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Allergic Inhalent Dermatitis
in the Canine

by
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Summary
A dog with allergic inhalant dermatitis presents a diagnostic and therapeutic challenge to the veterinarian. The patient exhibits intense pruritus often accompanied by scratching, foot licking, face rubbing, sneezing, and lacrimation. The occurrence of signs is often seasonal and is usually first seen in the second or third year. Allergic inhalant dermatitis is an immediate type of allergic hypersensitivity mediated by the skin sensitizing antigen, IgE. The allergen, or sensitizing agent, usually pollen, mold or dust, enters the body via inhalation. Allergic inhalant dermatitis has a high hereditary tendency and may persist for the life of the patient. Diagnosis is based on carefully taken history, results of intradermal testing, and response to therapy. Allergic inhalant dermatitis can be controlled by avoidance of the allergen, by medical treatment, or by biological treatment. It cannot be ‘cured’.

Introduction
The veterinary clinician is often presented with pruritic patients. In fact, most dermatologic conditions are characterized by scratching as the earliest clinical manifestation. All too often the clinician is tempted to resort to corticosteroid therapy in lieu of an orderly and complete diagnostic workup. Corticosteroids will frequently provide temporary relief from the itching but unless the primary cause is uncovered and treated specifically, the patient will continue to itch when taken off steroids or will suffer the side effects or consequences of long term corticosteroid therapy.

Allergic inhalant dermatitis (AID) is but one of many causes of pruritus. Ectoparasites such as Cheyletiella and Sarcoptes should always be considered as possible causes of pruritus. Contact dermatitis or ‘prickle’ dermatitis from soaps, synthetic rugs, rug cleaners, wool products and straw are also common causes of pruritus. Bacterial skin infections manifested as superficial pyoderma, folliculitis, furunculosis or associated with generalized demodectic mange are also pruritic (10). Extensive and carefully taken history and routine as well as special tests are necessary to differentiate AID from other conditions.

Discussion
AID is a form of atopy, a term coined by Coca and Sulzberger in 1922 to denote a familial type of allergy. Atopy is an immediate type of hypersensitivity or allergic reaction seen in man and lower animals. Approximately ten percent of humans are atopic and dogs are presumed to be similarly predisposed. The percentage of atopic dogs will increase since it is a highly inheritable condition. Chamberlain (9) estimates fifteen percent of the canine population to be atopic and lists no particular breed predispositions. Kirk and Muller (14) list breed predilections for wire-haired terriers, Dalmations, West Highland white terriers, and poodles. Lorenz (13) lists the Dalmation, wire-haired fox terrier, Scottish terrier, Irish setter, and poodles. The toy and terrier breeds seem most commonly affected but it has been reported in most purebred breeds as well as in mixed breeds.

AID is only one of a number of allergic diseases affecting the canine, but is unique in that the allergen is inhaled and initiates...
an immediate hypersensitivity reaction manifested clinically as a dermatitis in the dog. The antigen responsible for the allergic state is a protein with a molecular weight of 10,000 or greater. The antigen may be seasonal, including pollens of grasses, trees, flowers, weeds and ragweed, or nonseasonal such as housedust, kapok, feathers, wool, and animal danders. The antibody responsible for the allergic reaction belongs to the IgE class of immunoglobulins and is known as reagin or skin sensitizing antibody. IgE is a homocytotropic antibody manufactured by plasma cells and bound to circulating basophils and tissue mast cells. The homocytotropic antibody has a special affinity for the skin, i.e., skin is the target organ or "shock tissue". The respiratory system and the gastric mucosa may be secondary target organs in the canine allergic reaction. When the cell bound antibody comes in contact with circulating antigen it causes degranulation of the mast cells and liberation of vasoactive amines such as histamine, serotonin, kinins and Slow Reactive Substance (SRS), heparin, and proteolytic enzymes. These in turn cause smooth muscle contraction, capillary dilatation, and increased capillary permeability. The clinical signs of allergy develop immediately after this reaction occurs and are due to the effects of the vasoactive amines and proteolytic enzymes. The early signs are edema, erythema, and pruritus. The areas most frequently involved with swelling, redness, and itchiness are the feet (especially between the toes), around the eyes, the ears, the groin, and the perineal area. Secondary excoriations may be seen from scratching the chest, ears, and axillae. Chronic paw licking may lead to reddish discoloration of the feet in white dogs. Hyperhydrosis may accompany and enhance the itchiness and paw licking. Conjunctivitis, epiphora, blepharitis and otitis are frequently observed. The signs may commence within ten minutes after exposure to the allergen (15), and continue until the allergen is removed from the dog's environment.

