avdap
australian veterinary dermatology advisory panel

AUSTRALIAN VETERINARY DERMATOLOGY
ADVISORY PANEL (AVDAP)

ADVANCING VETERINARY PRACTICE IN DERMATOLOGY

Guidelines for the diagnosis and management of pruritus in dogs – **THIRD EDITION**

CONTENTS

Australian Veterinary Dermatology Advisory Panel

OBJECTIVE

The Australian Veterinary Dermatology Advisory Panel (AVDAP) was formed to advance veterinary practice in dermatology in Australia. Skin disease in dogs is a common and challenging condition to manage given the complexity of its diagnosis and treatment while, at the same time, attempting to meet the expectations of pet owners.

In recognition of the need to assist the veterinary community in navigating these difficult journeys and advocating for best practices in dermatology, the panel has crafted the AVDAP Guidelines. These guidelines stem from thorough reviews of published literature, the latest research findings, and expert insights, with a focus on improving diagnostic and case management skills as well as promoting the appropriate and optimal use of available products.

Addressing and managing pruritus in dogs may be complex and often requires a long-term, multimodal approach that involves close collaboration between veterinarians and pet owners. Keeping owners informed of progress is crucial for gaining their support and ensuring adherence to the treatment plan. However, achieving owner compliance remains a significant challenge, highlighting the importance of effective communication, education, and prescription of proven and trusted treatment options. This collaborative approach not only fosters adherence to treatment plans but also improves overall patient outcomes and client satisfaction.

Zoetis is proud to endorse this educational initiative, aligning with its broader commitment to the continuous education and professional growth of veterinarians, thereby enhancing the quality of care provided to patients.

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AVDAP consists of six panel members, all experts that have substantial enthusiasm for this field of veterinary science.

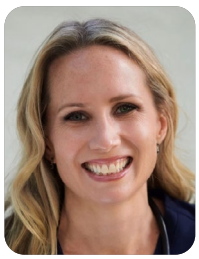
THE PANEL MEMBERS INCLUDE:

DR JEYLAN ASLAN
BVSc (Hons I) MANZCVS (Small Animal Medicine) DipACVD
Specialist in Veterinary Dermatology, Brisbane, QLD

Jeylan graduated from the University of Queensland in 2013 with first class honours and as top of her class. She completed her specialty training in Brisbane where she continues to work. She is a Diplomate of the American College of Veterinary Dermatology and a Member of the Australian and New Zealand College of Veterinary Scientists by examination in small animal medicine. Jey is the current President of the Dermatology Chapter of the Australian and New Zealand College of Veterinary Scientists and one of the Australian and New Zealand representatives to the World Association for Veterinary Dermatology. She is an adjunct lecturer at the University of Queensland where she teaches undergraduate veterinary students small animal dermatology. She is also the founder and host of a quarterly dermatology journal club attended by dermatologists across Australia and New Zealand to discuss recent publications and advances in the art and science of dermatology.

DR MANDY BURROWS
BSc, BVMS, MANZCVS, FANZCVS
Specialist in Veterinary Dermatology, Perth, WA

Mandy is a Fellow of the Australian and New Zealand College of Veterinary Scientists (ANZCVS) in Veterinary Dermatology; a registered specialist in veterinary dermatology, an Associate Dean of the School of Veterinary Medicine, a member of the Academic Council and Associate Professor in Small Animal Medicine (Dermatology) at Murdoch University, Western Australia. She has over 30 years of experience working in University and clinical practice and teaching and has trained veterinary dermatologists in veterinary specialty practice in Western Australia. Mandy has been designing and delivering the dermatology curriculum and teaching undergraduate veterinary students at Murdoch University for the past twenty years. She joined the University academic staff in 2017 and has received Vice Chancellor's Awards for Teaching and Excellence in Learning for three consecutive years in recognition for being in the top 10% of teaching staff. She is the current Australian and New Zealand representative of the World Association for Veterinary Dermatology. She has authored and co-authored many publications in national and international journals and textbooks and delivers lectures in veterinary dermatology at both national and international conferences. Her opinion is regularly sought in providing specialist expertise and advice to industry. Mandy has extensive experience with clinical dermatology in companion animals. A deep personal commitment to working for the good of students, veterinary practitioners, animals and society informs all her work. She values being able to make a difference and finds reward in the challenge of finding creative and practical solutions to difficult problems.



DR SAMANTHA CROTHERS
BSc, BVMS, DipACVD
Specialist in Veterinary Dermatology, Perth, WA

Sam Crothers is a board-certified veterinary dermatologist. She is a founder and director of Veterinary Dermatology Specialists in Perth. Sam has practiced in the field of dermatology in Northern California, Colorado, Perth and Melbourne. She has treated exotic animals at the San Francisco Zoo and a wildlife park in Colorado while in the USA.

Sam graduated from Veterinary School at Murdoch University. She worked in a busy small animal general practice in Perth before moving to California to complete a dermatology residency training program at the University of California Davis (UC Davis). She accepted a role as a clinical instructor at the Veterinary Teaching Hospital following her residency then was an Assistant Professor at Colorado State University (CSU). Sam has trained dermatology residents at both UC Davis and CSU as well as hundreds of veterinary students in the USA and Melbourne. Her scientific research has been published in the journal of Veterinary Dermatology.

Sam is a certified Fear Free Dermatologist – the Fear Free certification helps veterinary professionals to minimise fear, anxiety and stress on patients whilst in hospital and in turn enhances the quality of medicine and patient/owner experience.

She is a member of the Australian and New Zealand College of Veterinary Scientists (ANZVCS) and the American College of Veterinary Dermatology (ACVD).

DR DANIELLE HOOLAHAN
BSc BVMS DACVD
Specialist in Veterinary Dermatology, NSW

Dani Hoolahan graduated from Murdoch University in 2007 with honours. She worked in busy, small animal general practices both in Sydney, Australia and Portland, Oregon before completing a dermatology internship in Perth, Western Australia and then moving to the University of California, Davis to join the dermatology service at the William R. Pritchard Veterinary Medical Teaching Hospital as a resident.

She completed her residency in 2013 and became a Diplomate of the American College of Veterinary Dermatology in the same year. She has worked in busy dermatology referral practice since 2014 and is the founder of the Veterinary Dermatology Clinic.

She also runs satellite clinics across NSW and Tasmania and as a result, has forged strong relationships with practices throughout the country.

With a special thank you to Professor Peter Hill for permission to include his images in this updated version

DR MIKE SHIPSTONE
BVSc (Hons), MACVSc, FACVSc, DipACVD
Specialist in Veterinary Dermatology
Brisbane, QLD

Mike is principal and director of a specialist dermatology referral practice, based in Brisbane with satellite clinics in Darwin, Alice Springs, Newcastle, Cairns, Townsville, Mackay, Rockhampton and Bundaberg and is adjunct Professor at the University of Queensland, teaching the undergraduate course in Veterinary Dermatology.

Mike is a Fellow of the Australian College of Veterinary Scientists (Veterinary Dermatology) and a Diplomate of the American College of Veterinary Dermatology with over 25 years experience in dermatology referral practice.

Mike has published in Australia and overseas and has presented in Australia, South East Asia, New Zealand and North America.

DR LINDA VOGELNEST
(AVDAP Chair) BVSc (Hons), MANZCVS, FANZCVS
Specialist in Veterinary Dermatology
Sydney, NSW

Linda graduated from the University of Sydney in Australia in 1984 and became a Specialist in Veterinary Dermatology after over 10 years working in general practice, following an initial desire to understand skin disease better and provide improved patient outcomes. She achieved Fellowship of the Australian and New Zealand College of Veterinary Scientists (ANZCVS) in Veterinary Dermatology in 2003 and has worked in both university clinical practice and private referral practice since then. Linda regularly participates in post-graduate dermatology education, and is passionate about promoting a greater understanding of dermatology. Linda's special interests include atopic dermatitis, otitis, and maximising value of skin sampling techniques, including skin biopsies, and skin and ear cytology.

CHAPTER 1:

OVERVIEW OF THE PRURITIC DOG

Pruritus is defined as an "unpleasant sensation that triggers a desire to scratch."[1]

INTRODUCTION

- Itch, like pain, is one of the body's basic defence mechanisms
- A fundamental biological function of itch is to alert an animal to the presence of potentially harmful agents including external parasites, insects that may cause trauma and/or transmit diseases, and infectious microbes
- Itch can manifest acutely, like the reflex to remove fleas and other parasites
- However, chronic itch, like pain, can become self-perpetuating and pathologic in itself such as developing an itch-scratch cycle
- Chronic itch necessitates more than symptomatic treatment, requiring a thorough diagnostic workup to identify the underlying cause, and therapeutic intervention to manage the insidious effects
- The management of pruritus in dogs can be complex and usually involves a multifaceted, long-term strategy requiring collaboration between veterinarians and pet owners.

THESE GUIDELINES DEAL SPECIFICALLY WITH THE PRURITIC DOG

The purpose of these guidelines is to assist veterinary practitioners in the diagnosis and effective management of the pruritic dog with the aim of helping dogs and their owners live a better quality of life.

Diagnosis and management of the pruritic dog can be divided into three components:

A the diagnostic approach

B the therapeutic approach

C ongoing effective management with pet owner

DIAGNOSIS AND MANAGEMENT OF THE PRURITIC DOG

A: DIAGNOSTIC APPROACH

HISTORY
Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

PHYSICAL EXAM
Most common differentials are parasites, secondary bacterial and yeast infections, and allergies

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES
- Fleas
- *Demodex* mites
- *Sarcoptes* mites
- Ear mites

Diagnostic tests to consider:
- Flea comb
- Wet paper
- Skin scrape
  - superficial
  - deep
- Trichogram
- Squeeze tape impression
- Flea & *Sarcoptes* therapeutic trials

2 INFECTIONS
- Bacteria
- Yeast

Diagnostic tests to consider:
- Adhesive tape impression
- Cotton bud smear
- Glass slide impression
- Culture
  - Bacterial culture and sensitivity
  - Fungal culture

If **parasites** and **infection** have been ruled out, and the skin condition remains, then **Allergic Dermatitis** should be investigated

3 ALLERGIES
Food, Contact, Atopic Dermatitis

FOOD

Diagnostic tests to consider:
- Food elimination trial

CONTACT

Diagnostic tests to consider:
- Avoidance and re-challenge
- Patch test

ATOPIC DERMATITIS

Diagnostic tests to consider:
- Skin allergy testing
- Serum allergy testing

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION
- e.g. isoxazolines

ANTIMICROBIALS / ANTIFUNGALS
Appropriately identify and manage secondary infections

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS
- Oclacitinib • Lokivetmab • Cyclosporin • Glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

MANAGE SKIN BARRIER (DIET, TOPICAL)

MANAGE FLARE FACTORS E.G. PARASITES, PYODERMA, DIETARY INDISCRETION

IF NO RESPONSE TO THERAPY OR IT LOOKS UNUSUAL: BIOPSY, CULTURE AND/OR REFER

C: ONGOING EFFECTIVE MANAGEMENT

MONITORING PRURITUS TREATMENT AND PROGRESS
• Multimodal Approach • Flare Management

PET OWNER COMMUNICATION, MANAGING AND SETTING EXPECTATIONS
Supporting compliance in medication and treatment plans

WHEN TO OFFER REFERRAL TO A DERMATOLOGIST

SECTION A: DIAGNOSTIC APPROACH

CHAPTER 2:

INITIAL ASSESSMENT OF THE PRURITIC DOG

STEP 1:

KEY HISTORY QUESTIONS FOR THE PRURITIC DOG

A: DIAGNOSTIC APPROACH

HISTORY
Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

History is the first essential step in the diagnostic process. One approach that can be helpful with skin cases, especially if they are chronic or recurrent is to use a questionnaire. Although this is not commonly utilised in general practice due to time constraints, it enables the efficient gathering of detailed information prior to the consultation allowing more time to be devoted to the evaluation of the patient. One example of how this can be achieved is to email a questionnaire to the pet owner when the appointment is made. **View or download example skin consultation questionnaires on page 13.**

If circumstances do not allow for this, a shorter set of questions is shown in the **table below.**

These would be considered key questions to address for a dermatological diagnosis. Additional questions in the full questionnaire aid with both diagnostic evaluation for less classical cases, and with the formulation of therapeutic plans most suitable to each patient and their owners.

Question	Areas of Assessment	Specific questions for owner:
1	Is the dog pruritic? Ask individually about multiple behaviours that owners may not interpret as itch	Does your dog lick, bite, chew, rub, roll, scratch or scoot?
2	Age of onset/duration of itch	At what age did you first notice the itch/how long has your dog been itchy?
3	Assess distribution of itch	Where on the body is the itch?
4	Pattern of itch	Is the itch continuous, seasonal or intermittent?
5	Development of condition	What came first? The itch or rash/skin changes?
6	Medications used for itch and response to treatment	Have you given any medications for itch or any other conditions? Did they resolve, reduce or make no change to the itch? Or did the condition relapse once medication stopped?

HISTORICAL FEATURES

Some distinctive/important historical features of common pruritic diseases in dogs will aid formulation of a prioritised differential list:

- **Signalment**
  - All of the differential diagnoses for pruritus can be seen in young animals. If the pruritus commences in middle or older age, parasitic or infectious causes are more likely.
  - Breed predispositions: recognised for atopic dermatitis, and some infections (e.g. *Malassezia* dermatitis) – check predispositions for the breed.

- **Pattern of pruritus**
  - Sudden onset of severe continuous pruritus; consider *Sarcoptes*, and flea allergy if pruritus focused on the back half of the body.

- **Lesions intermittent or waxing/waning pruritus**
  - Most consistent with seasonal parasitosis or atopic dermatitis.
  - Lesions before itch: exclude parasitic and infectious causes first.

- **Response to previous medications**
  - Complete resolution of skin condition with oclacitinib (Apoquel®/Apoquel Chewable®), lokivetmab (Cytopoint®), or glucocorticoids (anti-inflammatory doses): most consistent with allergy.
  - Partial resolution of pruritus with oclacitinib (Apoquel®/Apoquel Chewable®), lokivetmab (Cytopoint®), or glucocorticoids (anti-inflammatory doses): non-specific.
  - Poor response to oclacitinib (Apoquel®/Apoquel Chewable®), or glucocorticoids: exclude demodicosis, scabies and infections.

EXTENSIVE – HISTORY TAKING QUESTIONNAIRE

HISTORY TAKING QUESTIONNAIRE

STEP 2:
PHYSICAL EXAMINATION

A: DIAGNOSTIC APPROACH

HISTORY
Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

PHYSICAL EXAM
Most common differentials are parasites, secondary bacterial and yeast infections, and allergies

EXAMINATION OF THE SKIN

There are three major aims when performing a dermatological examination. These are to:

1. Assess coat quality and general body condition

2. Identify any lesions or parasites, e.g. fleas that are present

3. Determine distribution of lesions

Physical Exam

1. ASSESS COAT QUALITY AND GENERAL BODY CONDITION

- **Examine hair coat for density: normal, sparse, absent; and hair coat quality: dry, coarse, faded, greasy.**
- **Screen body for signs of systemic disease: body condition, muscle wasting, patient demeanour.**

2. IDENTIFY LESIONS OR PARASITES

- **Examine the skin surface by running the fingers against the lay of the hair. If necessary, clip the hair to visualise subtle lesions that would otherwise be hidden:**
  - › Use a magnifying glass to assess very small lesions.

- **The sensitivity of the skin can be assessed by digital stimulation. This technique can be used to determine if the skin is generally pruritic or if the pruritus is restricted to particular lesions or body regions**
  - › Use this technique to determine if pruritus is resulting from the lesions themselves such as occurs with staphylococcal pyoderma. This will assist in predicting if the pruritus will resolve following treatment of the bacterial lesions alone.
  - › If pruritus occurs when the margins of the pinnae are scratched, it is known as the pinnal–pedal scratch reflex and is suggestive of canine scabies.

- **Assess for abnormal odours**
  - › The cause of odour will vary between patients; rank odour can occur with *Malassezia* infection, bacterial infection or overgrowth, and excessive glandular secretions without infection. Not all infections are associated with notable odour.

- **Characterise and record any types and locations of lesions that are observed**
  - › For this to be meaningful, clinicians must have a complete understanding of the various types of lesions that can occur on the skin and their diagnostic significance.

Important physical examination features in pruritic dogs that provide helpful clues to aid the formulation of an accurate prioritised differential list, include:

LESIONS

- **Pustules:** bacterial pyoderma most common; exclude demodicosis, dermatophytosis, pemphigus foliaceus.
- **Papules:** exclude parasites, bacterial pyoderma, flea allergy.
- **Epidermal collarettes:** bacterial pyoderma likely.
- **Alopecia:**
  - Papular rashes in contact regions (paws, exposed minimally haired skin) consider contact allergy.
  - Complete, well-demarcated foci/regions: exclude demodicosis, pyoderma.
  - Patchy/consistent with self-trauma: any pruritic disease.
  - Partial diffuse/moth-eaten: exclude bacterial pyoderma/folliculitis.
- **Lichenification/hyperpigmentation:** chronic, non-specific change.
- **Coat changes (dull, coarse hair coat/poor regrowth after clipping):** common with extended glucocorticoid therapy; consider hypothyroidism, or hyperadrenocorticism if no recent history of glucocorticoid therapy.

PARASITES

- Look for grossly visible ectoparasites, such as fleas, lice, ticks or trombiculid larvae, or clues to their presence such as flea dirt or lice eggs.

Lice and 2 fleas on adhesive tape
Image courtesy of Linda Vogelnest

UNDERSTANDING THE DIAGNOSTIC RELEVANCE OF IDENTIFIED LESIONS

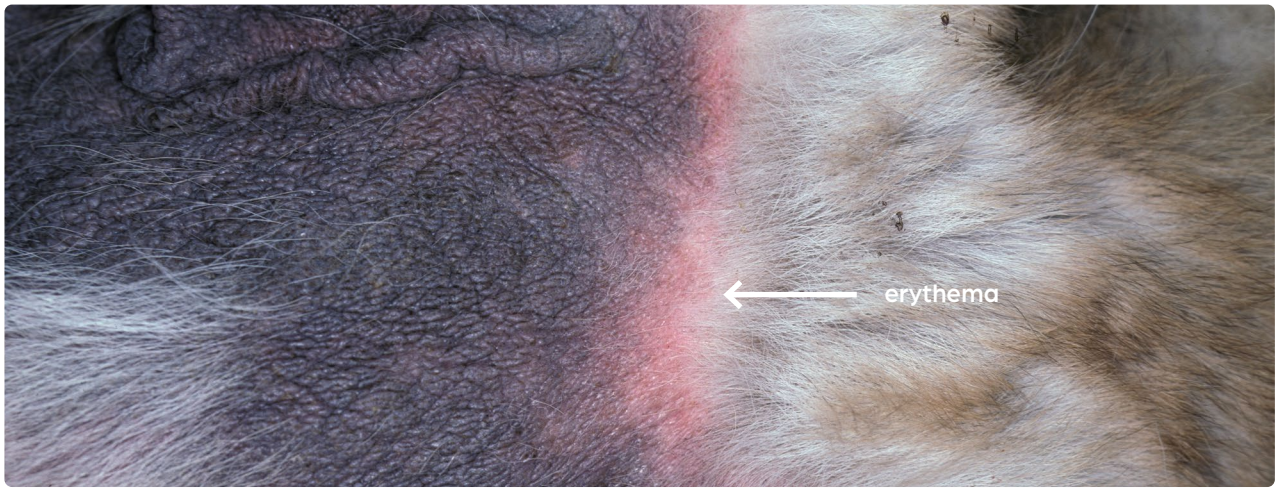
Major skin lesions in pruritic dogs

- The skin can only respond to injury in a limited number of ways. These pathological changes (or lesions) indicate what type of disease process is occurring.
- The major lesions that are encountered in pruritic dogs are described below, along with their diagnostic significance:

I. Changes in skin colour
II. Rashes
III. Loss of hair
IV. Excessive scaling
V. Changes in skin thickness
VI. Defects in skin integrity

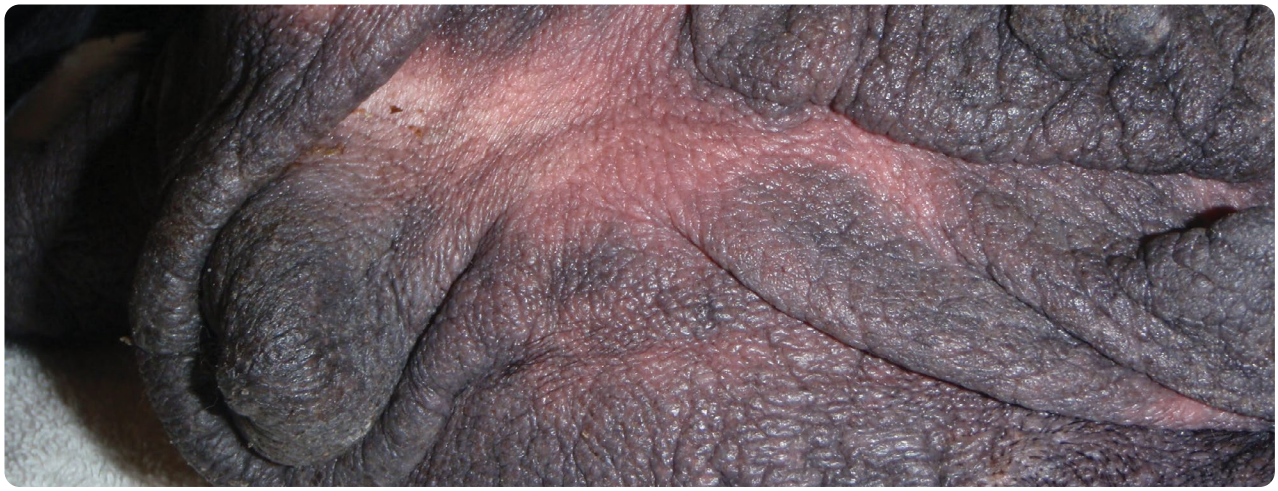
I. CHANGES IN SKIN COLOUR

- The normal skin of dogs is usually a whitish-grey colour, even if the animal has a black coat. In animals with black and white or tricolour coats, some areas of skin may be naturally pigmented but this is usually a darkish-grey colour rather than black.
- Some white-coated breeds, such as English Bull Terriers and West Highland White Terriers have pale-pink coloured skin that can become more intense when the dog is excited.
- The two major colour changes seen in pruritic dogs are:
  - *Erythema* – skin that is redder than normal, implying that the skin is inflamed. Erythema may occur with all the pruritic skin diseases, including allergic, parasitic and infectious causes.



Erythema, alopecia, lichenification, hyperpigmentation
Image courtesy of Mike Shipstone

- **Hyperpigmentation** – skin that is darker than normal.
  - › *Epidermis*. Excessive pigment in the epidermis leads to black-coloured skin. This occurs most commonly as a chronic change in allergic diseases, *Malassezia* dermatitis and bacterial pyoderma.
  - › *Dermis*. Excessive pigment in the dermis leads to blue-grey coloured skin. This occurs most commonly in demodicosis. (It is also possible to have hyperpigmentation with immune-mediated diseases and mucocutaneous pyoderma however these are less likely to be associated with pruritus).

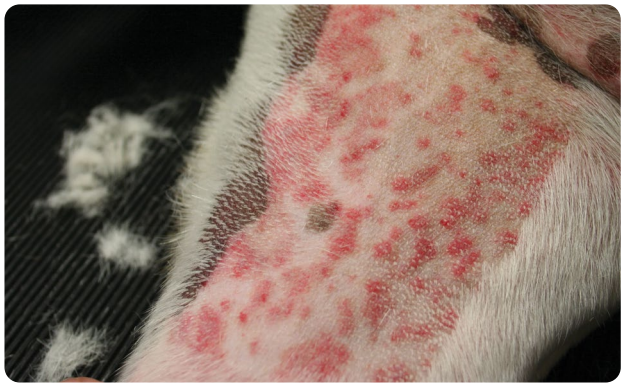


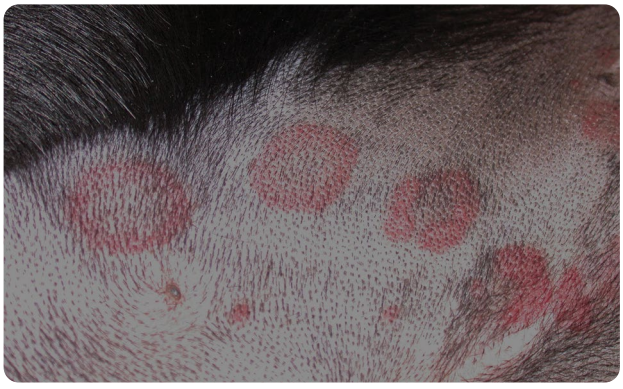
Lichenification hyperpigmentation
Image courtesy of Mike Shipstone

II. RASHES

A rash is a collection of skin lesions usually comprised of erythematous macules, papules and pustules (maculo-papulo-pustular eruption)

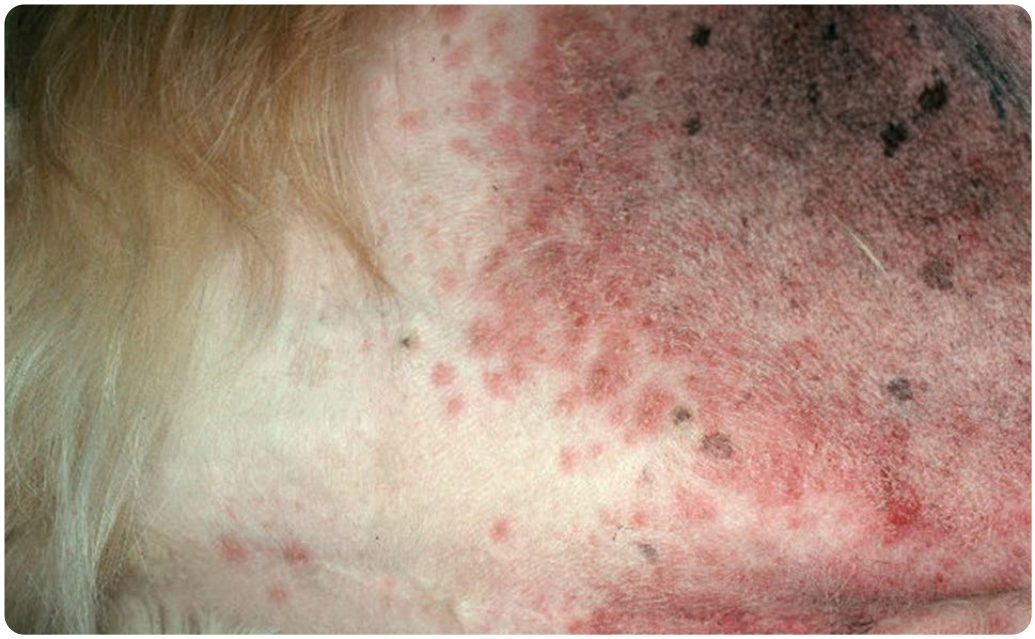
- **Erythematous macules** – circular, flat areas of erythematous skin, up to 1 cm in diameter. Often seen with staphylococcal pyoderma, flea-bite hypersensitivity and contact dermatitis. Some macules can become hyperpigmented, most commonly at the site of staphylococcal pyoderma lesions.





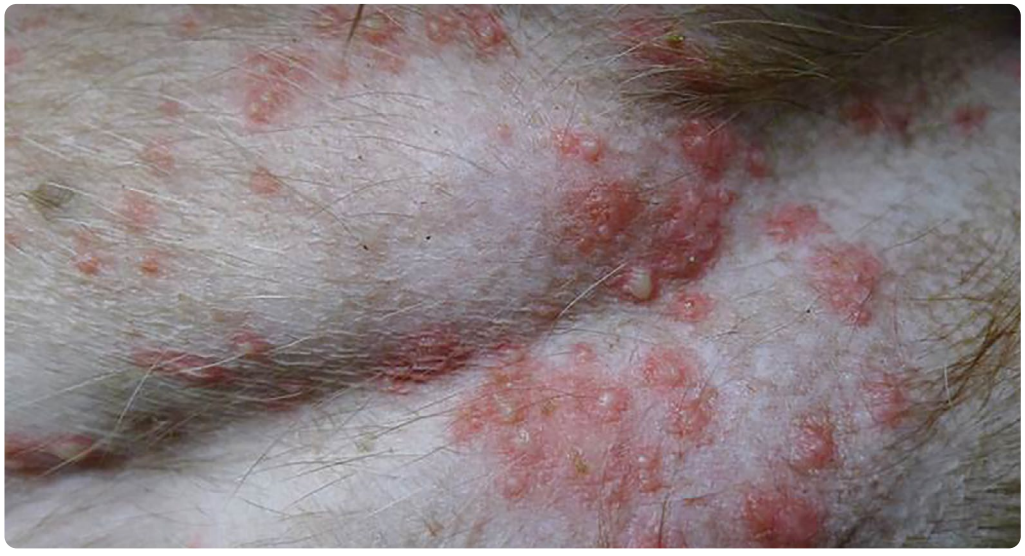
Erythematous macules and patches
Image courtesy of Linda Vogelnest

- **Papules** – small, red, firm raised lesions less than 1 cm in diameter, often with a central crust. Papules are most commonly seen with staphylococcal pyoderma, flea bite hypersensitivity, scabies, atopic dermatitis, fly bite hypersensitivity and contact dermatitis. Clinicians should be extremely careful in distinguishing a papular eruption from erythema. Erythema is a diffuse area of inflamed skin, whereas a papular eruption will appear mottled with areas of normal skin interspersed amongst the raised papules. However, with severe papular eruptions, the lesions can become contiguous so the clinician needs to look carefully at the edge of the dense patch of inflammation to see the individual lesions.



