



## A Clinical Approach to Allergic Skin Disease in Cats and Dogs

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# Canadian Academy of Veterinary Dermatology

## CAVD.ca

- An excellent resource!
- Includes handouts for clients, the itch scale, useful resources and literature for veterinarians
- Membership is affordable





## Learning Outcomes


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- Understand the basic scientific principles of allergic hypersensitivities
- Compare the different variations in presentation of pruritus in cats and dogs
- Develop a step-wise clinical approach to the diagnosis of allergic skin disease in dogs and cats
- Identify common clinical features of flea allergic dermatitis and appropriate therapy
- Understand critically appraised topics of food allergic dermatitis
- Compare the clinical presentations of allergic skin disease in dogs versus cats
- Develop a treatment plan for allergic dermatitis in cats and dogs treating both the underlying disease and clinical symptoms
- Understand the labelled use, benefit and side effects of common medications used in allergic skin disease: Antihistamine, Cytopoint, Apoquel, Zenrelia, Atopica and glucocorticoids

# Summary


 What is an allergy?

 Taking a History


 Dermatological Examination


 Diagnosing Allergic skin disease

Flea Allergic Dermatitis  
Cutaneous Adverse Food Reaction  
Atopic Dermatitis

 Treating the symptoms of an allergy

# Summary


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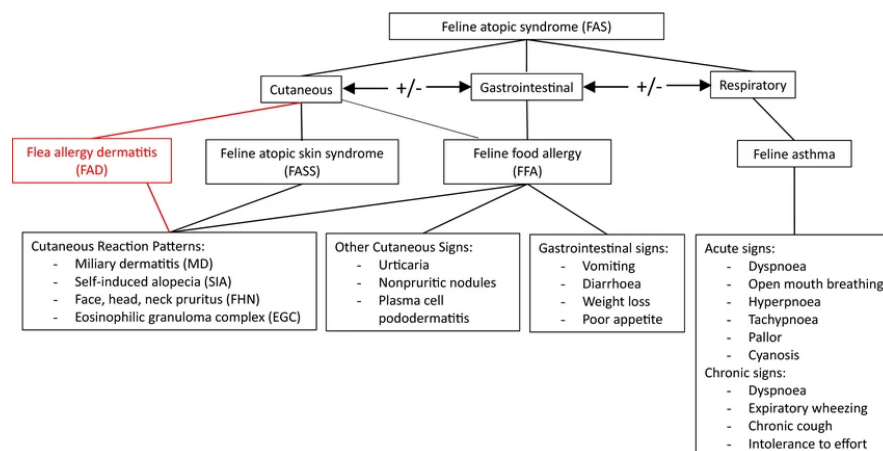
# What is an allergy?

- **Allergy**- a diseased state characterized by a hypersensitivity response to an allergen; often mediated by IgE antibodies

Nomenclature in dogs

- **Flea Allergic Dermatitis**- immunologic disease caused by the injection of antigens from the salivary glands of fleas
- **Cutaneous Adverse Food Reaction**- a pruritic immune-mediated reaction following ingestion of food
- **Atopic Dermatitis**- a common, genetically predisposed, inflammatory and pruritic skin disease

# Nomenclature is different in cats



# Pathogenesis of an allergic dermatitis

- Beyond the scope of this lecture
- Complicated and not fully understood
- Suspected skewed T helper cell type 2 response to environmental and food allergens
  - Favour IgE antibody production

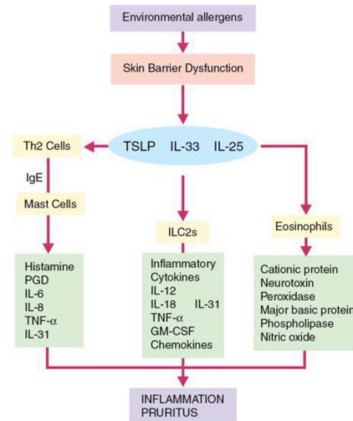


FIG. 9.1 Overview of the pathogenesis of atopic dermatitis. This represents the most widely accepted outside:inside hypothesis where the disease is triggered by extrinsic environmental allergens and skin barrier defects.

## The itch issue...

- Estimates of prevalence of atopic dermatitis range from 3-15% of dogs
- Estimated that cutaneous adverse food reactions are 1-5% of all canine diseases
- Following the claims
  - From over 500,000 claims from Healthy Paw's pet insurance (2017-2018), skin issues and ear infections were the first and third most common claims respectively; and second and fourth in 2019.
  - AVMA stated skin issues and ear infections were the first and second most common claims recorded in 2013
  - Nationwide insurance found allergic dermatitis and ear infection to be number one and two most common conditions in 2016



# Summary

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## Taking a History

- Questionnaire?
- Signalment?
- History from owners is critical in helping make our diagnosis
  - Key questions to ask:
    - Is this itch year round? Or are there seasonal exacerbations in the itch or infections?
    - When did the itch start? At what age?
    - Which parts of the body are most affected?
    - Has the owner noticed other animals affected?
    - Any visible fleas? Has the pet been on acaricidal medication?
    - What does the dog eat? Any recent changes?
    - Does the owner notice the flare with any particular foods?



# Taking a History

**PATIENT HISTORY**

Client name: \_\_\_\_\_ Pet's name: \_\_\_\_\_  
 Chief complaint: \_\_\_\_\_  
 Age of pet when acquired: \_\_\_\_\_ Age of pet now: \_\_\_\_\_  
 How long has your pet had this problem? \_\_\_\_\_  
 Is there a time when the problem is less severe or the itching is less intense? \_\_\_\_\_

What was the problem like initially and where did it start?  
 Normal skin, just itchy     Rash     Redness     Hair loss     Pimples  
 Nose     Neck     Tail     Back legs  
 Around eyes     Back     Front legs     Back paws  
 Ears     Rump     Front paws     Chest  
 Abdomen     Groin

Has it spread?  Yes  No If so, to what sites: \_\_\_\_\_

Does your pet scratch, chew, lick, or rub any of the following areas? Please check all that apply:  
 Nose     Neck     Tail     Back legs  
 Around eyes     Back     Front legs     Back paws  
 Ears     Rump     Front paws     Chest  
 Abdomen     Groin

Comments: \_\_\_\_\_

Other pets in environment? State how many: \_\_\_\_\_  
 Dogs     Cats     Birds     Rabbits  
 Rodents     Large/farm animals – what type? \_\_\_\_\_

Do any other pets have skin problems? Describe: \_\_\_\_\_

Do any people in the household have skin problems?  Yes  No  
 Describe: \_\_\_\_\_

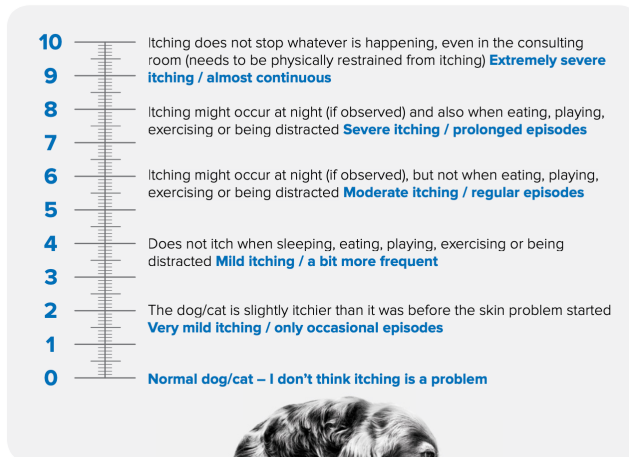
Amount of time pet spends:  % indoors     % outdoors  
 Are symptoms any worse?  Indoors     Outdoors     Morning     Night

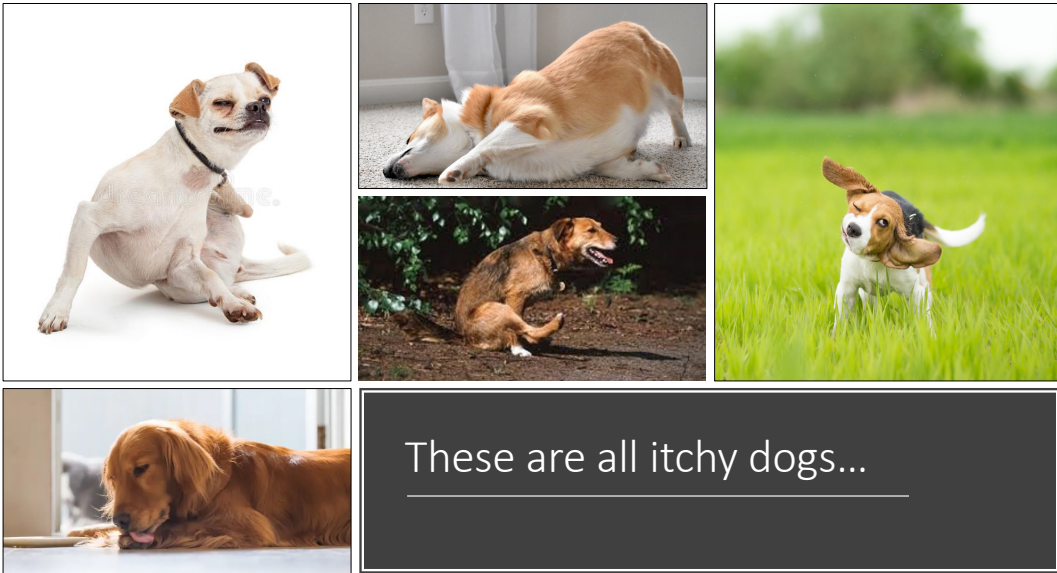
Do any relatives of your pet have skin problems that you are aware of?  Yes  No  
 Describe: \_\_\_\_\_

