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Canine pruritus – approaching the itch!

Pruritus is common in the dog and can be triggered by various stimuli, the intensity of which is modified by stress and other cutaneous sensations. A systematic, diagnostic approach should be adopted in order to determine underlying cause(s) and appropriate therapy. Principal differentials include ectoparasitic infestation and allergic skin disease. Specific and non-specific therapeutic options are considered.

Key words: Pruritus, dog, allergy, skin, atopy

Introduction

Pruritus is very common in the dog. It has been defined as an unpleasant sensation that provokes the desire to scratch. Licking, chewing, biting, rubbing, scooting and head-shaking are also manifestations of pruritus. Severity varies considerably: sarcoptic mange is typically very pruritic, whereas cheyletiellosis may be asymptomatic (Fig 1). Pruritus in allergic skin disease varies from dog to dog, from one part of the body to another, and even in the same dog, from minute to minute (Miller, Griffin, Campbell, 2013).

Pruritus can be triggered by localised, systemic, peripheral or central stimuli. Its intensity is modified by stress factors such as boredom or anxiety, and cutaneous sensations such as heat and cold, touch and pain, which act selectively on a gate-control regulatory system (Goldsmith, 1991). Dog owners often report pruritus to be greatest at night or during periods of inactivity when other sensory input is low.

Precise underlying pathways and mechanisms involved in triggering pruritus are unclear although inflammatory mediators are thought to be involved (Ikoma, Steinhoff, Ständer, 2006). Histamine has been considered the typical mediator in canine allergic disorders but administering histamine to dogs does not result in pruritus, and response to antihistamine medication is often poor (Nuttall, 2013). One specific cytokine, interleukin 31, (IL-31), has recently been found to induce pruritus in dogs when injected locally or systemically, and has been shown to be elevated in some dogs with atopic dermatitis (Gonzales, Humphrey, Messamore et al, 2013).

Diagnosis

Pruritus is a clinical sign associated with many different conditions. It can lead to

many other signs including erythema, crusting, scaling, alopecia, excoriation, skin thickening and hyperpigmentation (Fig. 2, 3). A systematic, diagnostic approach (Table 1) should be adopted in order to determine underlying cause(s) and appropriate therapy. This should include taking a detailed general and dermatological history, performing a thorough clinical examination, construction of a differential diagnosis, selection of appropriate laboratory tests to shorten the differential diagnosis, and eventual confirmation of one or more definitive diagnoses. Therapeutic trials may be indicated. A firm, reliable diagnosis should in turn yield a prognosis and allow appropriate, specific therapeutic strategies to be instituted.

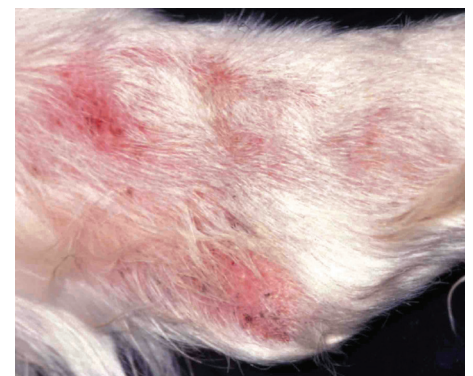


Figure 1: Erythema, alopecia and excoriation in a 10-year old pruritic Springer spaniel with sarcoptic mange



Figure 2: Erythema, alopecia, crusting, excoriation and hyperpigmentation in a pruritic atopic Labrador

Table 1. Systematic Diagnostic Approach to Pruritus**History:****General***Patient*

- Age, breed, sex
- Appetite
- Thirst
- General demeanour
- History of systemic disease
- Intestinal signs
- Coughing

Environment

- Household surroundings – e.g. indoor/outdoor, more than one household, bedding materials, carpets, time spent in bedrooms, exposure to carpets, mattresses, cushions, pillows
- Presence of other animals and birds (with or without skin disease) in household
- Diet (itemise fully, commercial or home-prepared)
- Frequency of flea control
- Contact with people who smoke

Dermatological

- Duration of problem
- Age at onset
- Initial presenting sign
- Progression
- Severity
- Prior history including response to previous treatments
- Family history of skin disease
- Evidence of contagion (suggests possibility of ectoparasitic infestation): are other animals and/or people in household affected?