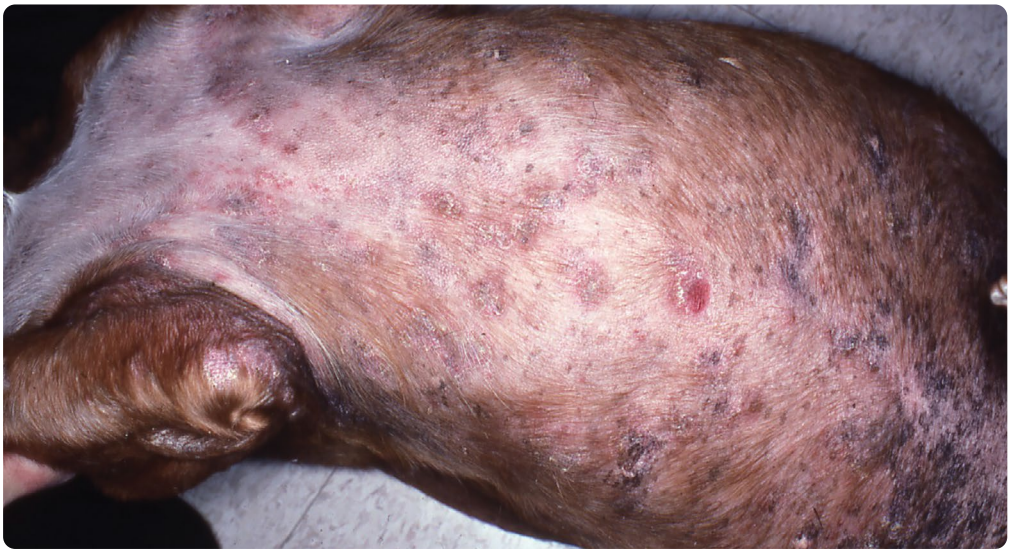
Macules and papules
Image courtesy of Peter Hill

- **Pustules** – red, circular spots containing a central, yellow sac of pus. In the vast majority of pruritic dogs, pustules would be associated with staphylococcal pyoderma.



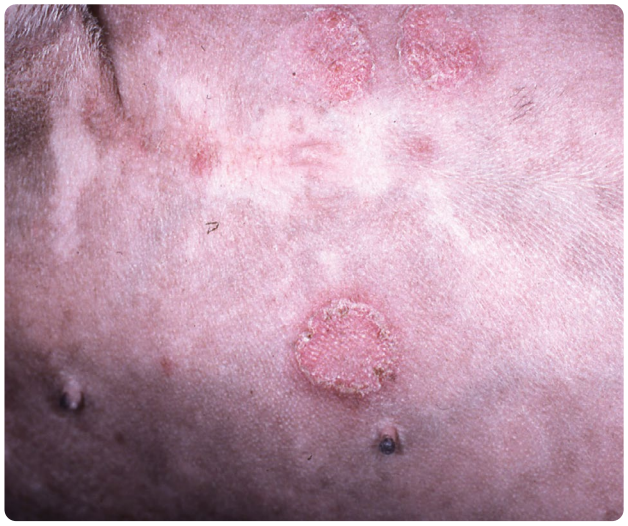
Pustules
Image courtesy of Mandy Burrows

- **Crusted papules and pustules** – papules and pustules covered in a small crust (scab). These lesions are commonly seen alongside papules and pustules and imply that pus or exudate has come onto the surface and dried.

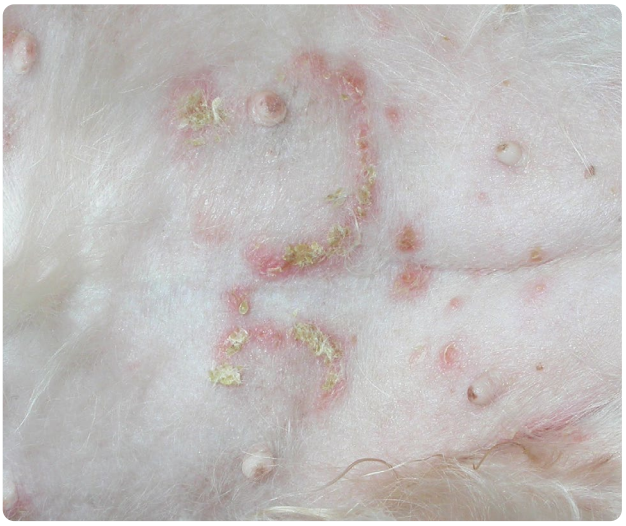


Crusted papules and pustules
Image courtesy of Peter Hill

- **Staphylococcal ring** – a specific type of lesion that is commonly seen in staphylococcal pyoderma. The lesion comprises a central, circular area of alopecia (that may or may not be hyperpigmented) surrounded by a rim of erythema with a ring of peripheral scaling (an epidermal collarette).



Epidermal collarette
Image courtesy of Peter Hill



Epidermal collarettes
Image courtesy of Mike Shipstone

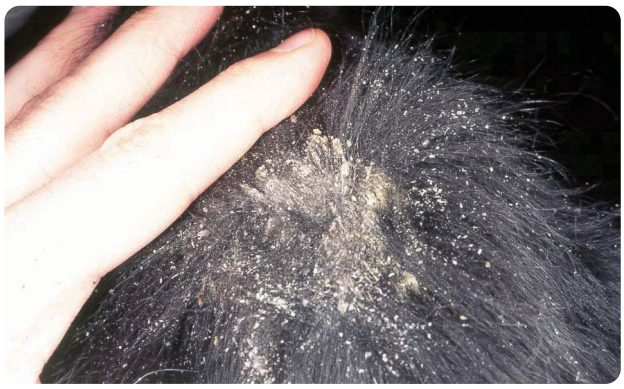
III. LOSS OF HAIR

- Some degree of hair loss (alopecia) is common in pruritic dogs. It may be due to self-trauma (i.e. secondary to the pruritus) or spontaneous in the case of staphylococcal folliculitis, demodicosis or dermatophytosis.
- If secondary to pruritus, the hair is removed by the animal itself by scratching, rubbing, biting, chewing or excessive grooming. In these cases, the hair loss appears at the site where the pruritus is most intense.
- With staphylococcal folliculitis, the alopecia appears as a multifocal pattern in which the areas of hair loss are scattered over the trunk and appear approximately circular in shape. Such hair loss may accompany the classical staphylococcal ring (as described above), but in short-coated dogs, the alopecia can be the predominant sign and give a patchy "moth eaten" appearance to the coat.

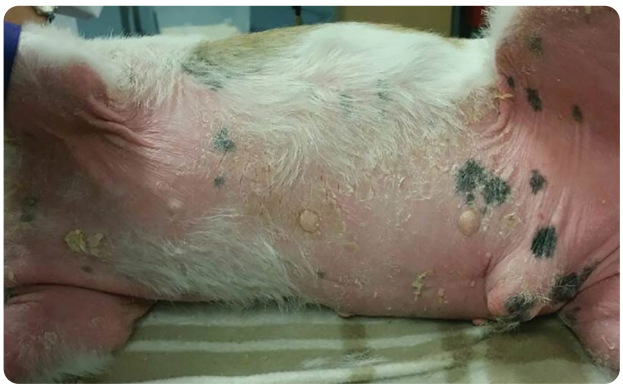
Pyoderma, annular alopecia
Image courtesy of Mike Shipstone

IV. EXCESSIVE SCALING

- The presence of visible scale in the coat of pruritic dogs is a common sign.
  - › *Scale* – grossly visible accumulation of corneocytes (dandruff). Excessive scale may form as a result of any disease that disrupts the normal process of cornification and desquamation.

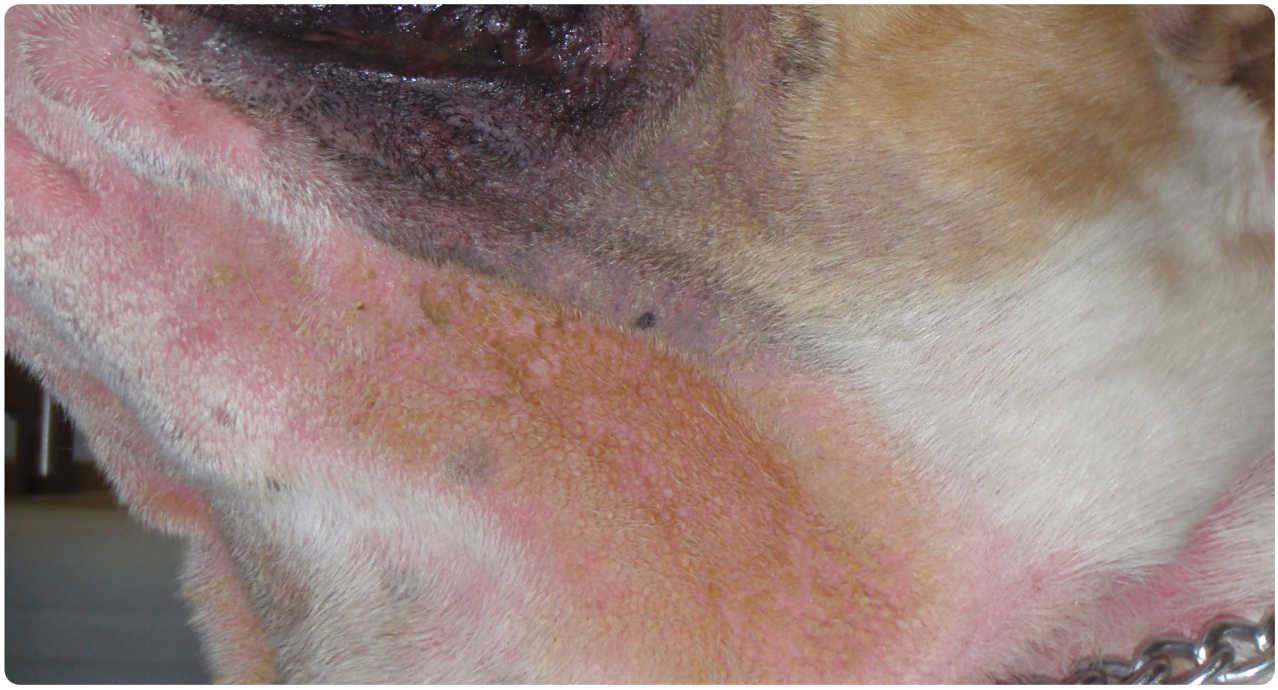


Scale
Image courtesy of Peter Hill



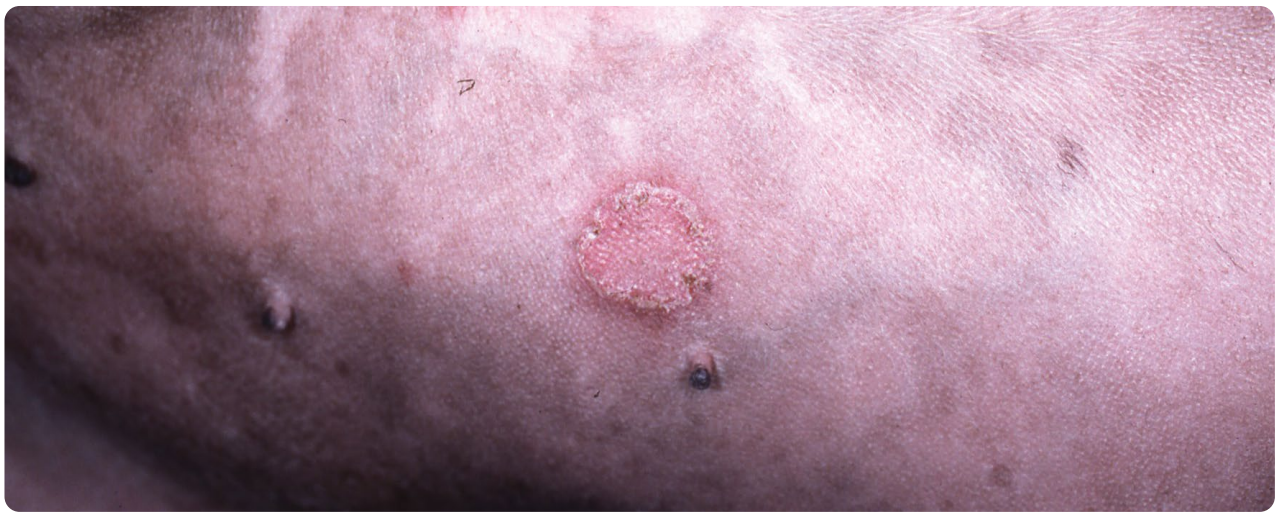
Scale
Image courtesy of Mandy Burrows

› *Seborrhoea* – a descriptive, clinical term referring to any skin condition characterised by excessive scaling or greasiness. Seborrhoea sicca is used to describe the appearance of dry and scaly skin. Seborrhoea oleosa is used to describe the appearance of excessively greasy skin. Dogs with pruritic skin diseases can have dry or greasy skin.



Seborrhoea oleosa in a dog with *Malassezia*
Image courtesy of Mike Shipstone

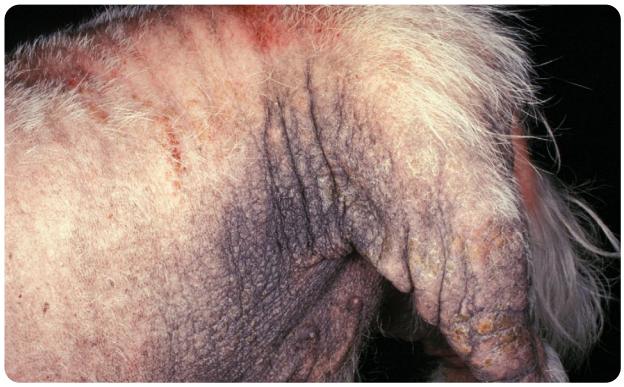
› *Epidermal collarette* – a circular ring of scale. Epidermal collarettes are formed when a focal point of infection spreads outwards as an enlarging circle, causing the stratum corneum to lift upwards. The end result is a circular patch of alopecia surrounded by a rim of scale. This extremely common lesion is associated with staphylococcal pyoderma and may be seen alone or in conjunction with papules and pustules. An epidermal collarette often surrounds a staphylococcal ring.



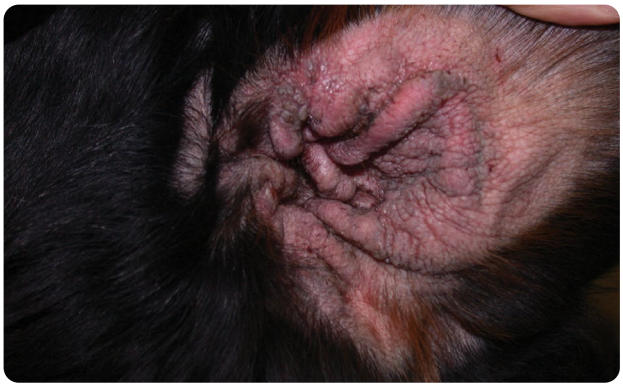
Epidermal collarette
Image courtesy of Peter Hill

V. CHANGES IN SKIN THICKNESS

- Skin may become either thicker or thinner than normal, although the former is by far the most common. Increased skin thickness can be caused by thickening of the epidermis or dermis, or infiltration of the skin with inflammatory cells. Decreased skin thickness occurs due to a combined thinning of the epidermis and dermis.
- The two major changes that are seen in pruritic dogs are lichenification and cutaneous atrophy:
  - *Lichenification* – a marked thickening of the skin due to a dramatic increase in thickness of the epidermis. Lichenification leads to an exaggeration of the visible skin markings so that the skin looks like that of an elephant. It is an attempt by the body to protect itself from further injury by forming a thicker defensive barrier. Lichenification often occurs in combination with hyperpigmentation which is another defensive mechanism. Lichenification can occur with any chronic pruritic skin diseases.

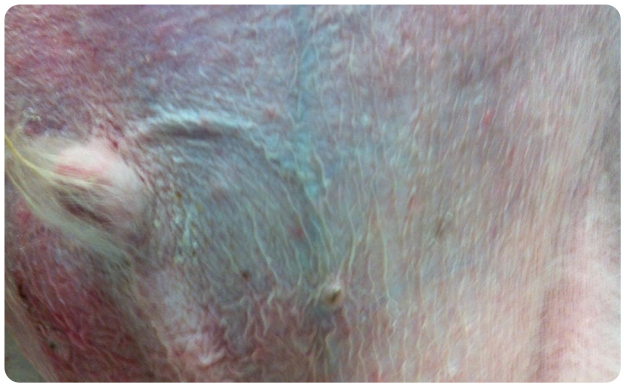


Lichenification
Image courtesy of Peter Hill



Lichenification
Image courtesy of Linda Vogelnest

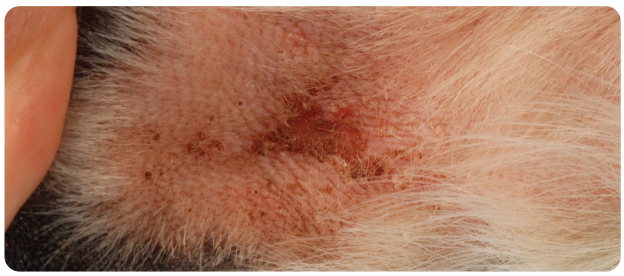
  - *Cutaneous atrophy* – skin that is visibly thinner than normal. This may be appreciated because the cutaneous blood vessels become more prominent or the skin may become less elastic and easily wrinkled. In pruritic dogs, cutaneous atrophy would be seen following prolonged treatment with systemic or topical glucocorticoids.



Cutaneous atrophy
Image courtesy of Peter Hill

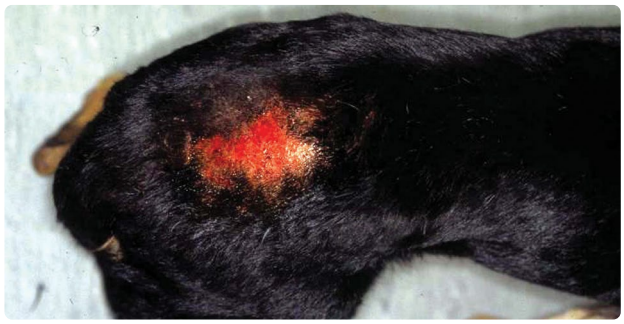
VI. DEFECTS IN SKIN INTEGRITY

- Pruritic dogs may have self-induced or spontaneous defects in skin integrity. Self-induced lesions include excoriations, erosions and ulcers:
  - *Excoriation* – a defect (scratch) in the skin caused by self-trauma. Excoriations often have a linear configuration and may be grouped in parallel rows that correspond to the animal's claws.

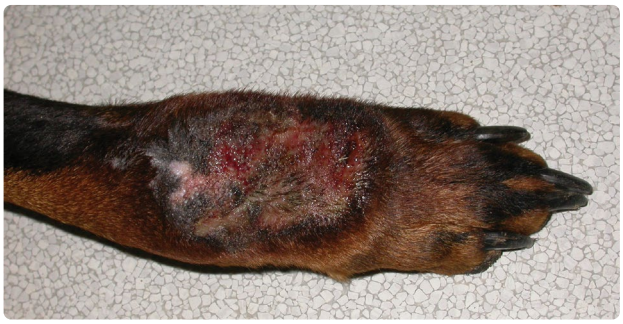


Excoriation
Image courtesy of Peter Hill

  - *Erosions and ulcers* – a defect in the skin in which the epidermis has been removed. Erosions and ulcers occur at sites of intense focal pruritus such as hot spots or acral lick dermatitis.

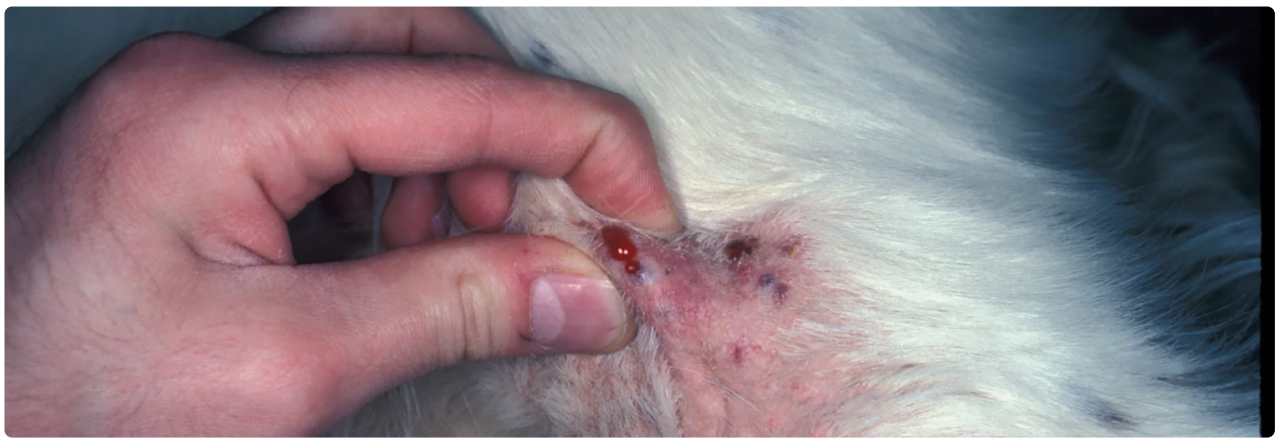


Erosion ulceration hot spot
Image courtesy of Peter Hill



Self trauma of the carpus due to acral lick dermatitis
Image courtesy of Mike Shipstone

- The main spontaneous defect seen in pruritic dogs would be the draining tracts seen in dogs with furunculosis:
  - *Furunculosis* – a rupture of hair follicles beneath the skin surface. Furunculosis normally occurs due to bacterial infection or demodicosis and results in draining tracts. Bullous lesions such as haemorrhagic bullae (large vesicles) may be evident as pre-emptive lesions of furuncles.



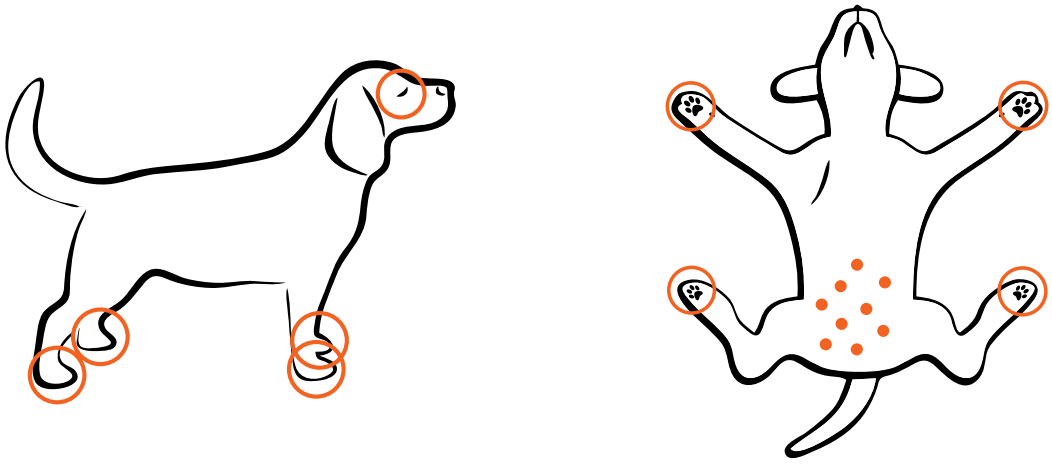
Draining tracts
Image courtesy of Peter Hill

3. DETERMINE DISTRIBUTION OF LESIONS

Distribution of skin lesions is one of the most important clinical features used to prioritise the differential diagnosis list

- Whilst assessing the type of lesions, the clinician must also record their distribution.
- Many dermatoses have characteristic distribution patterns which makes the distribution of lesions so important in helping to prioritise the differential diagnosis list.
- This information can be recorded in a written format, but a lesion distribution diagram is a useful addition to the medical record.
- In addition to being quick and easy to perform, this method provides a visual reference that is useful to refer back to when monitoring progress. It is also valuable when cases are seen by more than one clinician during the course of treatment.

An example of a completed lesion distribution diagram is shown below:



Typical distribution patterns

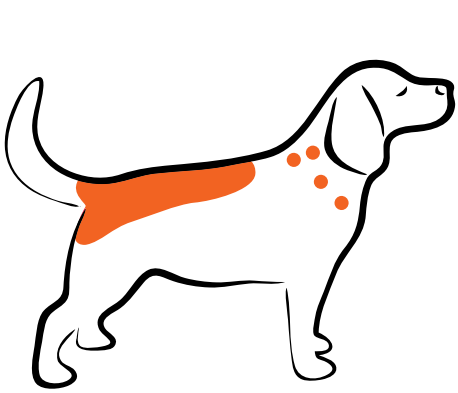
- The distribution of lesions provides important clues as to the possible diagnosis in pruritic dogs.
- The distribution patterns of the major pruritic skin diseases in dogs are shown on the following pages. Note that these distribution patterns are of more typical cases and more generalised variations do occur.

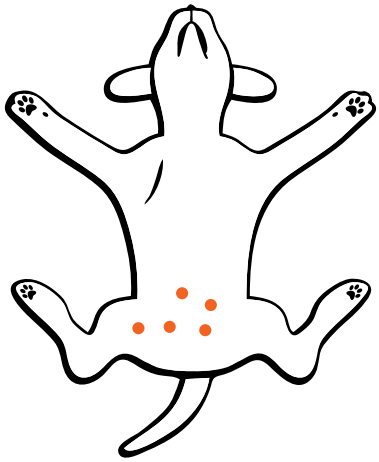
PARASITIC SKIN DISEASES

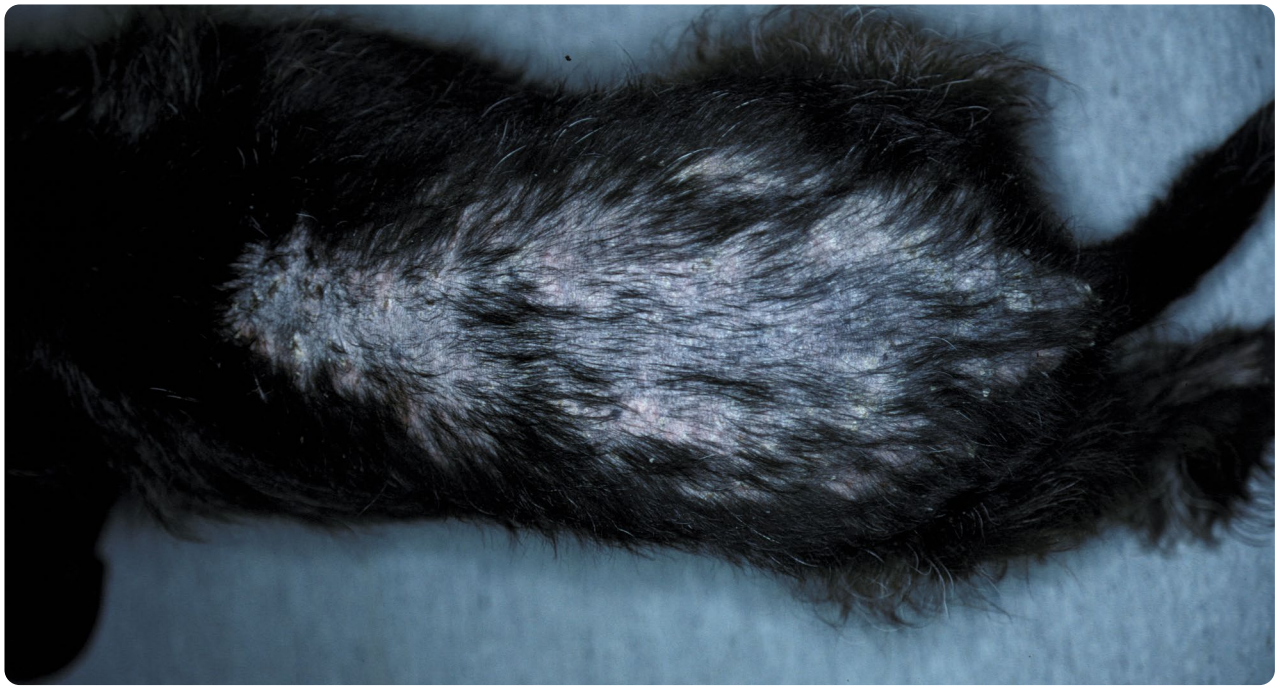
I. FLEA ALLERGY DERMATITIS

Predominant lesions

- *Acute* – erythematous macules, papules, crusted papules, acute moist dermatitis (hot spots).
- *Chronic* – self-induced alopecia, lichenification, hyperpigmentation.





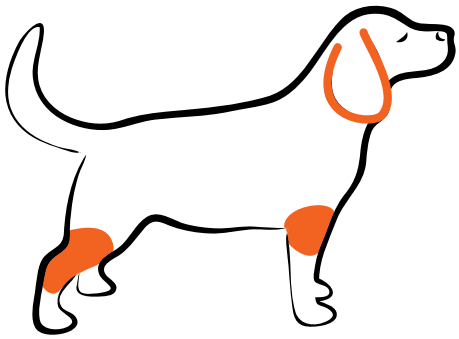


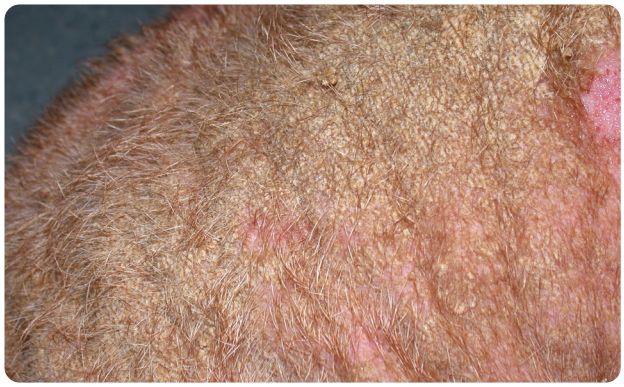
Flea bite hypersensitivity
Image courtesy of Mike Shipstone

II. *SARCOPTES SCABIEI* INFESTATION (SARCOPTIC MANGE, SCABIES)

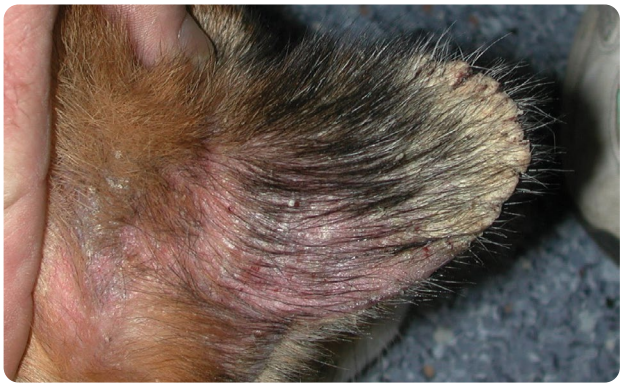
Predominant lesions

Papular eruption, erythema, scaling, excoriations. In severe cases the lesions may extend over the entire body.