Do you use routine flea control?  Yes  No

# Itch scale

- A lot of owners do not understand that itch manifests in many ways
- We need to clarify
- Still subjectivity, but allows consistency with one client/patient







# Feline Itch Scale (Colombo et al, 2022)

How much does your cat lick?			How much does your cat scratch?
<p><b>Continuous/almost continuous chin licking</b> Licking doesn't stop whenever it's happening, even in the consulting room. Licking always provokes hair loss, and might provoke lesions. and/or the cat frequently hides.</p> <p><b>Severe licking/prolonged episodes</b> Licking might occur at night when eating or playing. Licking often provokes hair loss. and/or the cat might hide frequently.</p> <p><b>Moderate licking</b> Licking might occur at night, but not when eating or playing. Licking often provokes hair loss. and/or the cat often hides.</p> <p><b>Mild licking/a bit more frequent</b> Wouldn't lick when sleeping or playing. Licking rarely provokes hair loss. and/or the cat might occasionally hide.</p> <p><b>Very mild licking/only occasional episodes</b> The cat is licking slightly more than it was before the problem started. Licking rarely provokes hair loss. and/or the cat might occasionally hide.</p> <p><b>Normal cat: licks overall for one hour a day.</b></p>	10	10	<p><b>Continuous/almost continuous scratching</b> Scratching doesn't stop whenever it's happening, even in the consulting room. Scratching always provokes lesions. and/or the cat frequently hides.</p> <p><b>Severe scratching/prolonged episodes</b> Scratching might occur at night and also when eating or playing. Scratching often provokes lesions. and/or the cat might hide frequently.</p> <p><b>Moderate scratching</b> Scratching might occur at night, but not when eating or playing. Scratching often provokes lesions. and/or the cat often hides.</p> <p><b>Mild scratching/a bit more frequent</b> Wouldn't lick when sleeping or playing. Licking rarely provokes hair loss. and/or the cat might occasionally hide.</p> <p><b>Very mild scratching/only occasional episodes</b> The cat is scratching slightly more than it was before the problem started. Scratching rarely provokes lesions. and/or the cat might occasionally hide.</p> <p><b>Normal cat: scratches overall for one hour a day.</b></p>
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Which of these are an allergy?



Secondary Infections



# Clinical Signs of an allergy in cats

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- Pruritus
- Non-inflammatory Alopecia
- Erythema
- Otitis externa
- Scale
- Asthma
- Conjunctivitis
- Miliary Dermatitis
- Eosinophilic Granuloma Complex
  - Indolent Ulcer
  - Eosinophilic Granuloma
  - Eosinophilic Plaque



# Clinical Signs of an allergy in cats

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- Pruritus may not be evident
  - May just have hair loss without any overgrooming being seen by owner
  - “my cat has always had a hairless belly”
- Over areas where the cat can lick
  - Abdomen
  - Flanks
  - Dorsum
  - Limbs



## Clinical Signs of an allergy in cats

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- Eosinophilic/Indolent Ulcer
  - Oral exams always important
  - Can have secondary bacterial infection
  - Partial improvement with antibiotics



## Clinical Signs of an allergy in cats

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- Eosinophilic Granulomas
  - Does not need to be in an area where the cat licks
  - Anywhere on body
  - Can include oral cavity
  - Can have secondary bacterial infection

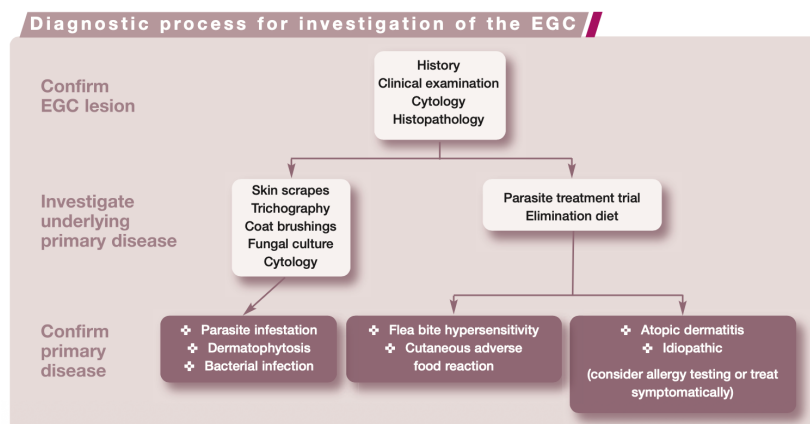


# Clinical Signs of an allergy in cats

- Eosinophilic plaques
  - In areas where cats lick
  - Ventral abdomen commonly
  - Secondary bacterial infections common

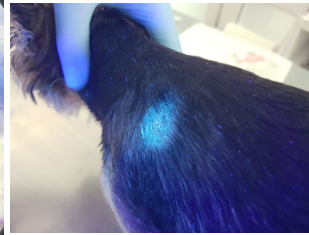
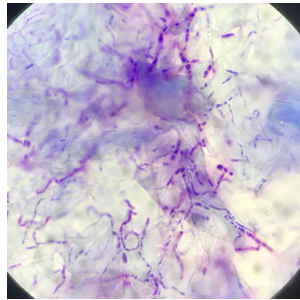
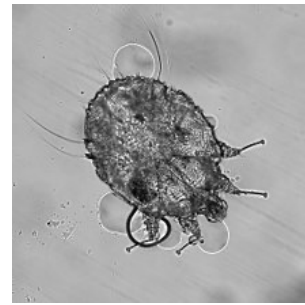
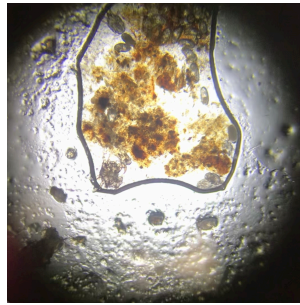


## Are allergies causing our symptoms?



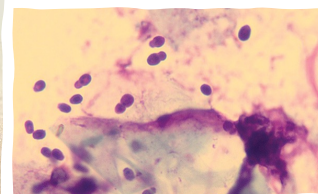
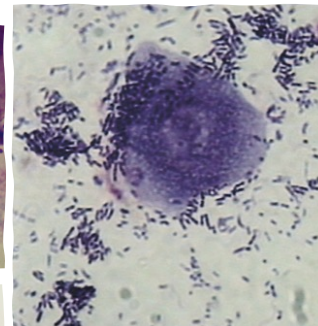
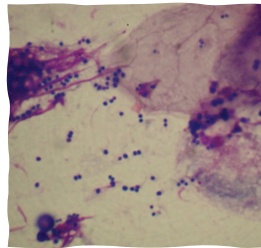
# Is it allergic itch?

- Rule out other common causes of pruritus
  - Ringworm (dermatophytosis)
    - Wood's lamp
  - Bacterial pyoderma
  - Malassezia overgrowth
  - Ectoparasites
- Consider rarer conditions if atypical appearance or signalment
  - Pemphigus foliaceus
  - Cutaneous lymphoma



# Microscopy

- Do cytology!
  - Tape strip
    - Better for dry skin
    - Good for visualizing Malassezia, dermatophytes
  - Direct impression
    - Often better for bacterial quantification
    - Moist lesions impression well
  - Trichogram/skin scrape



## We think its an allergy.... Now what?

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- We need to treat both primary and secondary effects of the allergy
  - The three 'I's
- We need a step-wise approach to systematically ruling out the most common allergies
  - Need to rule these out one after the other
    1. Flea allergic dermatitis
    2. Cutaneous adverse food reaction
    3. Atopic dermatitis (environmental allergies)

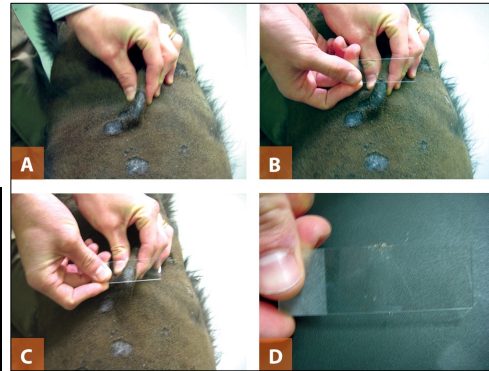
Treat the  
three 'I's

1. Infection
2. Itch
3. Inflammation

# 1. Infection

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- Do cytology (show the client you're a magician)
  - Tape strip
    - Good for yeast, dry skin
  - Direct impression
    - Good for cocci, crusts
    - Lance pustules
    - Wet cotton tip applicators



# Treating Infection

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- If possible, treat topically
  - Medicated shampoos, mousses, sprays, wipes
    - 3-4% chlorhexidine products good options
      - Institute regular bathing
      - 10 minute contact time for shampoos
  - Topical gels, creams
    - Careful of overuse with steroid containing compounds
  - Ear drops
    - Caution if cannot visualize tympanic membrane



# Systemic medications

- When to use systemic medications
  - Widespread infection
  - Failure of response to topical medication
  - Unable to apply topical medications
  - Deep infections
- Need cytology to guide antibiotic choice
- When to culture
  - No response to empirical treatment
  - History of antibiotic use
  - Deep pyoderma
  - Use of second line antibiotics



## 2. Itch

Know the benefits of the available pharmacological products!

