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AUSTRALIAN VETERINARY DERMATOLOGY
ADVISORY PANEL (AVDAP)

GUIDELINES FOR THE DIAGNOSIS AND MANAGEMENT OF PRURITUS IN DOGS

Start from Scratch
FOR HEALTHY SKIN


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CONTENTS

AUSTRALIAN VETERINARY DERMATOLOGY ADVISORY PANEL

OBJECTIVE

The Australian Veterinary Dermatology Advisory Panel (AVDAP) was formed with the objective of advancing 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 expectations of pet owners.

In recognition of the need to help the veterinary community to better navigate the condition and promote best practice within the field of dermatology, the panel have developed these AVDAP Guidelines. These are based on an extensive review of published literature, latest research outcomes and expert opinion and are focussed on enhancing diagnostic and case management skills, and the appropriate and best use of available products.

Zoetis are pleased to support this educational initiative, which reflects its wider and ongoing commitment to the continuing education and professional development of veterinarians and, consequently, the delivery of the best possible care to patients.

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australian veterinary dermatology advisory panel

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

THE PANEL MEMBERS INCLUDE:

DR MANDY BURROWS BSc, BVMS, MANZCVS, FANZCVS

Associate Professor in Small Animal Medicine (Dermatology); Registered 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 and Associate Professor in Small Animal Medicine (Dermatology) at Murdoch University, WA. She is part of the global Animal Dermatology Clinic (ADC) team that has veterinary dermatology referral practices located in the US, Australia and New Zealand and she is the key dermatologist at ADC-Perth with two dermatology practices in WA. Mandy teaches undergraduate veterinary students at Murdoch University and the dermatology unit of the Masters in Veterinary Medicine at both Murdoch and Massey University, WA. She is the President of the Council of ANZCVS; a co-editor of the international journal Veterinary Dermatology; the current Australian and New Zealand representative of the World Association for Veterinary Dermatology; and, the President of the World Congress in Veterinary Dermatology to be held in Sydney in 2020. Mandy has authored and co-authored national and international journals and textbooks and has extensive experience with clinical dermatology in companion animals.

DR SAMANTHA CROTHERS BSc, BVMS, DipACVD

Specialist in Veterinary Dermatology Melbourne, VIC

Sam Crothers graduated from Murdoch University, WA in 2003. She spent 3 years in a busy general small animal practice in Perth before moving to California, USA in 2006 to commence her residency in dermatology at the University of California Davis (UCD). She became a Diplomate of the American College of Veterinary Dermatology in 2009. Following the completion of her residency, Dr Crothers worked at UCD as a clinical instructor of dermatology for two years where she was responsible for undergraduate dermatology training for veterinary students and was part of the residency training program team. In 2010, she was the assistant professor in dermatology at Colorado State University, USA, where she continued to train undergraduate veterinary students and dermatology residents. Since returning to Australia in late 2011, Dr Crothers has worked in her home town of Perth before moving to Melbourne in 2012 with her husband. She has been with Melbourne Veterinary Specialist Centre since 2013.

DR PETER HILL (AVDAP Chair) BVSc (Hons), PhD, DVD DipACVD, Dip ECVD, MANZCVS
Professor of Veterinary Dermatology and Immunology, Adelaide, SA

Peter Hill is a UK veterinary graduate with over 25 years' experience of clinical practice and academia. After spending 5 years in a UK companion animal hospital, he trained as a specialist dermatologist at the University of Madison, Wisconsin, USA. He obtained a PhD at the University of Edinburgh, UK and subsequently worked as a lecturer, clinician and researcher. After spending some time at Bristol University, UK he emigrated to Australia and spent 18 months at a specialist referral centre in Sydney. Following that, Peter returned to academia at the University of Adelaide, SA. Peter is the only veterinary dermatologist in the world to have been board-certified as a Diplomate in the UK, Europe and the USA, as well as having a PhD. He has trained 9 dermatology residents, written 2 textbooks, published over 100 papers and book chapters, and given over 240 invited talks and presentations.