Scale in dog with *sarcoptes*
Image courtesy of Linda Vogelnest

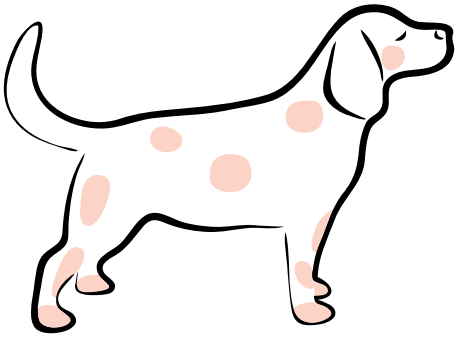


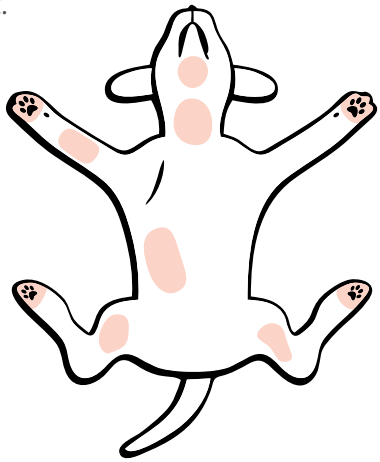
Ear pinna in a dog with *sarcoptes*
Image courtesy of Mike Shipstone

III. *DEMODEX* INFESTATION

Predominant lesions

Patches of focal, multifocal or diffuse alopecia; erythema in pink-skinned dogs; comedones, follicular casts, scale, blue-grey hyperpigmentation in chronic cases. Papules, pustules, furunculosis and ulcers if secondary infection present.

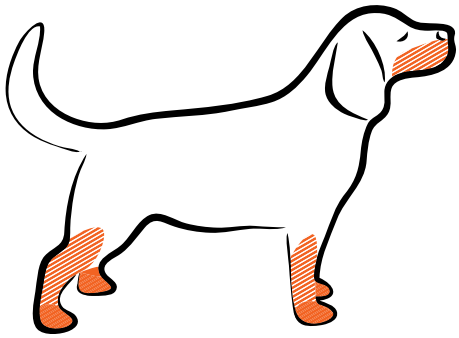


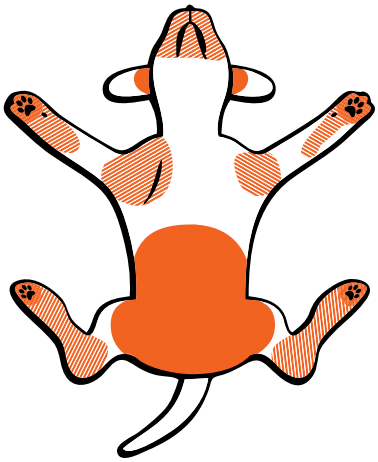


IV. TROMBICULID AND *IXODES* TICK LARVAE INFESTATION (LIMITED GEOGRAPHICAL DISTRIBUTION IN AUSTRALIA)

Predominant lesions

Papular eruption/ macroscopically bright orange colour of the larval mites.

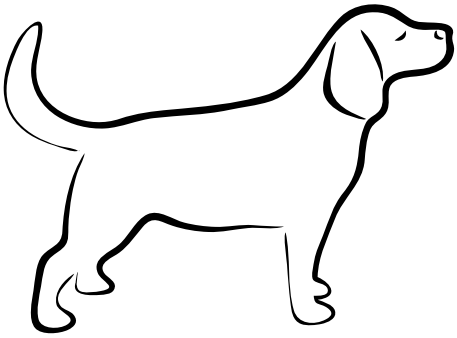




V. OTITIS (*OTODECTES*, EAR INFECTIONS, ALLERGIES)

Predominant lesions

Erythema, discharge.



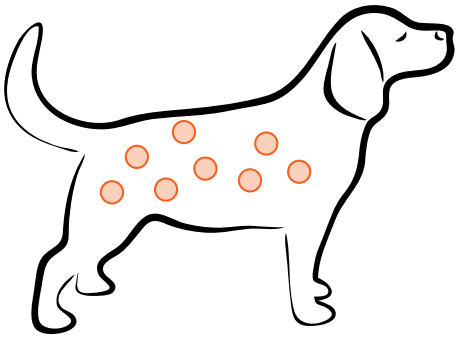
INFECTIOUS SKIN DISEASE

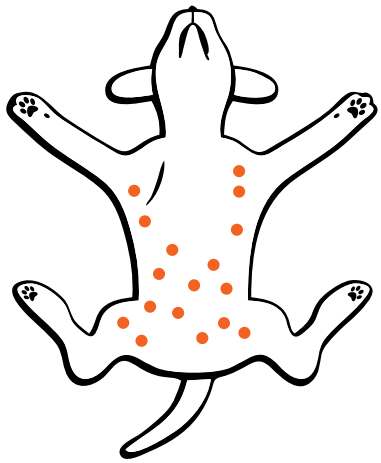
I. STAPHYLOCOCCAL PYODERMA (SUPERFICIAL PYODERMA, SUPERFICIAL FOLLICULITIS)

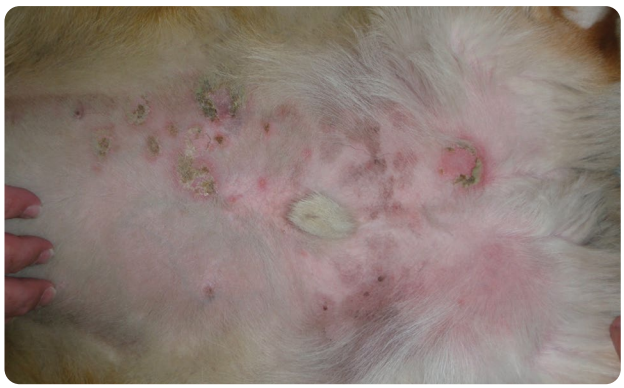
Predominant lesions

- *Acute* – papules, pustules, epidermal collarettes, staphylococcal rings, circular patches of alopecia
- *Chronic* – lichenification, hyperpigmentation, greasiness and scaling.

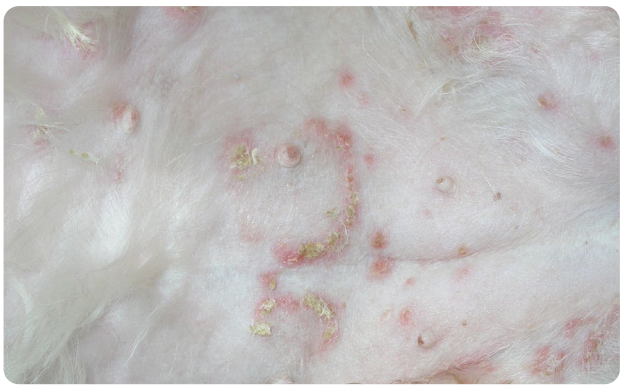
Note that pyoderma may frequently involve the dorsum and feet.



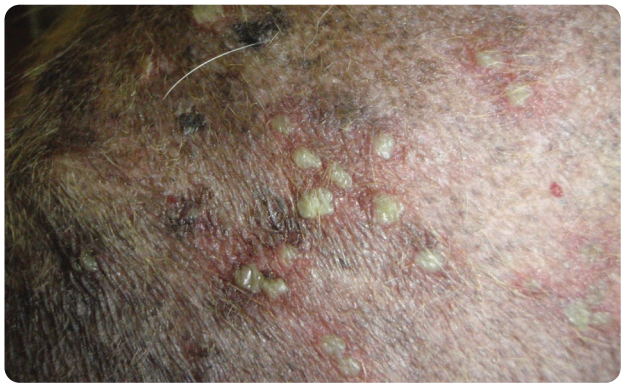




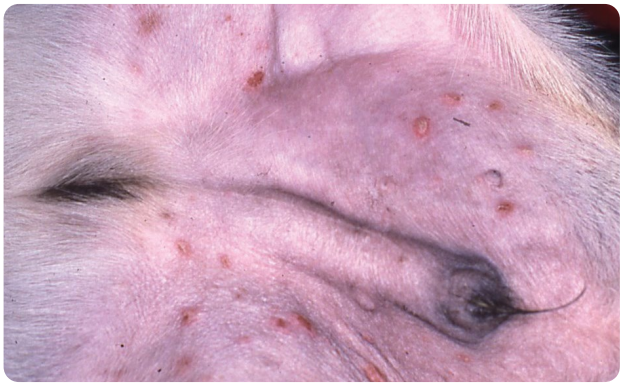
Superficial pyoderma showing papules, crust and epidermal collarettes
Image courtesy of Mike Shipstone



Epidermal collarettes
Image courtesy of Mike Shipstone



Staphyloccal pyoderma
Image courtesy of Mike Shipstone

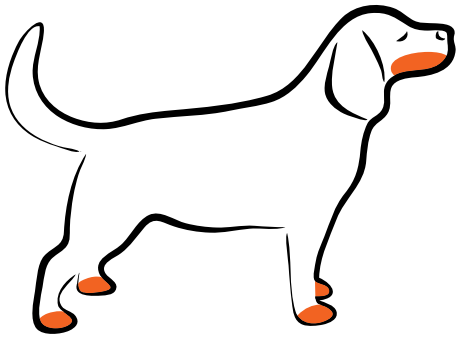


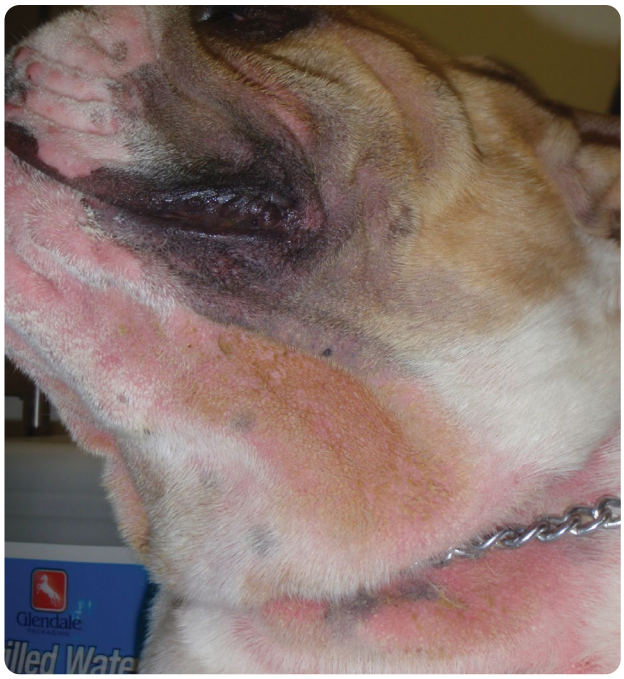
Pustules
Image courtesy of Peter Hill

II. *MALASSEZIA* DERMATITIS

Predominant lesions

Erythema, yellowish or brownish greasy scale, hyperpigmentation with chronicity.





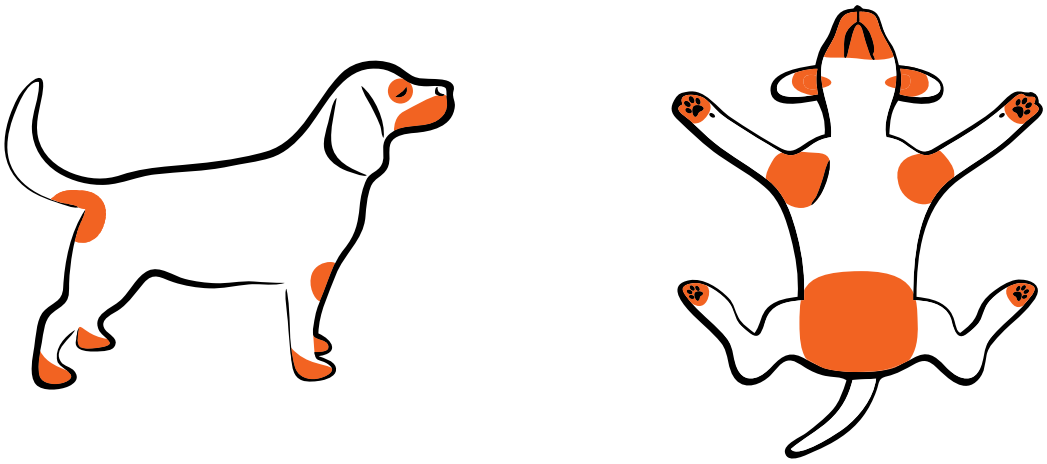
Seborrhoea in a dog with *Malassezia*
Image courtesy of Mike Shipstone

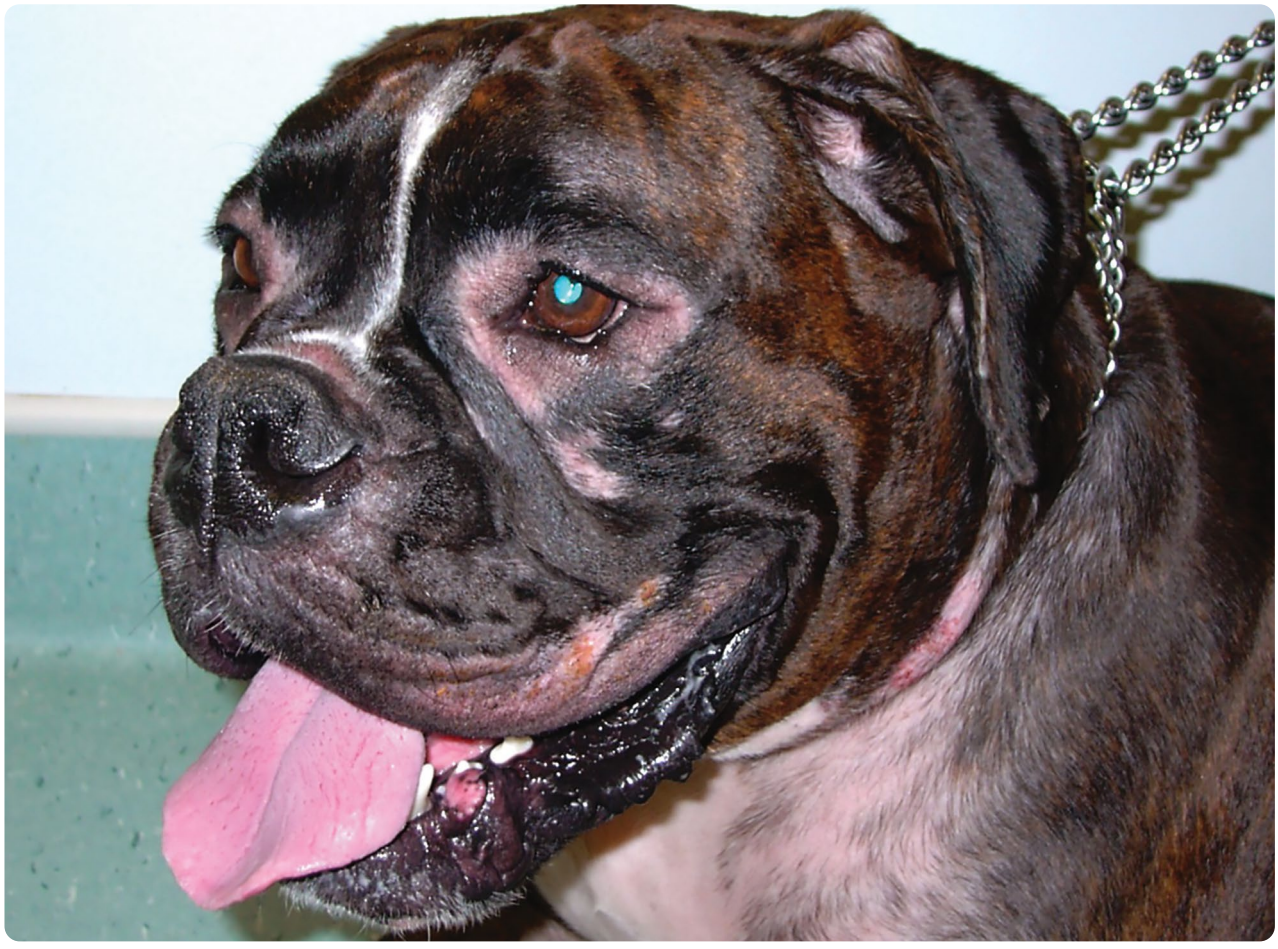
ALLERGIC SKIN DISEASE

I. ATOPIC DERMATITIS AND FOOD ALLERGY

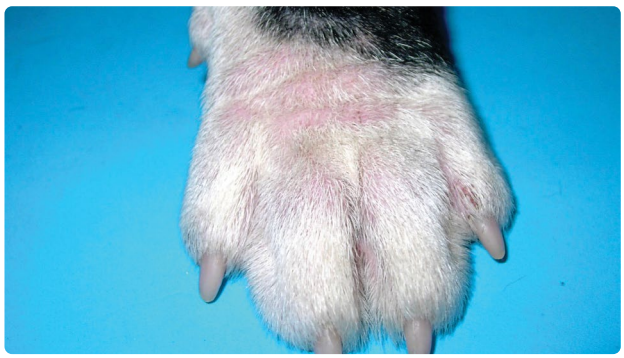
Predominant lesions

Erythema, excoriations, lichenification, hyperpigmentation. Often complicated by secondary staphylococcal and Malassezia infections.

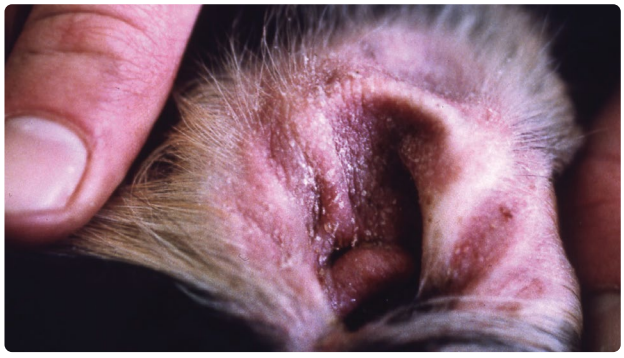




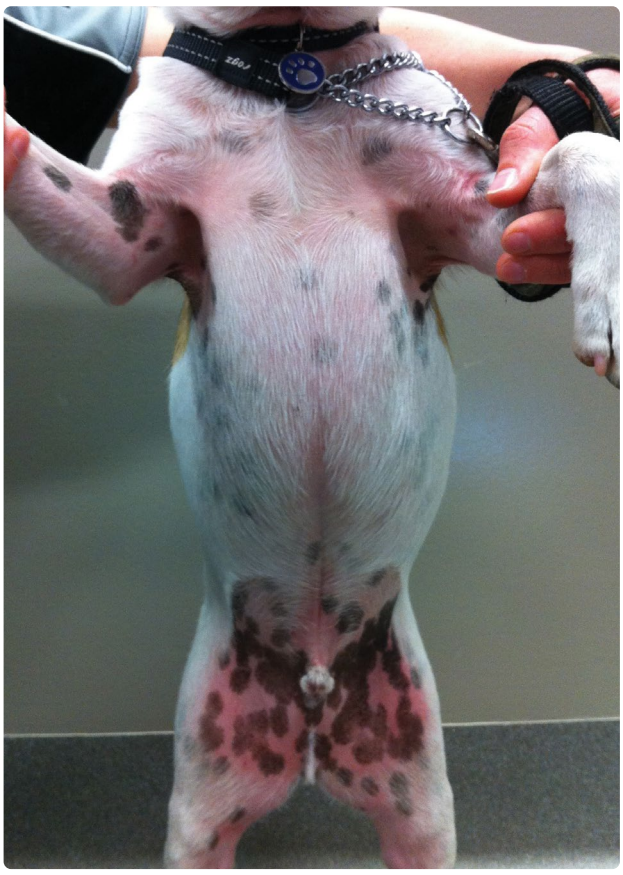
Atopic Dermatitis – Erythema and alopecia of the face
Image courtesy of Peter Hill



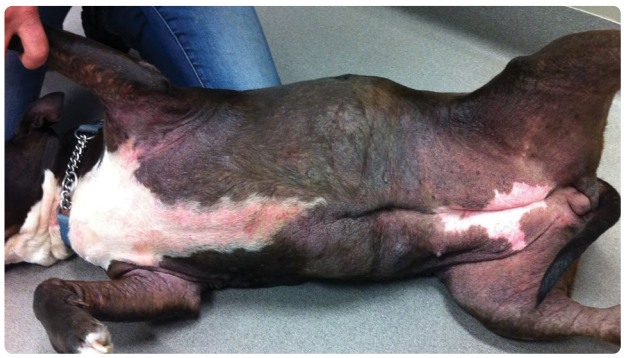
Atopic Dermatitis – Erythema of the dorsal paw
Image courtesy of Peter Hill



Atopic Dermatitis – Erythema of the medial pinna
Image courtesy of Peter Hill

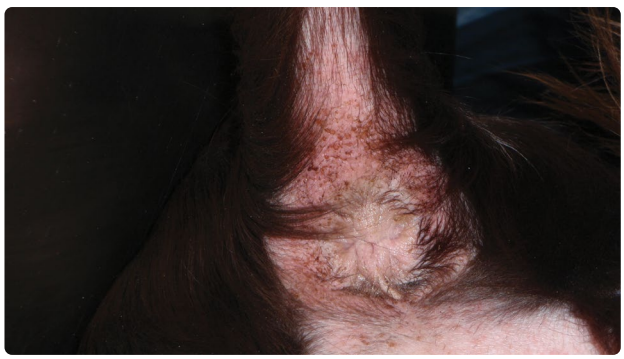


Atopic Dermatitis – Erythema of the ventral abdomen and axillae
Image courtesy of Peter Hill

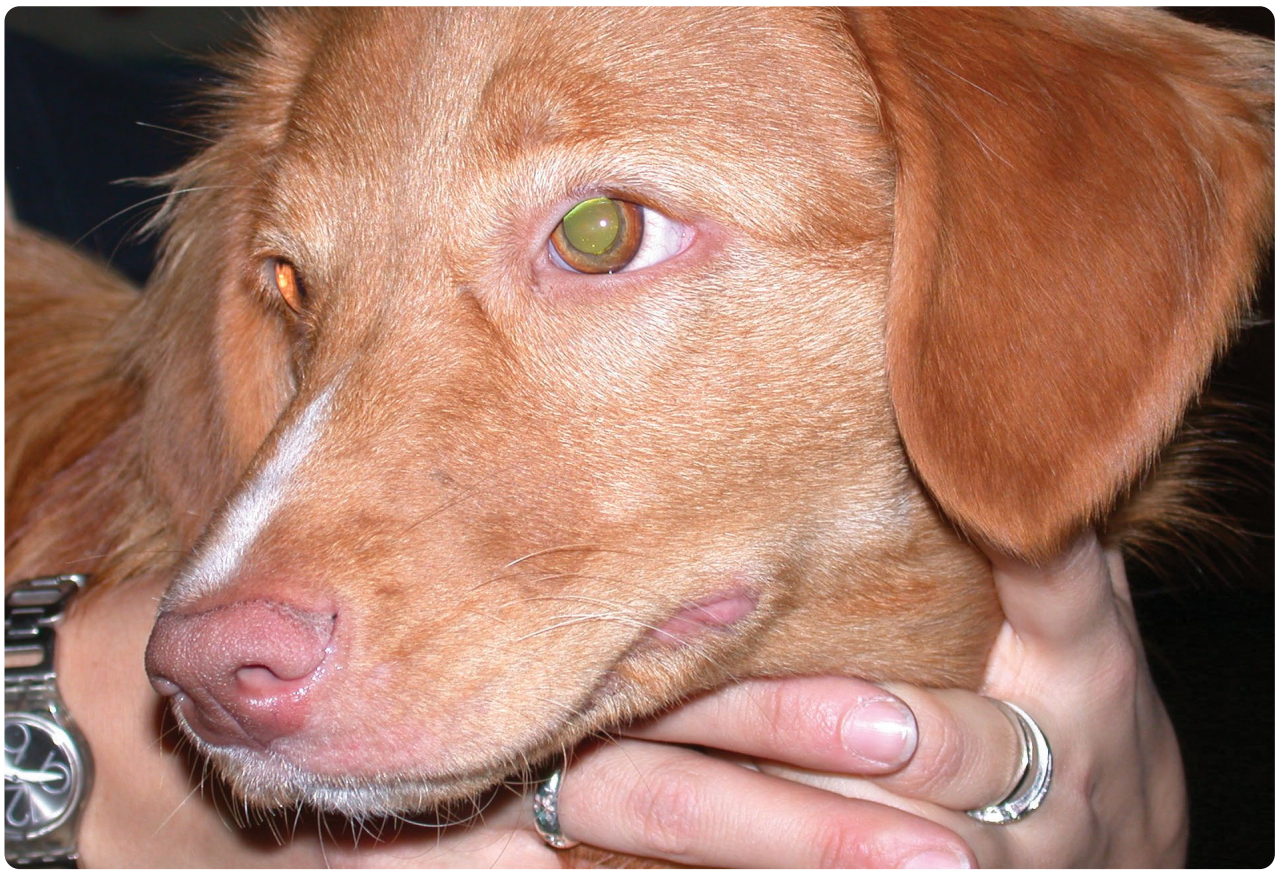


Atopic Dermatitis – Chronic dermatitis, lichenification and hyperpigmentation of the ventrum
Image courtesy of Peter Hill

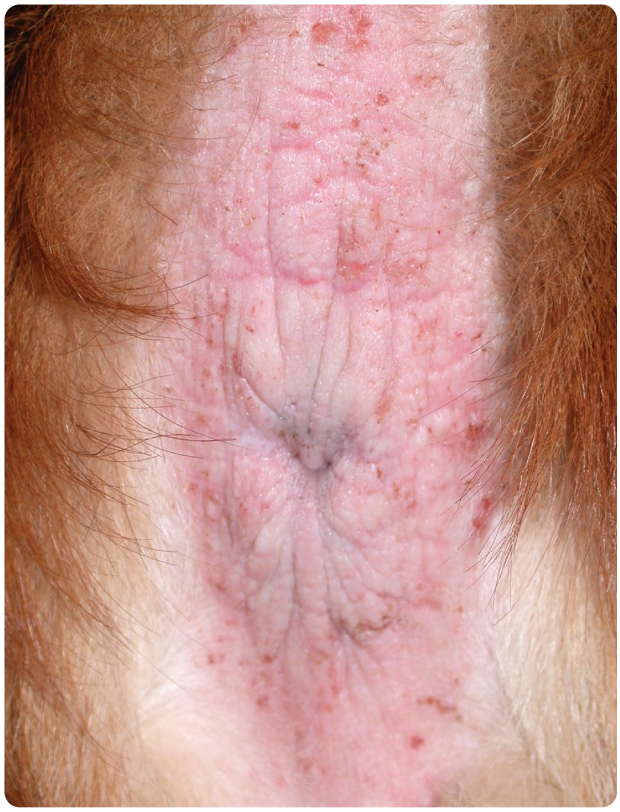
Atopic Dermatitis – Chronic atopic dermatitis
Image courtesy of Peter Hill



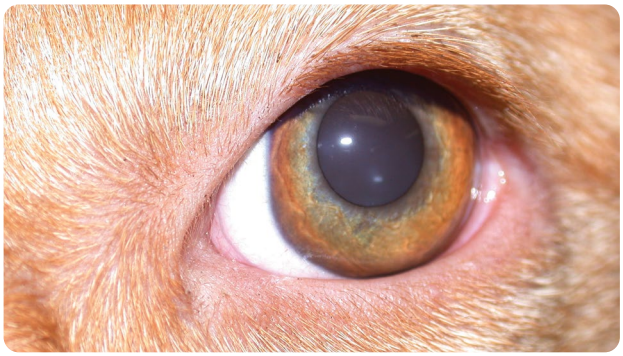
Perianal dermatitis
Image courtesy of Mike Shipstone



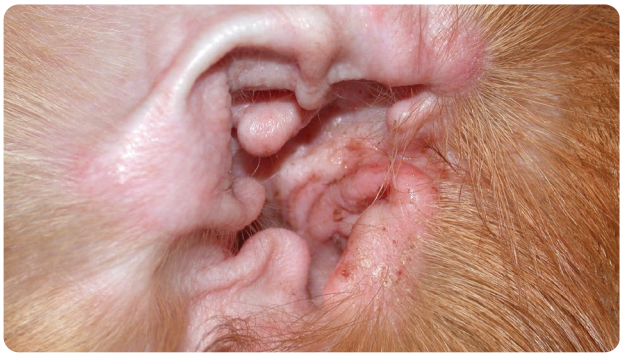
Food allergy – facial dermatitis – 7 month Duck Tolling Retriever – confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows



Food allergy – perianal dermatitis – 7 month duck tolling retriever – confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows



Food allergy – periocular dermatitis – 7 month duck tolling retriever – confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows

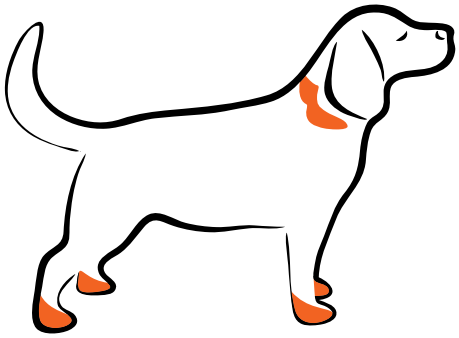


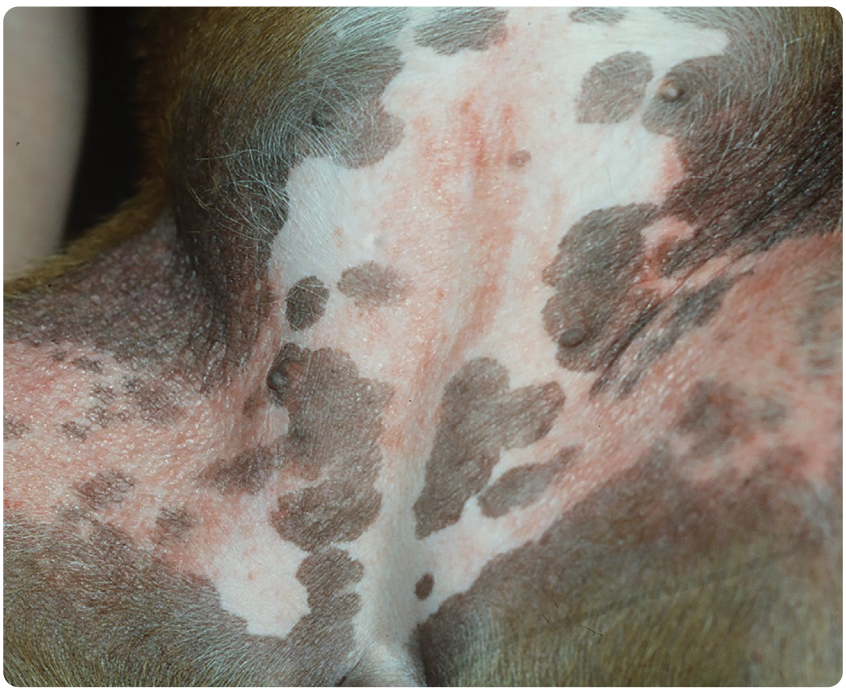
Food allergy – otitis externa – 7 month duck tolling retriever – confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows

II. CONTACT DERMATITIS

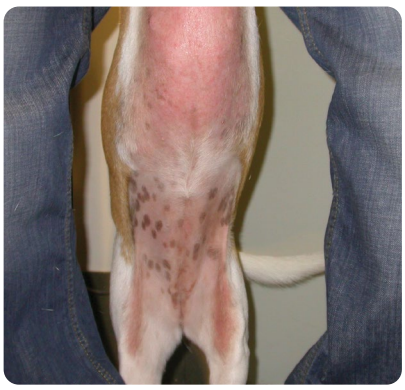
Predominant lesions

Erythematous macules, papules, lichenification, hyperpigmentation, erosions.