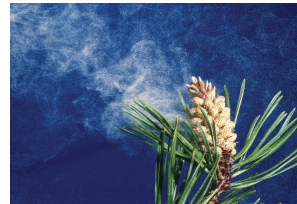
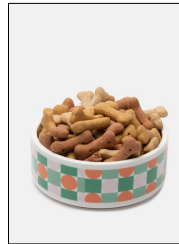
- Cytopoint®
- Apoquel®
- Zenrelia®
- Atopica®
- Glucocorticoids
- Other Treatments
  - Antihistamines
  - CBD oil
  - Gabapentin



# 3. Inflammation

We need to address the underlying issue!

- **Flea allergic dermatitis**
  - Acaricidal medications
  - Environmental cleanup
- **Cutaneous adverse food reactions**
  - Remove inciting food allergens
- **Atopic dermatitis**
  - Immunotherapy



## Summary

? What is an allergy?

📄 Taking a History

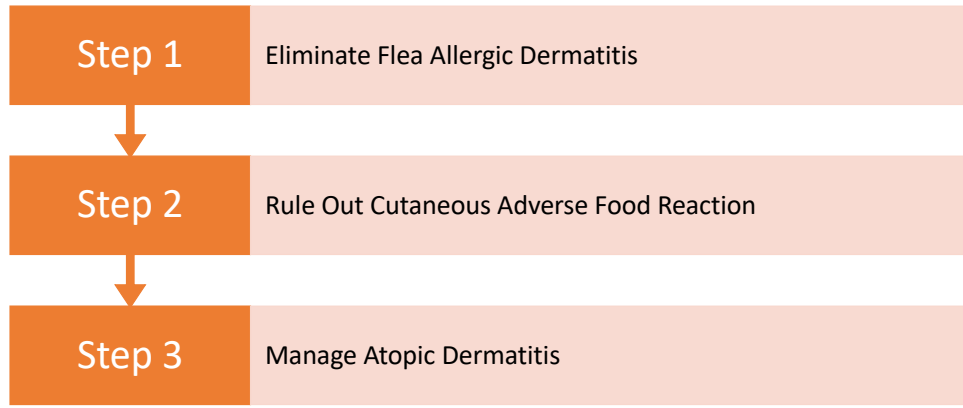
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## Systematic Approach to Allergic Skin Disease



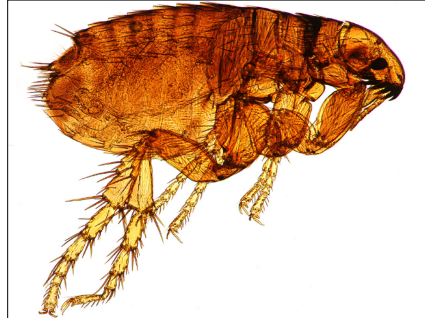
## Systematic Approach to Allergic Skin Disease



# Flea allergic dermatitis (FAD)

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- Can develop at any age
- May be seasonal
- Can be indoor only animals
- May be visible in the household or multiple animals affected
- *Ctenocephalides felis* (cat flea) is the most common flea in both dogs and cats

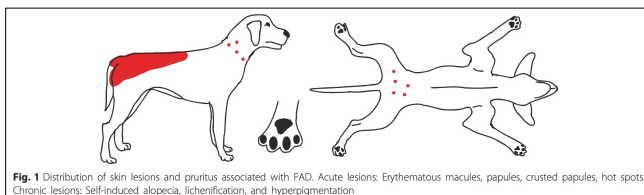
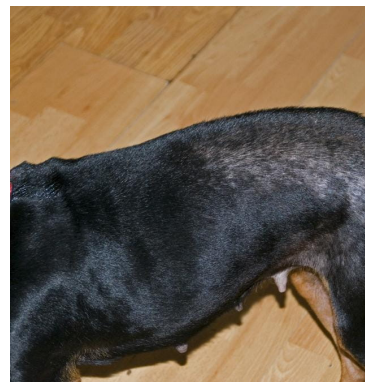


# Flea allergic dermatitis (FAD)

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## Dogs

- Clinical Signs
  - Pruritus can manifest over entirety of the body
  - Alopecia, erythema, papules and crusts develop on the lower back, tailhead, caudal and inner thighs, neck
  - “Corn-cobbing”



# FAD- Clinical Appearance

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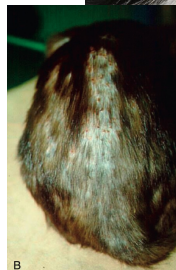


## Flea allergic dermatitis (FAD)

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### Cats

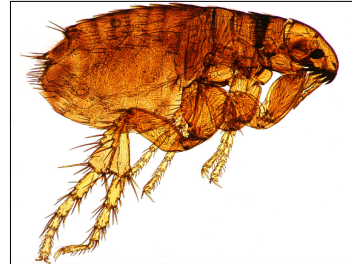
- Clinical signs
  - Visual identification of fleas
  - Pruritus
  - Miliary dermatitis
  - Scale
  - Alopecia
- Distribution
  - Ventral abdomen
  - Dorsum
  - Tail
  - Face



## FAD- Diagnosis

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- Visually assess for fleas
  - Can use tape to harvest
- Look for flea dirt (comb and wet paper towel)
- Multiple animals affected
  
- Not common in greater Vancouver but possible
  
- Beware: \*owners may not be convinced\*



## FAD- Treatment

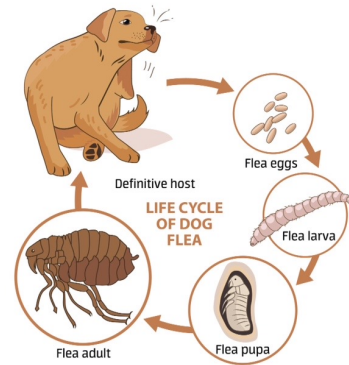
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- Acaricidal medications
  - Numerous options with good efficacy
    - Isoxazolines, selamectin, imidacloprid, nitenpyram, fipronil, pyrethrin, others
    - All have varied speed of kill and prophylaxis
  - Preferably a choice for treatment and prophylaxis

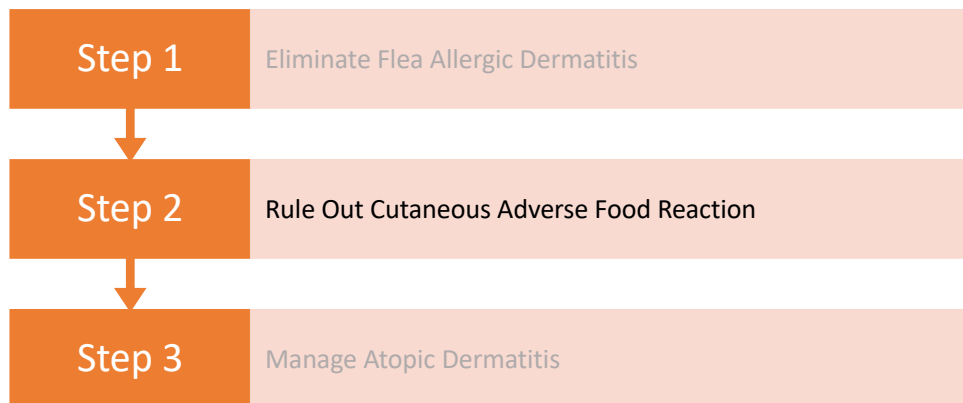


# FAD- Treatment

- Insect growth regulators
  - Often as sprays (from pet stores)
  - Break the flea life cycle by inhibiting development of immature insect
- Environmental cleanup
  - 95% of flea burden is in the environment
  - Vacuum/clean/wash bedding, rugs, carpet, drapes



## Systematic Approach to Allergic Skin Disease



# Cutaneous Adverse Food Reaction in Dogs

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- Can affect any age
  - 40% start by one year of age
  - Mean age onset 2.9 years
- Clinically indistinguishable from atopic dermatitis
- Non-seasonal
  - If seasonal, its likely not food
- Most dogs have a generalized pruritus
- Possibly a slight higher amount of facial pruritus
- Both cutaneous manifestations and non-cutaneous manifestations

## Cutaneous Manifestations in Dogs

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- Recurrent bacterial and yeast infections
  - Up to 70% of cases
- Pruritus (with or without skin lesions)
- Ear infections
- Erythema
- Papules
- Pustules
- Epidermal collarettes
- Crusting
- Excoriation
- Alopecia
- Lichenification
- Hyperpigmentation

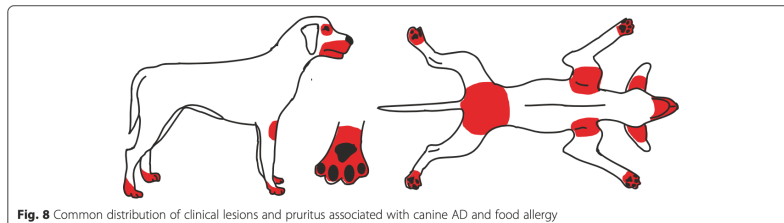


Fig. 8 Common distribution of clinical lesions and pruritus associated with canine AD and food allergy