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

Mike graduated from the University of Queensland, QLD in 1984 and has worked in a number of different private practice and industry positions. In 1995, he started a residency in Melbourne, with additional periods of study at the University of California, Davis and Louisiana State University, Baton Rouge, USA. He is Principal and Director of a specialist dermatology referral practice based in Brisbane with satellite clinics in Darwin, Alice Springs, Cairns, Townsville, Mackay, Rockhampton and Bundaberg. Mike is adjunct Professor at the University of Queensland, teaching the undergraduate course in Veterinary Dermatology. He is also a Fellow of the Australian College of Veterinary Scientists (Veterinary Dermatology) and a Diplomate of the American College of Veterinary Dermatology. Mike has several national and international publications and has delivered many presentations in Australia, South East Asia, New Zealand and North America.

DR REBECCA TRAUB BSc (Vet. Biol.), BVMS (Hons), PhD
Associate Professor in Veterinary Parasitology, University of Melbourne, VIC

Rebecca graduated from Murdoch University, WA, in 1997 and worked in small animal practice in Perth until 2002. In 2004, she was awarded her PhD (Murdoch University) in canine zoonoses, for which she received the prestigious John Frederick Adrian Sprent Prize by the Australian Society for Parasitologists Inc. Following her postdoctoral fellowship she lectured in Veterinary Public Health at the School of Veterinary Science, The University of Queensland until 2013. In 2014, Rebecca was appointed to the Research at Melbourne Acceleration Program (RAMAP) at the University of Melbourne. To date, Rebecca has published over 110 peer-reviewed papers and invited book chapters in the field of parasitology and veterinary public health. She has supervised eleven PhD students and three postdoctoral fellows to completion. Her research expertise has been formally recognised through consultations for the Gates Foundation, WHO/OIE/FAO, the veterinary pharmaceutical industry, and not-for-profit organisations. Rebecca is the Founding Director of the Tropical Council for Companion Animal Parasite (TroCCAP) and an Associate Editor for Veterinary Parasitology – Regional Studies and Reports.

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

Linda graduated from the University of Sydney, NSW in 1984, and worked in private and university small animal practices in Australia and the UK for over 10 years before following a long-time interest in dermatology. Linda achieved Membership of the Australian and New Zealand College of Veterinary Scientists in Feline Medicine in 1997, and a Fellowship in Veterinary Dermatology in 2003. She has worked in university and private dermatology referral practice for 20 years, and is currently based at the Small Animal Specialist Hospital in Sydney, NSW, for clinical work, and continues undergraduate pre-clinical teaching at the University of Sydney. Linda has given numerous presentations in Australia and internationally, has a range of research and educational publications, and is currently the President of the Dermatology Chapter of the Australia College of Veterinary Scientists. She is passionate about increasing dermatology knowledge and understanding for veterinary students and general practice veterinarians.

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CHAPTER 1:

OVERVIEW OF PRURITUS IN THE 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 biologic 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 work-up to identify the underlying cause, and therapeutic intervention to manage the insidious effects

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 two components:
(A) the **diagnostic approach** and (B) the **therapeutic approach**

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

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES

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

Diagnostic tests to consider:

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

2 INFECTION

- Bacteria
- Yeast

Diagnostic tests to consider:

- Adhesive tape impression
- Cotton bud
- Glass slide impression

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:

- Dietary exclusion trial

ATOPIC DERMATITIS

Diagnostic tests to consider:

- Intra-dermal testing
- Serology

CONTACT

Diagnostic tests to consider:

- Avoidance and re-challenge
- Patch test

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE

May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION

ANTIBIOTICS

• Topical +/- systemic

ANTI-FUNGALS

• e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

• Oclacitinib • Cyclosporin • Glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

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

SECTION A: DIAGNOSTIC APPROACH

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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.

PHYSICAL EXAM

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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 evaluation of the patient. One example of how this can be achieved is to email the following questionnaire when the appointment is made: **www.vetsaustralia.com.au/AVDAPresources**

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 formulation of therapeutic plans most suitable to each patient and their owners.

MINIMAL HISTORICAL INFORMATION REQUIRED TO ASSIST WITH AN ACCURATE DIAGNOSIS

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?

