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SKIN MANIFESTATIONS OF ADVERSE REACTIONS TO FOOD IN THE DOG & CAT

FLEA ALLERGY DERMATITIS: STILL THE MOST COMMON SMALL ANIMAL DISEASE ON THE PLANET!

DEMODICOSIS: WHAT WE KNOW IN BOTH THE DOG & THE CAT

CANINE PYODERMA: THE MOST COMMON CANINE INFECTION SKIN DISEASE

MALASSEZIA DERMATITIS: THE OTHER COMMON INFECTION SKIN DISEASE

DERMATOPHYTOSIS: STILL UNDERDIAGNOSED & OVERDIAGNOSED!
FLEA ALLERGY DERMATITIS:
STILL THE MOST COMMON SMALL ANIMAL DISEASE ON THE PLANET!

A-Introduction – Flea Allergy Dermatitis

a.-Flea allergy dermatitis (F.A.D.) 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.

b.-However, flea allergy dermatitis commonly is underdiagnosed all over the world. Additionally, flea allergy still is seen relatively commonly in University dermatology clinics and dermatology specialty practice worldwide. This occurs despite modern advances in flea control plus the fact that most small animal clinicians are quite cognizant of flea allergy dermatitis and routinely manage dogs and cats with flea allergy dermatitis. There are many reasons for this including socio-cultural biases against having ectoparasites.

c.-Self-referral by the owner (second opinion) or veterinary referral of dogs and cats with flea allergy dermatitis occurs for multiple reasons.

d.-Surprisingly, when you suspect flea allergy, your most important task is convincing the owner that you are making the correct diagnosis.

B. Canine Allergic Skin Diseases – Frequency

1. Globally, the most common allergic canine skin diseases are, in frequency of occurrence, flea allergy dermatitis, atopic dermatitis, and food allergy (adverse reactions to food).

2. The reported frequency of occurrence of different allergic skin diseases varies widely from study to study and is highly controversial. Many dermatologists have expressed the opinion that in parts of the world where fleas are common, flea allergy dermatitis comprises between 50% and 80% of all allergic skin disease.
C. Differentiating Allergic Skin Disease by Ruling out Flea Allergy & Food Allergy

1. There are no laboratory tests available that consistently can rule in or out allergic skin disease in the dog.

2. Therefore, since flea allergy dermatitis is the most common allergic skin disease, it is logical to rule out flea allergy by several months of strict flea control.

3. If pruritus remains after strict flea control, initiate a strict elimination diet to rule out food allergy.

D. Reasons Flea Allergy Dermatitis is seen in Dermatology Specialty Practice

1. Owner disbelief that FAD is the correct diagnosis.

2. Owner skepticism that FAD is the correct diagnosis based on management failure.

3. Veterinary practitioner skepticism that FAD is the correct diagnosis based on perceived management failure or lack of visualization of fleas.

E. Owner Disbelief in the Diagnosis of FAD

1. Failures in the management of flea allergy dermatitis correlate strongly with owner Disbelief that fleas are the underlying problem. ("My veterinarian believes that the problem is due to fleas but I know that it is not!")

2. Reasons for disbelief

   a. Fleas not seen by owner

   b. Cultural biases against having ectoparasites – “It is not acceptable for me to have ectoparasites - Therefore it is not acceptable for my dog to have ectoparasites!”

   c. “I am already doing everything to kill fleas!”

   d. “We are already using the latest expensive wonder drugs!”
F. Reasons for Flea Allergy Dermatitis Treatment Failure

1. Failure to treat all in-contact animals (The squeaky wheel gets the oil...) In-and-out cats are a frequent cause of treatment failure in households with multiple animals. Consider regular animal visitors that are not receiving flea control.

2. Failure to use flea products properly

3. Failure to maintain treatment consistency

4. Substitution of less effective and less safe over-the-counter (OTC) spot-on products

For veterinary products

5. Failure to deal with environmental issues in severe cases

G. Flea Biology and Flea Hypersensitivity

1. 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 typical cat flea life cycle involves development through egg, larvae, pupa and cocoon, and the adult over a time period of between 3 and 4 weeks. However, contingent on environmental conditions, 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. It is now known that adult fleas begin feeding (injecting antigen) almost immediately after finding a host. Two recent studies show that 25% to 60%, or even 89% of adult cat fleas feed within 5 minutes of being on a new host. Blood consumption by female fleas 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 or “flea dirt” to feed flea larvae.

