disadvantages – dog only product, do not use on cats, diminished efficacy after bathing or swimming, occasional application site reactions?
- c. Bottom-line – Good broader spectrum product, dog only product

#### 5. Selamectin (Revolution<sup>®</sup> [USA]; Stronghold<sup>®</sup> [Europe], Pfizer)

- a. Advantages – broad spectrum against many internal and external parasites, kills adult fleas plus larvae and eggs, kills ticks, kills some ectoparasitic mites (*Sarcoptes*, *Notoedres*, *Cheyletiella*, *Otodectes*), ease of application,
- b. Disadvantages – does not have repellent action, diminished efficacy after bathing or swimming, slower efficacy?, application site reactions?
- c. Bottom-line – Good broader spectrum product

#### 6. Nitenpyram (Capstar<sup>™</sup>, Novartis)

- a. Advantages – very rapid response with visual results, kills 100% of adult fleas within 6 hours, short-acting, ease of oral administration, give every 24-72 hours (half-life in dogs is 2.8 hours, half-life in cats is 7.7 hours) very safe product, adverse reactions not seen yet
- b. Disadvantages – does not have repellent action, does not disrupt flea life cycle, short-acting, does not have activity against ticks
- c. Bottom-line – Good narrow spectrum product, use with spot-ons initially for rapid response, not for use as sole therapy, use in dogs requiring frequent shampooing, compliance problems?

#### 7. Lufenuron (Program<sup>®</sup>, Novartis; Sentinel<sup>®</sup> [lufenuron + milbemycin oxime])

- a. Advantages – oral product, very safe product without known mammalian toxicity, adverse reactions not seen yet,
- b. Disadvantages – does not kill adult fleas or pupa, time lag – 60-90 days required to disrupt flea life cycle, does not have repellent action, adult flea must feed on animal to ingest, does not have activity against ticks, must give with food
- c. Bottom-line – use with spot-ons for long-term control, not for use as sole therapy

unless very closed environment, treat all animals, use in dogs requiring frequent shampooing, compliance problems?

8. Pyriproxifen (Nylar®) containing collars – Pyriproxifen & amitraz collars (Preventic PLUS®, Virbac), dogs only!, no longer available in the USA

Pyriproxifen & 2% permethrin (KnockOut® Collar for Dogs, Virbac), no longer available in the USA

Pyriproxifen (KnockOut® Cat & Kitten Collar for Dogs, Virbac), no longer available in the USA

a. Advantages – ovicidal and larvicidal for fleas, UV stable juvenile hormone analogue, translocates to bedding, IGR efficacy for 3 months, Preventic Plus® adds tick protection

b. Disadvantages – long-term residual status may affect beneficial insects

c. Bottom-line – very useful adjunct to spot-ons or spray products, useful in dogs requiring frequent shampooing

9. Synthetic pyrethroid containing pump sprays (variety of manufacturers)

a. Advantages – daily use in dogs requiring frequent shampooing

b. Disadvantages – frequency of application, compliance, poor residual activity

c. Bottom-line – rarely used as sole therapy unless very closed environment, use in dogs requiring frequent shampooing, compliance problems?

#### D. Personal Recommendations

1. Flea control must be regionalized and often personalized based on severity of possible infestation in your locale, number of dogs and cats in the environment, indoor/outdoor/run free status, infested pests and strays in the environment, finances of the owner, and severity of disease vs. magnitude of the infestation

2. 'The average dog or cat' will respond to fipronil and S-methoprene, imidacloprid with or without lufenuron, or selamectin as sole therapy.

3. Severely flea allergic dogs will require fipronil and S-methoprene or imidacloprid plus permethrin, plus either nitenpyram, with or without lufenuron.

4. (Severely flea allergic cats will require spot-on preparations plus nitenpyram with or without lufenuron. Pump-sprays also may be beneficial.)

5. Animals with tick exposure benefit from fipronil and S-methoprene, imidacloprid plus permethrin (dogs only!), and pyriproxifen & amitraz collars (dogs only!)