STEP 2: PHYSICAL EXAMINATION

A: DIAGNOSTIC APPROACH

HISTORY

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

PHYSICAL EXAM

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

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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

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

- 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

- 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. If this occurs when the margins of the pinnae are scratched, it is known as the pinnal-pedal scratch reflex and is suggestive of canine scabies:
  - 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
  - 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

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

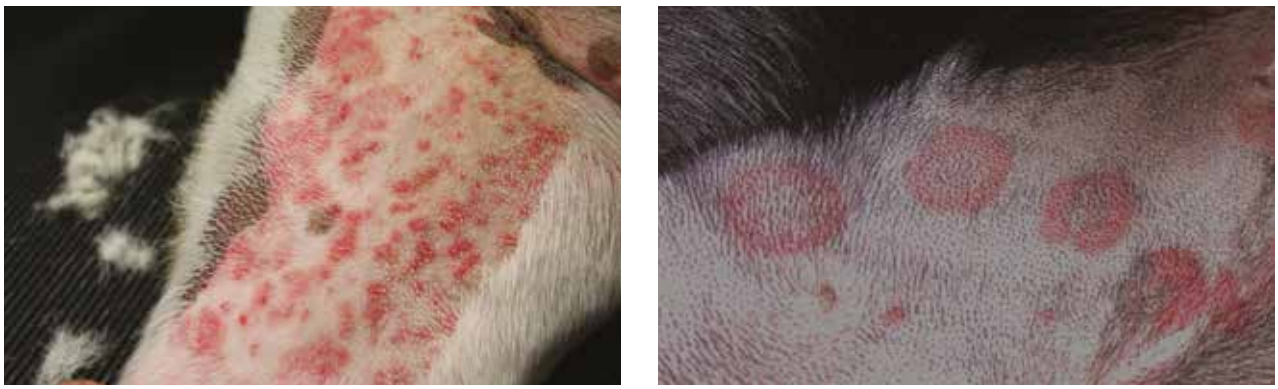
- **Hyperpigmentation** – skin that is darker than normal.
  - *Epidermis*. Excessive pigment in the epidermis leads to black-coloured skin. This occurs most commonly as a chronic change in allergic diseases, *Malassezia* dermatitis and bacterial pyoderma
  - *Dermis*. Excessive pigment in the dermis 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

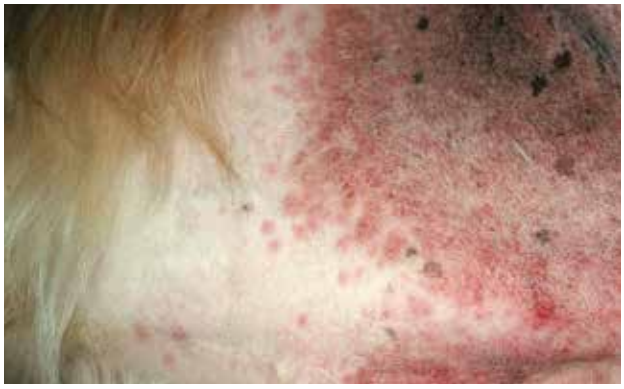
A rash is a collection of skin lesions usually comprised of erythematous macules, papules and pustules (maculo-papulo-pustular eruption)

