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# Atopic skin disease – diagnosis and treatment

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**ABSTRACT:** Atopy is an allergic skin disease that is often seen in general practice. This article discusses the aetiology of the disease on a cellular level. The exclusion process of diagnosis is discussed in depth, including diagnostic skin tests, food trials and intradermal skin testing. Finally, methods of treatment are examined.

## Pathogenesis

Atopy is a skin disease seen fairly often in small animal practice. In Muller and Kirk's *Small Animal Dermatology* (2001), atopy is defined as, 'A genetically programmed disease of dogs in which the patient becomes sensitised to environmental allergens that in non atopic animals create no disease'.

Atopy is the result of a type I hypersensitivity reaction. This type of reaction occurs when an allergen is absorbed percutaneously, possibly through a defect of the epidermal barrier.<sup>1</sup>

The allergen is absorbed by a Langerhan's cell situated in the basal layer of the epidermis. The Langerhan's cell travels to the lymph nodes, where helper T-cell lymphocytes become sensitised to the allergen.

Sensitised helper T-cells release cytokines (chemical messengers) to B-lymphocytes and plasma cells, which in turn produce allergen-specific immunoglobulin E (IgE). IgE acts as an antibody to the allergen – specifically the protein within the allergen. IgE coats mast cells in the skin, which, when the allergen is next introduced,

causes the mast cells to degranulate, leading to inflammation. It is at this point that we start to see skin changes (**Table 1**).

When mast cells degranulate, histamine is released, along with heparin, proteolytic enzymes, prostaglandins and other inflammatory mediators. These chemicals cause vasodilation and increased capillary permeability. What we see is redness and swelling. What the animal feels is pain, heat and pruritus.

To alleviate its discomfort, the animal begins to lick, chew and scratch. Thus secondary lesions develop. The self-trauma leads to more inflammation and, therefore, the animal continues to abrade and lacerate itself.

Excoriations and erosions appear, eventually becoming infected, leading to a secondary pyoderma or an opportunistic yeast infection. A variety of lesions, such as pustules and epidermal collarettes, begin to appear. If untreated, eventually, the skin will become thickened, hyperpigmented and even lichenified (**Figures 1 & 2**).

## Diagnosis

When a dog is presented after a period of continuous self-trauma, it is essential that

**TABLE 1** A dermatological glossary

Alopecia – loss of hair coat
Excoriation – scratch
Erosion – loss of epidermal skin layer
Epidermal collarettes – a secondary lesion caused by ruptured pustules
Hyperpigmented – Increased pigment (colour) to the skin
Lichenification – thickening of skin
Pruritus – itchiness
Pyoderma – skin infection, often including pustular lesions



Figure 1. Note the erythema and alopecia along the flank as well as the hyperpigmentation and lichenification of the axilla



Figure 2. Chronic inflammation has led to alopecia, hyperpigmentation and lichenification



the dermatology consultation begins with a detailed history. The secondary lesions created by self-trauma and, possibly, infection make it extremely difficult to ascertain the original cause of the skin disease.

It is important to elicit a clear record of the patient's ectoparasite control, including the use of environmental treatments by the owner. Factors such as contact with other animals – both inside and outside the house – where the animal sleeps, contact with any chemicals (carpet freshener, for instance), diet, vaccination status and endoparasite control should all be discussed.

The BSAVA *Manual of Dermatology* gives an example of a history-taking sheet that can be used in a dermatology consultation.<sup>2</sup>

Most 10-minute consultations will not allow for a thorough dermatological history to be taken, so it is useful for the

nurse to obtain a history prior to the consultation with the veterinary surgeon. A history sheet can be sent to the owner a few days before the consultation or a nurse can meet with the client directly prior to the appointment.

Another option is for clients requesting an appointment for a skin condition to be given double appointments.

## Ectoparasites

One of the most common questions asked by dermatologists is, 'Is it an itch that scratches, or a scratch that itches?' In other words, what came first – the lesions or the pruritus? Unfortunately, most owners won't know the answer to this question, so the long road to diagnosis must begin.

As mentioned previously, the very first factor to rule out is an ectoparasite infestation (Figure 3). So the owner must be asked to provide details of the type of flea control he or she uses and how the product is applied.

Figure 3. Parasite infestations should be ruled out first



A great deal of treatment failure is the direct consequence of a lack of knowledge of how to use a product.<sup>3</sup> Show the client how to apply the product and have them demonstrate it back to you to ensure that the product is actually reaching the skin of the affected pet. In some cases, it might be worthwhile to book the pet in for a monthly nurse clinic to have its ectoparasite treatment applied accurately by a nurse.