2. FAD is a complex hypersensitivity phenomenon involving at least four immunologic processes; immediate hypersensitivity, late-onset immediate hypersensitivity, delayed hypersensitivity, and cutaneous basophil hypersensitivity. Formerly, flea allergy dermatitis was viewed as an “all-or-none phenomenon” and multiple companies advertised their products with the myth that their products “killed the fleas before they can bite”. However, multiple studies have now shown that the majority of fleas feed within the first 3-5 minutes on the host before most modern products can kill fleas. Therefore, effective modern products must actually diminish rather than prevent flea feeding before the flea is killed. Consequently, flea allergy is now recognized as simply another dose dependent hypersensitivity contingent on the dosage of antigen (flea salivary proteins) injected into the host. The severity of flea allergy is dependent on the magnitude of hypersensitivity elicited in that animal, the number of fleas successfully
feeding, plus the amount of antigen injected by fleas during feeding. Since rapid flea kill will reduce antigen access, products with more rapid speeds of kill should diminish antigen access (flea saliva injection) more effectively.

3.- New advances in the understanding of the biology of the flea and new agents available to combat multiple life stages of the flea both on and off the animal have revolutionized our ability to deal with flea allergy dermatitis. In the past, since the bulk of the flea lifecycle (eggs, larvae, and pupa) occurs in the environment, environmental control always needed to 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, both more rapid acting and more effective topical and systemic anti-flea therapy may be the only management tools required. The initial agents that created this paradigm shift during the past fifteen years include imidacloprid, fipronil, selamectin, nitenpyram, lufenuron, S-methoprene, and pyriproxifen. Products containing these active ingredients have exponentially increased our ability to effectively control fleas and manage flea allergy dermatitis. Despite relatively rapid flea kill and industry claims to the contrary, none of these products can prevent fleas from biting and feeding before they are killed. However, these newer products clearly reduce an animal’s flea burden enough to diminish clinical signs of flea allergy. The recent release of an oral product containing spinosad and a topical product containing dinotefuran may substantially add to that armamentarium.

**H. Diagnosing Flea Allergy Dermatitis**

1.- Compatible lesions - The lesions of FAD include crusted papules, erythema, and excoriations. Secondary or chronic changes include lichenification, hyperpigmentation, alopecia, fibropruritic nodules, and secondary organism overgrowth or infection. Crusted papules in the umbilical fold, especially in male dogs, are an under-appreciated clinical marker of FAD.

Fibropruritic nodules are highly characteristic clinical markers of FAD in dogs predisposed to their development. Secondary bacterial or Malassezia overgrowth or infections are underappreciated causes of increased pruritus in all allergic skin diseases including FAD.

2.- Appropriate lesion localization - The pruritus seen with FAD is predominantly localized to the caudal one-half of the dog. FAD has a characteristic distribution pattern with partial bilateral symmetry and lesions involving the dorsal lumbosacral region, tail-base, perineum, medial, and caudal thighs.

3.- Feline flea allergy usually presents a ‘miliary dermatitis’ (small crusted papules) seen most commonly on the neck, rump, the rest of the dorsum, and the groin.
I. Diagnosing Co-Existing Diseases

1. Animals with flea allergy dermatitis often have other allergic skin diseases. Consider the possibility of coexisting atopic dermatitis or food allergy.
2. Animals with any inflammatory skin diseases often have secondary infections or organism overgrowth. Therefore, always perform surface cytology.

J. Modern Flea Control

1. New, considerably less toxic veterinary products that also are much easier to use are available that both kill adult fleas and disrupt the flea life-cycle. Many insecticides can effectively kill fleas; preventing reinfestation is the problem. Insuring long-term pet owner compliance also 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 and oral systemic 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 or reuse 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. In addition, insect growth regulators can be used to disrupt flea reproduction. 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 should be instituted. Preventions of wild mammals that can carry fleas (rats, opossums, squirrels, raccoons, skunks, feral cats) from entering crawl spaces, foundation vents, porches and garages also is important.