- 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



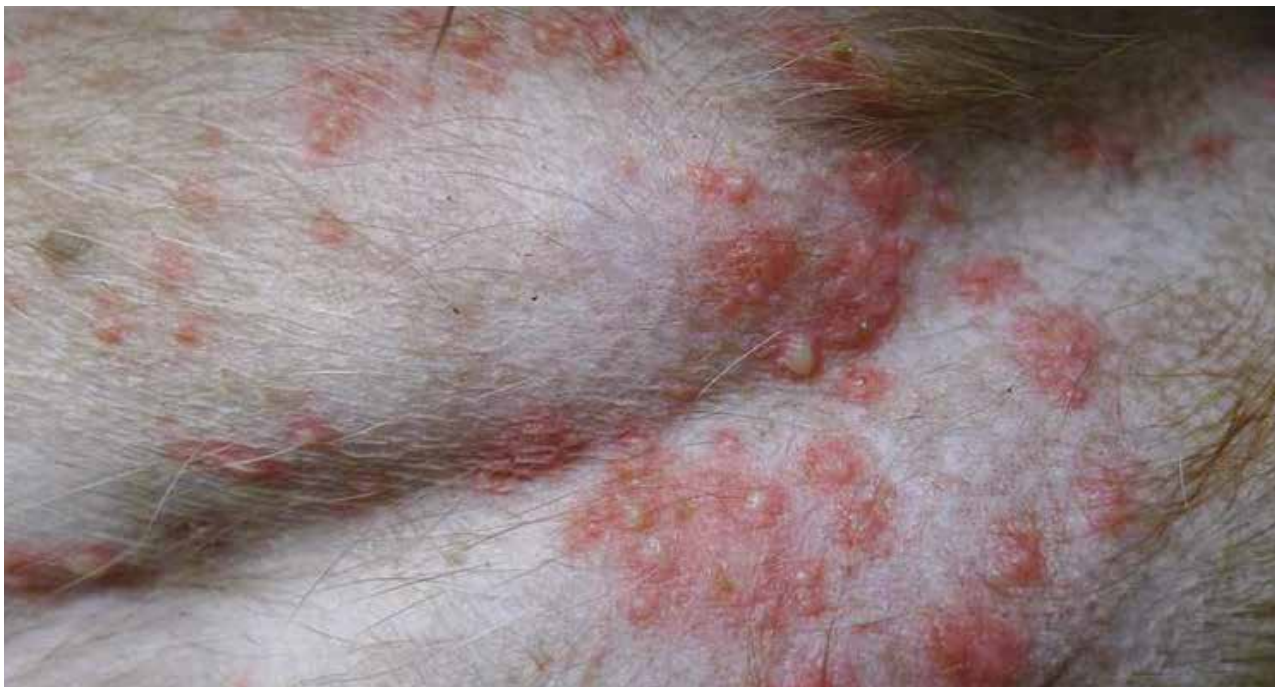
Erythematous macules and patches
Image courtesy of Linda Vogelnest

- Papules – small, red, firm raised lesion 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



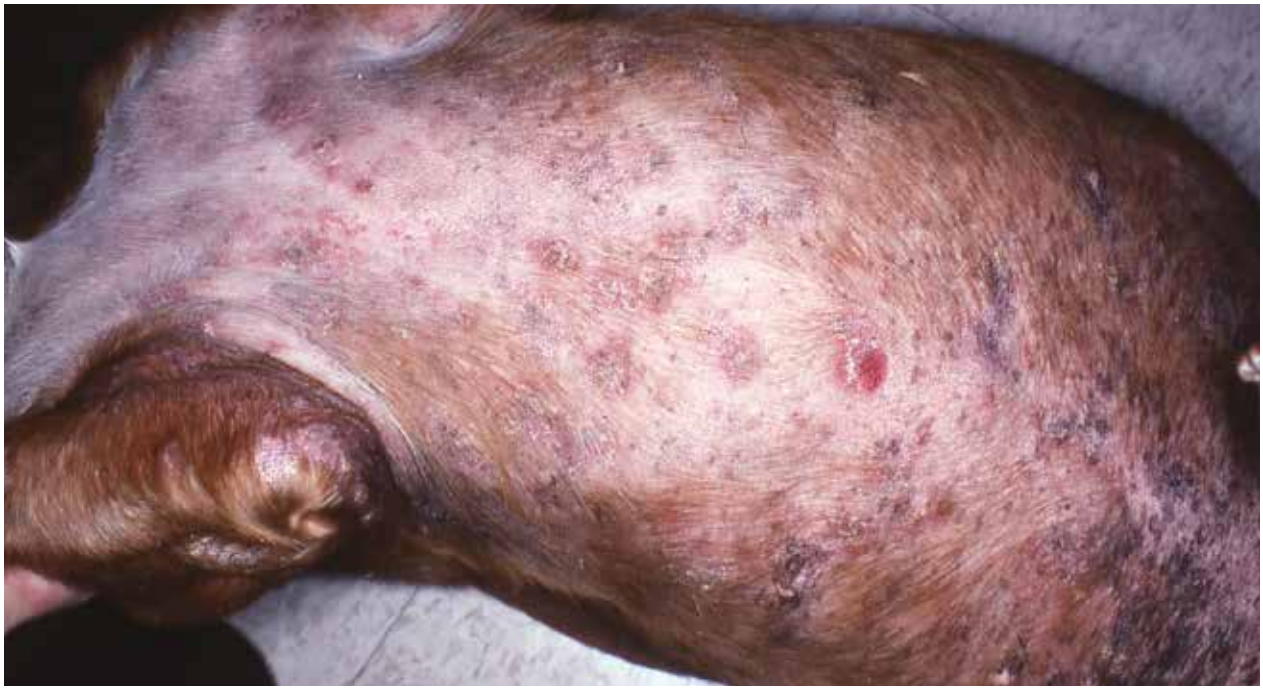
Macules and papules
Image courtesy of Peter Hill