Clinical Examination:**General**

- Assess liveliness and general demeanour, look for signs of systemic illness, lymphadenopathy

Dermatological: assess lesions

- *Distribution:* localised, multifocal or generalised, diffuse; symmetrical or asymmetrical
- *Configuration:* linear, annular, polycyclic, centrally healing, serpiginous, single, multiple, grouped, arciform, coalescing
- *Morphology:*
 - **Primary:** macule, patch, erythema, papule, pustule, vesicle, wheal, nodule
 - **Secondary:** epidermal collarette, erosion/ulcer, fissure, callus, lichenification, excoriation, scar
 - **Primary or secondary:** alopecia, scale, crust, follicular cast, comedo, pigmentary abnormality

Construction of a differential diagnosis:**Laboratory tests**

- Skin scrapings, coat brushings, hair plucks, tape strips, impression smears for cytology
- Bacterial and fungal culture
- Skin biopsies, immunohistochemistry
- Haematology and biochemistry profiles
- Radiography and scanning

Allergy tests

- Intradermal and serological testing
- Restricted diet

Therapeutic trials

Flea control, antibiotics, acaricide

Table 2. Differential Diagnosis of Canine Pruritus**Ectoparasitic infestation****Insect infestation:**

Fleas, lice (pediculosis)

Mite infestation:

- Sarcoptic mange (scabies, sarcoptic acariosis)
- *Cheyletiella* infestation (cheyletiellosis)
- Harvest mite infestation (trombiculosis)
- Ear mite (*Otodectes*) infestation

Allergic skin disease:

- Atopy
- Flea bite hypersensitivity
- Adverse food reaction
- Contact dermatitis

Microbial overgrowth/infection:

- Staphylococcal folliculitis
- *Malassezia* dermatitis
- Acute moist dermatitis (hot spot, pyotraumatic dermatitis, wet eczema)
- Acral lick dermatitis
- Dermatomyositis

Immune-mediated and auto-immune disease:

- Pemphigus foliaceus
- Erythema multiforme
- Adverse drug reaction

Neurogenic disease:

- Psychogenic and sensory neuropathy

Neoplasia:

- Epitheliotropic lymphoma
- Mast cell tumour



Figure 3: Erythema, alopecia and hyperpigmentation on the chin and muzzle of a pruritic atopic Labrador

“Pruritus is a clinical sign associated with many different conditions.”

Differential diagnosis

The differential diagnosis of canine pruritus is lengthy (Table 2). However, the vast majority of cases involve either ectoparasitic infestation, allergic skin disease or a combination of the two. Microbial infections (e.g. staphylococcal folliculitis and *Malassezia* dermatitis) commonly occur as secondary complications of ectoparasitic infestation and allergic skin disease.

Laboratory tests

Most tests used to investigate canine pruritus can be performed relatively easily, quickly and cheaply. Skin scrapings and coat brushing should almost always be performed initially. If mites or fleas are demonstrated, they should be eliminated before further assessment. If nothing is revealed from scrapings and brushings, other tests or trial therapy should be considered.

Skin scraping

Clip the hair, moisten selected area of skin with liquid paraffin, and scrape with a size-10 scalpel blade. Place scraping in liquid paraffin on a microscope slide (Fig 4), apply a glass cover slip, and examine under low power objective of a good microscope. Lots of deep scrapings from small crusts around the ears, elbows and hocks are indicated when looking for *Sarcoptes* (Fig 5). *Cheyletiella* is typically found superficially, on dorsal skin and hair.

