

Bio-Medical Services  
**PET ALLERGY**  
**CLINIC REFERENCE GUIDE**

# I. ALLERGY FACTS: WHAT IS ALLERGY?

Each year approximately 50 million Americans suffer from allergy, a type of immune hypersensitivity which includes asthma, rhinitis and food allergy. More Americans than ever are suffering from allergies. The occurrence of allergies in our pets mirrors that which occurs in human allergies, and incidence is rising each year. Animals, just like people, can suffer allergic reactions to a wide variety of environmental substances, or allergens. Research has shown that the immunologic mechanisms underlying allergy in our companion animals (dogs, cats and horses) are essentially the same as in humans.

The word “allergy” originated from two Greek words meaning “altered reactivity.” In today’s lexicon, allergy is used to describe a condition of hypersensitivity to a substance that is otherwise considered harmless to most animals or people. The substances that trigger allergy are called allergens, and include:

- Pollens
- Dust mites
- Molds
- Dander (animal and human)
- Insect bites
- Fibers
- Foods

Exposure to these substances, by physical contact, ingestion or inhalation, causes the body’s immune system to overreact and produce antibodies to attack the invading allergens. The most common manifestations of allergic disease include:

- Dermatologic symptoms (atopic dermatitis)
- Respiratory symptoms (allergic rhinitis, asthma)
- Gastrointestinal symptoms (adverse food reactions, food allergy)
- Ocular symptoms (conjunctivitis)

## Heritability: Allergies are an Inherited Trait



Allergies are an inherited trait and lifelong disease, the result of an immune system imbalance. The tendency to develop allergies is a dominant genetic trait. When one parent is allergic, there’s an increased likelihood that his/her offspring will also be allergic. Allergies are not curable, but they can be managed with

immunotherapy treatment, medications that treat symptoms and avoidance.

- If neither parent is allergic, the chance of developing allergies in offspring is about 15%.
- If one parent is allergic, the risk increases to 30%.
- If both parents are allergic, the risk is greater than 60%.

Dog breeds with a pre-disposition for atopic dermatitis:

Boston Terrier  
Boxer  
Bull Terrier  
Cairn Terrier  
Chihuahua  
Chinese Shar-Pei  
Cocker Spaniel  
Dalmation  
English Bulldog  
English Setter  
German Shepherd  
Golden Retriever  
Gordon Setter  
Irish Setter  
Jack Russell Terrier  
Labrador Retriever  
Lhasa Apso  
Miniature Schnauzer  
Pug  
Scottish Terrier  
Shih Tzu  
West Highland White Terrier  
Wirehaired Fox Terrier  
Yorkshire Terrier

# Understanding Allergic Disease

## Canine Atopic Dermatitis

Canine allergic disease (atopy) often presents as skin disease, or canine atopic dermatitis (CAD). Atopy can be defined as an inherited predisposition to develop IgE-mediated hypersensitivity to substances present in the indoor and outdoor environment, resulting in reactions such as eczema (atopic dermatitis), chronic urticaria, allergic rhinitis and asthma. The clinical signs of atopic dermatitis are pruritus, characterized by intense itching, redness (erythema), face rubbing, feet chewing and constant licking. These often result in hair loss, chronic ear infections and secondary infections.

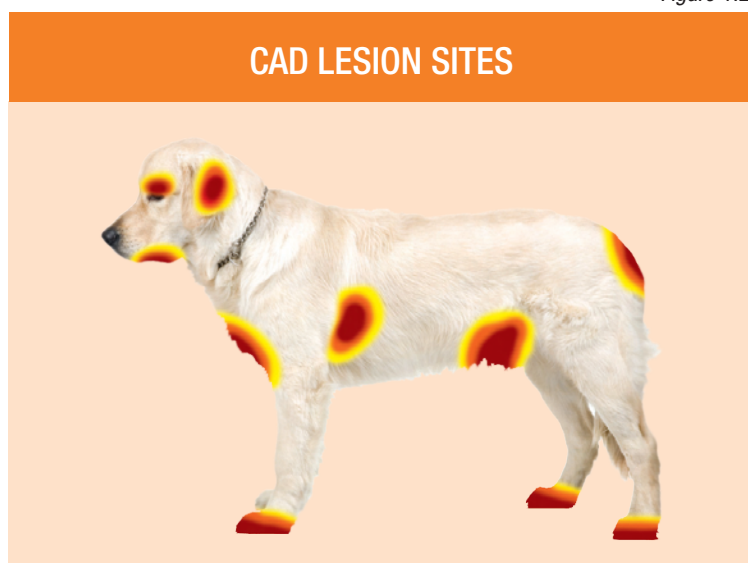
The progression of allergic disease is complex, and depends on many factors:

- Accumulation of environmental allergen exposure over time
- Inheritance of an autosomal dominant genetic tendency<sup>1</sup> to produce allergen-specific IgE
- Impaired barrier function in the skin
- Altered cellular immune responses
- Secondary bacterial and yeast infections
- Self-induced trauma

Figure 1.1

CLINICAL FEATURES OF CANINE ATOPIC DERMATITIS
<ul style="list-style-type: none"><li>• Pruritus</li><li>• Alopecia</li><li>• Chronic or relapsing dermatitis</li><li>• History of licking, chewing, biting or scratching</li><li>• Erythema, generalized</li><li>• Periocular erythema with or without conjunctivitis</li><li>• History of recurrent pyoderma</li><li>• History of recurrent yeast otitis</li><li>• Salivary staining on areas affected by dermatitis lesions</li><li>• Lichenification or hyperpigmentation of the skin</li><li>• Persistent or recurrent acral lick granulomas</li></ul>

Figure 1.2



## Feline Atopic Dermatitis

Cats, like dogs, also experience atopic dermatitis, though the understanding of feline atopic disease is more limited. As in humans and dogs, feline AD has a genetic component, characterized by increased incidence when there is a family history of the disorder.<sup>2</sup> Allergy to flea bites is the most common cause of allergic dermatitis in cats. Cats with AD, like dogs, exhibit heightened IgE responses to environmental allergens.<sup>3</sup> Many cats with underlying flea allergy, atopy or food allergy present to the clinic with eosinophilic granuloma complex (EGC), an inflammatory skin disease characterized by lesions that tend to occur around the mucocutaneous regions (oral cavity, eyes) or footpads. EGC lesions may include ulcers, raw, thickened skin or granulomas infiltrated with high numbers of eosinophils.

House dust mites are a predominant allergen in cat AD; more than 80% of cats have detectable IgE specific for *Dermatophagoides farinae*, one of two common house dust mite species. Feline atopy is under-diagnosed, because a common symptom of AD in many cats is over-grooming, which is easily mistaken for normal behavior or mild anxiety.

FELINE ATOPIC DERMATITIS	
<ul style="list-style-type: none"><li>• Genetic component</li><li>• Flea allergy is primary</li><li>• Elevated IgE responses/altered T cell function involved in disease development</li></ul>	<ul style="list-style-type: none"><li>• Respiratory symptoms (asthma) more common than in dogs</li><li>• Over-grooming indicative of underlying atopy</li><li>• Eosinophilic granuloma complex reflects underlying hypersensitivity</li><li>• Environmental and food allergens involved</li></ul>

## Equine Atopic Dermatitis and RAO

Allergic dermatitis is one of many inflammatory skin disorders affecting horses. The epidermal layer of horse epithelium has high numbers of mast cells that degranulate when activated, resulting in typical symptoms of dermatitis: pruritus, urticaria, erythema and crusting or flaky lesions. In a recent study, horses with urticaria had significantly more IgE-bearing cells in the sub-epidermal dermis than control horses.<sup>4</sup> Simple contact with an irritant such as a bit, or other horse tack items, can cause skin irritation.