For an individual to develop hypersensitivity, previous exposure to the allergen is essential. The initial exposure causes antibody production and sensitization of the animal. Upon subsequent exposure, the allergen reacts with the specific antibody to cause the allergic reaction. An allergic dog seems predisposed to develop allergies to things which are present in his environment for a long time. The reaction may be seasonal at first, but as the patient ages and adds new allergies to the existing ones, the disease may progress to a continuous affliction which makes diagnosis more difficult (14).

Probably the single most important aspect of making an accurate diagnosis in an allergic patient is an accurate history. Question the client about onset of itching, when it is worst, previous medications, and response to treatment. Inquire about the patient's diet and environment, especially where he sleeps. Also find out if the owners themselves or any other pets itch. Ragweed allergy in the dog was first described in 1959 by Patterson (15).

Ragweed and other pollenoses have been documented by many individuals since then. The National Pollen Calendar is published in several texts (9,14) and regional pollen guides are available from Hollister-Stier Laboratories or Center Laboratories. Weekly and daily pollen counts are posted locally and are valuable in correlating the onset of pruritus with the pollination of various plants. Nonseasonal or perennially pruritic patients are more likely to be hypersensitive to an allergen found indoors such as house dust, feathers, kapok, wool, or any materials from which household furnishings are made. If the itching starts early in the spring before pollination of plants, then molds should be suspected as the allergen. The regional fauna of molds varies considerably and the species indigenous to Iowa may not be found in other states. Mites found in house dust, such as Dermatophagoides spp., have been shown to be allergenic in the dog (9). Multiple allergies develop as the dog ages and leads to a perennial pruritus with seasonal exacerbations (14).

Once a tentative diagnosis of allergic inhalant dermatitis has been made, allergy testing may be employed to confirm the diagnosis and determine the allergens responsible. Allergy testing by itself does not provide a diagnosis, but must be
correlated with clinical signs and history. The optimal time for allergy testing is when the IgE, or reaginic antibody is at the highest concentration in tissues and clinical signs are most severe. Prior to testing, the inflammation and excoriations from scratching should be controlled so the test areas are free of irritation. This must be accomplished without the use of either corticosteroids or antihistamines. Soaking baths of tar or colloidal oatmeal are often beneficial (10). All immunosuppressive drugs, tranquilizers, phenothiazine derivatives, theophylline, atropine, and sympathomimetic amines should be withheld for at least ten days. If possible, no anesthesia or sedative should be used but meperidine hydrochloride (Demerol® Winthrop), thiamylal, or a short-acting anesthetic may be used if the patient is uncooperative.

There are several methods described that may be used to test for allergic reactions. The method used may depend upon the areas involved, the severity of the condition, the sensitivity of the patient, and the clinician’s preference. The available methods are:

1. Intradermal testing
2. P-K (Prausnitz-Kustner)
3. Scratch test
4. Pin prick test
5. Modified prick test
6. Conjunctival test
7. Nasal and conjunctival smears
8. Patch test
9. Provocative exposure

Properly performed, the intradermal technique is the most reliable and reproducible of all the skin testing techniques used. It has the disadvantage of being technically the most difficult, but has the advantages of good quantitative and qualitative control and is more easily read. The antigens commonly used at the ISU Teaching Hospital for intradermal and scratch testing are:

1. Mixed tree pollen extract
2. Mixed grass pollen extract
3. Tall and short Ragweed pollen extract
4. Mixed weed pollen extract
5. Mixed mold extract
6. Inhalants (orris root, silk, kapok, pyrethrins)
7. Mixed epidermals (feathers, wool, and horse, dog, and cat epidermals)
8. Extract of house dust
9. Saline control

These antigens were selected because they are indigenous to central Iowa. They were obtained from Center Laboratories, Inc., Port Washington, New York. A concentration of 1000 protein-nitrogen units (PNU) per ml is used for scratch testing; 0.05 ml is used for each test. The technique for testing has been described by Chastain (10). It must be emphasized that a diagnosis of AID is not made on the results of skin testing alone. Clinically normal dogs will react to the allergens with or without previous exposure. Skin testing is used after the diagnosis is made in order to demonstrate the specific allergens responsible for the clinical signs.

Interpretation of the results of intradermal and scratch tests must be correlated with the history and physical examination since hypersensitivities may coexist with other causes of pruritus. If the dog itched only in the spring but reacted only to ragweed pollen, the results would not be valid, since ragweed pollinates only in August and September. Positive reactions indicate present, past, or future clinical hypersensitivities, cross reactions with a similar antigen, excess concentration of test antigen, subclinical hypersensitivity, contamination of the test antigen, or dermographia (extremely sensitive skin).