Contact allergy – positive on scratch testing to kikuyu grass
Image courtesy of Mandy Burrows



Contact allergy, dermatitis on ventral chest
Image courtesy of Mike Shipstone

LESION DISTRIBUTION CLINIC POSTER

STEP 3:
DIFFERENTIAL DIAGNOSIS

PRIORITISATION OF THE DIFFERENTIAL DIAGNOSES

A: DIAGNOSTIC APPROACH
HISTORY Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.
PHYSICAL EXAM Most common differentials are parasites, secondary bacterial and yeast infections, and allergies
PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

Based on the information derived from the history and physical examination, the differential diagnosis list can be prioritised.

DIFFERENTIAL DIAGNOSES BY PREVALENCE

Major differential diagnoses for the pruritic dog

Causes of Pruritus	Examples
Parasites	Fleas, *Sarcoptes, Demodex* (pruritus level is variable)
Infection	Bacteria, yeast *(Malassezia)*
Allergies	Flea-bite hypersensitivity, cutaneous adverse food reaction, atopic dermatitis, contact allergy (e.g. grass such as *Tradescantia* spp.)

Uncommon to rare differential diagnoses for the pruritic dog (not covered in detail in these guidelines)

Causes of Pruritus	Examples
Parasites	*Otodectes* (more likely in puppies), *Cheyletiella,* lice, trombiculid larval mites, ticks (larvae or adults), hookworm dermatitis, mosquitos, poultry mites, filarial dermatitis
Infection	Dermatophytes
Allergies	Drug hypersensitivity
Other	Immune-mediated disease (e.g. pemphigus foliaceus), neoplastic, psychogenic, other e.g. sensory neuropathies

CHAPTER 3:

PERFORMING AND INTERPRETING DIAGNOSTIC TESTS

Formulating a prioritised differential list prior to reaching for diagnostic tests will guide the most important tests to perform for each patient

There are a number of diagnostic procedures that can easily be conducted in a consult room which, whilst requiring minimal equipment, provide useful information in the management of dermatology cases. The most important diagnostic tests to choose for efficient evaluation of any pruritic dog will depend on the presentation.

Initial prioritisation of these differentials is based on:

- Signalment – including age, breed, sex, intact vs neutered
- History
- Physical examination findings

Diagnostic tests most frequently of value for the pruritic dog include cytology, coat brushings, superficial and deep skin scrapings, therapeutic trials and elimination diet trials. Tests that are less frequently useful include provocation trials, environmental restrictions and provocation, patch/scratch testing (referral) and skin biopsy for histopathology.

Effective use of skin sampling tests in-house requires an adequate microscope and good microscope technique.

MICROSCOPE SET-UP

- Skin surface samples can be divided into two basic types in relation to their microscopic examination:
  - In-oil preparations (usually unstained), and
  - Dry preparations (usually stained)

Each type requires different microscope settings to allow efficient examination of target species.

GUIDE TO LENS CHOICE			
	Objective (lens)	**Magnification**	**Uses**
Low power	4x 	40x	Slide scanning, detection of parasites
Low or medium power	10x 	100x	Slide scanning at higher power
Medium power	40x 	400x	Histopathology, blood smears, neoplasia (less valuable for skin cytology)
High power; oil immersion	100x 	1000x	Cell and microorganism identification

SAMPLES COLLECTED IN LIQUID PARAFFIN/MINERAL OIL

- This technique is relevant to skin scrapings, plucked hairs, and ear cerumen when evaluating for presence of mites, or for morphology of hair shafts.
- The microscope should be set to increase the natural contrast, which can be achieved by closing the iris on the condenser or by lowering the condenser away from the microscope stage.
- A cover slip should be placed on a sample that is distributed in sufficient paraffin oil to create an even thickness, enabling an even plane of focus for examination.

SAMPLES COLLECTED BY TAPE, SWAB OR IMPRESSION

- Most cytology samples are stained to enable accurate identification of cells and microbes.
- To examine stained preparations most efficiently, the microscope is usually set with the iris fully opened and the condenser level with the bottom of the microscope stage enabling maximum light necessary for oil immersion evaluation.

NEW TECHNOLOGY ADVANCEMENTS

- There are increasing capabilities of diagnostic equipment available to veterinarians to support clinics with automated and AI functionality to run tests like cytology.
- Incorporating new AI-enabled technology can standardise and expand point-of-care testing capabilities and clinic workflow efficiencies by involving clinic staff in running equipment.

DIAGNOSTIC PROCEDURES

The table below provides outlines diagnostic procedures that may be undertaken in order to help identify causes of pruritus.

Parasitic Infection/Infestation	Bacterial and Fungal Infection	Allergy
Skin scraping	Adhesive tape impression	Flea elimination trial
Squeeze tape impression	Glass slide impression	Food elimination trial diet
Ear smear for otic parasites	Ear smear for microbes	Contact avoidance trial
Coat combing	Trichogram	Allergy testing • Intradermal • IgE serology
Trichogram		

A: DIAGNOSTIC APPROACH

HISTORY

Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

PHYSICAL EXAM

Most common differentials are parasites, secondary bacterial and yeast infections, and allergies

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES

- Fleas
- *Demodex* mites
- *Sarcoptes* mites
- Ear mites

Diagnostic tests to consider:

- Flea comb
- Wet paper
- Skin scrape
  - superficial
  - deep
- Trichogram
- Squeeze tape impression
- Flea & *Sarcoptes* therapeutic trials

2 INFECTIONS

- Bacteria
- Yeast

Diagnostic tests to consider:

- Adhesive tape impression
- Cotton bud smear
- Glass slide impression
- Culture
  - Bacterial culture and sensitivity
  - Fungal culture

If **parasites** and **infection** have been ruled out, and the skin condition remains, then **Allergic Dermatitis** should be investigated

3 ALLERGIES

Food, Contact, Atopic Dermatitis

FOOD

Diagnostic tests to consider:

- Food elimination trial

CONTACT

Diagnostic tests to consider:

- Avoidance and re-challenge
- Patch test

ATOPIC DERMATITIS

Diagnostic tests to consider:

- Skin allergy testing
- Serum allergy testing

WATCH DEMONSTRATIONS OF CYTOLOGY TECHNIQUES

INFECTION AND INFESTATION DIAGNOSTIC WORK–UP

A. COAT COMBING

Indications

Parasites identified include: fleas and less commonly, lice, *Cheyletiella*, trombiculid mites.

Technique

The coat is brushed with a flea comb and the resultant scurf placed on a white piece of paper and examined grossly. Flea faeces ("dirt") will form typical rust stain, if paper is moistened, allowing differentiation from other organic debris.

Interpretation

A positive finding is diagnostic; a negative finding is inconclusive.

Lice and 2 fleas on adhesive tape
Image courtesy of Linda Vogelnest

Flea naked eye close up
Image courtesy of Peter Hill

B. ADHESIVE TAPE IMPRESSION

Indications

- Adhesive tape impressions are invaluable for the diagnosis of superficial bacterial pyoderma and *Malassezia* dermatitis, which are common considerations in pruritic patients, complicating a range of underlying pruritic or non-pruritic diseases.
- They are a simple method that can also be diagnostic for dermatophytosis, and surface dwelling mites (e.g. *Cheyletiella*), reveal inflammatory cell types such as eosinophils to support parasitic or allergic disease, and may be helpful to support diagnosis of some immune-mediated diseases (e.g. acantholytic cells in Pemphigus foliaceus).

Technique

Taping:

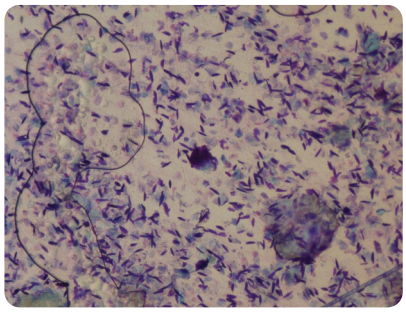
- Adhesive ('sticky') tape should be plain, non-patterned, non-invisible, with good quality adhesiveness, and 2cm wide (to cover the width of a glass slide; e.g. Office Works®, Scotch®). Glass slides ideally have one frosted end (for writing sample location). Most skin sites and lesion types can be sampled with adhesive tapes, making this test very versatile.
- Dry areas: alopecia, erythema, scaling, crusting, papules, epidermal collarettes.
- Chronic lesions: lichenification, hyperpigmentation, greasiness.
- Moist erosive or ulcerative lesions.
- Difficult sites (e.g. interdigital, skin folds).
- Push the adhesive tape firmly onto affected skin multiple times, parting hair a little first if sample sites are more densely haired. Similar sites can be sampled on one tape (e.g. interdigital). Different lesions and different body areas (e.g. muzzle, ventral abdomen, feet) may be best sampled on different tapes to more clearly indicate the extent of infections.

Staining:

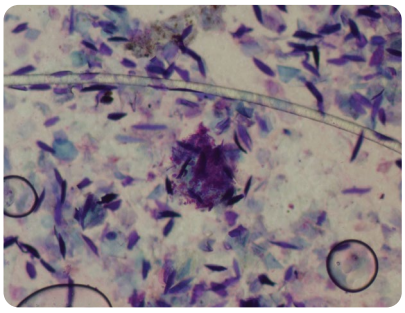
- Stain with a modified Wright's stain (e.g. DiffQuik®), using both the eosinophilic stain (orange or red) and the basophilic stain (blue or purple) but without the fixative.
- The tape can be dipped into the stains, while attached to one end of a glass slide. Curling into a loop may facilitate dipping, or a pipette or eye dropper can be used to apply the stain directly to the slide.
- Place the freshly stained tape sticky side down onto a glass slide, and use a tissue to smooth and dry the surface.
- Immersion oil is applied to the back of the tape (without need of a cover slip).
- Tape impressions should be examined immediately after staining, as clarity reduces fairly quickly after staining due to water uptake by the tape.
- Unstained tapes may be retained for later staining and examination (overnight, and potentially a few days).

Important principles when evaluating adhesive tape impressions

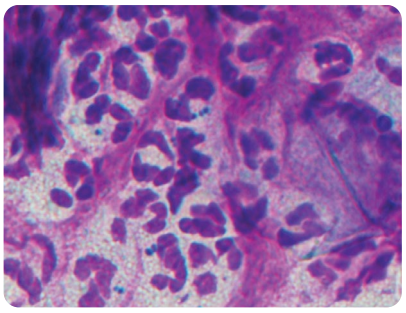
- Scan samples on lower power (4x lens) to identify areas of dense cells, or neutrophil clusters (see below), that warrant examination under higher power.
- Most efficient and accurate examination requires repeated scanning under low power, interspersed with closer examination of suspect areas under oil immersion.
- Inflammatory cells stain purple with modified Wright's stains.
- On the skin surface, neutrophils are the most prevalent cell type while eosinophils are less frequent.
- Mononuclear cells (macrophages, lymphocytes, plasma cells, mast cells) are rare on the skin surface, and most are often restricted to the deeper erosive or nodular/exudative lesions.



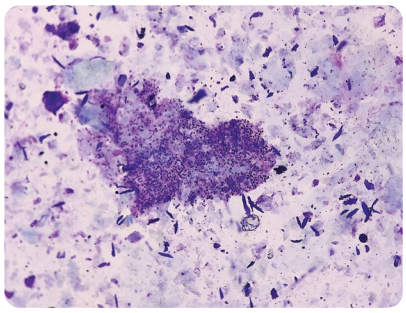
Neutrophilic clump on tape strip low power
Image courtesy of Peter Hill



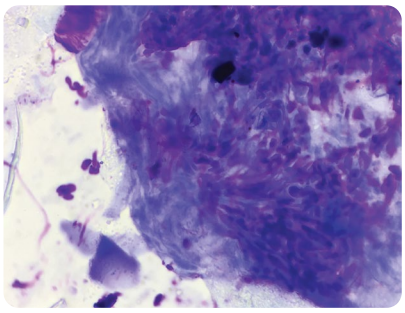
Neutrophilic clump on tape strip medium power
Image courtesy of Peter Hill



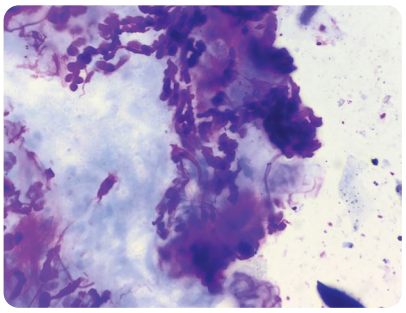
Neutrophilic clump on tape strip high power
Image courtesy of Peter Hill



Neutrophil cluster on adhesive tape impression low power
Image courtesy of Linda Vogelnest



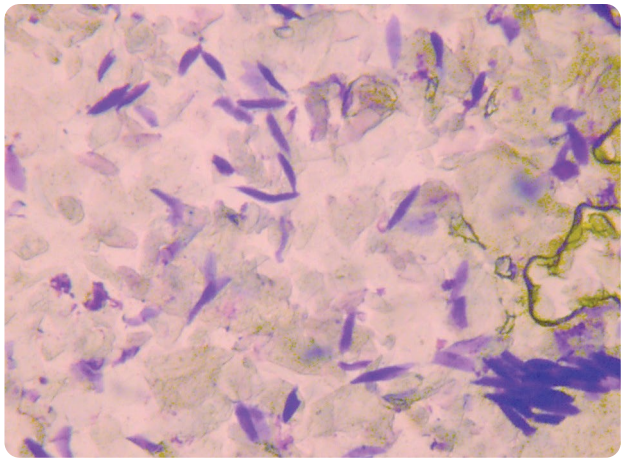
Neutrophil cluster on adhesive tape impression medium power
Image courtesy of Linda Vogelnest



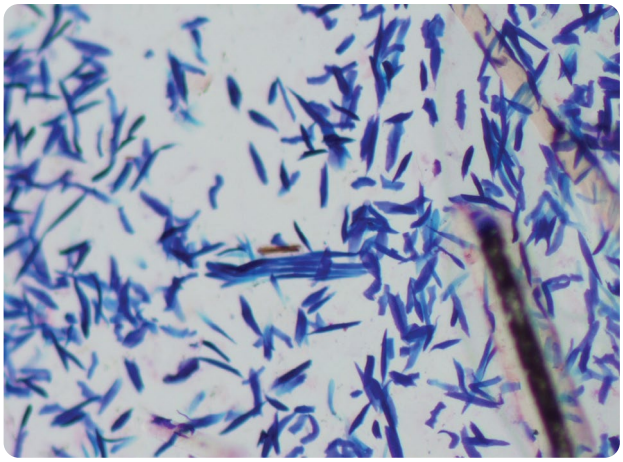
Neutrophil cluster on adhesive tape impression medium power
Image courtesy of Linda Vogelnest

WATCH CYTOLOGY TECHNIQUES FOR INFECTIOUS SKIN DISEASE

- Keratinocytes dominate many samples and stain pale to deeper blue. They are: surface corneocytes (*flat polyhedral cells*, present in sheets, very pale staining) or follicular keratinocytes (*linear shards*, scattered, dark blue staining).

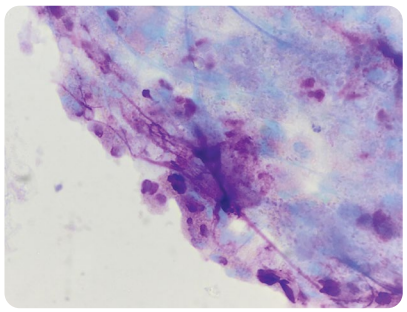


Corneocytes surface and follicular low power
Image courtesy of Peter Hill

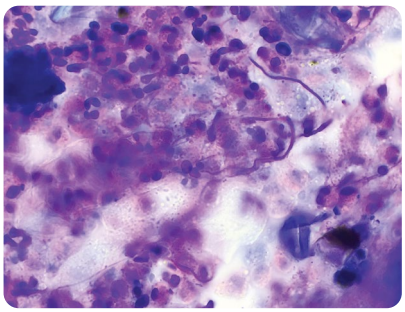


Corneocytes follicular low power
Image courtesy of Peter Hill

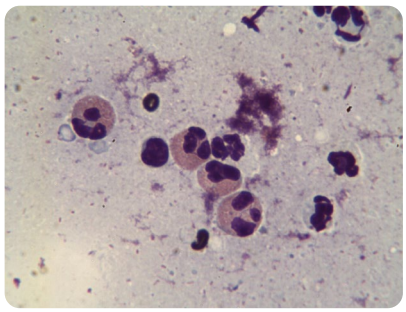
- Neutrophils will be present in conjunction with many inflammatory skin lesions, as they are the first cell type responding to a range of skin insults including microbial infections, physical trauma, and chemical irritants.
- Neutrophils tend to form clusters around sheets of keratinocytes, producing a purple granular rim around pale blue keratinocytes, that is best evaluated on lower power magnification (e.g. 4x or 10x lens).
- Neutrophils frequently occur in degenerate forms on the skin surface, often appearing as long strands of purple–staining nuclear material (referred to as nuclear streaming).
- Eosinophils are less readily identified on tape impressions until more experienced.
- Eosinophils appear as polymorph cells filled with very pale slightly pink granules on tapes counter–stained with red and purple dyes, or pale blue granules with blue staining alone.
- In relation to eosinophils, small numbers of nearby extracellular granules are frequent.



Eosinophil cluster on adhesive tape impression high power
Image courtesy of Linda Vogelnest



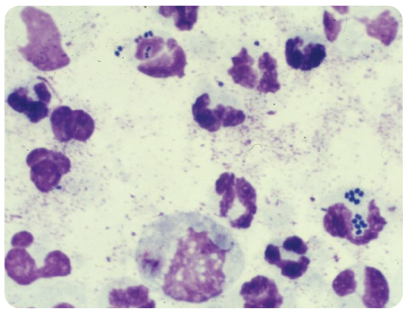
Eosinophil cluster on adhesive tape impression high power
Image courtesy of Linda Vogelnest



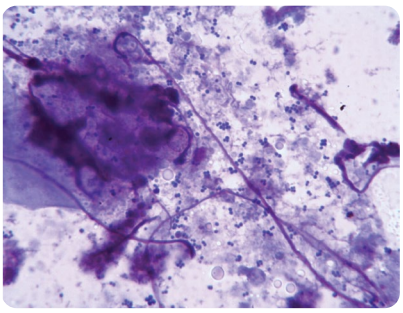
Eosinophil high power
Image courtesy of Mike Shipstone

Evaluation of tape impressions for superficial bacterial pyoderma

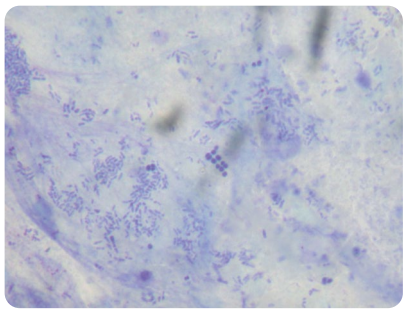
- Bacteria are only accurately recognised on oil immersion examination, and both gram–positive and gram–negative bacteria stain dark blue with modified Wright's stains.
- Bacteria are rarely seen on keratinocytes in normal skin evaluated at oil immersion magnification.
- It is important to recognise that although normal bacterial flora can be readily cultured from surface swab samples, a swab would be collected from an area representing thousands of oil immersion fields.
- When evaluated microscopically at oil immersion magnification, normal skin has only sparse bacteria.
- A cytological diagnosis of pyoderma requires the presence of neutrophils closely associated with bacteria; ideally bacteria are intracellular within intact neutrophils, but often lie amongst degenerate neutrophil strands and remnant nuclear segments.
- Most bacteria causing superficial pyoderma are cocci (staphylococcal species), which are characteristically present in pairs, and occasionally single .
- Bacterial colonisation (overgrowth) consists of bacterial cocci and/or rods not associated with neutrophils.
- Bacterial infection occurs often at moist sites, such as interdigital or skin folds and may cause skin irritation and pruritus, but do not reflect active infection.



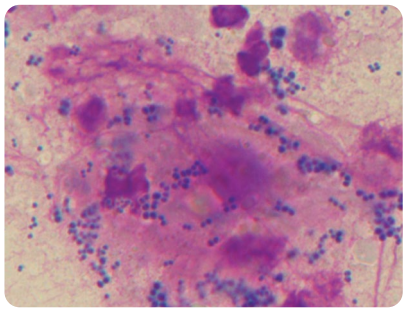
Staphylococci high power
Image courtesy of Peter Hill



Bacterial staphylococci high power
Image courtesy of Mike Shipstone



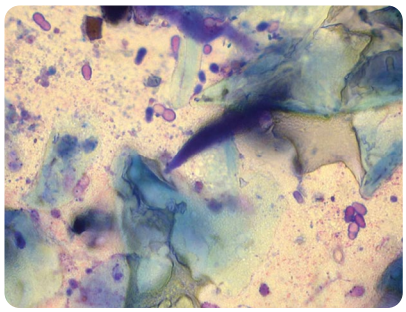
Bacterial rods and sparse staphylococci – colonising high power
Image courtesy of Linda Vogelnest



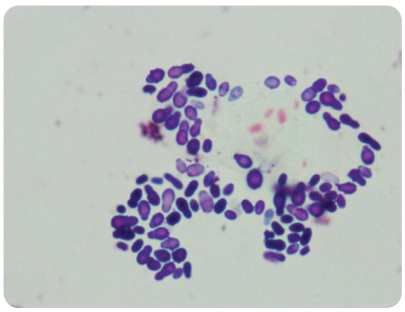
Staphylococci bacterial overgrowth high power
Image courtesy of Peter Hill

Evaluation of tape impressions for *Malassezia* dermatitis

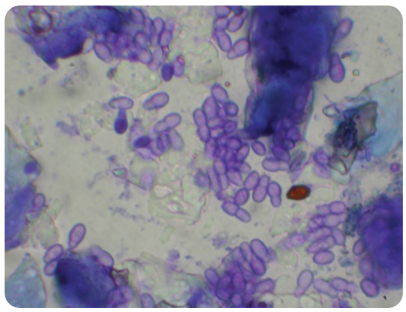
- *Malassezia* are fairly uniformly distributed amongst keratinocytes and infection occurs with increased numbers of yeast that are typically not associated with inflammatory cells.
- They are visible with the 40x lens but are often evaluated under oil immersion while assessing for bacteria.
- A cytological diagnosis of *Malassezia* dermatitis requires an increased number of *Malassezia* compared to normal flora; the distinction between normal and abnormal numbers of *Malassezia* is not always clear cut, as normal numbers may vary with climate, body site, breed, and individual.
- As a general rule > 1–2 yeast per oil immersion field, in conjunction with consistent clinical signs (erythema, pruritus), is likely abnormal.
- In allergic dogs, hypersensitivity to *Malassezia* antigen is documented.
- One organism every 3–4 oil immersion fields, in association with consistent clinical signs, may be significant.



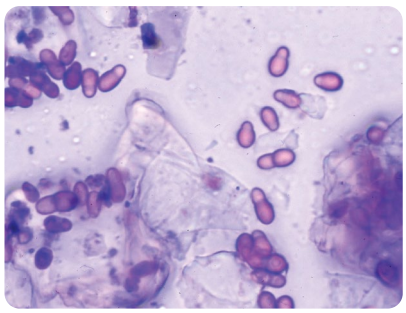
Malassezia **medium power**
Image courtesy of Linda Vogelnest



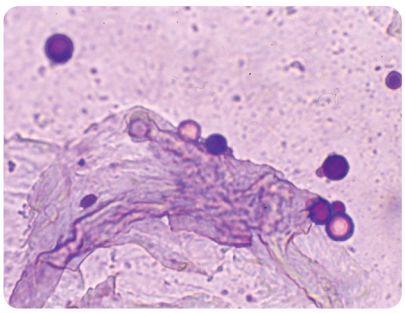
Malassezia **medium power**
Image courtesy of Peter Hill



Malassezia **in a dog with atopic dermatitis high power**
Image courtesy of Mike Shipstone



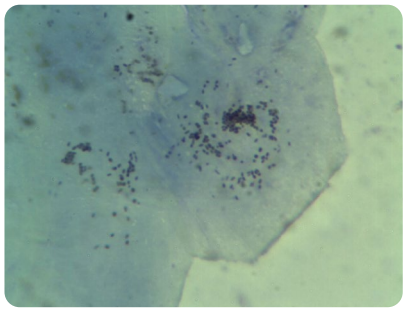
Malassezia **high power**
Image courtesy of Peter Hill



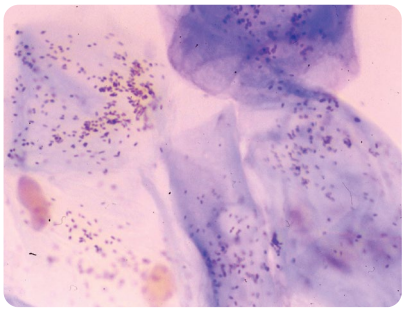
Malassezia **globoid high power**
Image courtesy of Peter Hill

Incidental findings on tape impressions

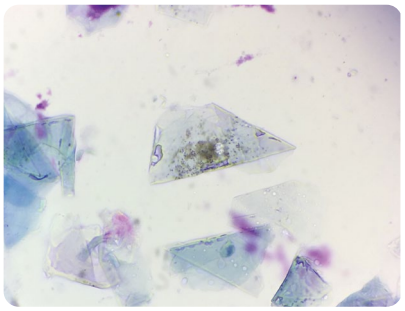
- Melanin granules may be confused with bacteria; they are small ellipsoid brown elements with slight size and shape variations that are scattered in clusters throughout keratinocytes.
- Adjustment of the fine focus reveals their multiple levels throughout the keratinocytes, and their distinct brown colouration, which contrasts to bacteria with more uniform morphology that are located on the keratinocyte cell surface.



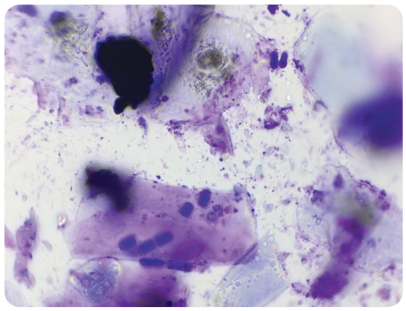
Melanin granules high power
Image courtesy of Mike Shipstone



Melanin granules in corneocytes high power
Image courtesy of Peter Hill

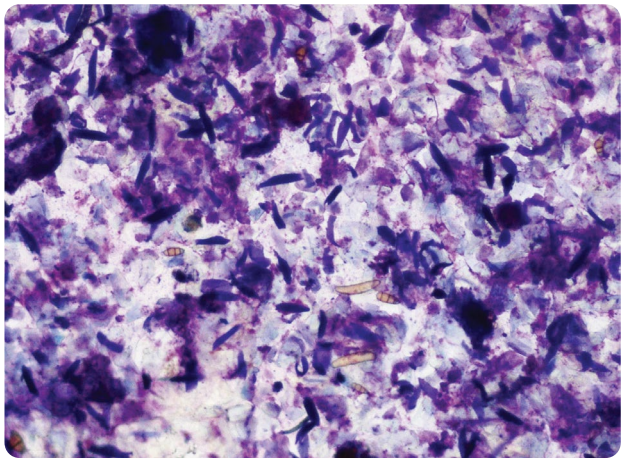


Melanin granules on a keratinocyte high power
Image courtesy of Linda Vogelnest

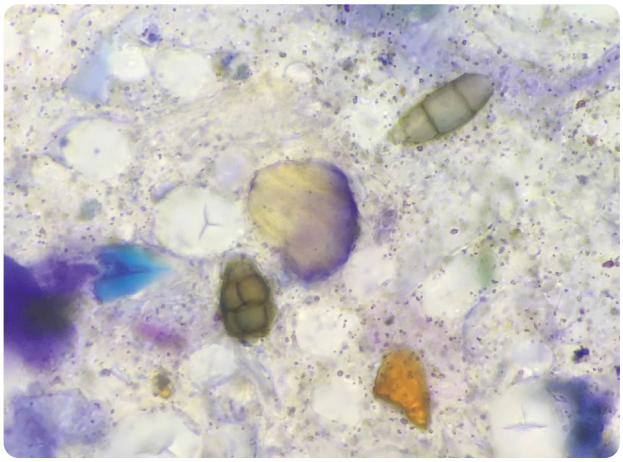


Keratinocytes, Melanin Granules and Conchiformibius (previously known as Simonsiella) on adhesive tape impression high power
Image courtesy of Linda Vogelnest

- Environmental contaminant mould spores may be erroneously confused with dermatophyte conidia, due to their large size, clear cell outlines, and multi-compartmental segmentation.
- Dermatophyte conidia are only produced when dermatophytes are grown on laboratory media, and not in natural infections.
- The arthrospore is the natural infective stage of dermatophytes.
- Mould spores are frequent contaminants on tape impressions, and do not cause skin surface infections or irritation.