K. Flea Allergy Dermatitis – Techniques for Convincing the Owner

1. Establish rapport - We never simply tell the owner that their dog has FAD. We establish rapport with the owner while we are taking the history, performing the physical examination, and performing cytology.

2. Goal of owner ‘buy in’ - The key is gradually getting the owner to buy in to the possibility that the skin disease in their dog may be caused by hypersensitivity to the bites of fleas.

3. Define and discuss allergy - We define allergy and talk about the 3 most common allergic skin diseases seen in the dog (atopic dermatitis, food allergy, flea allergy).
4. ‘The imaginary belt around the middle of a dog’ - During our taking of the history, we draw an imaginary belt around the middle of a dog and ask the owner, “Does your dog itch more in front of or behind this line?”. (Flea allergy dermatitis is the only known pruritic canine skin disease seen consistently with a markedly caudal bilaterally symmetric distribution pattern.)

5. How a diagnosis is made - We discuss how a diagnosis is made visually indicating the importance of bilateral symmetry, lesions and the distribution pattern plus ruling out other skin diseases. During this discussion, we describe the distribution pattern of the 3 common allergic skin diseases and gradually let the owners begin to draw their own conclusions.

6. Discuss mechanisms of flea allergy - Flea allergy as a complex allergic reaction to proteins in the saliva of the flea involving at least 4 different allergic mechanisms. We also tell them that we see severe flea allergy in well-cared-for animals living in clean environments with limited exposure to fleas.

7. Diffuse hostility and cultural bias - Ectoparasites on humans or animals is a hot-button issue in developed countries. People do not consider it appropriate to have ectoparasites on themselves or their animals! This cultural bias is strong, and not rational. One must diffuse this cultural bias and hostility. We may say, “Fleas are a way of life in California”, "My own dogs have fleas if I don't practice strict flea control routinely and consistently."

8. Show defects in past flea control – Common defects include not treating all of the animals, indoor/outdoor cats as a continuously re-infesting source, lack of treatment consistency (every 4 weeks becomes every 8 weeks!), substitution of inferior OTC products, and severely infested environments. It is common for multiple defects to be present.

9. Stress ruling out ‘the other common allergic skin diseases’ before expensive or time-consuming laboratory testing. We then offer the owners the alternative of 6 weeks of concerted flea control based on our recommendations. Lastly, our final gambit is not, “Trust us”, instead it is "Prove us wrong"!

1. Modern Flea Control Products

1. New spot-on veterinary products display 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 when these products are applied every 3 weeks instead of monthly. Unfortunately, despite industry advertising claims to the contrary, our strong clinical impression remains that either bathing or swimming degrades the efficacy of all of these spot-on topical 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 veterinary products. More recently, safe and effective oral veterinary products offering rapid kill have become available.

2. **Imidacloprid** spot on preparation (Advantage®, 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 broad-spectrum product for fleas & ticks

3. **Fipronil & S-Methoprene** spot on preparation & spray (Frontline® Plus, Merial), Fipronil (Frontline® 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, diminished efficacy after bathing or swimming, occasional application site reactions, spray is more effective but labor intensive

c. Bottom-line – good broader spectrum product

4. **Imidacloprid & 44% permethrin** spot on preparation (Advantix®, Bayer)

a. Advantages – larvicidal on the animal and kills/debilitates adult fleas on contact, interrupts flea life cycle, repellant ‘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** spot on preparation (Revolution® [USA]; Stronghold® [Europe], Pfizer)

a. Advantages – broad spectrum against many internal and external parasites, kills adult fleas plus larvae and eggs, very rapid flea kill in cats, kills ticks, kills some other ectoparasitic mites (*Sarcoptes, Notoedres, Cheyletiella, Otodectes*), ease of application, better product in cats?, FDA approved
b. Disadvantages – does not have repellent action, diminished efficacy after bathing or swimming, slower efficacy on dogs, application site reactions

c. Bottom-line – good broader spectrum product

6. Nitenpyram oral tablet (Capstar™, 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, expensive when used frequently

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 and dogs that swim, compliance problems?

7. Lufenuron oral tablet (Program®, Novartis; Sentinel® [lufeneron + 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 or newer oral products for long-term control, not for use as sole therapy unless very closed environment, treat all animals, use in dogs requiring frequent shampooing or that swim, compliance problems?