- **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



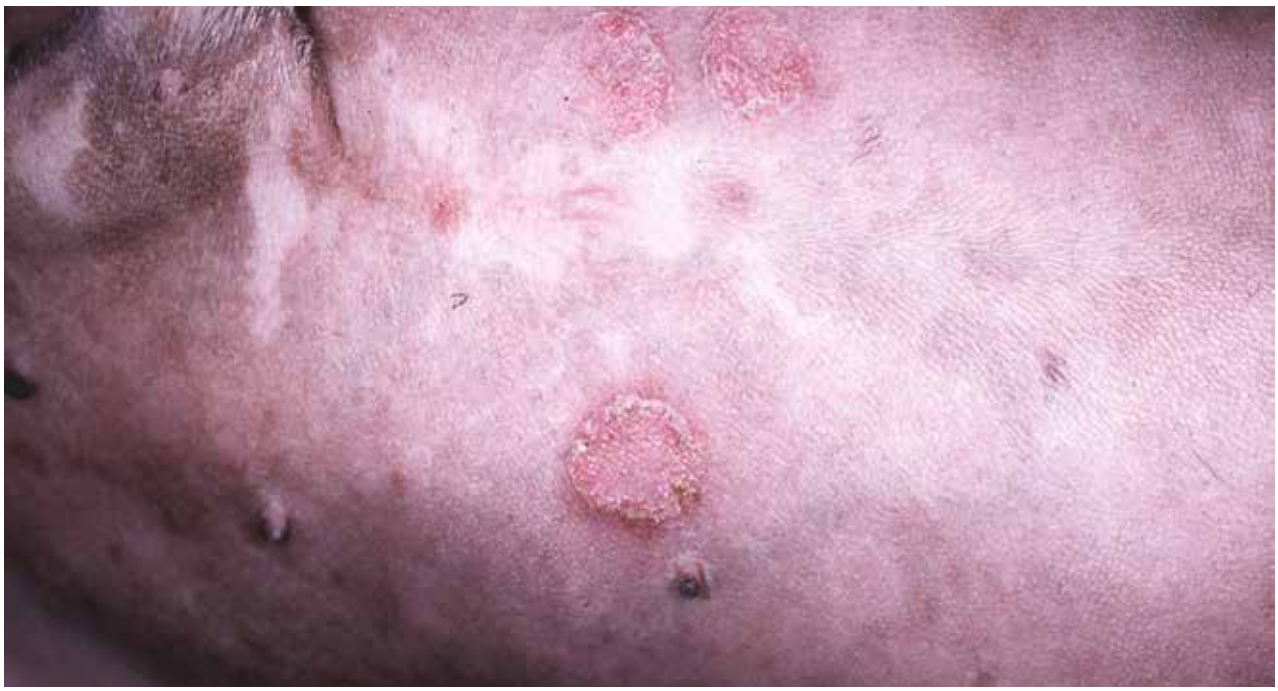
Pustules
Image courtesy of Mandy Burrows