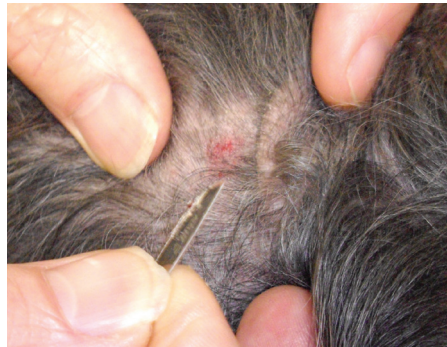


Figure 4: skin scraping, taken with a size-10 scalpel blade

Coat brushing

Rub, comb or brush the coat and collect brushings onto a large piece of white paper. Black specks yielding reddish streaks of blood when moistened, are likely to be flea droppings. Samples can also be examined microscopically for flea faeces and mites such as *Cheyletiella* (Fig 6).

Hair plucking

Hair plucking is useful for hair analysis and demonstrating louse eggs (which stick to hair). *Cheyletiella* eggs, loosely attached to hairs, are sometimes demonstrated.

Tape strip

Tape strip is used to demonstrate *Malassezia pachydermatis* (yeast) and bacteria on the skin surface. It is also helpful in revealing *Cheyletiella* and *Demodex* (mites and eggs). Clip the hair, apply adhesive tape to the skin, remove from skin, stain and attach, sticky side down, onto a glass slide ready for microscopical examination (Figs 7, 8).



Figure 7: Immersion of tape strip preparation in stain



Figure 5: Adult *Sarcoptes* mite found on skin scraping

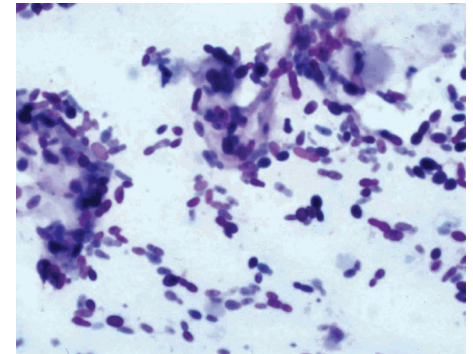


Figure 8: *Malassezia* spp. on stained impression smear



Figure 6: Adult *Cheyletiella* mite revealed on coat brushing



Figure 9: Multiple positive intradermal test reactions in an atopic West Highland White Terrier

Impression smear for cytology

Impression smears give a rapid assessment of a pustular disease. Spread thinly a small amount of pustular content on a microscope slide. Dry, stain and examine microscopically. Degenerating neutrophils and bacteria are typically seen in pyoderma. Acantholytic cells, well-preserved neutrophils, and an absence of bacteria are suggestive of pemphigus foliaceus.

Dietary trial

Many dermatologists advocate feeding a restricted diet of one source of unfamiliar protein and carbohydrate for at least 6 weeks. If pruritus improves, only to worsen soon after a challenge with the old diet, the restricted diet should be reinstated until pruritus again resolves. Individual dietary components should then be given, one additional item per week, to identify offending agents. This can be a very lengthy procedure and interpretation is often difficult. Pyoderma and *Malassezia*

dermatitis, if present, need to be treated before any beneficial effects of a restricted diet can be assessed.

Allergy testing

Identifying causative allergens in atopic dogs allows specific therapy such as allergen avoidance and/or immunotherapy (desensitisation, hyposensitisation) to be prescribed. The test also allows owners to feel they have a diagnosis, enabling them to come to terms with the fact that their dog will have an increased susceptibility to skin problems for the rest of its life.

Intradermal and serological tests are available (Fig 9). Neither is of benefit in diagnosing food-related problems. Results of both tests need to be considered in the light of the clinical history. This author has seen dogs with mange that have received inappropriate courses of immunotherapy based on serological allergy testing.