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

Pyriproxifen & 2% permethrin containing collar (KnockOut® Collar for Dogs, Virbac), no longer available in the USA, KnockOut® Spray, Duowin® Spray & Duowin® Contact Spot On [with 40% permethrin] (Virbac Europe)

Pyriproxifen containing collar (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. **Spinosa**d oral chewable tablet (Comfortis®, Lilly) New oral monthly beef-flavored tablet for dogs, environmentally friendly member of the spinosyns class of insecticides, activates nicotinic acetylcholine receptors

   a. Advantages – rapid response for a systemic once monthly product, kills adult fleas before egg laying initiated, efficacy *not* affected by bathing or swimming, FDA approved

   b. Disadvantages – does not have activity against ticks

   c. Bottom-line – new product with excellent potential

10. **Dinotefuran, Permethrin & Pyriproxifen** (Vectra 3D®, Summit VetPharm) New neonicotinoid insecticide based on acetylcholine structure

   a. Advantages – fast-acting monthly topical

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

   c. Bottom-line – new product with excellent potential

11. **Metaflumizone** spot on preparation (ProMeris™ for cats, Fort Dodge)

Metaflumizone is a new, novel semicarbazone calcium channel blocker insecticide

   a. Advantages – kills/debilitates adult fleas on contact, ease of application, stops egg production?

   b. Disadvantages – does not have repellent action, assume diminished efficacy after bathing or swimming, does not have activity against ticks, possibility of occasional application site reactions?

   c. Bottom-line – new product awaiting judgment

12. **Metaflumizone & Amitraz** spot on preparation (ProMeris™ for dogs, Fort Dodge)

Metaflumizone is a new novel semicarbazone calcium channel blocker insecticide

   a. Advantages – kills/debilitates adult fleas on contact, ease of application, stops egg production?, efficacy against ticks, efficacy in some cases of demodicosis?
b. Disadvantages – dog only product, does not have repellent action, assume diminished efficacy after bathing or swimming, concern with unusual application site reactions – ‘Pemphigus foliaceus-like’

c. Bottom-line – new product awaiting judgment, worrisome application site reactions

13. **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 or that swim, compliance problems

14. **Imidacloprid** & Moxidectin spot on preparation (Advantage Multi®, Bayer)

a. Advantages – larvicidal on the animal and kills/debilitates adult fleas on contact, ease of application, efficacy against ticks

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

c. Bottom-line – good broad-spectrum product for fleas & ticks

(Canada – Imidacloprid & Moxidectin - Advantage Multi®, Bayer)

(Europe – Imidacloprid & Moxidectin - Advocate®, Bayer)

15. **Pyriprole** spot on preparation (PracTic™, Novartis in Europe) Not available in the US

a. Advantages – kills/debilitates adult fleas on contact, ease of application, efficacy against ticks

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

c. Bottom-line – product not available in the US

**M. Personal Recommendations**

1. **Client education** is crucial. All dogs and cats in the environment must be treated.

2. **Flea control must be personalized** and regionalized 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

3. **Indoor only dogs or cats** with very limited possible flea exposure – Lufenuron plus or minus spot-on product, spinosad monthly, nitenpyram every few days
4. **The average dog** – Fipronil & S-methoprene, imidacloprid, imidacloprid & permethrin, spinosad, dinotefuran with permethrin & pyriproxifen, selamectin as sole therapy

5. **The average cat** – Selamectin, fipronil & S-methoprene, or imidacloprid as sole therapy

6. **Dogs that swim regularly** – spinosad monthly, nitenpyram every 1-2 days,

7. **Dogs requiring frequent bathing** - spinosad monthly, nitenpyram every 1-2 days

8. **Severely flea allergic dogs** require more aggressive therapy - imidacloprid plus permethrin, spinosad only?, fipronil & S-methoprene plus nitenpyram

9. **Severely flea allergic cats** require more aggressive therapy – selamectin alone, fipronil & S-methoprene or imidacloprid plus nitenpyram.

**N. Suggested Reading**


Dryden MW. Flea biology and epidemiology: clinically relevant issues. 16th Annual George H. Muller Veterinary Dermatology Seminar 2000; 4-10.