- **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

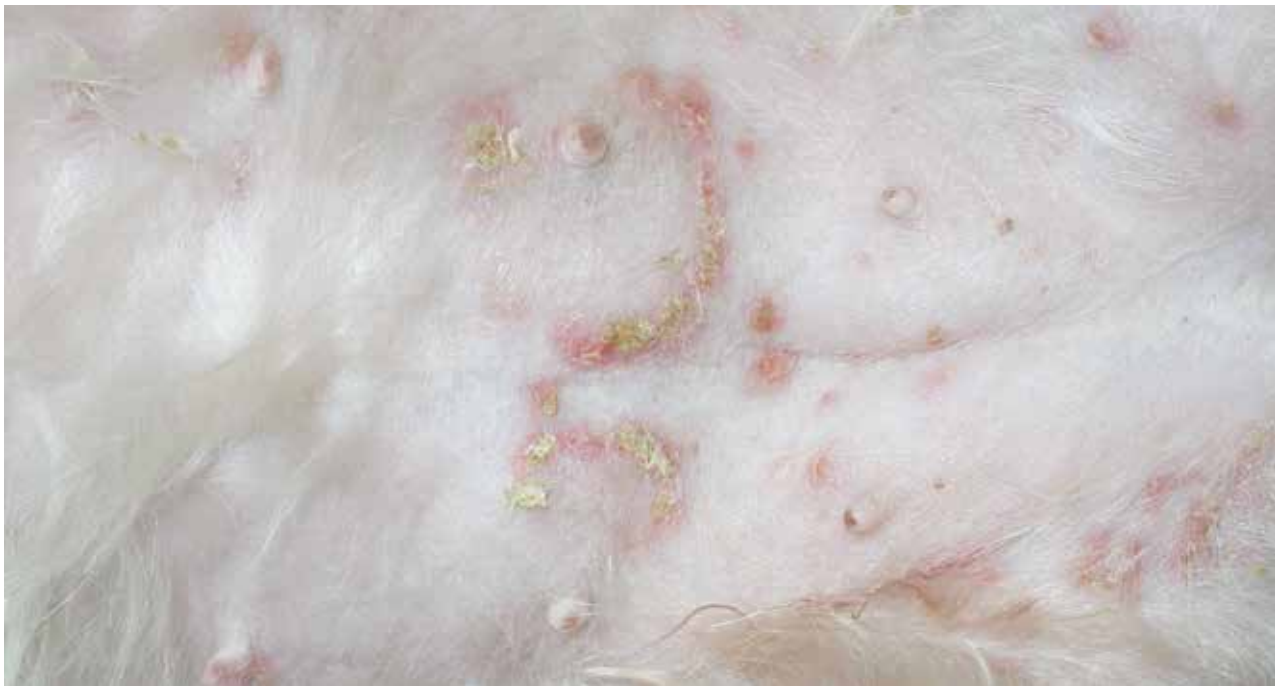


Crusted papules and pustules
Image courtesy of Peter Hill

- **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)



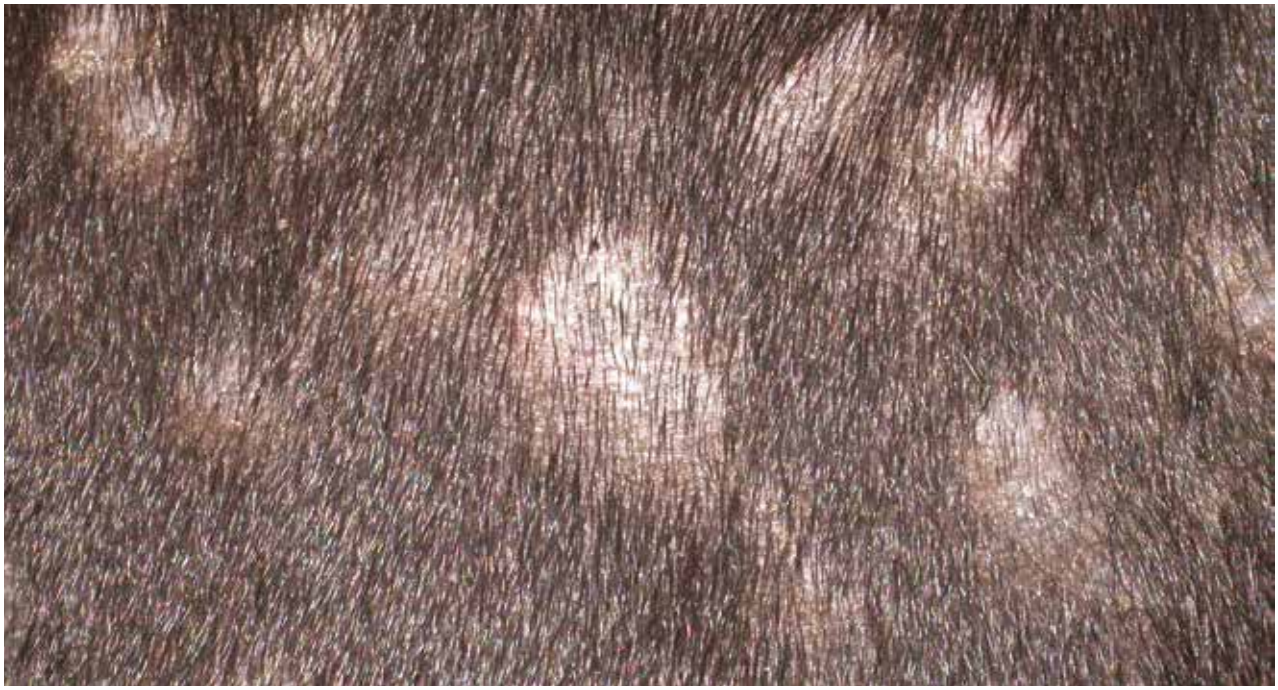
Epidermal collarette
Image courtesy of Peter Hill