# Non-cutaneous manifestations in Dogs

**Table 1** Non-cutaneous clinical signs of AFR in dogs

Clinical sign	Number of animals (% of all reported non-cutaneous AFR)	Strength of evidence
Diarrhoea [9–19, 22–27, 32–44, 47, 48]	391–490 <sup>a</sup> (70–88%)	Strong in 36–39 <sup>a</sup> [9–19, 48] Moderate in 151–189 <sup>a</sup> [22–27, 47] Weak in 204–212 <sup>a</sup> [32–44]
Vomiting [9, 11, 13–15, 17, 18, 22–27, 33, 34, 40, 42, 43]	28–115 <sup>a</sup> (5–21%)	Strong in 6–47 <sup>a</sup> [9, 11, 13–15, 17, 18] Moderate in 5–43 <sup>a</sup> [22–27] Weak in 17–25 [33, 34, 40, 42, 43]
Increased frequency of defecation [23, 24, 45]	33 (6%)	Strong in 16 [45] Moderate in 17 [23, 24]
Tenesmus [45]	11 (2%)	Strong in 11
Paroxysmal gluten-sensitive dyskinesia of Border terriers [49]	5 (1%)	Strong in 2 Weak in 3
Symmetrical lupoid onychodystrophy [50]	4 (1%)	Strong in 2 Weak in 2
Anaphylaxis [40]	1 (0.2%)	Weak
Conjunctivitis [12]	1 (0.2%)	Strong
Asthma [27]	1 (0.2%)	Moderate
Sneezing [14]	1 (0.2%)	Strong

<sup>a</sup> Minimal and maximal number of dogs, as in some studies, the specific number of dogs showing some of the individual clinical signs was not reported

## Cutaneous Manifestations in Cats

- Mean onset at 3.9 years; early as 4 months of age
- Clinical signs
  - Pruritus
  - Miliary dermatitis
  - Eosinophilic granuloma complex
  - Crusted dermatitis
  - Otitis externa
- Distribution
  - Generalized
  - Head and neck
  - Ventrum



# Non-Cutaneous Manifestations in Cats

**Table 2** Non-cutaneous clinical signs of AFR in cats

Clinical sign	Number of animals (% of all reported non-cutaneous AFR)	Strength of evidence
Diarrhoea [5, 7, 20, 21, 27–31, 51]	25–49 <sup>a</sup> (28–55%)	Strong in 11–16 [20, 21] Moderate in 14–33 [5, 7, 27–31] Weak in 1 [51]
Vomiting [4, 5, 7, 20, 21, 27–29, 31]	26–46 <sup>a</sup> (29–52%)	Strong in 15–20 [20, 21] Moderate in 8–27 [4, 5, 7, 28, 29, 31, 51]
Conjunctivitis [4, 7, 46]	3–20 <sup>a</sup> (3–22%)	Strong in 1 [7] Moderate in 1 [4] Weak in 1–18 [46]
Salivating [46]	1–18 (1–20%)	Weak
Respiratory signs [7]	4 (4%)	Moderate
Flatulence [5]	3 (3%)	Moderate
Hyperactive behaviour [6]	1 (1%)	

<sup>a</sup> Minimal and maximal number of cats, as in some studies, the specific number of cats showing some of the individual clinical signs was not reported

## Diagnosing a food allergy

- **8 Week Elimination Diet** with a rechallenge is the gold standard for diagnosis
- Serum IgE/IgG for food has low repeatability and highly variable accuracy
  - **No peer reviewed research suggesting its benefit**



# Choosing the appropriate diet...

- Three options for owners
  - Prescription Novel Protein Diet
  - Prescription Hydrolyzed Protein Diet
  - Home-Cooked Novel Protein Diet
    - Need to ensure it is nutritionally balanced
    - Hilary's Blend diets, Balancelt, Veterinary nutritionist consult, others



## Catering to puppies and kittens

- There are several diets formulated for growth
- Variety of wet and dry food options



Canadian Academy of Veterinary Dermatology  
Académie Canadienne de Dermatologie Vétérinaire

Updated December 2021

### Veterinary Diets for Food Trials (Canine)

Manufacturer	Diet name	Main protein	Carbohydrate source	Formulated for growth	Calories per cup	Other indications for use/added	Kibble/canned	Treats
Hill's	Prescription Diet did Potato and Salmon	Salmon	Potato	No	360 kcal 369 kcal/can		Both	No
	Prescription Diet did Potato and Duck	Duck	Potato	No	371 kcal 356 kcal/can		Both	No
	Prescription Diet did Potato and Venison	Venison	Potato	No	371 kcal 1091 kcal/can		Both	No
	*Canned food currently unavailable							
	Prescription Diet Derm Complete	Egg product	Brown rice, Brewer's rice	No	398 kcal 448 kcal/can	Alopecia dermatitis	Both	No
Prescription Diet z/d	Hydrolyzed chicken liver	Hydrolyzed chicken liver	Starch	No	317 kcal 349 kcal/can		Both	Hill's Prescription Diet Hippo-treats
Purina	Proplan Veterinary Diets HA Hydrolyzed (Vegetarian) Canine Formula	Hydrolyzed soy	Starch	No	311 kcal		Kibble	Yes (Purina Gentle Snackers)
	Proplan Veterinary Diets HA Hydrolyzed Chicken Flavour canine formula	Hydrolyzed soy and hydrolyzed chicken liver and chicken	Starch	No - kibble Yes - canned	322 kcal 346 kcal/can	Pancreatitis, lymphangiectasia, protein-losing enteropathy, Esophageal pancreatic insufficiency	Both	Yes (Purina Gentle Snackers)
	Proplan Veterinary Diets HA Hydrolyzed Salmon Flavour canine formula	Hydrolyzed soy protein isolate, hydrolyzed salmon	Starch	Yes	316 kcal	Inflammatory bowel disease, lymphangiectasia, protein-losing enteropathy, pancreatic insufficiency, malabsorption, hyperlipidemia	Kibble	No

1

	Proplan Veterinary Diets DRM Dermatological Management Nutrition Canine Formula	Trout	Brewer's rice, oat meal, pea protein, potato protein	Yes	398 kcal		Kibble	No
Rayne	Rabbit Meat	Rabbit	Chickpeas (kibble), potato (kibble and canned), potato	Yes	380 kcal 358 kcal/can		Both	Yes (rabbit jerky)
	Rabbit Diet	Rabbit	Chickpeas (kibble), potato starch (canned)	No	453 kcal 404 kcal/can		Both	Yes (Rayne Rewards S.L.T Rabbit)

# The dreaded food trial

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Do it once, do it right!

- Keys to success
  - [Give owners options!](#)
    - Include treats (vegetables, veterinary grade novel protein treats)
  - Educate owners on why
    - Explain this is only temporary to help reach a diagnosis
  - Ensure all family members know not to give treats
  - Ask about [all medications, supplements, treats](#)
  - Explain to owners this may not solve the issue, but is necessary to help reach a diagnosis
  - Other pets? [Can they all be on the same diet?](#)



# The silent killers of the diet trial

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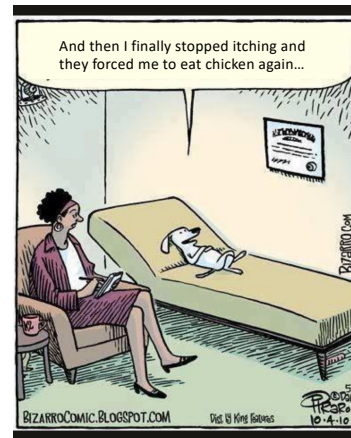
- I often explain to owners in human terms to simplify the concept. Use peanut allergies as an example “one peanut is too many peanuts”.
- Common failures of diet trials include:
  - Feeding commercial dog treats
  - Table scraps
  - Probiotics (some, not all, have animal protein); [recommend veterinary probiotics without animal protein only](#)
  - Flavoured toothpastes
  - Flavoured medications



# Dietary Rechallenge

---

- Flare ups occur within 14 days of a rechallenge
  - 21% by 48 hours, 90% by 14 days
    - Suggests a cell mediated and not an IgE-mediated reaction
    - Increase in itch, erythema, sudden infections
- Recommend only one new diet item every 2 weeks
- If a flare up occurs, return to elimination diet until stable
  
- My personal preference:
  - I recommend [single source diets \(preferably veterinary grade if owner is willing\)](#) so we know what the dog may be reacting to