Allergic inhalant dermatitis can be controlled by avoidance of the allergens, by medical treatment, and by biological treatment. When multiple allergens are involved, treatment is difficult.

The most effective way to control allergic conditions encountered in small animal practice is by preventing exposure of the animal to the substance which provokes the allergic state (9). For example, if ragweed pollen is shown to be the allergen, the client is instructed to keep the patient indoors, preferably in airconditioning or in an electrostatically filtered environment, during the pollen season of August and September, to keep the patient out of fields where ragweed grows, or move to a non-pollen area during the height of the ragweed season. These last two suggestions
are hardly feasible since ragweed grows in all 50 United States, Mexico, and Canada. Ragweed is a prolific pollen producer with each plant estimated to produce one billion grains and one square mile producing sixteen tons of pollen. It is highly airborne and detected at altitudes exceeding 10,000 feet; pollen counts in large cities, miles from the nearest plant, are very high during the pollen season. A permanent change of location does not greatly help the patient with multiple pollenoses since he soon develops sensitivities to allergens in the new location and after a temporary improvement will relapse.

If the patient is allergic to wool, removal of all wool carpeting, rugs, clothing, and furniture from the home would be beneficial but rarely feasible. Or, as in the case of dust allergy, keep the patient in one room without furniture or drapes, with a frequently mopped tiled floor, and filtered air. If an allergen such as feathers is responsible, then removal of all feather pillows from the dog's environment would alleviate the symptoms.

Medical treatment is most popular and takes two routes: topical and systemic. Since the primary complaint is pruritus, topical treatments are aimed at soothing and relieving the itch. Medicated baths reduce the inflammation and clean the skin. Colloidal baths such as colloidal oatmeal are absorptive, cleaning, and antipruritic. Tar baths, wet dressings, and lotions are also antipruritic. It is not uncommon for animals with AID to develop secondary contact sensitivities to various topical medications (1) so care must be taken to avoid overtreatment with lotions and baths. For patients with very short or sparse hair coats, topical creams of 0.5 to 1.0% hydrocortisone acetate may be effective, but application of creams to dogs has obvious drawbacks.

Three types of drugs have been used systemically to treat AID. Tranquilizers may reduce the urge to itch but only sedation will eliminate the itching so these should be avoided.

Antihistamines have long been used in man for the control of allergic diseases but their value in the canine is extremely limited. The rationale is based on the belief that the vasoactive amine histamine is released from mast cells following an antigen-antibody reaction. The free histamine interacts with histamine receptors to exert its effects; these can be blocked by antihistamines. But histamine release is a very minor part of the dermatological manifestations of AID and antihistamines are reported to bring very negligible results (1, 11). However, some antihistamines have other pharmacological effects, such as central nervous system depression and sedation, which may have some benefit in reducing the urge to itch. They may be beneficial in reducing the self mutilation induced by excessive scratching in some cases of extreme pruritus (9).

Corticosteroids are definitely the most widely used group of drugs for the symptomatic treatment of allergic diseases of small animals. Although they are of proven efficacy for the management of AID and other allergic conditions, they must be used with caution since their misuse may lead to severe side effects, most notably iatrogenic hyperadrenalcorticism. Although the exact mechanism of action in tissue is not known, their anti-inflammatory effects are probably of primary importance. The ability of the steroids to inhibit inflammation may involve a stabilization of cell membranes. This action would prevent the disruption of lysosomes and prevent the release of inflammatory substances contained within these cellular organelles. This membrane stabilizing effect may also be important in inhibiting the disruption of mast cell granules and the release of vasoactive substances such as kinins and Slow Reactive Substance (SRS). Steroids also stabilize the membranes of blood vessels to prevent the increased capillary permeability and edema. In addition, steroids decrease the synthesis of skin sensitizing antibody, IgE, by plasma cells.

The type of corticosteroid and the dosage must be selected to meet the needs of the individual patient. Repositol corticosteroids should not be used in the long term management of pruritus. An effort should be made to find the lowest dose that will alleviate the itching; the dosage will vary with the individual, the environment, and the season. A daily divided dose of about 0.25 to 0.50 mg per lb. for forty to sixty days will usually be adequate for a seasonal
pollenosis (13), such as ragweed hypersensitivity. If the pruritus is present for longer periods, alternate day dosages or regimens of three days on and three days off are effective. These regimens of therapy minimize the chance of adverse side effects even when used for years (14), but periodic check-ups and white blood cell differentials to monitor the patient are recommended. Prednisolone, prednisone, and hydrocortisone are used routinely. Repeated communication with the client is essential in order to adjust the dosage to eliminate the pruritus. At the end of the allergy season the drug should slowly be tapered off since abrupt withdrawal could lead to an exacerbation of the allergic syndrome.