Although owners may need some persuasion that fleas are a problem, parasite control should be dispensed at the first consultation. If necessary, distributing coat brushings on to a wet paper towel is an easy method of providing evidence of flea infestation.

Other ectoparasites should also be investigated. Tape strippings should be performed for the surface mite *Cheyletiella* and skin scrapings should be performed for *Sarcoptes scabiei* and *Demodex* (Figures 4 & 5).

Hair pluckings are also a good method for collecting *Demodex* mites. While *Demodex* infestation does not generally cause pruritus, a secondary infection caused by these mites can be very pruritic.

Ideally, all parasitic investigations can be undertaken during the initial consultation. Samples can be collected with the client present and examined later, easing the pressure on the consultation schedule. Regardless of the diagnosis, a multi-pharmaceutical antiparasitic agent, such as Advocate (Bayer), should be dispensed along with an environmental spray. Clear instructions on how to use the spray should be given, both verbally and in writing.



Figure 4. Performing tape stripping to collect surface mites such as *Cheyletiella* spp



Figure 5. Skin scrapes to eliminate the possibility of mites



## Secondary infection

After eliminating the possibility of the skin damage's being caused by ectoparasites, the veterinary surgeon must consider how secondary infection may be contributing to the pruritus and self-trauma.

Tape strips should be taken for cytology, by applying Sellotape to affected areas – this often includes between the toes, the ventrum, the axillae and inside the pinnae. The strips are then dipped in rapid stains (Diff-Quik, Dade Bering) (Figure 6).

Five dips in each pot are adequate, with a quick rinse on the back of the slide. Once dry, the slide is examined under an oil immersion lens for bacterial cocci, rods, neutrophils and *Malassezia*. Some practices prefer to send their cytology to external laboratories, but qualified nurses are certainly capable of identifying basic bacteria and yeast.

## Initial treatment

Once the presence of a secondary infection is confirmed – together with whether that infection is of bacterial or yeast origin – treatment can commence.

## Topical

Many surface infections can be treated with an antibacterial, antifungal shampoo – chlorhexidine and miconazole (Malaseb, Dechra) being one treatment option.

Clients should be instructed in detail on how to use shampoo effectively, including information on the correct contact time, frequency of baths and thorough rinsing technique. If there is some doubt as to the client's ability to follow the instructions, it may be better for a nurse carry out the treatment to ensure that it is performed properly.

Figure 6. Rapid stains for creating cytology slides



## Oral

In the case of heavy bacterial or yeast infections, oral treatment may also be necessary. A broad-spectrum antibiotic, such as cephalexin, is usually chosen but, if it is not effective within a short term, then a swab for culture and antibacterial sensitivity should be done.

A heavy yeast burden can be treated with oral antifungals (ketoconazole, for example) although it may be prudent to perform appropriate pre-medication blood tests before commencing treatment with antifungal therapy.

Client compliance must be assured, as treatment not given is not effective! Skin infections generally require treatment for at least one week after an apparent clinical cure.<sup>4</sup>

## Further investigation

Eliminating any ectoparasitic, bacterial or yeast infection should make the pet a great deal more comfortable. But if a cure has not yet been effected, it will be necessary to continue with the exclusion criteria to isolate the initiating cause.

## Endocrine disease

If the animal is middle-aged, it is often worth taking a blood sample for biochemistry analysis as abnormalities in the profile may point towards an endocrine disturbance.

Hypothyroidism in dogs can manifest with alopecia and thickened skin. Secondary pyoderma, demodicosis and ear disease can also occur with this endocrinopathy. Diabetic and hyperthyroid cats may also show signs of skin disease (Figure 7).<sup>5</sup>

Blood tests are also useful in establishing the pet's overall health status before



prescribing medications that may prove burdensome to the liver or kidneys.

At this point in the investigation, an ectoparasite burden, infection and endocrinopathies have been eliminated. It may have taken several diagnostic tests – and certainly more than one consultation – to get to this level of diagnosis. So it is important that the client is informed at the beginning of the process that skin problems can take some time to unravel.

Emphasis on the fact that finding the cause will save the owner money in the long run does help them develop patience with the diagnostic process. Just treating the symptoms will not resolve the problem if you are dealing with an atopic patient.

### Food trial

A food trial is the penultimate step in the diagnostic process. Some clinicians will choose to start a food trial at the first consultation as an effective trial should be six to eight weeks in length.<sup>6</sup>

Novel protein and carbohydrate sources must be used for a food trial. A home-cooked diet can be utilised but it would involve a great deal of work for the owner and hypoallergenic diets with hydrolysed protein (Hills z/d, for instance) are a simpler option.