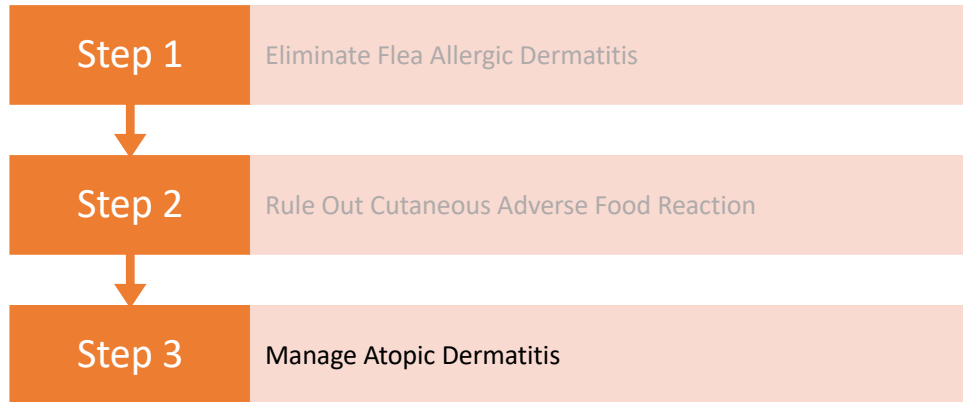


# Critically Appraised Topics in Canine/Feline Food Allergies

---

1. Critically appraised topic on adverse food reactions of companion animals (1): duration of elimination diets
2. Critically appraised topic on adverse food reactions of companion animals (2): common food allergen sources in dogs and cats
3. Critically appraised topic on adverse food reactions of companion animals (3): prevalence of cutaneous adverse food reactions in dogs and cats
4. Critically appraised topic on adverse food reactions of companion animals (4): can we diagnose adverse food reactions in dogs and cats with in vivo or in vitro tests?
5. Critically appraised topic on adverse food reactions of companion animals (5): discrepancies between ingredients and labeling in commercial pet foods
6. Critically appraised topic on adverse food reactions of companion animals (6): prevalence of noncutaneous manifestations of adverse food reactions in dogs and cats
7. Critically appraised topic on adverse food reactions of companion animals (7): signalment and cutaneous manifestations of dogs and cats with adverse food reactions
8. Critically Appraised Topic on Adverse Food Reactions of Companion Animals (8): Storage Mites in Commercial Pet foods
9. Critically appraised topic on adverse food reactions of companion animals (9): time to flare of cutaneous signs after a dietary challenge in dogs and cats with food allergies

# Systematic Approach to Allergic Skin Disease



## Atopic Dermatitis: Favrot's Criteria

A diagnosis of exclusion... does it fit.....?

**Table 4** Favrot's criteria [5]

	Use	Reliability
Set 1:	• Use for clinical studies and adapt required criteria based on the goal of the study.	• 5 criteria:
1. Age at onset <3 years	• If higher specificity is required, 6 criteria should be fulfilled (e.g., drug trials with potential side effects)	Sens. 85.4 %
2. Mostly indoor	• If higher sensitivity is required, 5 criteria should be fulfilled (e.g., epidemiological studies)	Spec. 79.1 %
3. Corticosteroid-responsive pruritus		
4. Chronic or recurrent yeast infections		• 6 criteria:
5. Affected front feet		Sens. 58.2 %
6. Affected ear pinnae		Spec. 88.5 %
7. Non-affected ear margins		
8. Non-affected dorso-lumbar area		

# Clinical signs in Dogs

- May be seasonal OR non-seasonal
- Pruritus (with or without skin lesions)
- Otitis externa
- Erythema
- Papules
- Bacterial pyoderma
  - Pustules
  - Epidermal collarettes
  - Crusting
- Salivary staining
- Alopecia
- Lichenification
- Hyperpigmentation



# Distribution



**Fig. 9** Silhouettes of atopic boxers, German shepherd dog, golden retrievers, shar peis, Dalmatians, Labradors retriever, French bulldogs, West Highland white terriers and Jack Russell terriers (in this order). Each colour corresponds to the percentage of affected animals (Reproduced with permission from Veterinary Dermatology)

# Clinical signs in Cats

- Clinical signs start between 6 months and 24 months of age in many patients but can occur at any age
- Clinically indistinguishable for feline food allergy
  - Miliary dermatitis
  - Eosinophilic granuloma complex
  - Pruritus
  - Otitis externa
- Can be seasonal or non-seasonal
- Can worsen with environment changes
- Sneezing, asthma, allergic airway disease
- Secondary infections less common than dogs



# Progression of Atopic Dermatitis

- Tends to get worse with time
  - “The atopic march”
- Breakthrough symptoms
  - No longer being controlled by medication
- Immunotherapy only option to stop the progression over time
  - Recommend referral for testing and management



# Summary

? What is an allergy?

📄 Taking a History

✓ Dermatological Examination

📌 Diagnosing Allergic skin disease

Flea Allergic Dermatitis  
Cutaneous Adverse Food Reaction  
Atopic Dermatitis

💊 Treating the symptoms of an allergy

## Pharmacological Treatment for Environmental Allergies by Species

- Cats
  - Immunotherapy
  - Atopica
  - Glucocorticoids
  - (Antihistamines)
  - (Apoquel)
- Dogs
  - Immunotherapy
  - Cytopoint
  - Apoquel
  - Zenrelia
  - Atopica
  - Glucocorticoids
  - (Antihistamines)

And more are coming!



## Treatment: Immunotherapy

---

- Cats and dogs
- Always a good option for all animals diagnosed with environmental allergies
- Can improve all aspects of the allergic condition
  - Pruritus
  - Improves skin barrier
  - Allergic rhinitis/conjunctivitis
- Two testing routes
  - Intradermal skin test versus Serum
    - Depends on many factors which test is selected
    - Serum allergy test IS NOT a test to diagnose atopic dermatitis; immunotherapy purposes only



## Treatment: Immunotherapy

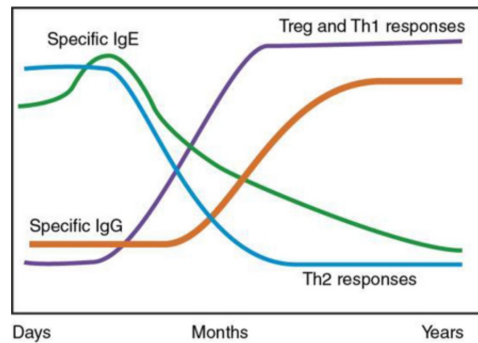
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- Sublingual vs Subcutaneous
  - Similar success rate
  - More important is owner efficacy
- Response
  - Excellent response in 31.5% (controlled alone)
  - Good response in 28.5% (over 50% improvement)
  - Poor response 40.1% (under 50% improvement)
  - Improves to 42.7 (excellent) and 26.6% (good) when regular follow up
- Time to response varies
  - Typically 3-12 months to maximal effect



# Treatment: Immunotherapy

- Mechanism of desensitization poorly understood
- Bypasses normal skin barrier
- Changes the type of immune response to allergen exposure



**FIG. 16.2** The major immunological changes that occur in animals receiving specific immunotherapy. The net effect is a change from a Th2-dominated immune system to a more balanced Treg and Th1 response.

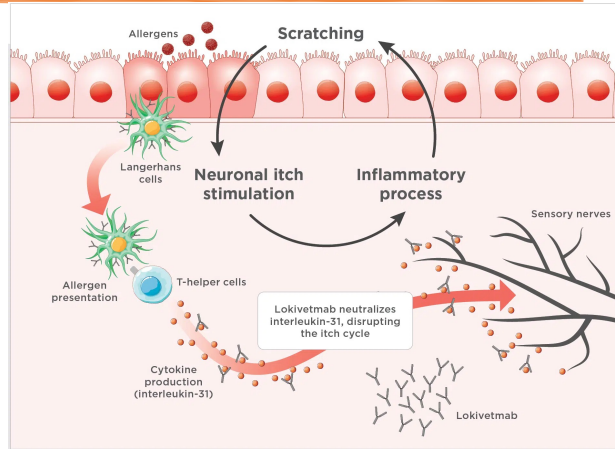
## Cytopoint®; Lokivetmab (Zoetis)

- Dogs only
- Mechanism: caninized monoclonal antibody against IL-31
- Dose: minimum 2mg/kg SQ every 4-8 weeks
- Uses: aids in reduction of clinical signs associated with atopic dermatitis and allergic dermatitis in dogs



# Cytopoint®; Lokivetmab (Zoetis)

- Mechanism: caninized monoclonal antibody against IL-31
  - Caninized means there still is partial murine DNA in antibodies
  - Can lead to host antibody response causing subsequent failure



# Cytopoint®; Lokivetmab (Zoetis)

- Side effects:
  - No incidence of adverse effects over placebo
  - Most common reported side effects are gastrointestinal upset
  - Not for use in dogs with hypersensitivity to Cytopoint

**TABLE 2 Adverse Effects of Lokivetmab<sup>9-11</sup>**

EVENT	FREQUENCY
Injection-site pain	5.1%
Vomiting	7%-15.5%
Diarrhea	3.7%-14.4%
Anorexia	4.9%
Lethargy	6%-9.9%
Lameness	2.1%

# Cytopoint®; Lokivetmab (Zoetis)

---

- Highlights:
  - Very high safety profile
  - Safe with puppies
  - Long lasting
  - Helps ease of compliance for owners
  - Great for dogs with history of sensitive stomachs
  - Can be used concurrently with other medications
- Weakness:
  - Does not prevent inflammation
  - Recurrent pyoderma and otitis externa

