

# ALLERGY FLOWCHART DOG

Imagine an **itchy dog** coming into your practice, what is the best way to deal with this case? How would you prioritise your diagnostic testing? The enclosed flowchart demonstrates decision making cascade used for patients with pruritus. This text is meant to assist you in making the best choices. Most important in working up an itching patient is to ask for an accurate medical history and anamnesis. One of the most important questions is:

**What started first?** The pruritus or the skin lesions?

If the pruritus has been the first symptom and you observe secondary skin lesions, it is very likely the patient is suffering from an allergy (pruritus sine materia). In these cases you may see secondary infections and skin lesions because of the itching, biting, and scratching of the animal. In contrast, if the disease starts with a skin problem which begins to itch in the course of time most often you have to deal with a non-itching skin disease. These non-itching skin diseases (e.g. demodicosis) develop itching after some time due to secondary infections and thus may mimic allergies at first sight.

Depending on the results of the clinical examination and medical history you first decide whether ectoparasites (ectoparasites: YES) are likely of primary concern or not (ectoparasites: NO).

If ectoparasites are the most likely differential (**ectoparasites: YES**) the following aspects and parasites should be considered:

## **Sarcoptes:**

*Sarcoptes scabiei* var. *canis* infestation is an important and rather common differential diagnosis to a suspected allergic skin disease. If you see the following clinical signs in your patient, you should always consider scabies as possible cause:

- severe pruritus
- the owner or other dogs are affected as well
- papules ventrally, elbow, hocks
- scaly, crusty ear margins
- generalised lymphadenopathy
- positive pinnal-pedal reflex

It is always important to obtain the following additional information in these cases:

- contact to other pruritic dogs?
- history of a stay in an animal shelter/animal hostel?
- walks in the forest (mangy fox)?
- do human family members also have pruritic skin lesions?
- source from which the dog was obtained (animal shelter, pet shop or unknown origin)?

**For diagnosis** you can perform a *Sarcoptes* serology, a *Sarcoptes* PCR, a superficial skin scraping or you can initiate a diagnostic treatment (careful: MDR1 sensitivity). If the pruritus disappears after the treatment is completed, scabies was the most likely reason for pruritus.

## **Cheyletiella**

This disease is typically seen in puppies and younger animals. It is highly contagious and can affect dogs, cats and other small pets, as well as human beings. These mites do not dig, but live on the skin in dead danders. If you see white, dry scales with or without pruritus, especially on the back of the animal, you should primarily consider a cheyletiella dermatitis.

- white scales dorsally
- other animals or humans affected

The best **detection** method is microscopic examination of adhesive tape and/or diagnostic treatment. Due to the high contagiousness, all animals that live in the household should be included in the therapy regime.

### Demodicosis PLUS secondary bacterial infection

Hair follicle mites (*Demodex canis*) are transmitted during the first day after birth due to direct contact between bitch and the newborn puppies. The mite can therefore also be found in low numbers in healthy animals. In dogs that have an impaired immune system (e.g. stress situations, puppies or adult dogs with severe systemic disease) you can see higher rates due to reproduction of the mites in the hair follicles. The clinical picture of this disease, seen mostly in young dogs and puppies, is characterised by alopecic, often circular skin lesions in the face and on the front limbs. These skin lesions can go along with (in case of simultaneous secondary bacterial infections) or without pruritus. They are mainly benign and heal spontaneously in younger dogs (self limiting). In cases of generalised demodicosis in adult dogs with alopecia, scales, danders, follicular casts and comedones widespread over the body. In these cases, it is important to search for an underlying disease. Any situation that severely weakens the immune system of the dog can result in an excessive reproduction rate among the mites, causing a generalised demodicosis. Demodicosis is not transmittable – except transmission from bitch to new born puppies.

- alopecia, scales, crusts, follicular casts, comedones

For **diagnosis** a deep skin scraping or Demodex PCR can be used to detect the mites. Cytology should be performed as well in order to identify a possible bacterial component.

Cases with generalised demodicosis should be expected to require long-term treatment – which should also include an adequate antibacterial therapy and a continued search for the underlying cause.

### Other ectoparasites

- *Otodectes cynotis* is a mite which induces the formation of thick, brown crusts in the ears. These mites mostly remain local. Rarely they are also found on the neck, croup and tail. This disease is known to be highly contagious and is associated with severe pruritus and is mostly found in young animals.
- Harvest mites (*Neotrombicula autumnalis*) are seen as small orange spots mostly on the paws of pets and can also lead to severe pruritus.
- The poultry mite (*Dermanyssus gallinae*) is mainly seen in poultry and bird farms. The larvae mainly parasitise their hosts at night, causing severe itching. Detection of the mites is difficult since they are rarely seen on the host. Severe pruritus due to poultry mites can also be seen in animals with contact to affected stables/animals.
- Adult fleas (*Ctenocephalides felis*) live on the dog and also place their eggs there. After some time the eggs fall to the ground and then remain in the environment of the dog. The larvae hatch, move away from the light and remain in carpets, under upholstered furniture or in cracks in the floor. The larvae become pupae which are the most resistant stage in the development of the fleas. They can remain in this stage for up to one year depending on the environmental conditions. If the pupae are activated, e.g. by vibrations in the ground, the flea emerges from of the pupa. Directly after emerging, the flea searches for its host. If there is no animal available, the fleas will also bite human beings to get blood. Because only the adult flea lives on the animal and all of the other stages live in the environment, it is very important to treat the surroundings (e.g. flat, car, bedding of the animal) in addition to treating the dog.