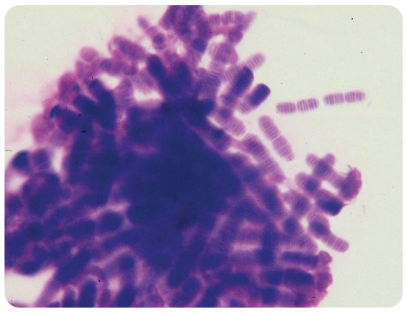


Fungal spore (saprophytic) low power
Image courtesy of Peter Hill

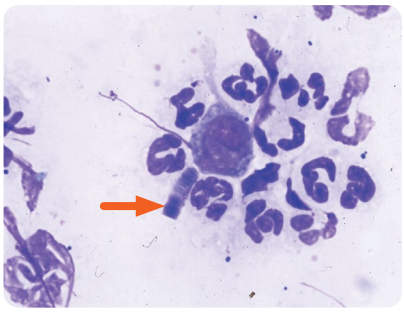


Mould spores and melanin granules on adhesive tape impression high power
Image courtesy of Linda Vogelnest

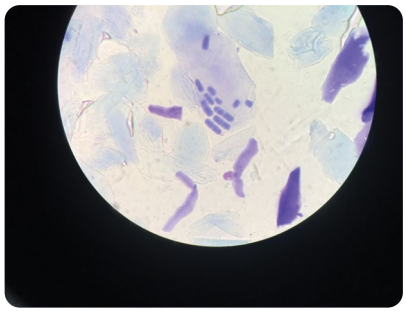
- *Conchiformibius* organisms are large, darkly staining rods that are positioned side by side to give the appearance of a much larger, banded organism. *Conchiformibius* are normal inhabitants of the oral cavity and they are transferred to the skin by licking. Their presence does not indicate skin infection but suggests pruritus.



***Conchiformibius* high power**
Image courtesy of Peter Hill



***Conchiformibius* high power**
Image courtesy of Peter Hill



***Conchiformibius* high power**
Image courtesy of Mike Shipstone

C. GLASS SLIDE IMPRESSION/EAR SMEARS

Indications

- Glass slide impressions are most useful for sampling erosive to ulcerative skin lesions, gently punctured pustules and ear canal cytology.
- They are helpful to evaluate for infectious organisms (bacteria, yeast, other fungi), inflammatory cells (neutrophils, eosinophils, macrophages), and neoplastic cells.
- Results can be diagnostic (e.g. superficial/deep bacterial pyoderma; *Malassezia* dermatitis; fungal infection), or provide useful information to guide the more likely differentials based on inflammatory cell types and presence or absence of microbes.

Technique

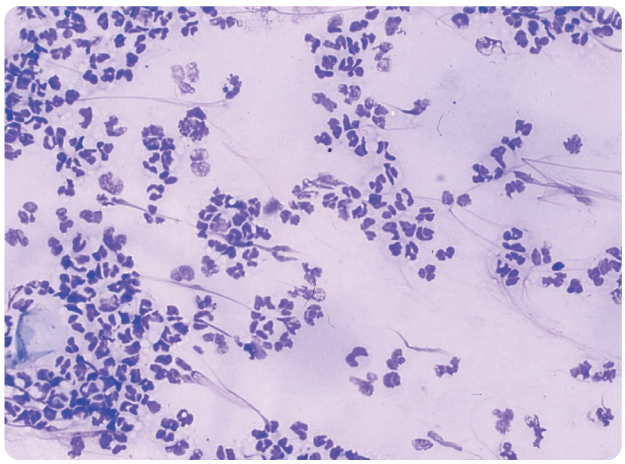
- Exudative erosive/ulcerative lesions – clean excessive discharge gently with a dry or saline-moistened swab then press a glass slide firmly onto affected skin for 2–3 seconds; air dry prior to staining.
- Pustules – carefully rupture with a 25g needle, then press the glass slide as above.
- Ear cerumen – roll a dry swab gently around the perimeter of the ear canal being sampled, approximately mid-way down the vertical canal.

Staining

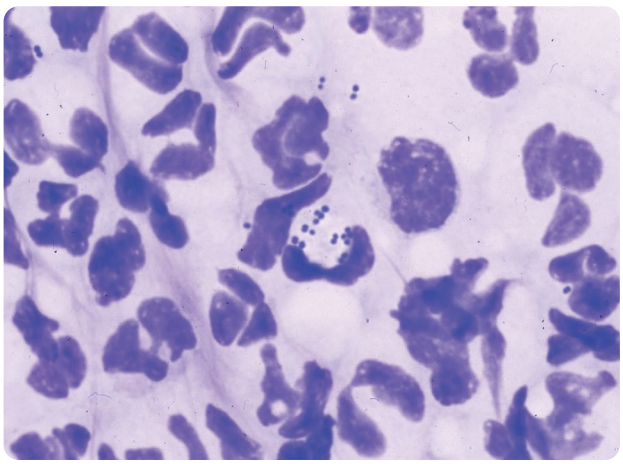
- Samples are most often processed with modified Wright's stain (e.g. DiffQuik®) but may be stained with the Gram stain or a variety of other laboratory stains.
- Slides should be placed in the fixative solution prior to staining. Once fixed and stained, glass slide samples can be retained for lengthy periods for future evaluation.

Microscopic examination

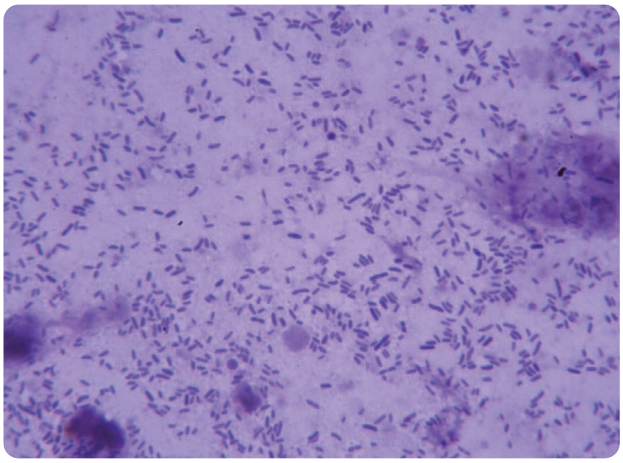
- The evaluation of glass slide impressions is generally more straightforward than from adhesive tape impressions, as cells and microbes typically appear clearer and better defined.
- Slides initially on low power (4x lens), are examined, looking for heavily cellular areas and/or clumps of inflammatory cells.
- These areas can be examined under 40x lens for *Malassezia*, other fungal hyphae/spores, and inflammatory cell types, then under oil immersion for bacteria.
- Oil can be placed on top of a cover slip placed on the sample, which can later be removed again for repeat examination under 40x and/or sending the slides to a laboratory.



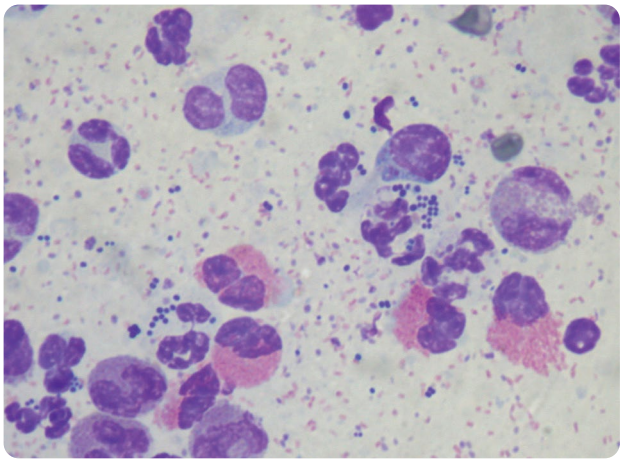
Neutrophils medium power
Image courtesy of Peter Hill



Neutrophils degenerate (pyoderma) high power
Image courtesy of Peter Hill



Bacterial rods in a dog with otitis high power
Image courtesy of Mike Shipstone



Eosinophils and fewer neutrophils with intracellular staphylococci from glass slide impression high power
Image courtesy of Linda Vogelnest

WATCH CYTOLOGY TECHNIQUES FOR FUNGAL INFECTIONS

D. SKIN SCRAPING: SUPERFICIAL

Indications

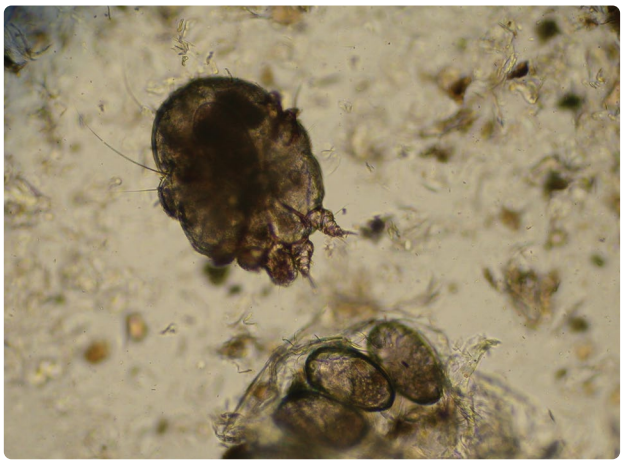
- To evaluate for superficial ectoparasites, including *Sarcoptes*, *Otodectes*, environmental mites (e.g. trombiculids).

Technique

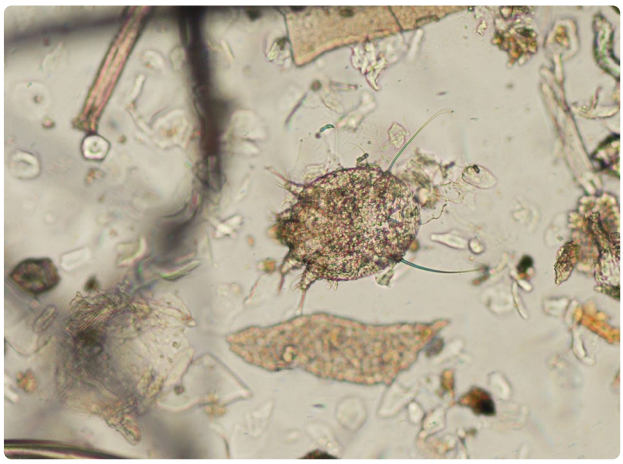
- Place paraffin oil on the skin in the area to be sampled and use a blunt scalpel to collect surface scale and crust.
- Densely haired regions should be lightly clipped where necessary to enable scraping. The aim is NOT to cause capillary bleeding as the parasites being collected are in the superficial layers of the skin.
- Once the material is collected onto a glass slide, contents should be mixed to evenly disperse the material then covered with a coverslip (to make an even plane of focus).
- Examine the slide under low power (4x or 10x lens) to systematically view the entire slide.

Interpretation

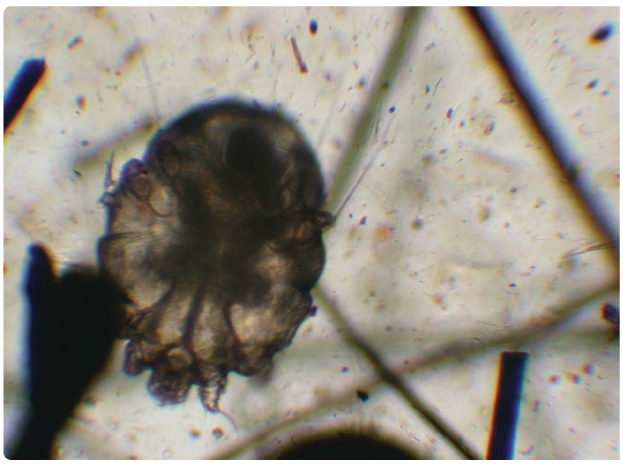
- The presence of any ectoparasites is diagnostic, although care is needed to differentiate dead mites from environmental contaminants (e.g. dust and storage mites). The absence of mites does not exclude any role in disease.



***Sarcoptes* mite – adult and eggs low power**
Image courtesy of Linda Vogelnest

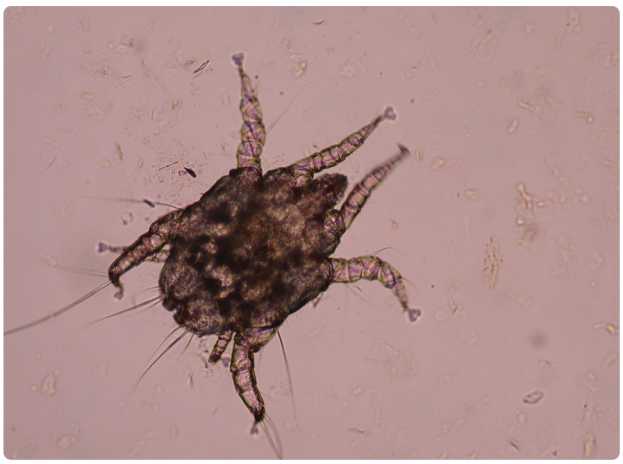


***Sarcoptes* low power**
Image courtesy of Peter Hill



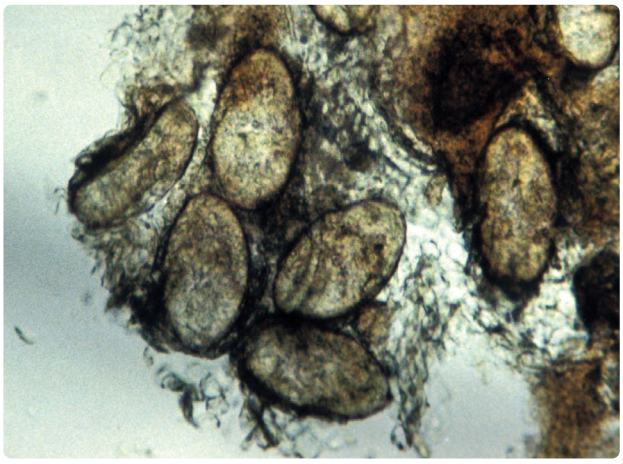
***Sarcoptes* seen on superficial skin scrape medium power**
Image courtesy of Mike Shipstone

***Sarcoptes* seen on superficial skin scrape high power**
Image courtesy of Mike Shipstone

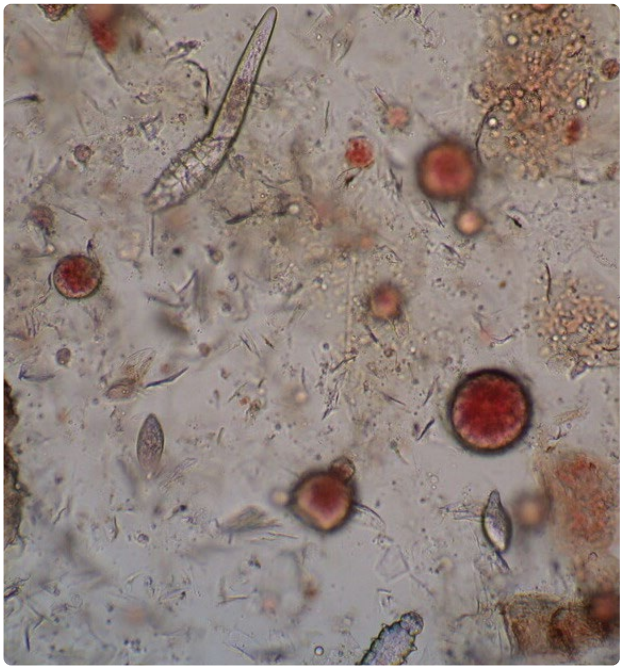


***Otodectes* mite – adult low power**
Image courtesy of Linda Vogelnest

***Otodectes cynotis* medium power**
Image courtesy of Peter Hill



***Otodectes cynotis* eggs high power**
Image courtesy of Peter Hill



***Demodex canis* – adult and egg from deep skin scraping low power**
Image courtesy of Linda Vogelnest

E. SKIN SCRAPING: DEEP

Indications

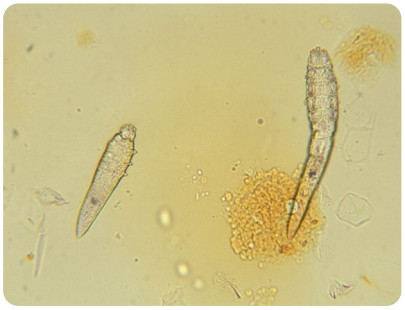
- To evaluate for demodicosis due to *Demodex canis* (more typical follicular mite), or *Demodex injai* (long-tailed mite).

Technique

- This involves a deeper level of scrape, until capillary oozing is seen. This is done whenever *Demodex* is suspected but as there is no such thing as a "classic' look to demodicosis, it should be a routine test method in most investigations.
- The area to be sampled may be clipped (#40 blade) if necessary and then the skin squeezed (increases mite yields).
- Paraffin oil should be applied and a scalpel (blunt or sharp fresh scalpel) used to scrape until capillary oozing (i.e. NOT bleeding from laceration) is evident.
- The material should be transferred to a glass slide and examined as above.

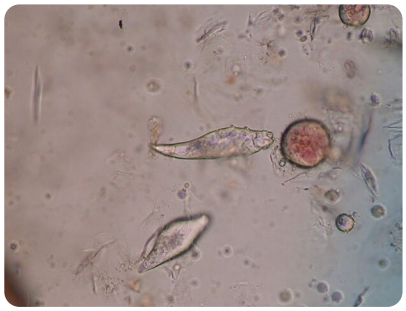
Interpretation

- Presence of any *Demodex* mites indicates demodicosis. It is extremely rare to detect *Demodex* mites on skin scrapings from normal skin.
- The absence of *Demodex* mites usually excludes any role for demodicosis except potentially in the following instances:
  - *Lesions restricted to the interdigital spaces* – the feet are often difficult to scrape and will bleed before an adequate depth is reached. If scraping the feet move to an erythematous area at the periphery rather than more swollen severely affected skin. Trichograms and squeeze tape impressions (see below) are often more useful than scrapes on feet.
  - *Shar Pei breed* – The mucin accumulation in the skin of this breed makes skin scraping difficult and a biopsy may be necessary to obtain a diagnosis.



***Demodex canis* adult (8 legs) plus larva (6 legs) low power**
Image courtesy of Peter Hill

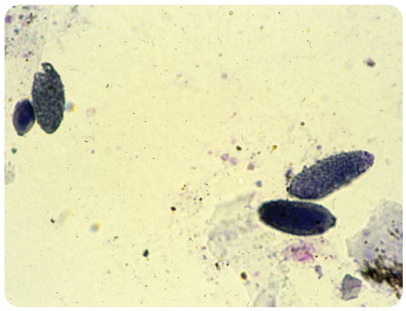
***Parasite Demodex injai* (long bodied Demodex) low power**
Image courtesy of Peter Hill



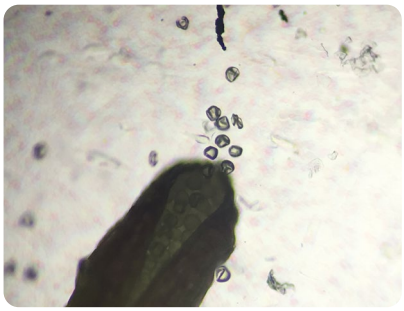
***Demodex canis* larva and egg low power**
Image courtesy of Linda Vogelnest

Artefacts

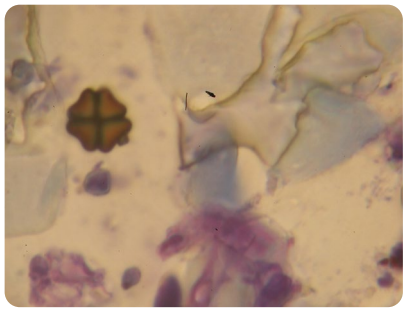
- Artefacts are common in skin scrapings
  - › Coloured threads are commonly seen in skin scrapings from pruritic animals and may be from carpets and sofas.
  - › Fungal spores and pollen grains can be confused with mites.
  - › Plant material is often, but not always coloured.
  - › Mites appear brown under the microscope.
  - › Blood cells mixed in mineral oil will often form round, red-brown globular structures.



Pollen grains high power
Image courtesy of Peter Hill



Buffalo grass anther with pollen granules high power
Image courtesy of Mike Shipstone



Pollen low power
Image courtesy of Mike Shipstone

WATCH ECTOPARASITES EXAMINATION TECHNIQUES

F. SQUEEZE TAPE IMPRESSION

Indications

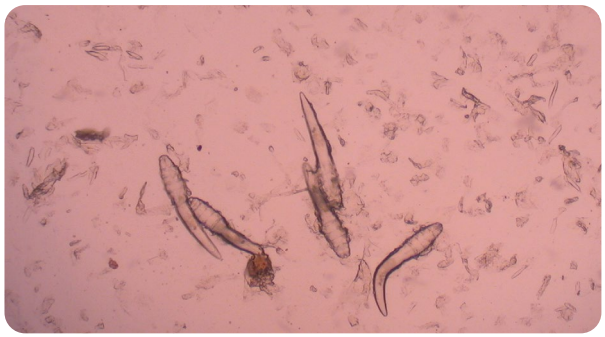
- This technique is useful whenever *Demodex* is suspected, and for monitoring response to therapy.
- It causes less patient discomfort, produces no apparent skin trauma, and is readily performed at all body sites, allowing ready sampling of multiple areas.
- It is particularly useful for difficult sites, such as around the eye, on the face or feet or if the animal is uncooperative or aggressive.

Technique

- The tape is applied to lesional skin, and the tape and underlying skin are squeezed for 3–5 seconds.
- The tape can be repositioned at other sites or, alternatively, repeat squeezing at same site can be done until there is loss of tape adhesiveness.
- Multiple sites can be sampled on one tape, or separate sites with different tapes if there is concern over multiple concurrent diseases.
- The tape is best examined as per stained cytology: being a dry preparation, increasing contrast is less effective and maximum light appears most suitable.

Interpretation

- The finding of *Demodex* mites is diagnostic.
- The absence of mites makes demodicosis unlikely, particularly if multiple lesional areas are sampled.
- A deep skin scraping may be indicated to aid exclusion of demodicosis; however, both techniques appear to have similar sensitivity.



***Demodex canis* – on tape squeeze low power**
Image courtesy of Linda Vogelnest

G. EAR SMEAR FOR OTIC PARASITES

Indications

- Evidence of otitis or pruritus of the ears and/or adjacent skin, especially in younger dogs or when exposure to young dogs or cats, and with dark granular ear discharge.

Technique

- This technique is used primarily to find *Otodectes cynotis*. Occasionally, *Demodex* mites may be found
- A cotton bud sample is collected as for ear cerumen above.
- Transfer the debris from the tip of the swab to a microscope slide by gently rolling the swab in a drop of liquid paraffin.
- Mix the contents to evenly disperse, then cover with a coverslip (to make an even plane of focus).
- Examine the slide under the low power (4x or 10x) systematically to cover the entire slide.

Interpretation

- A positive finding is diagnostic; a negative finding is inconclusive.
- Many species of ear mites migrate to the ear margins to deposit eggs, therefore if swabs from the ear canal are negative, skin scrapings from the ear margins or peri-aural skin are indicated.

Artefacts

- The most common artefact is clumps of coagulated dried blood.

WATCH CYTOLOGY TECHNIQUES FOR OTITIS EXTERNA

H. TRICHOGRAM

Indications

- A very simple yet useful technique that allows evaluation for:
  - Infectious agents – *Demodex* mites.
  - Causes of hair loss – trauma or shedding.

Technique

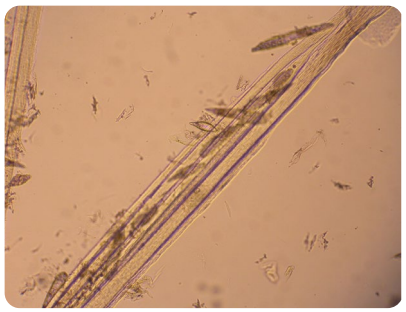
- Pluck hairs gently with haemostats, using a rolling motion to pull in the direction of hair growth to facilitate retention of hair bulbs.
- Lay hairs carefully on 1–2 drops of paraffin oil on a glass slide, taking care to keep the bulbs aligned at one end. Longer hair may have tips cut short, (with the middle of the shaft discarded) to facilitate examination of both bulbs and tips.
- Place a cover slip on top of the sample, spreading hairs apart gently, and with sufficient paraffin oil underneath to provide an even surface for focusing.
- Examine microscopically as for other wet preparations (condenser lowered).
- Scan slides with the 4x lens (40x magnification). Examine hair shafts and bulbs for abnormalities.

Interpretation

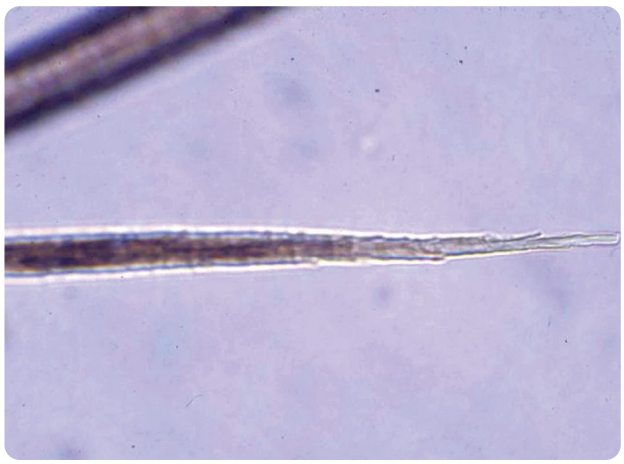
- Infectious agents will appear as per acetate tape impressions and skin scrapings, associated with plucked hairs.
- When alopecia is caused by trauma (self-trauma or external trauma), the hair tips will appear irregularly broken. In contrast, hairs that are easily shed will have gently tapered tips.
- Normal telogen hairs have straight spear-like less-pigmented bulbs, while normal anagen hairs have curled or clubbed more heavily pigmented bulbs. Normal dogs will have a mix of anagen and telogen hairs at any one time, with longer-haired dogs having a predominance of anagen hairs.

***Demodex canis* plus follicular casting low power**
Image courtesy of Mike Shipstone

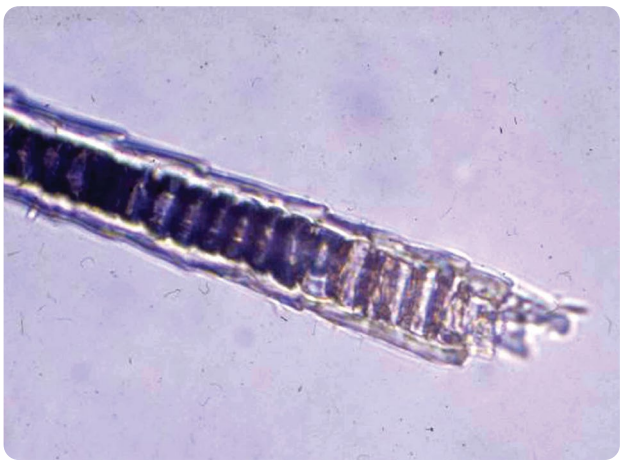
***Demodex canis* trichogram low power**
Image courtesy of Peter Hill



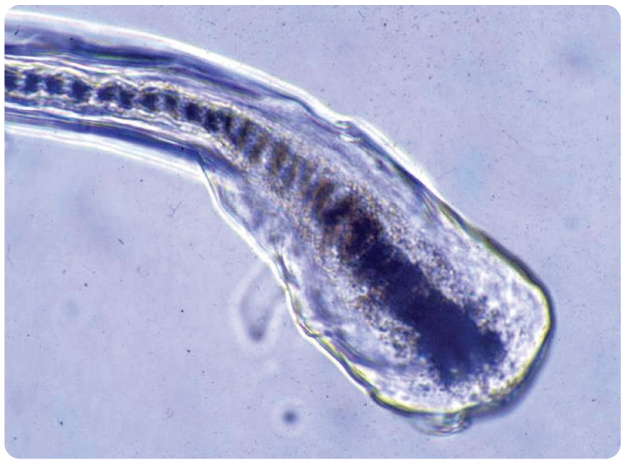
***Demodex canis* trichogram low power**
Image courtesy of Mike Shipstone



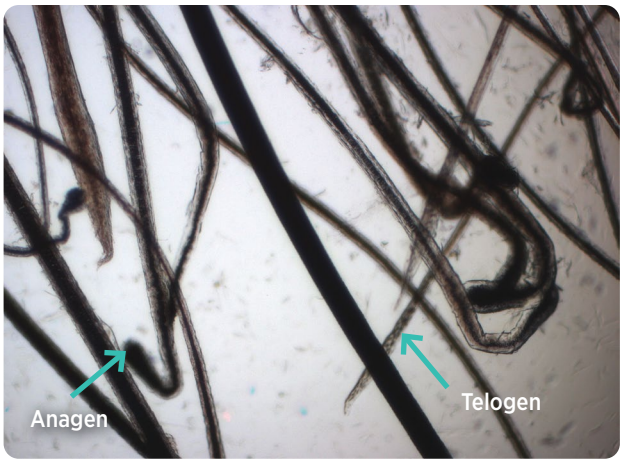
Trichogram normal tip medium power
Image courtesy of Peter Hill



Trichogram fractured shaft high power
Image courtesy of Peter Hill



Trichogram anagen bulb high power
Image courtesy of Peter Hill



Anagen and telogen hairs on trichogram low power
Image courtesy of Linda Vogelnest

THERAPEUTIC TRIALS FOR FLEAS AND *SARCOPTES*

- Both fleas and *Sarcoptes* can go undetected in dogs with pruritus, despite performing appropriate diagnostic tests.
- If the lesion distributions and pattern of pruritus are consistent with either flea allergy dermatitis or scabies, a therapeutic trial should be undertaken.