# Apoquel®; Oclacitinib (Zoetis)

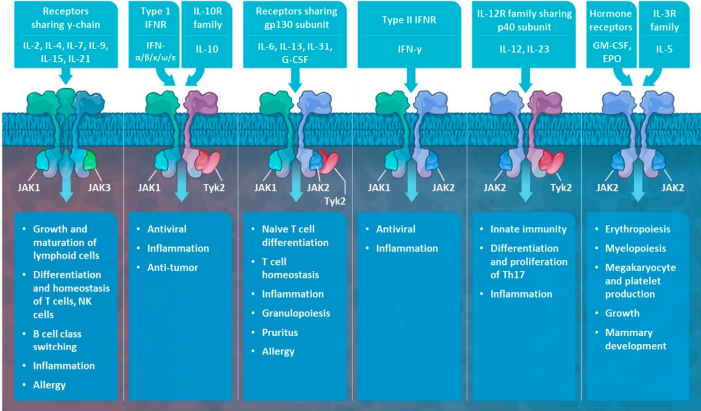
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- Labelled for dogs only
  - Has been used in cats with variable success
    - Higher doses
    - Concern for serious side effects (Neutropenia, Anemia)
- Mechanism: Janus Kinase inhibitor
  - Labelled as selective JAK1 inhibitor
  - Also inhibits JAK 3 to lesser extent
  - Inhibits cytokines IL-2,-4,-6,-13,-31
- Dose: 0.4-0.6mg/kg BID for two weeks, then SID
- Uses: for use in dogs to control pruritus associated with allergic dermatitis in dogs 12 months of age or older



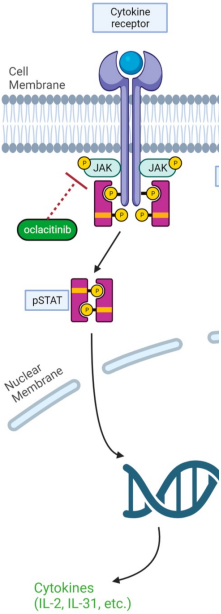
# Apoquel®; Oclacitinib (Zoetis)

• Janus Kinase (JAK)-1 and -3 inhibitor



# Apoquel®; Oclacitinib (Zoetis)

- Janus Kinase are intracellular non-receptor tyrosine kinases that are involved in cellular signals
- Inhibits down stream signaling and cytokine production by the receptor cell



# Apoquel®; Oclacitinib (Zoetis)

---

- Highlights
  - Rapid action
  - Great for diet trials
  - No taper required
  - Fairly high safety profile
  - Flavoured (pork) chews allow for easier administration
- Adverse reactions
  - Gastrointestinal upset
  - Anorexia
  - Lethargy
  - Immune suppression
  - Development of lumps



# Apoquel®; Oclacitinib (Zoetis)

---

- Weakness:
  - Does not significantly prevent inflammation
  - Recurrent pyoderma and otitis externa
- Warnings:
  - Modulates the immune system
    - Can cause recurrence of papilloma warts
    - Recommend blood monitoring
  - Not for use in dogs with serious infections
  - May increase susceptibility to infections and exacerbation of neoplastic conditions

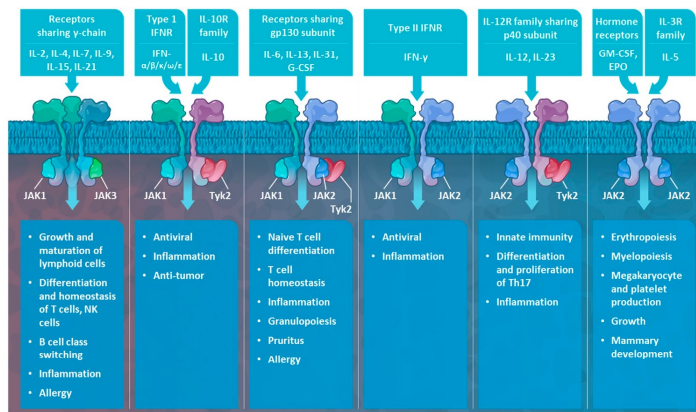
# Zenrelia™; Ilunocitinib (Elanco)

- Mechanism: Non-selective Janus Kinase inhibitor
  - Inhibits cytokines IL-2, -4, -6, -13, -31 and TNF $\alpha$
- Dose: 0.6-0.8mg/kg SID
- Uses: for use in dogs to control pruritus associated with allergic dermatitis in dogs 12 months of age or older



# Zenrelia™; Ilunocitinib (Elanco)

- Janus Kinase (JAK)-1, -2 and Tyrosine kinase (Tyk)-2 inhibitor



# Zenrelia™; Ilunocitinib (Elanco)

- Highlights
  - Rapid action
  - Great for diet trials
  - No taper required
  - Fairly high safety profile
  - May benefit some dogs where Apoquel has not
- Weakness:
  - Does not significantly prevent inflammation
  - Recurrent pyoderma and otitis externa



## Zenrelia™; Ilunocitinib (Elanco)

- Side effects:
  - Similar to Apoquel
  - Mainly gastrointestinal
  - Anorexia
  - Growths
  - Immune suppression
  - Secondary infections

Adverse Reaction	Zenrelia N = 181 Number of Dogs (%)	Placebo N = 87 Number of Dogs (%)
Vomiting or nausea	40 (22.1 %)	14 (16.1 %)
Diarrhea	36 (19.9 %)	9 (10.3 %)
Lethargy	22 (12.2 %)	9 (10.3 %)
Otitis externa	19 (10.5 %)	20 (23.0 %)
Anorexia	17 (9.4 %)	7 (8.0 %)
Dermal growth (e.g., cyst, papilloma)	16 (8.8 %)	4 (4.6 %)
Epiphora or ocular discharge	14 (7.7 %)	1 (1.1 %)
Coughing or wheezing, including respiratory infections	12 (6.6 %)	2 (2.3 %)
Bacterial skin infection	10 (5.5 %)	9 (10.3 %)
Elevated liver enzyme(s)	10 (5.5 %)	2 (2.3 %)
Urinary tract infection	10 (5.5 %)	2 (2.3 %)
Upset stomach, including flatulence and abdominal pain	10 (5.5 %)	0
Leukopenia	9 (4.9 %)	1 (1.1 %)
Sneezing	8 (4.4 %)	1 (1.1 %)
Lipoma	7 (3.9 %)	1 (1.1 %)
Weight gain	7 (3.9 %)	0
Increased water intake	4 (2.2 %)	2 (2.3 %)
Gingivitis (occurrence or worsening)	4 (2.2 %)	0
Blood in stool	4 (2.2 %)	0
Elevated total bilirubin	4 (2.2 %)	0
Elevated triglyceride	4 (2.2 %)	0
Histiocytoma	3 (1.7 %)	0
Increased appetite	3 (1.7 %)	0
Fungal skin infection	3 (1.7 %)	2 (2.3 %)
Weight loss	2 (1.1 %)	1 (1.1 %)
Metastatic neoplasia (i.e., hemangiosarcoma)	1 (0.6 %)	0
Systemic fungal infection	1 (0.6 %)	0
Mast cell tumor	1 (0.6 %)	0

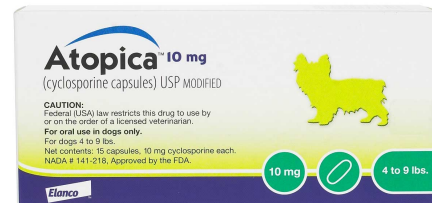
# Zenrelia™; Ilunocitinib (Elanco)

- Warnings:
  - Patients must have completed full course of puppy vaccinations
  - Modulates the immune system
    - Can cause recurrence of papilloma warts
    - Recommend blood monitoring
  - Not for use in dogs with serious infections
  - May increase susceptibility to infections and exacerbation of neoplastic conditions

Adverse Reaction	Zenrelia N = 181 Number of Dogs (%)	Placebo N = 87 Number of Dogs (%)
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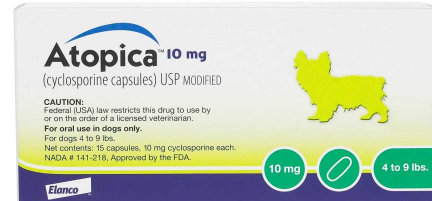
# Atopica®; Cyclosporine A (Elanco)

- Micro-emulsified (modified) Cyclosporine A
- Dose: 5mg/kg SID for 30 days, then taper
- Uses:
  - Control of clinical signs in dogs with atopic dermatitis 6 months of age or older, and greater than 2kg body weight
  - Control of feline allergic dermatitis, miliary dermatitis, eosinophilic plaques and self-induced alopecia in cats 6 months of age and 1.4kg in weight



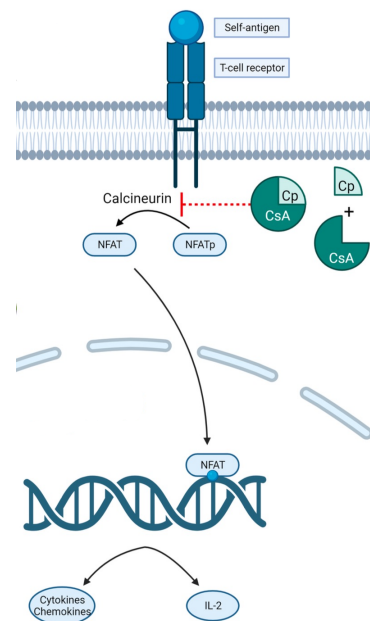
# Atopica<sup>®</sup>; Cyclosporine A (Elanco)

- Mechanism: calcineurin inhibitor; immunosuppressive agent via inhibition of interleukin-2 and other lymphokines secreted by activated T cells
  - Prevents activation of nuclear factor (NFAT) which codes for cytokines
    - IL-2, IL-4, TNF $\alpha$ , INF $\gamma$
  - May inhibit mast cell degranulation and histamine release