### Ectoparasites: NO

You first need to decide whether there is an infection or not. Then you have to consider the following diseases:

### Infection: YES

#### Malassezia:

*Malassezia pachydermatis* is a yeast which often causes skin lesions and pruritus. Massive ear infections or yellowish, fatty, scaly skin lesions mainly on the neck and paws are most commonly observed. Infections are also associated with a typical yeasty smell. This kind of infection is very often secondary due to other various underlying diseases.

- yellowish, fatty scales

**Diagnosis:** The infection with yeast can be detected by cytology, a culture or in rare exceptional cases with the help of histology. Malassezia-antibodies (IgE) are detected with the Fcε-receptor test, which also detects sensitization due to yeast.

**Treatment:** apart from the topical +/- systemic symptomatic treatment the underlying reasons for the infection need to be determined, controlled, and treated if possible. ASIT (allergen-specific immunotherapy) with *Malassezia* extract can be considered as well.

## Bacterial infections

Due to colonisation of the hair follicles with bacteria like *Staphylococcus pseudintermedius* you can see pruritic skin lesions like papules, pustules, collarettes, scales, and crusts. If you have a chronic disease, the skin becomes thickened, hyperkeratotic and darkly pigmented (lichenification). Secondary hair loss may result from infection of the hair follicles. Most often a bacterial infection of the skin will occur secondarily due to various primary underlying diseases.

- scales, collarettes
- papules, pustules

**To diagnose** a bacterial infection of the skin you can run either cytology and/or bacterial culture. If the patient shows recurring infection, it is also possible to detect staphylococcus antibodies.

Due to the increasing detection of MRSA/MRSP, antibiotic sensitivity testing or a PCR for differentiation is prudent.

**Treatment:** the infection should primarily be treated systemically as well as topically with an adequate antibiotic. Afterwards, you will need to diagnose, control, and treat the primary reason responsible for the secondary bacterial infection. In some cases of chronic recurrent pyoderma, the use/application of a staphylococcal vaccine may be useful.

## Dermatophytosis

A fungal infection can lead to various clinical signs: primarily "classical" fungal infections, in which the patient shows circular, hairless and scaly lesions. In this context you will also find danders, follicular casts, diffuse alopecia, etc. If the animal also has a secondary bacterial infection, the pet will also develop pruritus. Never try to diagnose a fungal infection based solely on the clinical presentation because there is no such typical picture. A fungal culture (DTM) or Dermatophytes PCR is obligatory for diagnosing a fungal disease. A positive Wood's lamp test or a trichogram can provide information but should not be used for ultimate diagnosis.

**Treatment:** systemic and topical treatment of all affected and contact animals is absolutely necessary.

## **Infection: NO**

Other reasons for pruritus:

### Autoimmune

Autoimmune diseases can be associated with pruritus. In these cases, cytology may reveal suspicion of e.g. pemphigus foliaceus. Histological examination of a skin biopsy is usually necessary for a final diagnosis.

### Others

Neoplasia of the skin (e.g. lymphoma) be associated with severe pruritus. In these cases, cytology can provide an approximate diagnosis. The final diagnosis should be confirmed with the help of histological investigations.

In all diseases mentioned above, pruritus should disappear after successful treatment. If pruritus still persists despite treatment, you should proceed as described below:

If pruritus still persists:

Allergic diseases are the most common cause. The utilization of the flowchart is very helpful for diagnosis of an allergy. The medical history is critically important for establishing the order of differential diagnoses.

### Adverse reactions to food/food intolerance

In the case of food allergies, allergic reactions to one or more components of the food are possible. The pet can develop severe pruritus with different clinical pictures at any time during its life. Itching and scratching (self trauma) can lead to secondary infections of the skin.

- pruritus: generalised or exactly like atopic dermatitis or flea dermatitis allergy
- chronic recurring otitis externa

- animals at all ages can be affected (including very young or old ones)
- gastrointestinal signs (diarrhoea, vomitus, flatulence, obstipation, frequent defecation) as an additional or only clinical sign

Adverse reactions to food can appear even without a food change for the dog and even if it has been fed the same food for many years. Puppies and even older dogs, that have been fed the same food for many years, can have a sudden onset of food allergy.