FLEA THERAPEUTIC TRIAL: CURRENT CHOICES
Selamectin (Revolution®) topical monthly
Sarolaner (Simparica® / Simparica TRIO®) PO every month
Nitempyram (Capstar®) PO q 24hrs
Lotilaner (Credelio®) PO every month
Fluralaner (Bravecto®) PO every 3 months
Afoxolaner (Nexgard®) PO every month

Some dermatologists have personal preferences based on clinical experience and may use products more frequently than the label recommendation.

- Fleas are amongst the most common trigger factors of pruritus in dogs.
- Eliminating contact with fleas and treating any infection are an important first step in the management of acute pruritus.
- In instances where there are heavy flea infestations, environmental control may be required.
- This could include the use of thorough vacuuming and steam cleaning of the house and car (if dog travels in car), followed by application of 'insect bombs' (e.g. Mortein®), washing of bedding where the household pets sleep, keeping lawn well mowed and removal of leaf and other garden litter.
- All pets in the household should be treated for fleas, not just the pruritic dog.
- Flea stages in the backyard and grassed areas are difficult to eradicate, especially if frequented by neighbourhood cats. However stringent use of adulticides on pets will ensure that any newly introduced infestations are eliminated in an effective manner.

SARCOPTES THERAPEUTIC TRIAL: CURRENT CHOICES
Selamectin (Revolution®) topical monthly
Sarolaner (Simparica® / Simparica TRIO®) PO every month
Moxidectin, imidacloprid (Advocate®) topical monthly
Fluralaner (Bravecto®) PO every month
Afoxolaner (Nexgard®) PO every month

Some dermatologists have personal preferences based on clinical experience and may use products more frequently than the label recommendation.

All isoxazoline products have an approved dosage range in mg per kg. If a mite infection is difficult to resolve then check the mg per kg being administered to see if a higher dose in mg per kg can be administered.

- Scabies is a highly pruritic disease that can sometimes be confused with allergy.
- Ruling out scabies is an important step before considering further investigation of allergic skin disease.

CHECKLIST:
SUMMARY OF PARASITE CONTROL

1	Check current parasite control strategies
2	Check for lesions (papules and crusts) and the pattern of distribution of lesions (refer to page 27 Typical distribution patterns)
3	Perform diagnostic testing for parasites
4	Implement a parasite therapeutic trial if indicated

ALLERGIES DIAGNOSTIC WORK–UP

DIETARY DIAGNOSTIC WORK–UP

A: DIAGNOSTIC APPROACH

HISTORY
Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

PHYSICAL EXAM
Most common differentials are parasites, secondary bacterial and yeast infections, and allergies

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES
- Fleas
- *Demodex* mites
- *Sarcoptes* mites
- Ear mites

Diagnostic tests to consider:
- Flea comb
- Wet paper
- Skin scrape
  - superficial
  - deep
- Trichogram
- Squeeze tape impression
- Flea & *Sarcoptes* therapeutic trials

2 INFECTIONS
- Bacteria
- Yeast

Diagnostic tests to consider:
- Adhesive tape impression
- Cotton bud smear
- Glass slide impression
- Culture
  - Bacterial culture and sensitivity
  - Fungal culture

If **parasites** and **infection** have been ruled out, and the skin condition remains, then **Allergic Dermatitis** should be investigated

3 ALLERGIES
Food, Contact, Atopic Dermatitis

FOOD
Diagnostic tests to consider:
- Food elimination trial

Once infectious and parasitic causes have been ruled out, the next crucial step in the diagnostic work-up involves a food elimination trial. A typical food elimination trial will run for up to 8 weeks prior to confirming the diagnosis by rechallenge with the original diet. Approximately 50% of food allergic dogs will show marked improvement or resolution of pruritus after 3 weeks, 85% of them after 5 weeks, and 95% after 8 weeks.

A food elimination trial includes the following steps:

Communicate → **Establish** → **Select** → **Treat**

- **Communicate** with the owner the importance of this diagnostic step, including the length of the trial, how important it is to strictly adhere to the diet and how the pruritus will be managed in the interim.
- **Establish** what food the dog has been exposed to previously. It is important to consider all sources of protein and carbohydrate.
  Common allergens may include chicken, beef, wheat and dairy.
- **Select** an appropriate diet containing novel protein and carbohydrate (ones which the dog has never previously eaten). This could include home-cooked diets or commercial diets.
  The precise diet should be determined on a case-by-case basis.
- If a commercial diet is chosen, the Panel would typically recommend a novel protein hydrolysed diet, that may include Royal Canin Anallergenic® or Hills z/d®. This dietary recommendation may change with the emergence of new evidence and/or new products.
- If a home-cooked diet is chosen, examples of novel proteins may include kangaroo, horse, donkey, crocodile, rabbit, emu, or borlotti/pinto beans, or a protein source such as pork which is significantly less allergenic for the majority of dogs. Turkey, duck and eggs should be avoided as there is the potential for cross-reaction with chicken. Novel carbohydrates may include sweet potato, pumpkin or yam.
- No other foods, treats, table scraps, snacks, raw hides, etc. should be consumed or fed during the diet trial. Dogs should also not be allowed to lick dinner plates.
- Flavoured medications, such as flavoured parasiticides, palatable medications, toothpastes and gelatin capsules should be avoided where safe to do so.
- **Treat** the dog with antipruritics. Oclacitinib (Apoquel® Film Coated Tablet), Lokivetmab (Cytopoint®) or prednisolone should be considered at the start of the diet trial depending on the severity of the pruritus. Management of the pruritus at the outset of the diet trial can improve owner compliance and accelerate the dog's recovery. Antipruritic medications should be withdrawn by 3 weeks to determine if there has been a response to the diet. If not, the medication can be restarted for a further period of up to 3 weeks until withdrawal prior to the end of the trial.
- If the dog is not pruritic at the end of the trial it may have a food allergy. The diagnosis is confirmed by rechallenge with the original diet for up to two weeks whilst not receiving antipruritics.
- If the dog flares on rechallenge, the diagnosis is confirmed and a sequential rechallenge may be performed to identify specific allergens to be avoided or a long-term maintenance diet with novel proteins should be recommended.
- If there is no improvement by 8-weeks on the trial (and there is certainty that the owners strictly adhered to the protocol) then a food allergy is unlikely.
- Serological and intradermal tests to determine hypersensitivity to food allergens are not recommended for assessing food-induced allergies in dogs.
- Studies show that there are currently no reliable commercially available tests for the diagnosis of food allergies.[2]

Benefits for conducting food elimination trials and subsequently diagnosing dietary allergens may include:

› less / no reliance on medications
› reduced flare propensity
› improved pruritic management

CONTACT DERMATITIS TRIAL

A: DIAGNOSTIC APPROACH

HISTORY
Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

PHYSICAL EXAM
Most common differentials are parasites, secondary bacterial and yeast infections, and allergies

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES

- Fleas
- *Demodex* mites
- *Sarcoptes* mites
- Ear mites

Diagnostic tests to consider:

- Flea comb
- Wet paper
- Skin scrape
  - superficial
  - deep
- Trichogram
- Squeeze tape impression
- Flea & *Sarcoptes* therapeutic trials

2 INFECTIONS

- Bacteria
- Yeast

Diagnostic tests to consider:

- Adhesive tape impression
- Cotton bud smear
- Glass slide impression
- Culture
  - Bacterial culture and sensitivity
  - Fungal culture

If **parasites** and **infection** have been ruled out, and the skin condition remains, then **Allergic Dermatitis** should be investigated

3 ALLERGIES

Food, Contact, Atopic Dermatitis

FOOD

Diagnostic tests to consider:

- Food elimination trial

CONTACT

Diagnostic tests to consider:

- Avoidance and re-challenge
- Patch test

- If the distribution of irritation and the nature of the clinical signs are consistent with contact allergic dermatitis, a contact avoidance trail can be conducted to confirm the diagnosis.
- Clinicians should be aware that there is considerable overlap between the clinical appearance of atopic dermatitis, food allergy, staphylococcal pyoderma, *Malassezia* dermatitis and contact dermatitis.
- The owner is advised to restrict the animal's access to certain areas. This may involve avoidance of outdoor areas where plants are present (grass, trees, weeds, poison ivy, poison oak, *Tradescantia* spp, dandelion leaves, cedar wood).
- The most common contact allergens are plants especially lawn grasses, *Tradescantia* spp. and other members of the *Commelinaceae* (succulent ground covers) family.
- The trial duration is normally 10 days and during this time the dog must be kept inside or prevented from contacting any plants.
- Complete resolution of the lesions following restriction suggests that contact dermatitis may be involved.
- The next step is to allow free access to all of the previously restricted areas. The diagnosis is confirmed if the re-exposure causes a flare in irritation (generally within 1 – 2 days).
- A scratch/patch test can then be performed to identify specifically what the trigger is.
- Interpretation may be complicated by the fact that animals may have more than one condition at the same time, some of which wax and wane. An integrated and sequential investigation is usually required if successful results are to be achieved.

ENVIRONMENTAL ALLERGENS WORK-UP

ALLERGY TESTING

A: DIAGNOSTIC APPROACH

HISTORY
Breed, age of onset, seasonality, environment, previous medication and response, current flea control, etc.

PHYSICAL EXAM
Most common differentials are parasites, secondary bacterial and yeast infections, and allergies

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES
- Fleas
- *Demodex* mites
- *Sarcoptes* mites
- Ear mites

Diagnostic tests to consider:
- Flea comb
- Wet paper
- Skin scrape
  - superficial
  - deep
- Trichogram
- Squeeze tape impression
- Flea & *Sarcoptes* therapeutic trials

2 INFECTIONS
- Bacteria
- Yeast

Diagnostic tests to consider:
- Adhesive tape impression
- Cotton bud smear
- Glass slide impression
- Culture
  - Bacterial culture and sensitivity
  - Fungal culture

If **parasites** and **infection** have been ruled out, and the skin condition remains, then **Allergic Dermatitis** should be investigated

3 ALLERGIES
Food, Atopic Dermatitis, Contact

FOOD
Diagnostic tests to consider:
- Food elimination trial

CONTACT
Diagnostic tests to consider:
- Avoidance and re-challenge
- Patch test

ATOPIC DERMATITIS
Diagnostic tests to consider:
- Skin allergy testing
- Serum allergy testing

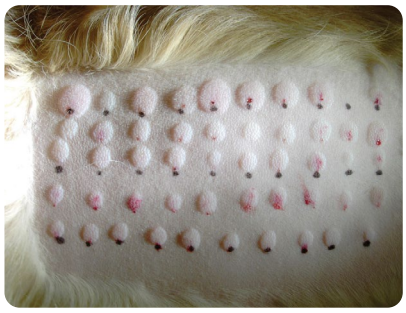
Two methods of allergy testing are routinely available for the further investigation of canine atopic dermatitis:

- Intradermal allergy test and in-vitro measurement of allergen-specific IgE (IgE serology). The principles underlying these tests are described below.
- Positive results can be obtained with either test in clinically normal dogs and dogs with other skin diseases. The test result is only meaningful if the dog has clinical signs consistent with atopic dermatitis and all other pruritic diseases have been ruled out.
- Allergy testing is indicated in animals with a history and clinical signs consistent with atopic dermatitis in which establishment of a definitive cause is desired, or allergen-specific immunotherapy is being considered as a potential treatment.
- It should only be performed after other pruritic diseases have been ruled out or controlled (ectoparasites, pyoderma, *Malassezia* dermatitis, food allergy).
- They are useful tests if owners wish to consider immunotherapy as a management strategy for the dog with chronic allergic dermatitis.

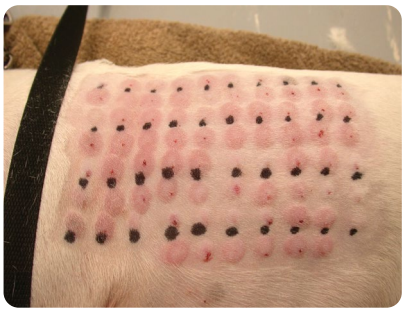
Many practitioners believe that a positive result in either of these tests is diagnostic for canine atopic dermatitis
– this is not the case

A. INTRADERMAL ALLERGY TEST

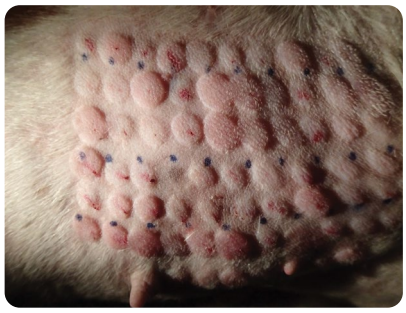
- The intradermal allergy test is a method for demonstrating the presence of hypersensitivity to various environmental allergens based on skin reactivity.
- Intradermal allergy testing is usually performed at referral centres or in practices in which there is a clinician with a specific interest in dermatology.
- The selection of allergens and interpretation of intradermal allergy tests requires specialised advice and training.
- Allergen solutions are also expensive and it would not be cost effective to offer this service unless one or two tests per week were being performed.
- Practitioners interested in performing this procedure should study for a further qualification in the discipline or undertake residency training.
- Most veterinary dermatologists test for reactivity against the following antigens:
  - › House dust mite and storage mite antigens (*Dermatophagoides farinae, Dermatophagoides pteronyssinus, Acarus siro, Tyrophagus putrescantiae*).
  - › Insect body parts/faecal elements (cockroach, moth, ant, houseflies).
  - › Pollens (from trees, weeds and grasses).
  - › Moulds (from the household or from crops).
- The inclusion of regional allergens (pollens) in the testing kit is based on knowledge of the plants in a particular geographical location.
- The intradermal allergy test is interpreted by correlating the positive reactions with the patient's history.
- Clinically relevant reactions can then be used to choose allergens for specific immunotherapy.
- Refer to Appendix 1 for allergy testing techniques.



Intradermal test – positive no erythema
Image courtesy of Peter Hill



Intradermal test – multiple strong positive reactions
Image courtesy of Linda Vogelnest



Intradermal allergy test
Image courtesy of Mike Shipstone

B. IgE SEROLOGY TEST

- *In-vitro* testing simply requires a blood sample to be taken and sent off to an appropriate laboratory.
- The serum is assayed for allergen-specific IgE and the results are reported as relative units (the higher the score, the higher the level of IgE).
- Refer to Appendix 1 for allergy testing techniques.
- The *in-vitro* test is interpreted by correlating the positive reactions with the patient's history. Clinically relevant reactions can then be used to choose allergens for specific immunotherapy.
- Note: Hair and saliva testing should not be used to diagnose allergies and is not a substitute for veterinary-directed allergy evaluation and diagnostics.

PREPARATION OF ANIMALS FOR ALLERGY TESTING

Before either of the above tests are performed, it is important that the patient is adequately prepared. Clinicians should ensure that:

- Other pruritic diseases have been ruled out.
- The skin is in a suitable condition for skin testing and is not covered in crusts or infection.
- Antipruritic drugs have been withdrawn for a suitable period of time.

APPROXIMATE WITHDRAWAL TIMES (IN WEEKS) FOR ANTI-PRURITIC DRUGS BEFORE ALLERGY TESTING

NOTE: These times may vary for an individual dog

Treatment	Intradermal testing	In-vitro testing
Methylprednisolone acetate injection	6–10	3–5
Daily prednisolone	4–6	0
Alternate day prednisolone	4–6	0
Topical steroids (including ear drops)	1	0
Antihistamines	1	0
Cyclosporin	0	0
Essential fatty acids	0	0
Oclacitinib (Apoquel®/Apoquel Chewable®)	0	0
Lokivetmab (Cytopoint®)	0	0

NOTE: Treatment with methylprednisolone acetate, daily and every other day prednisolone, or cyclosporin for periods longer than 3 months may require longer withdrawal times than stated in the Table above.

INTRADERMAL ALLERGY TESTING VERSUS IgE SEROLOGY – WHICH TEST IS BEST?

Veterinary dermatologists are often asked which of the above tests is the best. When answering this question, it is important to remember that the tests are not measuring the same thing.

- *In vitro* tests merely measure the amount of allergen-specific IgE that is present in the blood. Intradermal allergy testing detects the presence of allergen-specific IgE that is bound to mast cells in the skin.

- However, intradermal allergy tests also measure mast cell releasability (this can be altered in atopic dermatitis) and the response of the skin to inflammatory mediators. Intradermal allergy tests, therefore, provide a complete functional assessment of some of the pathways that are required to initiate an allergic reaction in the skin.

- In contrast, *in vitro* tests only measure one particular point in the pathway. For this reason, most veterinary dermatologists regard intradermal allergy testing as the superior test.

- If it is not possible for a dog to undergo intradermal allergy testing (e.g. if the practice doesn't perform it, there is no local referral centre, the owner doesn't want a referral), *in vitro* tests can be used as an alternative to identify allergens for use in immunotherapy.

- In some reports, the response to treatment is as good with this approach as that obtained with intradermal allergy testing, although, to date, this has not been confirmed in properly controlled studies.

- Despite the above theoretical and practical considerations, it is common for a positive reaction to occur in one test and not the other.

- Performance of both tests at the same time is more informative, although it may be cost prohibitive.

- Of note, an increase in the efficacy of the chosen immunotherapy based on the combined test results has not been demonstrated.

SECTION B: THERAPEUTIC APPROACH

CHAPTER 4:

MANAGEMENT OF PRURITUS

ACKNOWLEDGING AND MANAGING OWNERS' EXPECTATIONS

- The role of the veterinarian is to provide rapid, symptomatic relief of the pruritus for the dog and to determine the underlying cause.
- It is important that all acute pruritic patients are effectively worked up and managed as failure to do so will result in chronic allergic dermatitis which can become more time-consuming and costly to manage.
- Setting the expectations of pet owners in the early stages of the dermatology work-up can aid in compliance of the pet owner to the course of treatment and process required for investigation of differential diagnoses.

Benefits of clear communication and expectation setting with pet owners can include improved:

- Adherence to treatments.
- Retention of the pet owner to the clinic.
- Trust and satisfaction with the veterinarian and treatment.

Refer to Chapter 5 for further detail.

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

The management of pruritic skin diseases should always be based on a definitive diagnosis, with therapy directed at the precise underlying cause. In some cases, a definitive diagnosis will be made during the initial consultation, but in other cases, additional diagnostic tests may have to be planned.

Some of these tests (e.g. food elimination trials) may occur over the subsequent weeks as part of a sequential work-up. During the diagnostic process, anti-pruritic therapy should be prescribed to provide the dog symptomatic relief, especially if the pruritus is severe. The situations in which this is appropriate are shown in the table below:

✓ Anti-pruritic therapy is appropriate	✗ Anti-pruritic therapy is not appropriate
Flea allergy dermatitis	Demodicosis
Sarcoptic mange	
Cutaneous adverse food allergy	
Atopic dermatitis	
Contact dermatitis	

In the case of parasitic skin conditions, the anti-pruritic therapy is used temporarily to provide relief for the patient while the anti-parasitic agents have time to work. Similarly, anti-pruritic therapy can be used during the first few weeks of a food elimination trials to investigate for food allergy, as it may take several weeks for a dog with a cutaneous allergic food reaction to stabilise on an appropriate low allergy diet (see chapter 3). For atopic dermatitis or contact dermatitis, anti-pruritic therapy can be used either as a short-term treatment (whilst other treatment modalities are being initiated) or as a long-term treatment (for ongoing management).

In most cases, the most appropriate anti-pruritic agent during the diagnostic investigation process is oclacitinib (Apoquel®/ Apoquel Chewable®). Its rapid onset of action, excellent safety profile and the ability to start and stop the drug quickly make it ideally suited for this type of symptomatic management. However, there may be specific circumstances where lokivetmab (Cytopoint®), or prednisolone would be a preferred choice (for example, difficulty giving medication daily, limited finances, very severe inflammation, lichenification, failure to respond to oclacitinib (Apoquel®/ Apoquel Chewable®).

For further details on the use of these drugs refer to the section titled Reduce Pruritus and Resolve Skin Lesions on page 81.

In most cases, during the diagnostic process, anti-pruritic therapy should be prescribed to provide the dog symptomatic relief, especially if the pruritus is severe.

TREAT PRIMARY CAUSES

1.FLEA AND MITE TREATMENT AND PREVENTION

B: THERAPEUTIC APPROACH		
STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE May occur concurrently with diagnostic approach		
FLEA AND MITE TREATMENT AND PREVENTION • e.g. isoxazolines		

FLEA CONTROL

- In geographic regions where flea infestation is endemic, all dogs with pruritus should be treated with year-round flea adulticides combined with relevant environmental measures.
- Insecticides that demonstrate long duration of effect and fast residual speed of kill are more effective in pruritic dogs, with isoxazolines being preferred where applicable.

FLEA MAINTENANCE PROGRAMS: CURRENT PRODUCT RECOMMENDATIONS	
Selamectin (Revolution®) topical monthly	Imidacloprid (Advantage®) topical monthly
Sarolaner (Simparica®/ Simparica TRIO®) PO every month	Fluralaner (Bravecto Quantum®) – annual injection
Moxidectin, imidacloprid (Advocate®) topical monthly	Fluralaner (Bravecto®) PO every 3 months
Lotilaner (Credelio®) PO every month	Flumethrin, imidacloprid (Seresto®) collar – 8 months
Imidacloprid, permethrin (Advantix®) topical monthly	Afoxolaner (Nexgard®) PO every month

Some dermatologists have personal preferences based on clinical experience.

- In instances where there are heavy flea infestations, environmental control may be required.
- This could include the use of thorough vacuuming and steam cleaning of the house and car (if dog travels in car), followed by application of 'insect bombs' (e.g. Mortein®), washing of bedding of all household pets, keeping lawn well mowed and removal of leaf and other garden litter.
- All pets in the household should be treated for fleas, not just the pruritic dog.

TREATMENT AND PREVENTION OF SCABIES

SARCOPTES TREATMENT: CURRENT PRODUCT RECOMMENDATIONS
Selamectin (Revolution®) topical monthly
Sarolaner (Simparica® / Simparica TRIO®) PO every month
Moxidectin, imidacloprid (Advocate®) topical monthly
Lotilaner (Credelio®) PO every month
Fluralaner (Bravecto®) PO every month
Afoxolaner (Nexgard®) PO every month

TREATMENT AND PREVENTION OF DEMODICOSIS

DEMODEX TREATMENT: CURRENT PRODUCT RECOMMENDATIONS
Sarolaner (Simparica® / Simparica TRIO®) PO every month
Lotilaner (Credelio®) PO every month
Fluralaner (Bravecto®) PO every 3 month
Afoxolaner (Nexgard®) PO every month

All isoxazoline products have an approved dosage range in mg per kg. If a mite infection is difficult to resolve then check the mg per kg being administered to see if a higher dose in mg per kg can be administered.

2. USE ANTIMICROBIAL THERAPY WHEN INDICATED

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION • e.g. isoxazolines	**ANTIMICROBIALS / ANTIFUNGALS** Appropriately identify and manage secondary infections	

- Topical and/or systemic antimicrobial therapy is indicated when a skin and/or ear infection with bacteria and/or yeast is diagnosed based on compatible clinical signs with supportive cytology or bacterial culture.
- In those patients who develop secondary infections as part of their disease state, prevention of recurrence with topical antimicrobials rather than systemic treatments forms a very important component of long-term management.
- Bacterial and yeast *(Malassezia)* skin infections, can be resolved by:
  - Appropriately treating the infection.
  - Identifying and managing the underlying cause.
- If an infection fails to resolve or recurs shortly after treatment is discontinued, then one or both of the above have not been done successfully.
- Skin infections can often be treated topically, but in some cases a combination of topical and systemic therapy is required.
- Most importantly, the management of infection must be suited to the individual patient and client.

USE OF TOPICAL TREATMENT

- Topical treatment can be used to reduce or eliminate a population of bacteria or *Malassezia* on the skin.
- In the majority of cases topical treatments are as effective as systemic therapies if they are applied appropriately.
- Topical treatments should be used wherever possible to minimise antibiotic exposure and the risk of antibiotic resistance developing.
- Topical treatments can take considerable time and effort on the owner's part so the owner must be involved in the decision-making process.
- As animals will often lick, wipe or groom the product off an effort must be made to prevent this from happening. Fit an Elizabethan collar where appropriate.
- Some infections may be too widespread or deep for topical treatment alone to be successful so in these cases they are used as an adjunctive therapy with systemic antibiotic or anti-fungal medications.

INDICATIONS FOR TOPICAL TREATMENT INCLUDE:

- Surface or superficial infection.
- Accessible area for treatment – small number of lesions and/or confined to a small area or if widespread in a short coated breed or an animal that can be clipped.
- Compliant animal.
- Owner who is willing to apply correctly and prevent product from being removed by animal.

INDICATIONS FOR TOPICAL TREATMENT INCLUDE:

Topical treatments	Product types	Key ingredients
Antiseptics	Shampoos Rinses Leave-on conditioners	**Chlorhexidine (2–4%) solutions** Dilute bleach Piroctone olamine Povidone iodine 0.5% solution may be considered suitable for regions where chlorhexidine contraindicated (e.g. periocular, deep ulceration)
Antimicrobials	Creams Ointments Gels	Gentamicin Bacitracin Polymixin B Silver sulphadiazine, Thiostrepton Mupirocin* Fusidic acid*
Antifungals	Shampoos Rinses Creams/spot-treatments	**Miconazole** **Clotrimazole** **Chlorhexidine (2–4%) solutions** Selenium sulphide Enilconazole Nystatin Terbinafine

* mupirocin and fusidic acid should should not be used as empirical choices and should only be used as a last line of treatment based on culture and sensitivity results, due to rapid development of resistance.

PRACTICAL TIPS ON THE USE OF TOPICAL THERAPIES

For topical antibiotic or anti-fungal therapy (i.e. creams, ointments, gels):

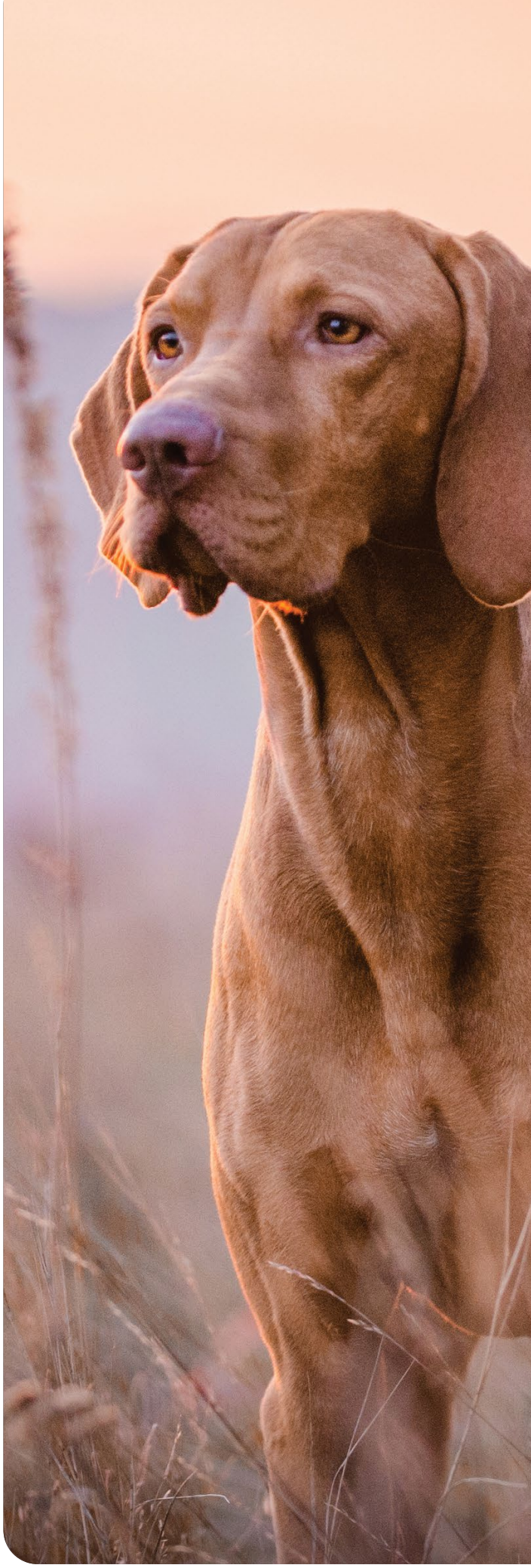
- Apply as directed on the label.
- Prevent dogs from licking/wiping/removing from skin surface for at least 15 minutes after application (i.e. use Elizabethan collar, distract by taking for a walk, feeding, playing with dog).

For topical antiseptics (e.g. aqueous chlorhexidine, chlorhexidine conditioners, iodine)

- Apply every 24 hours.
- Ensure application is liberal, soaks the skin and is left on.

For shampoo therapy:

- Follow shampoo therapy as directed – time on skin varies depending on product.
- Frequency of bathing is dependent on a number of factors including:
  - animal compliance
  - owner preference/ability
  - severity of infection, and
  - use of a concurrent systemic therapy and other topical therapies
- Clipping longer haired coats, where possible, will aid in increasing the shampoo/skin contact time and decreasing drying time.
- Daily application is most effective but it is impractical for most owners, therefore twice-weekly application is adequate in most cases.
- A topical antiseptic (e.g aqueous chlorhexidine, chlorhexidine conditioner or iodine) can be applied on days the animal is not shampooed.
- Use tepid/cool water and avoid hair dryers on a warm/hot setting.