Some insurance companies will pay for the cost of the diet if the food trial is clearly described as a diagnostic aid. During the food trial, the chosen food and water may pass the dog's or cat's lips and nothing else! The client will need a great deal of support in order to comply with this tall order! Frequent telephone calls from a dedicated nurse who is tasked with supporting the owner are highly recommended.

If improvement occurs with the food trial, it is likely that the animal does have a food allergy and the process of re-introducing other foods can begin in order to identify which food leads to a recurrence of clinical signs. Once the offending food item is identified it can be avoided and, hopefully, the animal will lead an itch-free life.

### Intradermal skin testing

Reaching this stage in the diagnostic ladder means that the patient has been identified as suffering from atopy, although the allergen (or allergens) has not yet been identified. If the owner has the 'stamina' to continue, the process of identifying the specific allergens which are causing the allergic response can begin.

The 'gold standard' for allergy identification is intradermal skin testing (IDST). This process involves injecting a negative control (saline) and a positive control (histamine) – and then several allergens.

If an injected allergen creates a reaction in the form of a wheal – greater than the mean between the negative and positive controls – then the animal can be deemed to be allergic to that substance. IDST measures the degranulation process of the mast cells.

Serology testing, where serum is taken and measured for IgE levels, is less accurate because the individual's mast cell degranulation cannot be assessed.<sup>1</sup>

### Further treatment

Once the specific allergens have been identified, treatment can begin!

### Avoidance

Common allergies are to dust and storage mites (*Dermatophagoides pteronyssinus*, *D. farinae*, *Acarus siro*) and many dogs are allergic to grasses and pollens. Avoidance of these by reducing the environmental level is one method of treatment.

Dogs allergic to dust benefit from homes with less carpeting and minimal soft furnishings (leather upholstery is approved). The pet's bedding should be washed weekly on a high temperature. Frequent vacuuming and dusting may help alleviate symptoms somewhat.

Storage mites can be controlled by freezing the pet's food and keeping it stored in tightly-sealed containers. Pollen and grass allergens can be reduced by wiping down the pet's coat with a damp sponge after exposure. Regular shampooing may also be of assistance.

Total avoidance, however, can never be accomplished, so a variety of treatment modalities will be needed. Ectoparasite treatment must be rigorously maintained,

Figure 7. Pinnal alopecia in cats can indicate an endocrinopathy; blood tests should be included in your work up



Figure 8. Food trials are an important part of an allergy work up





keeping the general allergen load down ensures that the pet is less likely to become sensitised to additional allergens.

Some clinicians will also recommend a low-allergen diet in order to reduce the allergen level further.

### Hyposensitization

Hyposensitization treatment involves creating a vaccine from the allergen to which the pet is sensitive. The individual is given injections on a prescribed schedule as a loading dose and then monthly throughout its life.

While 'allergy shots' do not eliminate clinical signs completely, they do decrease the need for additional treatment modalities.

### Essential fatty acids and antihistamines

Essential fatty acids (EFAs) – omega 3 (fish oils) and omega 6 (evening primrose oil) – are useful in reducing inflammation. While clients can mix their own EFAs using cod liver oil and evening primrose oil, using veterinary products is advisable to ensure accurate dosing.

EFAs used in conjunction with antihistamines can have a synergistic effect. It may take a few attempts to find the antihistamine most appropriate for each patient, but there are several from which to choose. Each product should

be given on a 10- to 14-day trial period with the owner being made aware that the side-effect of drowsiness will wear off after three to four days.<sup>7</sup>

### Immunosuppressants

The administration of immunosuppressants may well be considered.

### Cyclosporin

Cyclosporin (Atopica, Novartis) is an immunosuppressant agent that has been used successfully in atopic dogs for several years now. Dogs should have a blood test prior to treatment to assess liver and kidney function and should be monitored closely for side effects. Precautions need to be taken around the time of vaccinations.

### Corticosteroids

It is unlikely that the use of corticosteroids will be avoided when treating the atopic pet. Given at low doses on alternate days, prednisolone can be highly effective in treating inflammation and reducing self-trauma. Controlled dosing can reduce side-effects but owners should be educated regarding the possible side-effects and the pet closely monitored throughout treatment.

## Conclusion

Unfortunately, atopy is a progressive disease that can only be managed, not cured. The veterinary nurse can fulfil

a valuable role by educating the client on the treatment regimen and ensuring treatment compliance.

The veterinary nurse should keep abreast of new therapies with a view to helping the veterinary surgeon develop individualised treatment programmes for each affected patient. [vni](#)

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