The **diagnosis** of a food allergy is a clinically estimated diagnosis. An elimination diet with subsequent provocation trials is state of the art to confirm the diagnosis and identify the allergens responsible for clinical signs. You can also use a serological food allergy test ("Food Allergens Basic", "Food Allergens Extended" or "Food Allergens Exotic"), which detects IgE and IgG antibodies to various food components. Ingredients that have not provoked antibodies are considered to be safe for feeding as part of an elimination diet..

- single allergen detection of IgE and IgG antibodies to food ingredients

According to the test results you will recommend an **elimination diet**. During that time, which should last for minimum of 2-3 months, the dog is only allowed to be fed a specific diet. At first it may be advisable to feed a self-prepared home cooked diet and later on to use hydrolysed or hypoallergenic diets which are only available from the veterinarian. It is very important that the ordered diet is strictly followed. Only small amounts of other food (cat food, chewing bones, treats, etc.) can ruin the effect of the elimination diet, and you have to start the whole trial from the beginning again.

- strictly feeding one type of protein and one type of carbohydrate
- at least 2-3 months
- no treats, chewing articles, etc.
- no flavoured drugs!

If the clinical signs do not disappear while strictly feeding an elimination diet, you should consider atopic dermatitis next.

### **Fleas/flea allergy**

In general, you have to distinguish between flea infestation and an allergic reaction to fleas. Flea allergy dermatitis is one of the most common allergic skin diseases. The flea bite brings the animal in contact with flea saliva, and this can lead a sensitization. This type of allergy does not depend on the number of fleas parasitising the dog. Even a low number of fleas can lead to allergic reactions because of their saliva. These affected dogs show severe pruritus and skin lesions, especially on the backside of the body which means the croup, the tail and on the hind limbs. It is therefore important to strictly and consequently provide flea prophylaxis, because any flea biting can lead to the development of typical skin lesions.

- flea allergy versus flea infestation
- backside of the body; mainly croup and base of the tail

To **diagnose** this kind of disease, you combine observation of typical clinical signs, appearance of fleas or flea faeces, a serological test for detection of IgE to flea antigen (Fcε-receptor test) or diagnostic treatment.

If the pruritus still persists after strict elimination diet and consequent flea treatment, you should then consider atopic dermatitis as a possible differential diagnosis.

### **Atopic dermatitis (AD)**

Atopy is known as an allergy to pollen, dust mites or moulds. The main clinical sign is pruritus with age of onset between 6 month and 3 years. Preferred areas of pruritus are face, ears and paws. Atopic dermatitis always starts with pruritus without any skin lesions (pruritus sine materia), but due to the continuous scratching secondary skin lesions usually are observed. These skin lesions are mostly superinfected with yeast and/or bacteria resulting in more and more itching. Primarily this type of allergy is seen during certain months of the year (seasonal variability), but over the course of time it can also become perennial.

- pruritus sine materia
- paws, limbs/extremities, head, otitis
- seasonal variability
- good response to cortisone
- mostly onset between 6 months and 3 years of age

To **diagnose** atopic dermatitis you need to determine the medical history and clinical signs (clinical diagnosis). To identify the causative allergens you can either perform an intra-dermal skin test or run serological tests (Fcε-receptor test). If you use serology, a so-called screening test may be an alternative to start with. This test analyses groups of various allergens like mites, pollen, moulds and flea saliva. Depending on the outcome of the screening test, you can continue with the main tests to identify the single allergens. It is possible to start with main tests right away as well. We offer a seasonal panel (single allergen detection to grass, weed and tree pollen), a perennial panel (single allergen detection to moulds, dust and storage mites), an insect panel (single allergen detection to various insects) and a feather/hairs/epithelium panel (single allergen detection to various feathers and epithelia). Other panels such as Mediterranean panel and hymenoptera are also available.

In the event of negative results, you have to ask the following questions:

- was the animal pre-treated at the time of testing (cortisone)?
- was the test performed at the wrong time point (no exposure to the causative allergen)?
- is it possible that the patient is suffering from an atopic-like disease (intrinsic type, which means that you cannot detect allergen-specific IgE antibodies)?
- do we have the wrong clinical diagnosis?

If you have positive results in the allergy test that correspond with clinical signs and medical history, the best choice of **management/treatment** would be to avoid the causative allergens. If this is not possible, you should strongly consider an allergen-specific immunotherapy (ASIT, hyposensitization).

Hyposensitization is carried out by injecting the pet subcutaneously with those allergens to which it has reacted positively in the allergy test and which correlate with history and clinical signs. It is important to stick to defined injection intervals and increasing concentrations. In 70% of the affected dogs we register excellent success using this type of treatment.

- allergen extract, includes positive tested allergens
- if there is a good response to the ASIT, the animal should be treated for the remainder of its life

It is important to understand that allergies are not curable. The disease is, however, controllable e.g. by life-long therapy. Optimum management and very good owner compliance are crucial for success.