USE OF SYSTEMIC THERAPIES

Systemic antibiotics

- Systemic antibiotics are used to treat bacterial skin diseases when topical therapy is not sufficient and a culture and sensitivity test is recommended to ensure appropriate antibiotic selection.
- The majority of skin infections in dogs are caused by bacterial infections.
- As with topical treatments, there are a number of animal, owner and bacteria-related factors which will dictate which antibiotic is most suitable for each individual.
- These include susceptibility of the bacteria, cost, taste of medication, ease of administration, timing and frequency of dosing and depth of infection.

Indications for systemic antibiotic therapy

- When bacterial infection has been confirmed with the presence of cocci and neutrophils on cytology samples.

PLUS:

- Presence of a deep bacterial infection (e.g. draining tracts, fissures, haemorrhagic crusts).
- In widespread surface or superficial infections where topical therapy is not possible or practical for the dog and/or owner.

Tips for successfully treating a superficial bacterial skin infection

- Treat with topical antiseptics whenever possible.
- If systemic antibiotics are required then treat for the shortest period as possible to achieve clinical resolution.
- Acute (<1–2 months) – until 5–7 days beyond resolution of lesions
- Chronic (>2 months) – until 1–2 weeks beyond resolution of lesions.
- If systemic antibiotics are required then use topical antimicrobial therapy concurrently if practical for dog and owner.

Tips for successfully treating a deep bacterial skin infection

- Treat for a minimum of 6–12 weeks with systemic antibiotics, continue for 2–3 weeks beyond clinical resolution (note superficial infection will resolve before deep infection).
- Revisit after 4–6 weeks and again prior to discontinuing the antibiotic to determine if infection has resolved.
- Consider concurrent topical antimicrobial therapy if practical for dog and owner.

What to do if the infection doesn't resolve

- Ensure antibiotics were given as prescribed at an appropriate dose and for a sufficient time period.
- Repeat physical examination and cytology to confirm presence of infection.
- Perform bacterial culture and sensitivity/ susceptibility testing to direct next antibiotic selection.
- Manage underlying disease process.

FIRST–LINE AND SECOND–LINE ANTIBIOTICS AND DOSES

First–line antimicrobials are defined as the primary choice of empirical therapy for known or suspected superficial bacterial folliculitis.

Second–line antimicrobials are indicated when empirical selection of first–line systemic antimicrobial and topical therapy are found to not be appropriate and cultures indicate susceptibility.

The above definitions are based on the ISCAID guidelines on antimicrobial use. https://www.iscaid.org/guidelines

SYSTEMIC ANTIFUNGALS

- Systemic antifungals are used to treat *Malassezia* dermatitis when topical therapy is not sufficient.
- The majority of fungal skin infections in dogs are caused by *Malassezia pachydermatis*.
- As with treatment for bacterial skin infections, treatment of *Malassezia* dermatitis must be individualised according to various dog and owner considerations, as well as severity of the infection.

SYSTEMIC ANTIFUNGAL DRUGS AND DOSAGES

- Treatment should be administered until clinical resolution on reassessment (physical

Anti–fungal	Dosage
Itraconazole	5mg/kg every 24hours with food
Fluconazole	5mg/kg every 24 hours with or without food
Terbinafine (weaker evidence to support use)	30–40mg /kg PO every 24hours (ideally with food)

Note: Griseofulvin is not effective in the treatment of *Malassezia* infections. Terbinafine absorption is unreliable in dogs hence response to treatment is variable. Ketoconazole is no longer available in Australia. Although this agent may be compounded, ketoconazole is generally not recommended with the exception of large dogs where clients have significant financial restraints and cannot afford alternative treatments.

Also note: compounded ketoconazole may not be as reliable.

For further information on the responsible use of antibiotics and infection control refer to latest available therapeutic guidelines such as:

Australasian Infectious Diseases Advisory Panel (AIDAP) Antibiotic prescribing guidelines 2nd edition.

AMR Vet Collective Resources including link to AIDAP Practical Infection Control Guidelines

Secondary bacterial and yeast infections are common in canine atopic dermatitis, but treatment with effective anti-allergic medication is likely to reduce this tendency. Based on the currently available literature, treatment with oclacitinib or lokivetmab appears to result in similar, or fewer infections, than with other available therapies. This probably represents the high efficacy seen with these products and their ability to normalise the cutaneous microbiome by reversing inflammatory changes within the skin (Zoetis Technical Update – Professor Peter Hill Dec 2018)

REFRACTORY OR RECURRENT INFECTIONS

Two common problems can be encountered when dealing with skin infections – poor response to treatment or relapses:

- Poor response to treatment can occur due to inappropriate therapy, inadequate duration, poor owner compliance or microbial resistance.
- Relapses typically occur because the underlying cause has not been identified or managed appropriately and therefore the infection recurs.
- If the infection is refractory to treatment or recurs very rapidly after treatment stops then culture and sensitivity testing is indicated.

Frequent recurrences of bacterial or yeast infections may require administration of maintenance topical treatments (e.g. shampoos, rinses, leave-on conditioners) on a once or twice-weekly basis. Pulse-dosing of antimicrobial agents is not advisable due to the risk of microbial resistance.

Assessing the level of pruritus in the absence of infection can help to narrow the differential diagnoses list. Determine if the secondary infections have resolved (via physical/ dermatological examination and cytological evaluation) and find out if the pruritus has:

- Completely resolved.
- Partially reduced.
- Persisted.

IF THE INFECTION RESOLVES FOLLOWING TREATMENT BUT THE PRURITUS PERSISTS, THEN THE MAIN UNDERLYING CAUSES INCLUDE:

- Flea bite hypersensitivity (FBH).
- Atopic dermatitis.
- Cutaneous adverse food reaction ("food allergy").
- Contact allergy.
- Scabies.

IF THE INFECTION AND PRURITUS HAVE BOTH COMPLETELY RESOLVED AFTER ANTIMICROBIAL TREATMENT, THEN UNDERLYING CAUSES INCLUDE:

- Cutaneous adverse food reaction.
- Atopic dermatitis.
- Endocrine disease.
- Primary keratinisation defects.

3. LONG-TERM MANAGEMENT OF ALLERGENS

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION	ANTIMICROBIALS / ANTIFUNGALS	AVOIDANCE OF DIETARY OR CONTACT ALLERGENS
• e.g. isoxazolines	Appropriately identify and manage secondary infections	

AVOIDANCE OF CONFIRMED FOOD ALLERGENS

A known food allergic dog should be fed a balanced maintenance diet containing none of the allergens to which the dog is known to be allergic. Numerous commercial limited ingredient diets are available that might be suitable for individual dogs. Long-term feeding of a home cooked diet should be approached with caution to avoid dietary deficiencies. If necessary, consultation with a nutritionist is advised dietary exclusion trial (refer to section on dietary diagnostic work-up for details of conducting a food elimination trial).

A dog that has a flare up of pruritus as a result of dietary indiscretion may be treated with an antipruritic such as oclacitinib (Apoquel® Film-Coated Tablet)*, lokivetmab (Cytopoint®), or prednisolone.

*Oclacitinib Apoquel Chewable formulation contains pork protein and can be utilised if pork is not a confirmed allergen in the patient.

AVOIDANCE STRATEGIES

B: THERAPEUTIC APPROACH		
STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE May occur concurrently with diagnostic approach		
FLEA AND MITE TREATMENT AND PREVENTION • e.g. isoxazolines	**ANTIMICROBIALS / ANTIFUNGALS** Appropriately identify and manage secondary infections	**AVOIDANCE OF DIETARY OR CONTACT ALLERGENS**

AVOIDANCE OF STORAGE MITES

- It is speculated that the presence of storage mites in dry dog foods might cause some relapses of allergic symptoms in dogs because of their allergenic cross-reactivity with house dust mites.
- Freezing dry foods might reduce contamination with storage mites, but the impact of such freezing on the clinical signs of mite-hypersensitive dogs is unknown.
- To decrease excessive storage mite contamination, owners should be encouraged to avoid storing commercial dry dog foods in humid and warm areas, and they should be advised to store foods in clean and sealed containers.

AVOIDANCE OF KNOWN ENVIRONMENTAL ALLERGENS

- All known contact allergens should be avoided wherever possible.
- Avoidance of known environmental allergens may not be significantly beneficial however loads should be reduced if practicable.

INVESTIGATION OF THE RELEVANCE OF OTHER TRIGGER FACTORS

- Other trigger factors such as stress or a humid or dry environment may act as flare factors in dogs with allergic pruritus.
- Owners should be educated to observe, and then avoid or alter, the specific situations in which they see their dog's condition worsen.

REDUCE PRURITUS AND RESOLVE SKIN LESIONS

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION • e.g. isoxazolines	**ANTIMICROBIALS / ANTIFUNGALS** Appropriately identify and manage secondary infections	**AVOIDANCE OF DIETARY OR CONTACT ALLERGENS**
		LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS • Oclacitinib • Lokivetmab • Cyclosporin • Glucocorticoids

- Whilst the causes of pruritus are being identified, the patient should be kept comfortable with an appropriate medication to relieve itch while avoiding interference with the diagnostic work-up.
- Alleviating the itch reduces the self-induced skin trauma and lesions as a result of scratching. This helps reduce the likelihood of secondary skin infections which would lead to further sensation of itch and further scratching. Antipruritics thus help to break the itch – scratch cycle.

TREATMENT WITH OCLACITINIB (APOQUEL®/ APOQUEL CHEWABLE®) OR LOKIVETMAB (CYTOPOINT®) OR CYCLOSPORIN OR ORAL GLUCOCORTICOIDS

- Oclacitinib (Apoquel®/ Apoquel Chewable®), lokivetmab (Cytopoint®), cyclosporin and oral glucocorticoids are effective agents for the treatment of chronic canine allergic pruritus concurrently with or after identification and control of known trigger factors.
- Oclacitinib (Apoquel®/ Apoquel Chewable®), lokivetmab (Cytopoint®) and glucocorticoids lead to faster improvement than cyclosporin, but cyclosporin can be combined with oral prednisolone, oclacitinib (Apoquel®/ Apoquel Chewable®), or lokivetmab (Cytopoint®) for the first 3 weeks to speed the onset of clinical improvement.
- Cyclosporin is only registered for atopic dermatitis as opposed to allergic dermatitis.

OCLACITINIB (Apoquel®)

- There are two oclacitinib formulations available: a film-coated tablet (Apoquel®) and a pork-liver flavoured chewable tablet (Apoquel Chewable®).
- Oclacitinib (Apoquel®/Apoquel Chewable®) is not approved for dogs less than 12 months of age.
- Oclacitinib (Apoquel®/Apoquel Chewable®), at the label dose, selectively targets a range of JAK1-dependent cytokines involved in itch and allergy to reduce inflammation and stop the signal to scratch, **providing rapid relief starting within 3 hours** without the systemic impacts of glucocorticoids and has little effect on JAK-2 dependent cytokines, involved in haematopoiesis.
- Oclacitinib (Apoquel®/Apoquel Chewable®) administered at a dose of 0.4 to 0.6 mg/kg orally twice daily for **up to** 14 days and then once daily thereafter for dogs is highly effective for the management of pruritus and skin lesions in dogs with allergic and atopic dermatitis.
- Twice daily dosing may or may not initially be required, and the clinician may select the number of days twice daily dosing is required, up to 14 days, depending on presentation and clinical signs of the individual patient.
- With a half-life of approximately 4 hours in dogs, oclacitinib (Apoquel®/Apoquel Chewable®) is rapidly cleared from the blood plasma and allows for flexible dosing in canine patients. This characteristic contributes to oclacitinib's favourable safety profile.
- If a complete remission of signs is obtained, further tapering may be attempted to a dose that can maintain remission, however, a tapering of the dose below what is recommended on the product label may not achieve plasma levels sufficient to be efficacious.
- Oclacitinib (Apoquel®/Apoquel Chewable®) has been shown to reduce pruritus and inflammation and clinical signs with a similar efficacy as prednisolone. The speed of effect of oclacitinib (Apoquel®) has been shown to be more rapid than injectable dexamethasone.[3]
- Short-term adverse effects of oclacitinib (Apoquel®/Apoquel Chewable®) appear mild. Studies in dogs treated for allergic dermatitis showed that adverse effects were reported with similar frequency in both oclacitinib (Apoquel®) and placebo groups.[4]
- The most common adverse effects in the oclacitinib (Apoquel®) group were diarrhoea and vomiting, at an incidence of 2.3%.[4]
- Results of a long-term compassionate use study support the safety of chronic use of oclacitinib (Apoquel®) and suggest an improved quality of life for the dog and the owner.[5]
- Long-term treatment with oclacitinib (Apoquel®) has not been associated with an increased risk of malignancy[6], however the product is contraindicated in dogs with immune suppression (e.g. Hyperadrenocorticism) or progressive malignant neoplasia due to lack of data in such dogs.
- Unlike glucocorticoids, oclacitinib (Apoquel®/Apoquel Chewable®) does not interfere with intradermal allergy testing, and there is no withdrawal time required, enabling the dog to be comfortable in the lead-up to testing.

- Oclacitinib (Apoquel®/Apoquel Chewable®) may be used concomitantly with many other commonly used medications and routine treatments (parasiticides, vaccinations) and there is no requirement to change vaccination protocols or stop vaccinations whilst using oclacitinib (Apoquel®/Apoquel Chewable®).
- As most signs of allergic dermatitis respond to oclacitinib (Apoquel®/Apoquel Chewable®) clinicians should review the diagnosis and the patient for secondary complications, such as skin infections, and/or ectoparasitism if there is no rapid clinical improvements after treating allergic dogs with this drug.
- A chewable formulation of oclacitinib (Apoquel Chewable®) may provide an easier dosing experience for owners, enabling compliance with daily medication, and providing veterinarians additional therapeutic options to tailor their approach to suit the patient's needs.[7]

TIPS FOR USING OCLACITINIB

Oclacitinib (Apoquel®/Apoquel Chewable®) can be flexibly dosed within label dosing ranges to manage the individual patient and presenting condition.

Flexible dosing means adjusting the treatment to each dog's needs: some may need twice-daily dosing for up to 14 days, while others may need twice daily dosing for a shorter period, or start with once-a-day treatment.

The flexibility of dosing also relates to the ability to intermittently use oclacitinib in various scenarios, including:

- Tailoring treatment during the initial differential diagnosis work-up.
- Controlling symptoms during food elimination trials.
- Maintaining symptom control during intradermal allergy testing.
- Managing pruritic flare-ups or adjusting treatment seasonally.

LOKIVETMAB (CYTOPOINT®)

- Lokivetmab (Cytopoint®) is a monoclonal antibody that specifically targets and neutralises canine IL-31, a key cytokine in the stimulation of pruritus in allergic and atopic dermatitis.
- It is indicated for the treatment of the clinical manifestations of allergic and atopic dermatitis in dogs of any age. Given its targeted mode of action, this predominantly means the relief of IL-31 induced pruritus.
- Lokivetmab (Cytopoint®) is available in single-use vials of 10mg, 20mg, 30mg, or 40mg.
- Lokivetmab (Cytopoint®) vials do not contain preservatives, so splitting vials between patients and multi-dosing open vials is strongly discouraged due to cross-contamination risk.
- A single, subcutaneous injection at a minimum dose of 1mg/kg typically provides a month of relief from pruritus. Repeat administration can be given monthly as needed in the individual patient. A maximum dose of 3.3mg/kg can be administered if required.
- Lokivetmab (Cytopoint®) has a rapid onset of efficacy and begins to relieve itch within 8 hours of administration[8].
- In a study of client-owned dogs with naturally occurring disease, significantly lower pruritus scores were observed in dogs treated with lokivetmab (Cytopoint®) when compared with cyclosporin from Day 1 through Day 84. On Day 84, 38% of cyclosporin-treated dogs were considered as "normal" versus 54.5% of the lokivetmab-treated dogs. After 6 months, 76.3% of lokivetmab (Cytopoint®) treated dogs were assessed as "normal".
- The very specific targeting of IL-31 minimises the potential for non-target effects and lokivetmab (Cytopoint®) is associated with minimal adverse effects.
- Adverse events observed with lokivetmab (Cytopoint®) were similar in type and rate of occurrence to placebo in negative-controlled studies.
- Lokivetmab (Cytopoint®) has a prolonged half-life and is eliminated via normal protein degradation pathways that are not dependent on the patient's liver or kidney function.
- No impact on normal immune function was observed in laboratory safety studies[9].
- Lokivetmab (Cytopoint®) can be administered to dogs with allergic or atopic dermatitis regardless of age, concurrent disease.
- Lokivetmab (Cytopoint®) can be used concomitantly with common medications including parasiticides, antibiotics, antifungals, corticosteroids, antihistamines, vaccines, immunotherapy, oclacitinib (Apoquel®/ Apoquel Chewable®) and cyclosporin.[10,11] The elimination of lokivetmab (Cytopoint®) is not impacted by the concurrent administration of drugs that are metabolised through the liver or kidneys.
- Lokivetmab (Cytopoint®) can be used as part of a multimodal approach to the management of atopic dermatitis including but not limited to: avoidance of allergen(s), support of the skin barrier function, allergen specific immunotherapy, management of secondary infections and other adjunctive treatments.
- Lokivetmab (Cytopoint®) is useful for the control of pruritus in canine atopic and allergic dermatitis, including young dogs less than 12 months of age where oclacitinib (Apoquel®/Apoquel Chewable®) is contraindicated. It is useful as a single treatment intervention for flares of atopic skin disease associated with changes in season or allergen load, but if it is used as a sole therapy, then ongoing monthly administration of Cytopoint is recommended to achieve best results.

- Lokivetmab (Cytopoint®) can also be used in combination therapy with oclacitinib (Apoquel®/Apoquel Chewable®), cyclosporin, corticosteroids or other drug therapy, as a dose reduction strategy for the maintenance management of severe atopic dermatitis.
- The once a month dose will assist some owners with treatment compliance.
- Repeated in-clinic administration provides the opportunity for veterinarians to reassess the patient, evaluate response to therapy, monitor for infections, and make adjustments to multimodal treatment regimens.
- It is well established that atopic dogs suffer dysbiosis of the skin and impaired barrier function, making them prone to secondary infections.[12] Best practice dictates that secondary infections of the skin and ears are well controlled prior to commencing lokivetmab (Cytopoint®) and that dogs are monitored, particularly in the first weeks for secondary bacterial and yeast skin and ear infections or in cases where therapy was working and appears to have stopped being as effective.
- Some dogs may require up to three monthly lokivetmab (Cytopoint®) injections to obtain the optimal treatment outcome (3 monthly injections demonstrated more than 93% of dogs being measured as a treatment success), however, the majority of dogs will show marked improvements in pruritic symptoms from the initial one to two monthly injections[13].
- If pruritus recurs in previously well-controlled patients, cytology and a review of parasite control are crucial, as these are often the cause of breakthrough pruritus.
- Patients receiving lokivetmab (Cytopoint®) have a 90% reduced possibility of flare-ups[14]

TIPS FOR USING LOKIVETMAB

- No age restrictions, making it a useful treatment for dogs under 12 months of age.
- There is a broad dosing range, with the minimum recommended dose being 1 mg/kg once a month, which can be increased up to 3.3 mg/kg if needed.
- If pruritus recurs in previously well-controlled patients, it is important that cytology and a review of parasite control are conducted, as these are often the cause of breakthrough pruritus.

CYCLOSPORIN

- Oral cyclosporin (Atopica®) should be administered at 5mg/kg once-daily for dogs until satisfactory control of clinical signs is achieved, which typically takes 4 to 6 weeks.
- Thereafter, the dose required to maintain remission should be tapered by either decreasing the frequency from every day to every other day and then twice weekly or by decreasing the daily dose.
- Generic cyclosporin formulations, shown to be bioequivalent to the first approved cyclosporin (modified) microemulsion (Atopica®), are acceptable substitutes.
- There is anecdotal evidence of a lack of response with some generics and compounded cyclosporine formulations. Equivalent responses to Atopica have been experienced with the use of Neoral®.

CYCLOSPORIN-ASSOCIATED ADVERSE EVENTS

- Adverse reactions in dogs receiving cyclosporin include gastrointestinal signs (vomiting, diarrhoea and reduced appetite) which are usually mild and transient.
- Strategies to reduce the frequency and severity of gastrointestinal signs in dogs include freezing the capsule (if used in lieu of liquid) prior to administration or dividing the liquid dose and giving it twice-daily, or beginning at a lower dosage and gradually increasing to a therapeutic dosage. However, this could delay the control of clinical signs.
- Gingival hyperplasia has been reported in dogs receiving cyclosporin. Drug cessation typically results in improvement. Oral azithromycin and azithromycin toothpaste may be of benefit in reducing gingival hyperplasia.

ORAL GLUCOCORTICOIDS

- Oral glucocorticoids (prednisolone) should be used at 0.5 mg/kg once- to twice-daily to induce remission of clinical signs of allergic pruritus in dogs.
- After such remission occurs, the dose of oral glucocorticoids should be tapered. Concurrent use of oclacitinib (Apoquel®/ Apoquel Chewable®) in any combination is not recommended because of the theoretical higher risk of immunosuppression.

Refer to Appendix 2 for further details of potential side effects associated with glucocorticoid use.

MONITORING

- There is no consensus on the need for laboratory monitoring (e.g. haematology, serum biochemistry and urinalysis) during prolonged cyclosporin, oclacitinib (Apoquel®/Apoquel Chewable®) or prednisolone administration.
- It is, however, recommended that laboratory monitoring is performed on an annual basis.
- Due to the increased risk of urinary tract infections in dogs treated with oral glucocorticoids and cyclosporin[15], it is recommended that dogs receiving these drugs should be monitored with annual urinalyses and urine cultures.
- Oclacitinib (Apoquel®/Apoquel Chewable®) has not been shown to increase the incidence of urinary tract infections.[16]
- The concomitant use of allergen-specific immunotherapy, emollient shampoos, essential fatty acid supplements or enriched diets may allow for a further reduction in the dose and/or frequency of oral glucocorticoids, cyclosporin and oclacitinib (Apoquel®/Apoquel Chewable®) required to maintain remission of clinical signs of chronic allergic dermatitis. The efficacy and safety of these combined approaches has not yet been determined.

TOPICAL GLUCOCORTICOIDS

- Topical glucocorticoids can be very useful as part of a management plan for the treatment of chronic canine allergic dermatitis.
- Care must be taken with frequent application as cutaneous atrophy has been reported with repeated use. This is particularly important to be mindful of with repeated application of a moderately potent product to thin-skinned regions, such as the ventral inguinal region and the pinnae.
- Application during the reactive (flare) phase may start with daily application if required, and then as part of a proactive phase to reduce flares it may be applied twice weekly.

USEFUL PRODUCTS

- 0.0584% hydrocortisone aceponate (HCA) spray (Cortavance®) spray.
- 0.1% mometasone (Elocon®) cream and lotion.*
- 0.1% methylprednisolone aceponate (Advantan®) lotion.*
- Budesonide (Barazone- Dermcare) – weekly topical steroid.

Note: Barazone is once weekly for maximum 5 weeks; if extending therapy monitor carefully for skin atrophy.

*not veterinary registered.

TIPS FOR USING CORTICOSTEROIDS

- Use on local (interdigital, interpad, scrotum, ear pinna and external ear canal, axillae, inguinal region) skin regions.
- Apply product as indicated.
- For sparsely haired regions, use a cream.
- For haired regions, use a lotion or spray.
- Avoid ingestion by grooming by incorporating positive ways to distract the pet such as taking them for a walk, playing games etc and fit with an Elizabethan collar where appropriate. After 5 minutes they have dried into the stratum corneum so licking is no longer effective at removal.
- Wet-wrapping (covering affected areas with cream and wrapping the dog in a wet T-shirt and socks) may be used in an attempt to reduce acute severe pruritus.

IMPROVE BARRIER FUNCTION

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION
• e.g. isoxazolines

ANTIMICROBIALS / ANTIFUNGALS
Appropriately identify and manage secondary infections

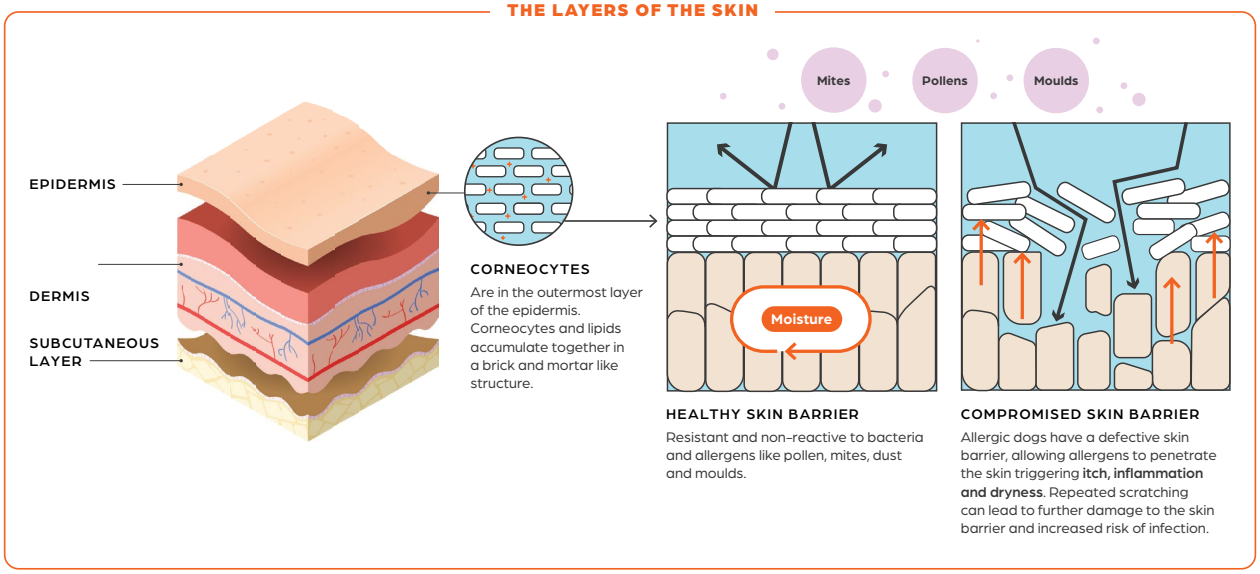
AVOIDANCE OF DIETARY OR CONTACT ALLERGENs

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS
• Oclacitinib • Lokivetmab • Cyclosporin • Glucocorticoids

MANAGE SKIN BARRIER (DIET, TOPICAL)

MANAGING THE SKIN BARRIER

- Allergens gain entry to the body via the skin. Improving the barrier function is useful to help reduce the entry of allergens and their exposure to the immune system.
- Many dogs that suffer from clinical signs of allergic dermatitis have defects in their skin barrier. Efforts to a) reduce the load of allergens on the skin and b) to improve the barrier function of the skin should be implemented.
- Poor skin barrier also leads to an increased incidence of skin infections with Staphylococcus and *Malassezia* spp.



BATHING (WITH NON–IRRITATING SHAMPOOS) AND TOPICAL MOISTURISERS

- Moisturising shampoo baths, and rinses with moisturisers are likely to be beneficial as they enable physical removal of surface allergens and microbes, provide a direct soothing effect to the skin, and increase skin hydration.
- The intensity and frequency of bathing may be the most important factor in relieving pruritus. Bathing once a week with a mild, non–irritating shampoo and lukewarm water is beneficial. The impact of frequent bathing on reducing the efficacy of topical flea control products should be considered.
- The type of shampoo should be tailored to each patient: emollient shampoos are likely to be the most soothing, but anti–seborrhoeic and antiseptic products may be more appropriate in dogs with skin greasiness, scaling, and/or for dogs that are prone to recurrent secondary infections.
- Bathing and shampooing are useful adjunctive therapies and are often used in combination with other modalities rather than in isolation.
- Wiping the patient with a damp cloth on a daily basis to remove surface allergens as an alternative to bathing is also a useful strategy in dogs that do not like being bathed.
- Shampoo bathing may be drying and irritating. If necessary, clinicians should consider changing products or protocols and/or adding post–bathing topical moisturizers.
- Any exacerbation of inflammation and pruritus following bathing should be reported to the veterinary clinic.

Useful products

- Episoothe® shampoo and conditioner.
- Resisoothe® lotion.
- Aloveen® shampoo and conditioner.
- Nutriderm® shampoo and conditioner.

SUPPLEMENT WITH ORAL ESSENTIAL FATTY ACIDS (EFAs)

- The oral intake of omega-6 fatty acids, either as a supplement or in an enriched diet, can influence superficial skin lipids and improve the gloss and quality of the coat.
- Oral omega-3 fatty acids may also provide some small benefits in reducing clinical signs of allergic pruritus in dogs, but the limited degree of improvement means that EFA supplementation is not suitable for monotherapy of chronic allergic pruritus.
- The benefit of EFAs, if any, might not be seen before two months of supplementation.
- There is no evidence of superiority for any particular EFA combination, dosage, ratio or formulation (including enriched diets) to improve skin and coat quality in dogs with chronic allergic pruritus.
- In general, EFA-enriched diets are higher in omega-6 fatty acids, fish oil capsules are higher in omega-3 fatty acids and other supplements have a more variable ratio.[17]
- Side effects of EFA are uncommon.

Useful products

- PAW Blackmores Dermega®
- Virbac Megaderm®
- Hill's™ Prescription Diet™ Derm Complete Dry Dog Food.
- Royal Canin® Skintopic diet.
- Human fish oil capsules and human evening primrose oil.

Application of topical EFA-containing formulations

- Topical lipid formulations can help normalise existing stratum corneum lipid barrier defects in dogs with chronic allergic pruritus, e.g Dermoscent Essential 6 pipettes.
- There is still insufficient evidence for the benefit of lipid-containing topical formulations to be able to recommend these as a monotherapy for chronic allergic pruritus.