## Ticks

### A. Introduction

1. Tick infestation and tick bite hypersensitivity are highly variable regional skin diseases. In some parts of North America, ticks are a major problem, while they are comparatively rare in many other areas. Ticks cause morbidity either by direct irritation from their bites, initiate hypersensitivity, or act as vectors for multiple bacterial, viral, rickettsial, or protozoal diseases.

### B. Modern Tick Control Products

1. Fipronil & S-Methoprene (Frontline® Plus, Merial), Fipronil (Frontline® Spray, Merial)

a. Advantages – kills ticks, ease of application, residual activity, also kills fleas

b. Disadvantages – does not have repellent action, some diminished efficacy after bathing or swimming, occasional application site reactions

c. Bottom-line – Good product for tick control

2. Imidacloprid & 44% permethrin (Advantix®, Bayer)

a. Advantages – kills ticks, ease of application, also kills fleas and mosquitoes

b. Disadvantages – dog only product, do not use on cats, diminished efficacy after bathing or swimming, occasional application site reactions?

c. Bottom-line – Good broad spectrum product, dog only product!

3. Selamectin (Revolution® [USA]; Stronghold® [Europe], Pfizer)

a. Advantages – kills ticks, also broad spectrum against many internal and external parasites, kills adult fleas, kills some ectoparasitic mites (*Sarcoptes*, *Notoedres*, *Cheyletiella*, *Otodectes*), ease of application,

b. Disadvantages – diminished efficacy after bathing or swimming, application site reactions?

c. Bottom-line – Good product for tick control

4. Amitraz containing collars – (Preventic®, Virbac), dog only product

a. Advantages – detaches and kills ticks, residual activity for 3 months

b. Disadvantages – dog only product

c. Bottom-line – good product for tick control

### C. Personal Recommendations

1. Tick control must be regionalized and often personalized based on severity of possible infestation in your locale, number of dogs, indoor/outdoor/run free status, infested pests

and strays in the environment, finances of the owner, and severity of disease vs. magnitude of the infestation

2. 'The average dog' will respond to fipronil and S-methoprene, imidacloprid and permethrin, selamectin, or an amitraz collar as sole therapy.
3. Severely affected dogs benefit from the combination of a spot-on product (fipronil and S-methoprene, imidacloprid and permethrin, or selamectin) plus an amitraz collar.

## Acariasis – Sarcoptic Acariasis, Notoedric Acariasis, Cheyletiellosis

### A. Introduction

1. Canine sarcoptic acariasis "Scabies" is an intensely pruritic, highly contagious, transmissible canine dermatoses caused by the epidermal mite *Sarcoptes scabiei* var. *canis*. Transmission is usually by direct contact with an infested dog. There is evidence that clinical disease is a multifactorial hypersensitivity reaction. Sarcoptic acariasis may be increasing in prevalence with the advent and increased popularity of newer insect-specific flea control products. Formerly, we may have stopped scabies infestation when we were simply attempting to kill fleas.

2. Notoedric acariasis or feline scabies is a rare contagious mite infestation caused by the sarcoptid mite *Notoedres cati* characterized by crusting with extreme pruritus. The disease is rare in most parts of the United States, but may be found in localized endemic areas. Similar to sarcoptic acariasis, notoedric acariasis may be increasing in prevalence with the advent of some newer insect-specific flea control products. Notoedres is highly contagious in cats and occasionally, may affect dogs or humans.

3. Cheyletiellosis or *Cheyletiella* dermatitis is a contagious mite infestation seen in domestic animals, wildlife and humans characterized primarily by scaling and crusting caused by different, but very similar, species of *Cheyletiella* mites. It may be seen more commonly in areas of the world where concerted flea therapy is not necessary or not consistent. *Cheyletiella* dermatitis may be increasing in prevalence on a wider basis with the advent of some newer insect-specific flea control products. Infestations have been reported in dogs, cats, rabbits, squirrels, poultry, foxes and humans. This disease may not be as uncommon as previously thought since many veterinarians have a very low index of suspicion and do not look for it. It is reported that the mites may live in an animal's environment for extended periods of time.