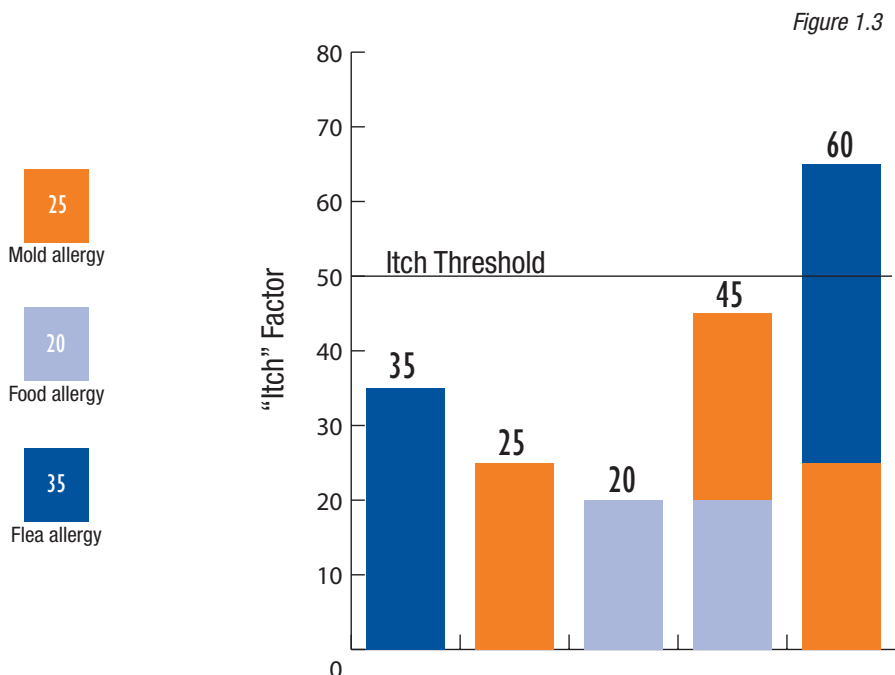
Prevalence of equine allergic dermatitis is not well defined, but likely occurs in about 5% of horses. Insect bite hypersensitivity is predominant, primarily due to biting midges (*Culicoides spp.*), gnats, mosquitoes, house flies and horse flies. Pollen allergens (grasses, trees and weeds, commonly found in pastures) and allergens common to barn environments (molds, storage mites, cat and mouse epithelia) also contribute to the etiology of equine AD.

A more complex form of allergy in the horse is an inflammatory lung condition known as Recurrent Airway Obstruction (RAO), formerly called Chronic Obstructive Pulmonary Disease (COPD). Also known as heaves, RAO is caused by immune system overreaction in susceptible animals to inhaled contaminants, most commonly mold spores found in barn dust and hay feed. Summer pasture heaves is a variant form of RAO affecting horses in warm climates; causative allergens are heat-loving molds and grass/weed pollens found in grazing pastures. Both IgE-mediated and delayed type hypersensitivities contribute to RAO; overproduction of inflammatory cells (neutrophils) is a key contributor to disease pathology. Cellular infiltration into the lung causes increased mucus production and subsequent narrowing of the airways. Allergy can also be the cause of head shaking, sneezing and chronic nasal discharge in some horses.

## Pruritic Threshold: The Summation Effect

The point at which a pet begins to itch and scratch indicates a summation of events, each of which contributes independently to the cascade of itchy discomfort that the pet is experiencing. This is called the pruritic threshold, or clinical threshold.

Pruritic thresholds are uniquely different in each animal. The summation effect explains why an animal who is allergic with low-level dermatitis to one or two mold allergens can appear to be completely normal, until she develops a new allergy to fleas. Taken separately, the flea or mold allergy may not cause her enough discomfort to “scratch,” but the summation effect of the two allergies together may cause her to reach a clinical threshold, where her discomfort manifests in clinically noticeable symptoms; she begins scratching.



Since most canine allergen exposure occurs percutaneously through direct contact with the skin, sensitization can occur even when pollens aren't in season.

## Itch is Cumulative



## Co-Factors in Atopic Dermatitis

Atopic dermatitis is a glucocorticoid-responsive disease. However, if secondary bacterial and yeast infections are also present, glucocorticoid therapy alone is unlikely to alleviate all of the clinical symptoms. Therefore, a history of unsuccessful previous treatment with glucocorticoids does not rule out a diagnosis of atopic dermatitis.