Epidermal collarettes
Image courtesy of Mike Shipstone

III. LOSS OF HAIR

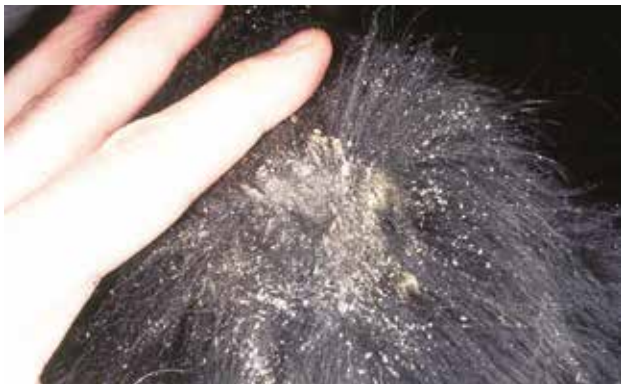
- Some degree of hair loss (alopecia) is common in pruritic dogs. It may be due to self-trauma (i.e. secondary to the pruritus) or spontaneous in the case of staphylococcal folliculitis, demodicosis or dermatophytosis
- If secondary to pruritus, the hair is removed by the animal itself by scratching, 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

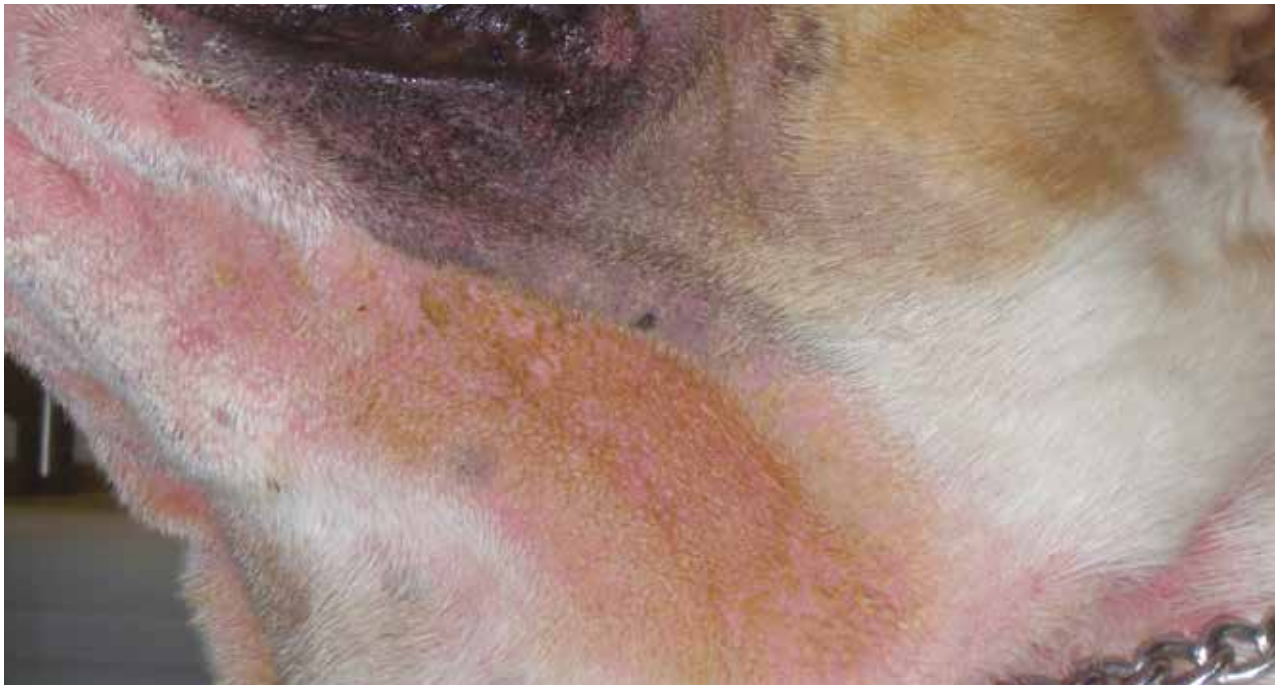
- The presence of visible scale in the coat of pruritic dogs is a common sign
  - *Scale* – grossly visible accumulation of corneocytes (dandruff). Excessive scale may form as a result of any disease that disrupts the normal process of cornification and desquamation