- Mechanism:
  - calcineurin inhibitor

## Atopica<sup>®</sup>; Cyclosporine A (Elanco)



## Atopica®; Cyclosporine A (Elanco)

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- Highlights
  - Good option for long term control of more severely inflamed dogs
  - Helps decrease inflammation of the ears
  - Good for patients with concurrent hair loss
  - Can be combined with ketoconazole to lower chance of Malassezia dermatitis and lower Atopica dose
  - Omega 3 fatty acids may be synergistic
  - A potentially safer alternative to allergic control than steroids
    - Lower risk of diabetes, etc



## Atopica®; Cyclosporine A (Elanco)

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- Side effects in dogs:
  - Vomiting, diarrhea, anorexia, hypersalivation
  - Immune suppression
  - Gingival hyperplasia
  - Hypertrichosis (increased hair growth)
  - Psoriasiform lichenoid dermatosis
  - Urinary tract infections



## Atopica®; Cyclosporine A (Elanco)

---

- Side effects in cats:

Adverse Reaction*	Number (Percent) of Cases n = 205
Vomiting/Retching/Regurgitation	72 (35.1%)
Weight Loss	42 (20.5%)
Diarrhea	31 (15.1%)
Anorexia/Decreased Appetite	29 (14.1%)
Lethargy/Malaise	28 (13.6%)
Hypersalivation	23 (11.2%)
Behavioral Disorder (hiding, hyperactivity, aggression)	18 (8.8%)
Ocular Discharge/Epiphora/Conjunctivitis	14 (6.8%)
Sneezing/Rhinitis	11 (5.4%)
Gingivitis/Gingival Hyperplasia	9 (4.4%)
Polydipsia	6 (2.9%)

## Atopica®; Cyclosporine A (Elanco)

---

- Warnings:

- Contraindicated in dogs with a history of malignancy/cancer
- Not for young dogs without adult dentition
- Can affect metabolism of other drugs metabolized by the P450 isoenzyme in the liver
- FIV/FeLV infected cats
- Exposure to toxoplasmosis in cats

## Atopica®; Cyclosporine A (Elanco)

- Warnings:
  - Can affect metabolism of other drugs metabolized by the P450 isoenzyme in the liver

**Table 1.** Drug interactions with cyclosporine.

Drugs that may increase cyclosporine concentrations	
Acetazolamide	Flavonoids in grapefruit juice
Allopurinol	Fluconazole
Amiodarone	Fluoxetine
Azithromycin	Ketoconazole
Bromocriptine	Imapenem
Calcium channel blockers	Itraconazole
Carvedilol	Macrolide antibiotics (Erythromycin, clarithromycin)
Chloramphenicol	Methotrexate
Cimetidine	Metoclopramide
Ciprofloxacin/Enrofloxacin	Metronidazole
Cisapride	Omeprazole
Colchicine	Sertraline
Danazol	Tacrolimus
Digoxin	Tinidazole
Estrogens	
Drugs that may decrease blood concentrations of cyclosporine	
Azathioprine	Phenobarbital
Carbamazepine	Phenytoin
Clindamycin	Rifampin
Cyclophosphamide	Sulfadiazine
Famotidine	Terbinafine
Nafcillin	Trimethoprim
Octreotide	
Drugs that may increase or decrease blood concentrations of cyclosporine	
Glucocorticoids	

## Glucocorticoids; prednisone, prednisolone methylprednisolone, dexamethasone

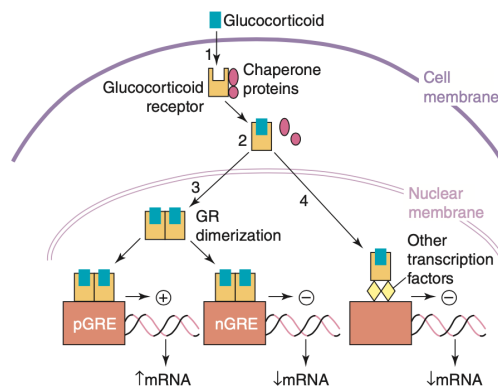
- Different steroids may have different efficacy or side effects for each patient
- Prednisone good first line for dogs, prednisolone good first line for cats
- Cannot use prednisone in cats
  - Reduced ability to convert prednisone into prednisolone
- Dose: Anti-inflammatory dose varies by steroid(prednisone: 0.5mg/kg SID for 2 weeks, then taper for example)



# Glucocorticoids

- Mechanism of action:
  - Bind to glucocorticoid receptors in the cell
  - Enter the nuclear as glucocorticoid + glucocorticoid receptor complexed
  - Interact with DNA and proteins that alter gene expression
  - Multiple ways it affects the genes:
    - Bind directly to DNA causing positive or negative regulation
    - Bind to other transcription factors that affect DNA (Tethering)
      - Binds NF- $\kappa$ B and activator protein-1 inhibiting production of all type of inflammatory cytokines, chemokines and immune adhesion molecules

## Glucocorticoids



**FIGURE 3-9** Mechanism of action of glucocorticoids. (1) Glucocorticoids (GCs) enter cell and bind to glucocorticoid receptors (GRs), which are found primarily in cytoplasm bound to chaperone proteins. (2) Binding of a GC causes release of chaperone proteins and migration of GC-GR complex into nucleus. (3) GC-GR complexes are able to dimerize and bind to glucocorticoid response elements (GREs) in DNA. Binding to a positive GRE (pGRE) promotes transcription; binding to negative GREs (nGREs) decreases transcription of the regulated gene. (4) GC-GR complexes are also able to interfere, as monomers, with transcriptional activating properties of other factors such as nuclear factor (NF)- $\kappa$ B and activator protein 1 (AP-1). (Modified from Lowe AD, Campbell KL, Graves T: *Glucocorticoids in the cat*. *Vet Dermatol* 19:340-347, 2008.)

## Glucocorticoids affect many body systems

**Table 3-6** Antiinflammatory and Immunological Actions of Glucocorticoids

Effects on eosinophils	Decrease formation in bone marrow Induce apoptosis and inhibit prolongation of eosinophil survival and function from IL-3 and IL-5
Effects on lymphocytes and monocytes	Redistribution of lymphocytes to extravascular compartments such as bone marrow Reduce number of lymphocytes and monocytes that bear low-affinity IgE and IgG receptors Decrease serum immunoglobulin levels Decrease all lymphocyte subpopulations with T lymphocytes affected more than B lymphocytes and CD4-positive T cells more than CD8-positive cells Decrease lymphocyte production of IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, and IFN- $\gamma$ Inhibit release of IL-1 and TNF- $\alpha$ from monocytes
Effects on mast cells	May decrease number of mast cells and synthesis of histamine
Effects on neutrophils	Neutrophilia due to release from bone marrow as well as decreased margination and diapedesis of neutrophils into tissues Decreased chemotaxis, adherence, and enzyme secretion
Effects on lipocortin 1	Causes upregulation of lipocortin 1 (phospholipid-binding protein), which has potent antiinflammatory effects Inhibition of phospholipase A <sub>2</sub> Decrease production of arachidonic acid metabolites (inflammatory eicosanoids) from cyclooxygenase and lipoxygenase pathways Decrease production of platelet-activating factor
Decreased vascular permeability	Mechanism unknown
Reversal of reduced $\beta$ -adrenergic responsiveness	Part of this effect is by increasing number of $\beta$ -adrenergic receptors expressed on cell surface
Effects on humoral immunity	Decreased antibody synthesis only after high dose, long-term therapy Reduces degree of suppression of B-lymphocyte proliferation in response to mitogens
Effects on cellular immunity	Decreased antigen survival, uptake, and migration Decreased maturation of dendritic cells Inhibition of transcriptional activators (NF- $\kappa$ B and AP-1) Decreased macrophages expression of some inflammatory cytokines (IL-1, TNF- $\alpha$ ) Increased expression of some antiinflammatory cytokines (IL-10) Decreased T-lymphocyte proliferation in response to mitogens Decreased T-cell activation Decreased T cell cytokines ( IL-2 and IFN- $\gamma$ ) Decreased NK cell-mediated lysis of target cells

## Glucocorticoids

- Uses: Affects multiple body systems, anti-inflammatory agent
- Highlights
  - Fairly fast acting
  - Potent effect for most severe cases
  - Useful in otitis cases
  - Useful in interdigital furunculosis
  - Can help prevent inflammation which predisposes animals to recurrent infections
  - Good anti-pruritus effects
  - Easy to titrate dose

# Glucocorticoids

---

- Side effects:
  - PU/PD, Polyphagia, panting
  - Weight gain/loss
  - Muscle loss
  - Elevated liver enzymes
  - Iatrogenic hyperadrenocorticism
  - Calcinosis cutis
  - Diabetes mellitus
    - More common in cats than dogs
  - Immunosuppression
  - Dermal atrophy
  - Too many cautions to list but most associated with chronic use



# Other commonly used treatments

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- Antihistamines
  - Small or limited benefit in some dogs
  - Possible better response in some cats
  - Warn against decongestion agents
  - Possibly act more as sedative
- CBD oil
  - Improvement in itch possible, but possibly just sedative
  - No improvement in lesions or change in inflammatory cytokines
  - No current legal pathway to prescribe to animals
- Gabapentin
  - Lacks support for anti-pruritic effects