Prognosis

It is important for owners to be given an accurate prognosis based on test results and an evaluation of the history and clinical examination. The prognosis for pruritic, ectoparasitic infestations is typically excellent whereas the likelihood of permanent resolution of allergic skin disease is very low. Quality of life for dogs with skin allergies is generally good provided drugs (e.g. glucocorticoids) associated with a strong likelihood of adverse reaction, can be avoided or used sparingly.

Treatment

Specific therapy is indicated where possible. This is often straightforward for ectoparasitic infestations but less so for skin allergies. Following diagnosis of an ectoparasitic infestation, a veterinary product, specifically licensed to treat that condition in the dog, should ideally be selected (Table 3) and used according to

Table 3. Therapy of Ectoparasitic Infestation

Indication	Parasite	Licensed therapy	Licensed aid in control
Mite infestation	<i>Sarcoptes scabiei</i>	Amitraz (Aludex, MSD Animal Health) Moxidectin (Advocate, Bayer PLC) Selamectin (Stronghold, Zoetis UK Ltd)	Fipronil (Frontline Spray, Merial Animal Health)
	<i>Cheyletiella</i> spp.	No fully licensed product	Fipronil (Frontline Spray, Merial Animal Health)
	Harvest mite (<i>Trombicula autumnalis</i>)	No fully licensed product	Fipronil (Frontline Spray, Merial Animal Health)
Insect infestation	Flea (<i>Ctenocephalides</i> spp.)	Fipronil (Certifect, Merial Animal Health Ltd Effipro, Virbac Ltd; Eliminall, Zoetis UK Ltd; Fipnil, Channele Vet UK Ltd; Fiprospect, CEVA Animal Health Ltd; Flevox, Vetoquinol UK Ltd; Frontline*, Merial Animal Health) Fluralaner (Bravecto, MSD Animal Health) Imidacloprid (Advantage, Advocate, Advantix [dogs only], Seresto collar, Bayer PLC) * Indoxacarb (Activyl, MSD Animal Health) Lufenuron (Program, Novartis Animal Health UK Ltd) Metaflumizone (Pro-Meris Duo, Zoetis UK Ltd) * Nitenpyram (Capstar, Novartis Animal Health UK Ltd) Pyriprole (Prac-tic, Novartis Animal Health UK Ltd) Pyriproxyfen (Vectra 3D, Ceva Animal Health) Spinosad (Comfortis, Elanco Ltd)	
	Louse (<i>Trichodectes</i> , <i>Linognathus</i>)	* products licensed to treat <i>Trichodectes</i>	

manufacturers' instructions. For canine allergic skin diseases, a combination of specific and non-specific therapies is often employed (Table 4).

Glucocorticoids are indicated in some dogs with severe pruritus associated with allergic skin disease. Optimal therapeutic doses have not been derived scientifically and recommended doses should be seen only as guidelines. Oral administration is convenient for most patients, enables precise dosing and rapid withdrawal should unacceptable adverse reactions develop, and is considered safer for longer-term administration. The regimen for oral glucocorticoid must be customised to the individual patient: a starting dose of 0.5–1 mg/kg/day of prednisolone is often given until pruritus is controlled. The dose is then tapered gradually to the lowest, alternate-day dose that provides acceptable control. Cyclosporin (Atopica, Novartis Animal Health UK Ltd) is licensed for the

Table 4. Therapy of Atopic Dermatitis and Adverse Food Reaction

Indication	Specific therapy	Non-specific therapy
Atopic dermatitis	Allergen-specific immunotherapy Allergen avoidance	Systemic: Glucocorticoids: prednisolone (Prednidale, Dechra Veterinary Products Ltd), methylprednisolone (Medrone V, Zoetis UK Ltd) Cyclosporin (Atopica, Novartis Animal Health UK Ltd) Oclacitinib (Apoquel, Zoetis UK Ltd) Essential fatty acids, antihistamines Antimicrobial preparations Topical: Shampoos, gels, sprays, spot-on preparations
Adverse food reaction	Avoidance of incriminated dietary items	