The classic age of onset of clinical signs is somewhere between one and three years of age. Symptoms may be seasonal or non-seasonal; dogs that initially present with seasonal clinical signs may develop non-seasonal atopy over time. Owners may not be aware of this, but careful review of medical records may reveal the pattern. Breed predisposition is another important historical clue.

## Secondary Staphylococcal Infection

Dogs with AD often have concurrent staphylococcal bacterial skin infections, mostly *S. intermedius*. Most clinicians would agree that staphylococcal infections can cause inflammation and mild to severe pruritus even in normal dogs, independent of atopic dermatitis.

The preponderance of evidence-based medicine suggests a complex and close interrelationship between staphylococcal infection and atopic dermatitis.

- Higher numbers of staphylococcal organisms are found on the skin of atopic vs. normal dogs. Bacterial organisms are concentrated in the cornified upper layer of the epidermis, the stratum corneum,<sup>5</sup> known to be defective in dogs with atopy.
- Dogs with recurrent superficial pyoderma secondary to atopic dermatitis have significantly higher serum levels of anti-staphylococcal IgE than healthy dogs, or dogs with other kinds of pyoderma.<sup>6</sup>
- In humans with AD, staphylococcal exotoxins function as “superantigens” and are major contributors to the induction and maintenance of allergic responses. Superantigens are powerful inducers of polyclonal T-lymphocyte activation and amplification of skin inflammatory responses.<sup>7</sup>

The clinical importance of staphylococcal infection in atopic dogs cannot be overstated. Early detection and treatment of staphylococcal infections, along with vigilant, continuous infection control are absolutely critical to the successful lifelong management of AD in the dog.

## Secondary Yeast Infection

*Malassezia* is unique. A yeast, it is the only fungal species that is part of the normal cutaneous flora in humans and other mammals.<sup>8</sup> *Malassezia* is commonly found in a wide range of animal species; it is a commensal organism that causes no harm to the host. Common sites are on the skin, interdigital spaces, ear canals, inguinal and ventral neck areas.

However, *Malassezia* can cause disease in animals with defects in the skin that allow it to become an opportunistic pathogen. Atopic animals with defective epidermal barrier function are particularly susceptible to inflammatory skin disease caused by pathogenic *Malassezia* infection.

*Malassezia pachydermatis* is the yeast species found in dogs. It is estimated that 50% of *Malassezia* dermatitis in dogs is associated with underlying allergy. *Malassezia* has been shown to induce immediate hypersensitivity in dogs with AD; higher serum levels of IgE specific for *Malassezia* antigens have been documented in atopic compared with non-atopic dogs, or in dogs with *Malassezia* dermatitis alone (animals with no evidence of concurrent atopic dermatitis).<sup>9</sup>

Cats also experience *Malassezia* dermatitis, or otitis, although the problem appears less generalized than in dogs. Evidence for yeast-induced inflammatory skin disease in the horse is scant, although *Malassezia* dermatitis has been documented in mares in the intermammary region of the ventrum.<sup>10</sup>

Significant improvement occurs in many AD patients following systemic anti-fungal (azole) or other drug treatment of yeast infection without any other intervention, illustrating that control of secondary *Malassezia* infection is absolutely critical to successful long-term management of animals with atopic dermatitis.

### DOG BREEDS WITH AN INCREASED RISK OF DEVELOPING MALASSEZIA DERMATITIS

- |                      |                   |                |                               |
|----------------------|-------------------|----------------|-------------------------------|
| • Australian Terrier | • Cocker Spaniel  | • Maltese      | • Shetland Sheepdog           |
| • Bassett Hound      | • Dachshund       | • Newfoundland | • Springer Spaniel            |
| • Chihuahua          | • German Shepherd | • Poodle       | • West Highland White Terrier |

### CLINICAL SIGNS OF MALASSEZIA DERMATITIS IN DOGS

- |            |                     |                              |                   |
|------------|---------------------|------------------------------|-------------------|
| • Alopecia | • Greasy coat       | • Increased scale production | • Pruritus        |
| • Erythema | • Hyperpigmentation | • Lichenification            | • Seborrheic odor |