# Antihistamines

- Mechanism of action: Antagonists of H1 and H2 receptors
  - H1 receptors (and to lesser extend H4 receptors) involved in itch response
- First generation tend to be more sedative than second generation

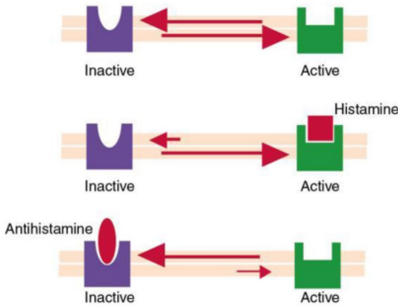
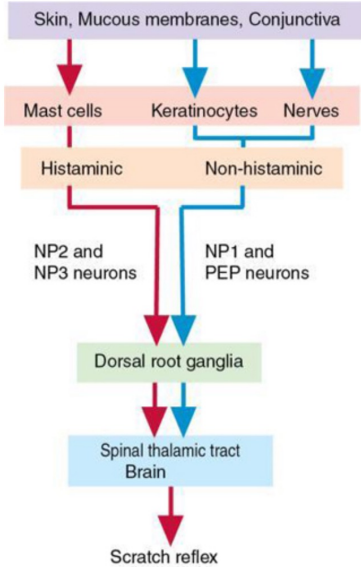
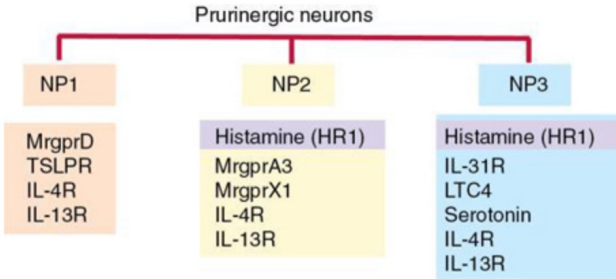


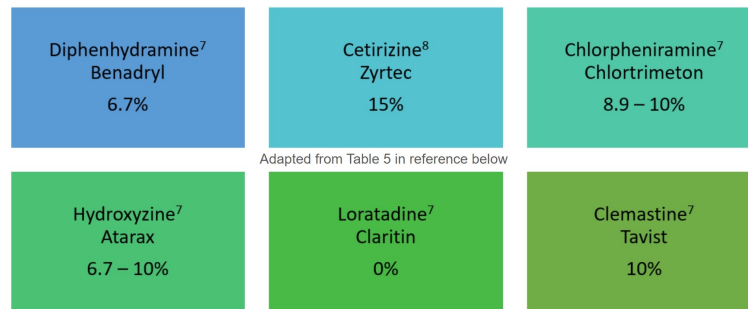
FIG. 17.1 The mode of action of antihistamines. Instead of simply blocking receptors as was once believed, they act as inverse activators. They effectively stabilize histamine receptors in their inactive state and hence prevent their activation.

# Antihistamines



# Antihistamines in Dogs

## What % of Dogs Achieved Satisfactory Control of Pruritus While Receiving an Antihistamine?



Adapted from Table 5 in reference below

7. Scott DW et al. J Small Anim Pract. 1999 Aug;40(8):359-64.  
8. Hsiao YH et al. J Vet Sci. 2016 Dec 30;17(4):549-553.



# Antihistamines in cats

**Table 8.** Responses to antihistamine treatment in 164 cats with feline atopic skin syndrome (FASS)

Antihistamine (number of cats evaluated)	Dose	Responses <sup>†</sup>			References Type of study	QOE
		Good– excellent– marked	Partial– moderate– fair	Poor–mild		
Loratidine (n = 46)	5 mg/cat once daily for 14 days	4%	17% <sup>o</sup>	79%	Ravens et al 2014 <sup>31</sup> ReSt Scott et al 2015 <sup>51</sup> Case series	3 2
Cetirizine (n = 19)	1 mg/kg once daily for 28 days	0%	11%	89%	Wildermuth et al 2013 <sup>63</sup> RCT	1
Cetirizine <sup>9</sup> (n = 32)	5 mg/cat once daily for 14 days	9%	16%	75% <sup>†</sup>	Griffin et al 2012 <sup>36</sup> Case series	2
Cyproheptadine HCl (n = 20)	2 mg/cat twice daily for 14 days	45%	0	55%	Scott et al 1998 <sup>45</sup> Case series	2
Chlorpheniramine (n = 37)	2 mg/cat twice daily for 14 days	70%	0	30% <sup>‡</sup>	Miller and Scott 1990 <sup>37</sup> Case series Scott and Miller 1995 <sup>44</sup> Case series	2
Clemastine fumarate (n = 10)	0.34 mg/cat twice daily for two weeks, then 0.68 mg/cat twice daily for two weeks	50%	0	50%	Miller and Scott 1994 <sup>38</sup> Case series	2
Mean outcomes		36%	6%	58%		

# Antihistamine Dose

**Table 8-3** Antihistamines used for trials with atopic dermatitis

Name	Dog Dose	Cat Dose
amitriptyline	1-2 mg/kg every 12h	0.5-1 mg/kg every 12h
cetirizine	1 mg/kg every 24h	5 mg/cat every 24h
chlorpheniramine	0.4 mg/kg every 8-12h	2-4 mg/cat every 12h
clemastine	0.05-0.1 mg/kg every 12h	0.68 mg/cat every 12h
cyproheptadine	0.3-2mg/kg every 12h	2 mg/cat every 12h
diphenhydramine	2.2 mg/kg every 12h	2.2 mg/kg every 12h
loratadine	1 mg/kg every 12h	

# Topical Therapy

- Too many options to delve into
- A great option to supplement the effect of systemic options and reduce the need for systemic medications
- Maintenance Bathing
  - Can physically remove allergens, reduces scale build-up, treat/prevent infection
  - Chlorhexidine products, Anti-fungal shampoo
- Improve skin barrier
  - Help restore the altered skin barrier in allergic dermatitis
- Topical anti-inflammatory medications
  - Steroids sprays
    - Hydrocortisone preferred for maintenance use due to higher safety, lower systemic absorption

## Summary of Medication

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- There is no one right medication for each case
- Explain to owners that these medications do not work in every patient- may sometimes be a trial and error
- Understand the benefits and limitations of the medications available
- If medications are not effective, re-evaluate the underlying cause

## When to refer

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- Conflicting clinical signs/further investigation
- Unresponsive to treatment
- Severely affected animals or refractory cases
- Interest in pursuing immunotherapy
- Resistant infections
- Progressive ear disease



## Final keys to success with dogs with Atopic Dermatitis

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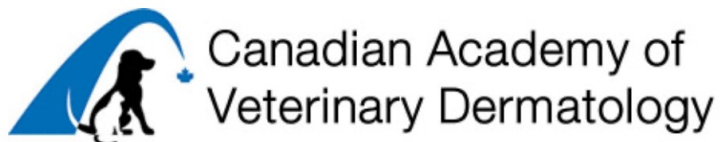
- Schedule enough time for appointment if possible
- Try to manage expectations
  - Lifelong condition that tends to get worse
  - No cure but can be successfully managed
  - Cannot remove animals from environment
- Have available handouts
  - Many available on CAVD website
- Follow up with owners



## Additional Resources

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- Canadian Academy of Veterinary Dermatology
- CAVD.ca
  - Webinars
  - Handouts for clients
  - Critically appraised reviews and research in veterinary dermatology
  - Consensus guidelines



## Additional Resources

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- World Association for Veterinary Dermatology
- WAVD.com
  - Huge database for continuing education
  - All different types of free lectures/webinars from world leading specialists
  - Consensus guidelines
  - Proceedings from the world congress meetings



PROMOTING THE WORLDWIDE ADVANCEMENT OF VETERINARY DERMATOLOGY

## Additional Resources

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VETERINARY PRACTICE GUIDELINES

### 2023 AAHA Management of Allergic Skin Diseases in Dogs and Cats Guidelines

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#### ABSTRACT

These guidelines present a systematic approach to diagnosis, treatment, and management of allergic skin diseases in dogs and cats. The guidelines describe detailed diagnosis and treatment plans for flea allergy, food allergy, and atopy in dogs and for flea allergy, food allergy, and feline atopic skin syndrome in cats. Management of the allergic patient entails a multimodal approach with frequent and ongoing communication with the client. Obtaining a comprehensive history is crucial for diagnosis and treatment of allergic skin diseases, and the guidelines describe key questions to ask when presented with allergic canine and feline patients. Once a detailed history is obtained, a physical examination should be performed, a minimum dermatologic database collected, and treatment for secondary infection, ectoparasites, and pruritus (where indicated) initiated. The process of diagnosing and managing allergic skin disease can be prolonged and frustrating for clients. The guidelines offer recommendations and tips for client communication and when referral to a dermatologist should be considered, to improve client satisfaction and optimize patient outcomes. (*J Am Anim Hosp Assoc* 2023; 59:■■■■-■■■. DOI 10.5326/JAHA-MS-7396)

# Additional Resources

Olivry et al. *BMC Veterinary Research* (2015) 11:210  
DOI 10.1186/s12917-015-0514-6

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**CORRESPONDENCE**

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## Treatment of canine atopic dermatitis: 2015 updated guidelines from the International Committee on Allergic Diseases of Animals (ICADA)



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Questions?