Table 5: Some antihistamines used to treat pruritus in dogs and cats (all unlicensed for veterinary use)

Brand	Active ingredient	Dose (mg/kg)	Dose / 20 kg dog	Frequency of dosing
Piriton (4 mg)	chlorpheniramine	0.2-0.4	4-8 mg	q 8 hrs
Nytol (25 mg)	diphenhydramine	1-2	20-40 mg	q 8 hrs
Tavegil (1 mg)	clemastine	0.05-0.1	1-2 mg	q 12 hrs
Phenergan (10, 25 mg)	promethazine	1-2	20-40 mg	q 12 hrs
Atarax (Ucerax) (10, 25 mg)	hydroxyzine	1-2	20-40 mg	q 8 hrs

treatment of chronic manifestations of atopic dermatitis in dogs. A starting dose of 5 mg/kg/d is given for a month. Once clinical signs are controlled, typically after 15-30 days, alternate-day dosing may be adopted. Oclacitinib (Apoquel, Zoetis UK Ltd) has recently become available in the UK. It inhibits Janus kinases (principally JAK1), enzymes that communicate signals between cell surface receptors and the nucleus (DeBoer, 2013). A dose of 0.4-0.6 mg/kg twice daily for two weeks is recommended before reducing to once daily.

Many dermatologists consider essential fatty acid (EFA) supplementation to be beneficial though one review of 20 studies (Olivry, Marsella, Hillier, 2001) concluded there was insufficient evidence to recommend for or against the use of EFA supplements to control signs of canine atopic dermatitis. Antihistamines are commonly used to control canine pruritus although their efficacy in canine atopy is very variable. One of several products can be given for 1-2 weeks before deciding on efficacy (Table 5). Antihistamines may be helpful, especially when combined with other treatments such as EFA supplementation, in helping to reduce steroid requirement.

Topical therapy can be very useful for many pruritic dogs. A gel containing fusidic acid and betamethasone (Fuciderm, Dechra Veterinary Products) and a spray containing hydrocortisone aceponate (Cortavance, Virbac Ltd) are licensed for use in the dog. Shampoos can soothe, exert antimicrobial effects and remove allergenic particles from the skin.

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1) Which of the following is the most appropriate differential diagnosis of pruritus?

- A) Sarcoptic mange, trombiculosis, demodicosis, alopecia areata
- B) Sarcoptic mange, trombiculosis, demodicosis, staphylococcal folliculitis
- C) Cheyletiellosis, alopecia areata, atopy, adverse food reaction
- D) Flea bite hypersensitivity, atopy, adverse food reaction, *Malassezia* dermatitis

2) Which of the following descriptions matches up most accurately to canine cheyletiellosis?

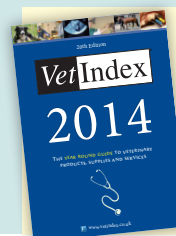
- A) Highly pruritic, no laboratory tests required for diagnosis, risk of contagion to other animals and people, fully licensed treatment unavailable
- B) Variable pruritus, skin biopsy required for diagnosis, risk of contagion to other animals and people, fully licensed treatment available
- C) Variable pruritus, skin biopsy not required for diagnosis, risk of contagion to other animals and people, fully licensed treatment unavailable

D) Variable pruritus, skin biopsy not required for diagnosis, risk of contagion to other animals and people, fully licensed treatment available

3) Which of the following lists contains products that feature in therapies, licensed, either fully or as an aid in control, for canine sarcoptic mange?

- A) Amitraz, fipronil, imidacloprid, indoxacarb
- B) Amitraz, fipronil, selamectin, moxidectin
- C) Amitraz, metaflumizone, selamectin, moxidectin
- D) Amitraz, lufenuron, selamectin, moxidectin

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