A third method of management of AID is through hyposensitization. As early at 1939 it was demonstrated that hyposensitization could be used successfully in the treatment of seasonal pollenosis in dogs (3), but it hasn’t been used widely in veterinary medicine until recently. Successful hyposensitization is dependent upon accurate, specific diagnosis, the type of product used, the injection schedule, and dosage.

Hyposensitization is accomplished by injecting therapeutic allergens at intervals with a slightly increased dosage on subsequent treatments. The rational and immunological principle is that when the specific allergens are injected parenterally, they cause the production of an IgG antibody or blocking antibody that is specific for the antigen but is not cell bound as is IgE. The blocking antibody then combines with the natural antigen, preventing it from binding to the cell bound IgE and thus preventing the allergic response (9). IgG will not initiate an enzymatic reaction when in the presence of the offending antigen (11).

An accurate diagnosis must be made through history, physical examination, and skin testing to determine the exact allergens responsible. If it is a case of multiple allergens, hyposensitization is futile; with many allergens involved and the predisposition of the patient to develop new allergies, an alternate approach should be taken.

Therapeutic allergens are available in aqueous vehicles which require about 20 injections. Alum precipitated extracts such as Allypral® (Dome Labs, West Haven, Conn.), a pyridine extracted aqueous antigen suspended in saline, require only 8-10 injections. The large particle size and relatively slow rate of absorption provide for prolonged stimulation of the immune system. Therapeutically effective dosage levels can therefore be attained with fewer doses. A third type of vehicle is repository, such as mineral oil, but is not advisable because of the possibility of abscess formation. Aqueous extracts in propylene glycol are reported to be very effective (9).

The dosage and injection schedule used will vary with the patient but is essentially an increase in concentration of allergen over many weeks and booster injections as indicated by the clinical response. Treatments with up to six antigens have been reported to give 60 to 72% good to excellent responses (9). Treatment failures are attributed to the use of the wrong extract, impotent extracts, or inadequate dosage.

An important aspect of treatment is client education. He must understand the nature of his pet’s disease that has been diagnosed and that a cure is impossible. Only by avoiding the allergens responsible and minimizing contact with all of them, will the itching stop.

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Iowa State University Veterinarian
Otitis Externa and Surgery

by

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Otitis is defined as an inflammation of the ear. There are three recognized types of otitis corresponding to inflammation in the various parts of the ear. Otitis externa is an inflammatory disease of the external ear canal. An inflammatory disease of the middle ear is otitis media and of the inner ear is otitis interna. These three diseases can be seen alone, but if left untreated or improperly treated, disease in one location will lead to involvement in the other areas, as they communicate.

The number of otology cases greatly exceeds the yearly number of cases in ophthalmology, orthopedic surgery, urology and neurology (13). Some dogs are more prone to ear problems because of their heredity, including breed and anatomy, their environment and their activities. Breed susceptibility is difficult to accurately determine because of varying breed popularity with location and time. The most commonly afflicted breeds are poodles, Spaniels, Retrievers, German Shepherds and terriers (5). Predilection for otitis is associated with pendulous ears, long hair on the pinna and hair within and around the external auditory meatus, a predisposition to various allergies or to those who enjoy being in the water and swimming.

The most frequently seen ear problem in dogs is otitis externa. It is most frequently seen in dogs from 1-2 years of age, but is common from 1-4 years (9). There is no apparent correlation of occurrence with sex, relative humidity or month of the year, although the highest number of cases are treated in the summer (9). The tendency to ignore dogs that scratch at their irritated ears results in more chronic than acute cases being presented which are usually bilateral.

Etiology

The causes of otitis externa are numerous but often go undiagnosed. Knowing the etiology speeds recovery because the proper treatment can be used initially. Causes include foreign bodies, parasites, trauma, allergic skin diseases, general infections, bacteria and fungi.

Grass awns, bugs, dirt, matted hair, water and dried wax are foreign objects commonly found in the ear canal. When the canal is occluded, a continuously moist, warm, dark chamber is created that is ideal for bacterial propagation. Shed epithelium, cerumen and other debris, especially in an ear canal filled with hair, are sources of

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