### B. Modern Acariasis Control Products

1. It is beneficial for the management of all 3

diseases to isolate the affected animal(s) and clean the premises, disposing of the animal's bedding or thoroughly cleansing it. For the management of canine sarcoptic acariasis, all dogs on the premises and any other dogs with significant contact with the affected dog should be treated. For the management of feline notoedric acariasis, all cats on the premises and any other cats with significant contact with the affected cat should be treated. The treatment of in-contact cats in households with canine sarcoptic acariasis and the treatment of in-contact dogs in households with feline notoedric acariasis are more controversial. If skin disease is present or if initial species-restricted therapy is ineffectual, treatment of the other species should be considered. All dogs and cats on the premises and any other dogs or cats with significant contact with the affected animal should be treated when Cheyletiellosis is diagnosed.

2. The traditional approach of using weekly keratolytic shampoos followed by parasitocidal dips has been superseded by newer less labor-intensive methods of therapy. Lime sulfur (LymDip®, DVM Pharmaceuticals) is still used in circumstances where safety is an issue especially in very young animals.

3. Systemic corticosteroids may be used adjunctively to control pruritus during the first week of therapy. Paradoxically, pruritus may actually increase initially because of increased antigenic load.

4. Selamectin (Revolution® [USA]; Stronghold® [Europe], Pfizer)

a. Selamectin is used for mite infestations most commonly at label dosages every 2 weeks for a minimum of 3 applications.

b. Advantages – kills all 3 ectoparasitic mites, approved for use on dogs and cats, label claims, ease of application, also kills adult fleas and ticks, also broad spectrum against many internal and external parasites

c. Disadvantages – none

d. Bottom-line – Good product to treat small animal acariasis

5. Ivermectin (Ivomec®, Merial; DVMectin®, DVM Pharmaceuticals)

a. Ivermectin 230 micrograms/kg or 1/10 cc/10 lbs body weight per os, for a minimum of four weekly dosages. Certain dog breeds are potentially more sensitive to this drug owing to the MDR1 mutation which diminishes the functionality of the blood-brain barrier. At the dosages used for scabies, this problem is of most concern for Collie Dogs and Shetland Sheep Dogs. Serious adverse neurologic reactions to ivermectin have been seen in Collie Dogs, Shetland

Sheep Dogs, Border Collies, Australian Shepherds, and, less commonly, a variety of other breeds.

b. Advantages – inexpensive, efficacious

b. Disadvantages – toxicity in dogs with MDR1 mutation, Ivomec® is a product licensed for use in cows

c. Bottom-line – efficacious product to treat small animal acariasis

5. Milbemycin oxime (Interceptor®, Novartis Animal Health)

a. Another avermectin, is also efficacious to treat acariasis. Recommended dosages vary from 1X to 2X the monthly heartworm dose given once weekly for four weeks. Milbemycin may be a 'safer' avermectin than ivermectin, but caution should still be exercised in at-risk breeds.

b. Advantages – efficacious, licensed for use in dogs, more safe than ivermectin?

b. Disadvantages – toxicity in dogs with MDR1 mutation

c. Bottom-line – efficacious product to treat small animal acariasis

6. Amitraz (Mitaban®, Pharmacia & UpJohn)

a. Amitraz is an MAO inhibitor and should not be used on dogs or applied by anyone taking other MAO inhibiting drugs. Amitraz should not be used on cats. Amitraz rinsing should be performed either outdoors or in an open garage. Rubber gloves should be worn by the applicator.

b. Advantages – efficacious, licensed for use in dogs

c. Disadvantages – greater potential for toxicity

d. Bottom-line – other products with equal or greater efficacy have less potential for toxicity.

### C. Personal Recommendations

1. It is important to maintain an index of suspicion for all 3 mite infestations as a cause of pruritus in dogs and cats. Cheyletiellosis may present as exfoliation with minimal pruritus. All 3 contagious mite infestations may be increasing in frequency of occurrence.

2. Most dogs and cats with mite infestations will respond to selamectin, ivermectin, or milbemycin.

3. Based on approval for use on dogs and cats for mite infestations, selamectin is the drug of choice for all 3 mite infestations. If financial constraints preclude usage, ivermectin can be used as an alternative.

### Recommended Reading

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