ADJUNCTIVE TREATMENTS

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION
• e.g. isoxazolines

ANTIMICROBIALS / ANTIFUNGALS
Appropriately identify and manage secondary infections

AVOIDANCE OF DIETARY OR CONTACT ALLERGENs

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS
• Oclacitinib • Lokivetmab • Cyclosporin • Glucocorticoids

MANAGE SKIN BARRIER (DIET, TOPICAL)

ADJUNCTIVE TREATMENTS

ALLERGEN SPECIFIC IMMUNOTHERAPY

TREATMENT WITH ANTIHISTAMINES

- Type 1 antihistamines, may have some efficacy against pruritus, either alone or in combination in certain patients. However, their effect appears to be variable and they are not useful as a monotherapy for the management of chronic allergic pruritus.
- In dogs, antihistamines with proven bioavailability and/or demonstrated reliable efficacy should be used.
  - › Hydroxyzine and cetirizine have demonstrable anti-histaminic action and are the preferred antihistamines for dogs.

Antihistamine agents
Cetirizine 1 to 2mg/kg every 12 to 24hrs
Hydroxyzine 1 to 2mg/kg every 12hrs (compounded)
Fexofenadine 2-5mg/kg every 12hrs or 10mg/kg every 24hrs

Note: oral chlorpheniramine is of no value in dogs as it is removed entirely by the hepatic first pass metabolism in the dog although some claim that it is beneficial in certain patients.

- Antihistamines should be used in a preventative strategy, given on a continuous daily basis.
- A combination with other antihistamines or other agents may improve their beneficial effects or have a drug sparing effect, although further studies are required to validate this.

IMPLEMENT ALLERGEN-SPECIFIC IMMUNOTHERAPY

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE
May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION • e.g. isoxazolines	**ANTIMICROBIALS / ANTIFUNGALS** Appropriately identify and manage secondary infections	**AVOIDANCE OF DIETARY OR CONTACT ALLERGENS**
		LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS • Oclacitinib • Lokivetmab • Cyclosporin • Glucocorticoids
		MANAGE SKIN BARRIER (DIET, TOPICAL)
		ALLERGEN SPECIFIC IMMUNOTHERAPY

- Allergen-specific immunotherapy (ASIT) is a safe treatment that is effective in some dogs to reduce or eliminate the clinical signs of atopic dermatitis.
- ASIT is the only intervention that has the potential to prevent the development of signs and alter the long-term course of disease.
- Limited controlled studies have been performed to determine the value of ASIT as a modifying treatment and much of what has been reported is based on open trials and anecdotal information. However, a general range of 50–70% success depending on the outcomes measures and protocol used is reported.
- Most dogs that demonstrate a response to ASIT exhibit a good response within 6 to 12 months.
- Conventional injection ASIT typically includes an induction phase, where gradually increasing amounts of allergen are administered over a period of several weeks; and a maintenance phase, where injections are typically administered every 1 to 3 weeks.
- There is no proven superiority of a particular ASIT protocol over other alternatives (traditional, rush or low-dose) and no single or standardised immunotherapy administration protocol exists.
- Allergen concentration, the interval between injections, and injection volume employed by dermatologists differ widely, which should be tailored to each patient depending upon the clinical improvement observed and the presence of adverse events.
- For most allergic dogs, concurrent medication (such as oclacitinib (Apoquel®/Apoquel Chewable® or lokivetmab (Cytopoint®)) is necessary, especially during the induction and early maintenance phase of immunotherapy administration. There is currently no evidence suggesting that the concurrent administration of such drugs alters the clinical benefit of ASIT. Efficacy can still be assessed based on the ability to lower concurrent medication doses and potentially discontinue certain medications in favour of safer options.
- Whether or not ASIT must be continued for the remainder of the life of the patient is individually variable and some dogs can ultimately have the injections discontinued and remain in long-term remission while others require ongoing treatment with ASIT.

RUSH IMMUNOTHERAPY

- Rush immunotherapy (RIT) is a technique of administering increasing amounts of allergen in a hospital or clinic setting with careful monitoring over several hours until the maintenance dose is reached.
- It is uncertain whether improved efficacy is noted with this method as compared to conventional administration protocols.
- The reduced burden of frequent injections at the beginning of ASIT and improved owner compliance are definite advantages of this approach.

SUBLINGUAL AND INTRALYMPHATIC IMMUNOTHERAPY

- There is some evidence that ASIT administered via the sublingual route (sublingual immunotherapy; SLIT), is safe and effective for treatment of atopic dogs.
- Research over the last decade shows intralymphatic immune therapy injections may be effective for treating certain allergies.
- Studies are needed to evaluate the relative efficacy and safety in a large number of allergic dogs to compare sublingual and intralymphatic immune therapy versus conventional immunotherapy.
- SLIT can be a useful alternative for dogs and owners averse to the administration of subcutaneous injections.

SUMMARY:

MANAGEMENT OF PRURITUS

MANAGE PRURITUS
(can be done in parallel with identifying the triggers)

- Oclacitinib, lokivetmab, cyclosporin, systemic or topical glucocorticoids, +/– antihistamines.

IDENTIFY TRIGGERS

- Implement flea and mite control.
- Look for secondary infections of the skin and ears and treat appropriately.
- Consider an elimination diet trial to assess for the possibility of a cutaneous adverse food reaction and consider using short acting allergy medications in first few weeks of food elimination trials e.g. oclacitinib, prednisolone, topicals, steroids, bathing, antiseptics, moisturisers.
- Identify allergens with allergy testing (note: oclacitinib, can be used to keep the patient comfortable whilst allergy testing is being undertaken or lokivetmab if the dog is under 12 months of age).

ALLERGEN SPECIFIC IMMUNOTHERAPY

SUPPORT SKIN BARRIER FUNCTION
(can be done in parallel with identifying the triggers)

- Bathing.
- Oral fatty acids.

PATIENT MANAGEMENT

- Communication of treatment expectations and timelines.
- Compliance supportive measures.

SECTION C:
ONGOING PATIENT MANAGEMENT

CHAPTER 5:

PET OWNER COMMUNICATION: MANAGING AND SETTING EXPECTATIONS

MONITORING PRURITUS TREATMENT AND PROGRESS

C: ONGOING EFFECTIVE MANAGEMENT

MONITORING PRURITUS TREATMENT AND PROGRESS
• Multimodal Approach • Flare Management

- The management of pruritus in dogs is often complex and challenging.
- Effective management may require a multimodal approach and treatment may be required long-term.
- Getting the owner to comply with the treatment recommendations is often one of the biggest challenges to overcome.
- Owner compliance is also one of the most important critical factors for success.

Keeping the owner informed of progress helps get their buy-in to the management protocol. It is also important for the veterinarian to monitor progress and response to different therapies, which will enable the treatment protocol to be adapted for best results.

- **Monitoring pruritus scores** is also a useful way of assessing the seasonality of allergies and response to food-elimination diets.
- There are various ways that pruritus and associated lesions can be monitored in dogs:
  - **Pruritus visual analogue scale score (PVAS)**
    - Using this tool, a 'score' between 0 and 10 can be assigned to a patient (refer to Appendix 3 for an illustration of the PVAS).

ITCH SCORE CARD CLINIC TOOL

- **Photos of lesions**
  - One of the best ways for vets and owners to track the progress of the patient's response to management is through the use of a series of photographs comparing the dog's lesions to baseline photographs before commencing management protocols.
  - For best comparisons, all photos should be taken in the same environment (same room, same light and same background), using the same angle and, where possible, should include an anatomical landmark in the picture so the view can be oriented to where the lesions are.

MULTIMODAL APPROACH

Itchy skin is often a chronic problem that may need lifelong management.
Once parasites and skin infections have been treated, multimodal therapy may be required to achieve better control of pruritus and reduce reliance on anti-itch medication alone.

- Manage owner expectations through communication.
- Stop the itch using appropriate anti-itch medications such as oclacitinib (Apoquel® / Apoquel Chewable®) or lokivetmab (Cytopoint®).
- Ensure consistent parasite protection.
- Improve skin barrier function through dietary supplementation with essential fatty acids.
- Reduce allergen load on the skin using weekly bathing with non-irritating shampoos and topical moisturisers.

FLARE MANAGEMENT

Allergic dermatitis can require lifelong management. Even when well-controlled, occasional flares can happen. Pet owners may lose confidence in their dog's allergic treatment if a flare occurs.

WHY DO FLARES OCCUR?

- Development of secondary infections (bacteria and/or yeast).
- Ectoparasites.
- Concurrent conditions.
- Environmental factors (dust mites, pollen, mould).
- Potential food-induced allergens.
- Not using proactive preventative pharmacotherapy or a lapse in treatment.

TIPS FOR MANAGING FLARES

- Avoid flare factors such as exposure to known allergens, use appropriate ectoparasite prevention and manage concurrent food allergies.
- Consider regular topical antimicrobial therapy for dogs predisposed to infection.
- Support the skin barrier (oral EFA supplementation, topical lipid-containing products).
- Proactive preventative pharmacotherapy. A combination of systemic and topical therapy.
- Consider allergen-specific immunotherapy.

PET OWNER COMMUNICATION, MANAGING AND SETTING EXPECTATIONS

C: ONGOING EFFECTIVE MANAGEMENT

MONITORING PRURITUS TREATMENT AND PROGRESS
• Multimodal Approach • Flare Management

PET OWNER COMMUNICATION, MANAGING AND SETTING EXPECTATIONS
Supporting compliance in medication and treatment plans

Subsequently, should long-term management be required, clear expectations of the treatment limitations and safety, as well as a sufficient understanding of the diagnosis, can improve outcomes and satisfaction of the pet owner.

Setting expectations can include:

- Anticipated process/steps required to diagnose the cause may include:
  - Timeline, explanation of findings, why further visits are needed, and referral.
- Treatment/s duration, limitations, safety, expected outcome.
- Diagnosed disease (if applicable), chronicity, basic pathology, progression, resolution, treatment considerations, and anticipated outcomes.
- Consider where applicable to provide resources (brochures, links to videos etc) to help the pet owner understand the conditions and set their expectations.

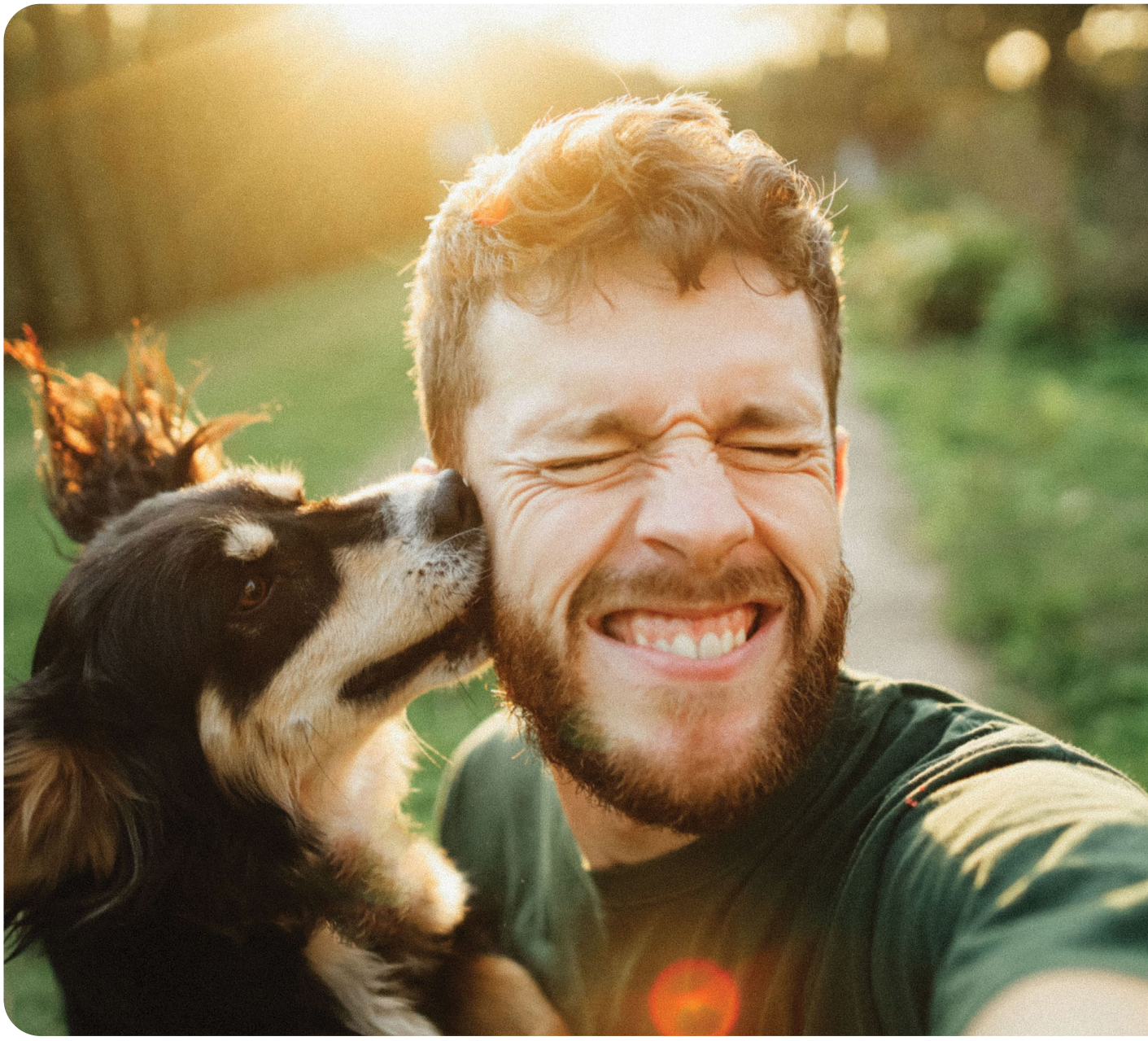
The benefits of clear communication and expectation setting with pet owners can include improved:

- Adherence to treatments.
- Retention of the pet owner to the clinic.
- Trust and satisfaction with the veterinarian and treatment.

SUPPORTING COMPLIANCE IN MEDICATION AND TREATMENT

- Just treating the itch, without determining the underlying cause, can be more time-consuming and costly to manage long term. Poor communication is one of the main reasons why owners seek a second opinion.
- Compliance with treatment plans can be a key factor in managing pruritic dogs. Research into medication compliance has shown the complexity of the medication regimen, the owner's understanding of the treatment plan, and the pet's temperament and behaviour can greatly impact the outcomes of treatments and the overall animal's health.[7]

Consideration of these known challenges to the pet owner when developing a treatment plan can subsequently aid better health outcomes and where possible should be considered or discussed with the pet owner:
Clear communication between veterinarians and pet owners (what is needed and why)
Simplify treatment protocols where possible
Consider follow-up consultations to ensure adherence
Consideration of the financial aspect
Practicality of the treatment for the pet owner (for example difficulty to tablet or bathing the dog)



CHAPTER 6:

WHEN TO OFFER REFERRAL TO A DERMATOLOGIST

WHEN TO OFFER REFERRAL TO A DERMATOLOGIST

C: ONGOING EFFECTIVE MANAGEMENT
MONITORING PRURITUS TREATMENT AND PROGRESS • Multimodal Approach • Flare Management
PET OWNER COMMUNICATION, MANAGING AND SETTING EXPECTATIONS Supporting compliance in medication and treatment plans
WHEN TO OFFER REFERRAL TO A DERMATOLOGIST

- A veterinary dermatologist is a veterinarian who has been trained in a 3 year residency program, and has sat and passed a board certification examination.
- They are specialised in diseases of the skin, ears, claws, mucous membranes, hair coat and subcutaneous tissues.
- It is a large specialty with hundreds of known skin diseases, including infectious, parasitic, allergic, auto-immune, as well as ear disease, seborrhoeic diseases, skin tumours, skin manifestations of systemic disease (such as endocrine/hormonal diseases) and many others.

Reasons for referral to a veterinary dermatologist might include:
Intradermal testing and desensitisation in the management of atopic dermatitis
Diagnosis and management of a more complex skin disease
Judicious advice for a chronic common skin problem
Biopsy/histopathological evaluation
Management of otitis, including the use of video-otoscopy and advance imaging of the bulla (e.g. CT or MRI)
Management of autoimmune or neoplastic skin diseases
If the owner requests a second opinion or referral
Bee/wasp venom testing and desensitisation

TIPS FOR REFERRAL INCLUDE:

- Recommend that the animal not be bathed for a week prior to examination and no ear medication to be instilled for 48 hours prior to examination.
- Instruct owners to bring all current medications, including flea preventative, shampoos and other topical treatments.
- Instruct owners to fast their animal to allow for diagnostic procedures such as sedation for intradermal testing if required (note: water is allowed).
- Discontinue systemic corticosteroids 4 weeks prior to and topical corticosteroids/anti-histamines at least 1 week prior to the initial visit if intradermal testing or serum allergy testing are to be performed.
- Send all relevant patient history, including diagnostic test results, to the veterinary dermatologist prior to the appointment.
- Contact the veterinary dermatologist if you have any specific questions regarding referral preparation.
- Treat any secondary skin or ear infections appropriately before the referral appointment.

VIEW CASE STUDIES FROM THE AVDAP SPECIALISTS

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REFERENCES

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APPENDICES

APPENDIX 1: ALLERGY TESTING METHODS FOR ATOPIC DERMATITIS

INTRADERMAL TESTING TECHNIQUE

1. The procedure is best performed with the animal under sedation in lateral recumbency. Medetomidine (Domitor®/ Medetate®) at a dose of 10–20 µg/kg are the preferred sedatives. Acepromazine (ACP) is not acceptable because it reduces skin test reactivity
2. A patch of fur is clipped from the lateral thorax (about 15cm x 10cm)
3. The injection sites are marked using a black marker pen
4. Approximately 0.05ml of each antigen is injected intradermally along with the positive (histamine) and negative (saline) controls (the exact amount isn't critical as long as the injections are the same size)
5. The reactions are read 10–20 minutes later. These appear as wheals. The positive control is given a score of 4+ and the negative control a score of 0. Other reactions are subjectively graded between these values based on the diameter of the wheal, the degree of erythema and the height of the wheal
6. In some cases, late phase reactions may occur at some sites 24–48 hours later. These appear as erythematous, indurated areas that may contain a papular eruption. The full significance of these reactions is currently unknown

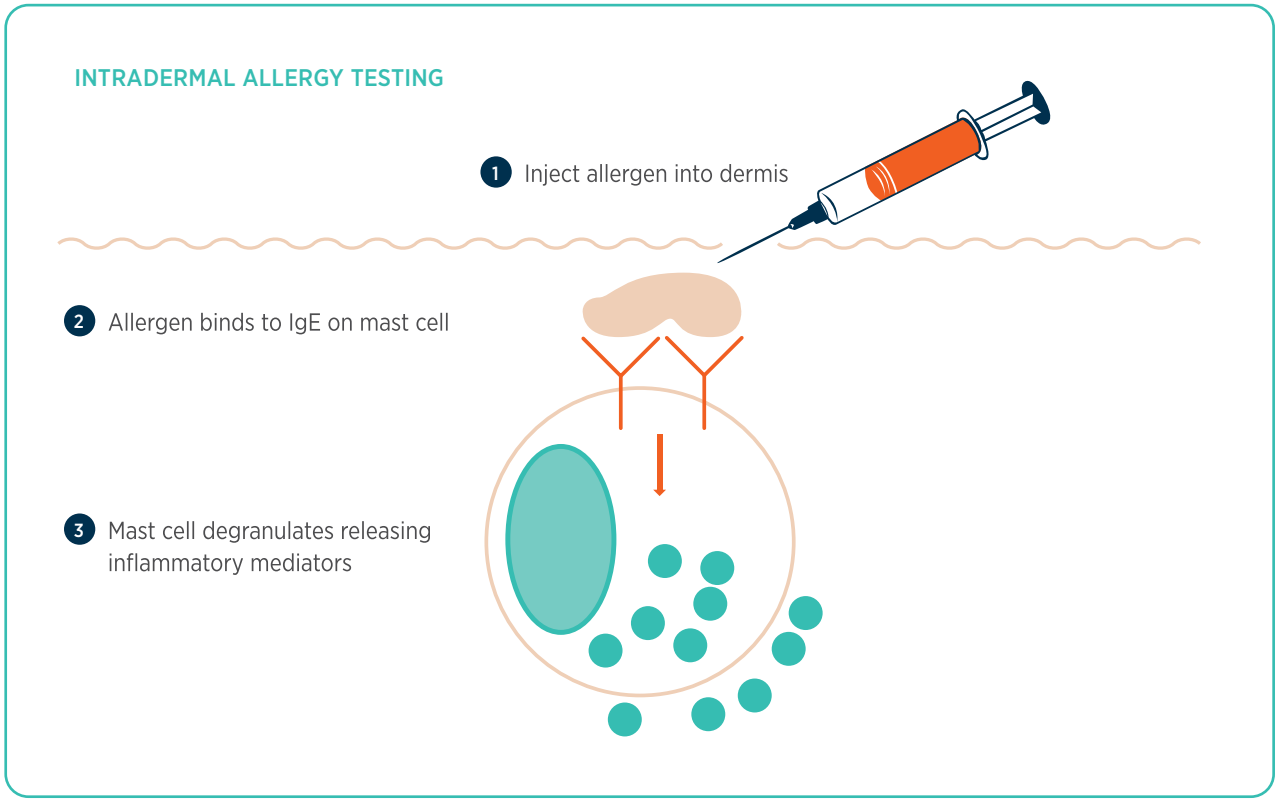


Diagram courtesy of Peter Hill

SEROLOGY TESTING TECHNIQUE

1. A blood sample is taken and the serum sent off to a laboratory offering the service
2. The diluted serum sample is added to a plate containing individual wells coated with specific antigens. The types of antigens tested are similar to those used for intradermal skin testing, but there are usually less than in a skin test
3. If there is any IgE in the serum that is specific for a particular antigen, it binds to it. The bound IgE is then detected by adding an enzyme–linked reagent that can bind to IgE. This is either a monoclonal antibody or a receptor for IgE molecules
4. A substrate is added that changes colour when it contacts the enzyme attached to the IgE reagent. The degree of colour change is proportional to the amount of IgE that is bound
5. The colour change is measured by an automated reader and the results are reported as a numerical score. The significance of various scores is indicated by the laboratory

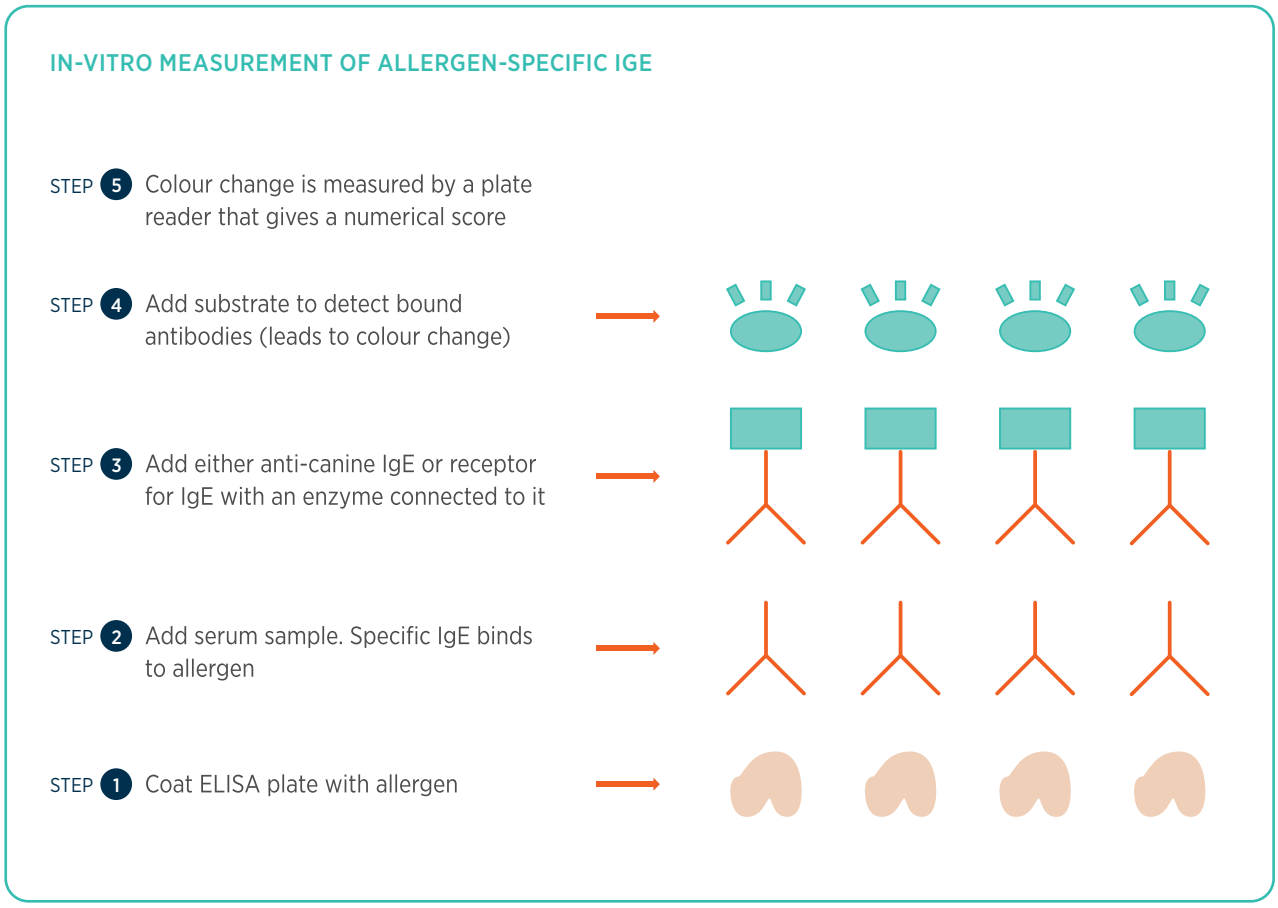


Diagram courtesy of Peter Hill

APPENDIX 2: POTENTIAL SIDE EFFECTS ASSOCIATED WITH GLUCOCORTICOID USE

CNS
- Polydipsia
- Polyuria
- Behavioural and mood changes
- Lethargy
- Panting
- Decreased seizure threshold

GASTROINTESTINAL
- Polyphagia
- Diarrhoea (may be bloody)
- Gastric ulceration
- Colonic perforation
- Pancreatitis

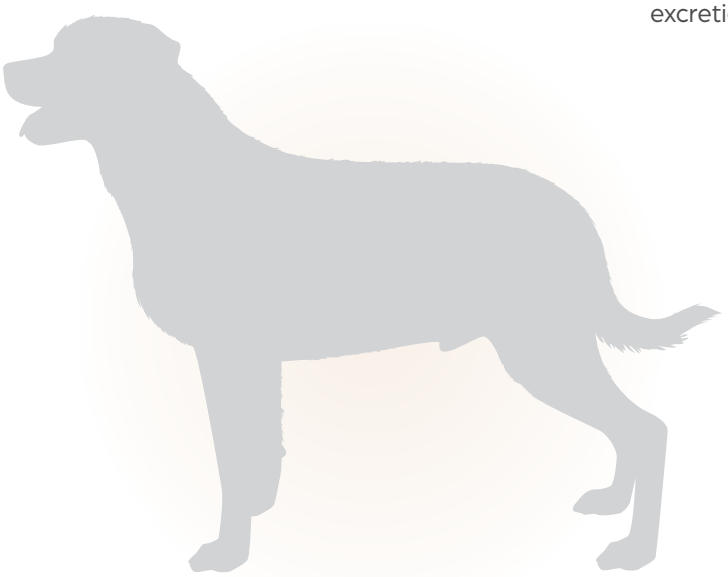
EYES
- Cataract
- Glaucoma

PANCREAS
- Pancreatitis
- Predisposed to type II diabetes

HEART AND BLOOD VESSELS
- Water retention
- Muscle weakening
- Increased blood pressure

MUSCULOSKELETAL
- Muscle atrophy
- Weakness
- Exercise Intolerance
- Catabolism
- Osteoporosis
- Decreased joint health due to weight gain & lack of muscle tone

KIDNEYS
- Proteinuria
- Glomerular pathology
- Altered electrolyte balance
- Increased urinary calcium excretion



BLADDER
- Increased susceptibility to infection

ENDOCRINE
- Iatrogenic Cushing's disease/ hyperadrenocorticism
- Reduced thyroid hormone levels
- Exacerbate/unmask diabetes
- Elevated insulin levels, carbohydrate intolerance
- Reduced gonadotropin and sex steroid levels
- Anoestrus, testicular atrophy, reduced libido
- Reduced vitamin D levels
- Elevated parathyroid hormone levels

SKIN AND FUR
- Reduced wound healing
- Hair loss
- Increased bruising
- Thin skin
- Calcinosis cutis
- Increased susceptibility to infection

LYMPH NODES
- Suppression of the immune system
- Lymphopenia

LIVER
- Elevated liver enzymes
- Fat accumulation
- Hepotomegaly
- Hepotopathy
- Micronodular cirrhosis

OTHER
- Hypertension
- Increased risk of infection
- Enhanced spread of infection
- Teratogenic effects
- Redistribution of body fat
- Retard growth

APPENDIX 3: PRURITUS VISUAL ANALOGUE SCALE

Instruction: this scale is designed to record the severity of the dog's itchiness (pruritic activity) during the past 24 hours. Itching includes scratching, biting, licking, clawing, nibbling, and/or rubbing. **Read all the descriptions below starting from the bottom.**

Draw a single small horizontal line on the vertical scale line to record the severity of the dog's itchiness (pruritic activity).

Extremely severe itching.
Dog is scratching, chewing, licking almost continuously. Itching practically never stops, regardless of what else is happening around the dog.

Severe itching.
Prolonged episodes of itching when the dog is awake. Itching occurs at night and also when eating, playing, exercising, or when otherwise distracted.

Moderate itching.
Regular episodes of itching when the dog is awake. Itching might occur at night and wake the dog. No itching when eating, playing, exercising or when being distracted.

Mild itching.
More frequent episodes of itching. May notice episodes of itching at night. No itching when sleeping, eating, playing, exercising or when being distracted.

Very mild itching.
Occasional episodes of itching. The dog is slightly more itchy than before the problem began.

Normal dog.
Itching is not a problem.

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