Scale
Image courtesy of Peter Hill

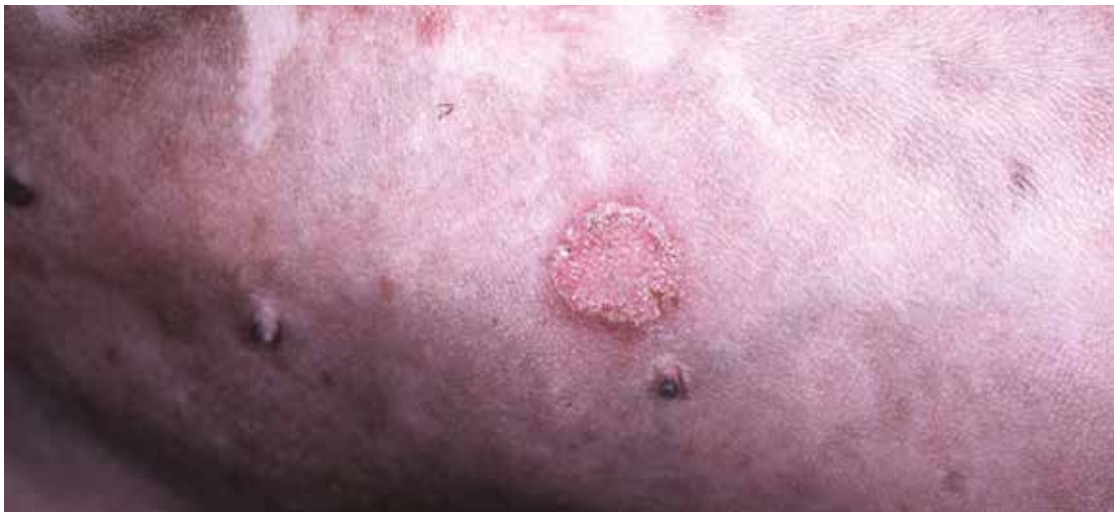
Scale
Image courtesy of Mandy Burrows

  - *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

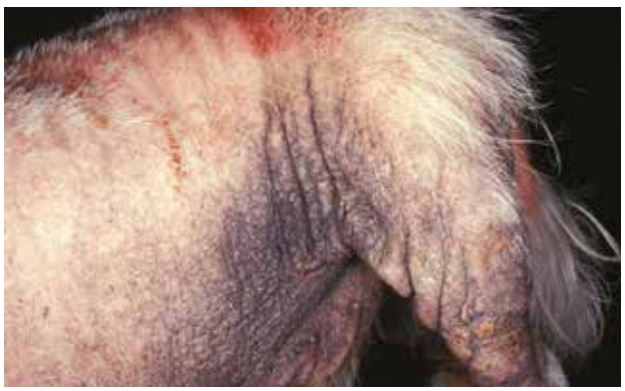
- *Epidermal collarette* – a circular ring of scale. Epidermal collarettes are formed when a focal point of infection spreads outwards as an enlarging circle, causing the stratum corneum to lift upwards. The end result is a circular patch of alopecia surrounded by a rim of scale. This extremely common 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



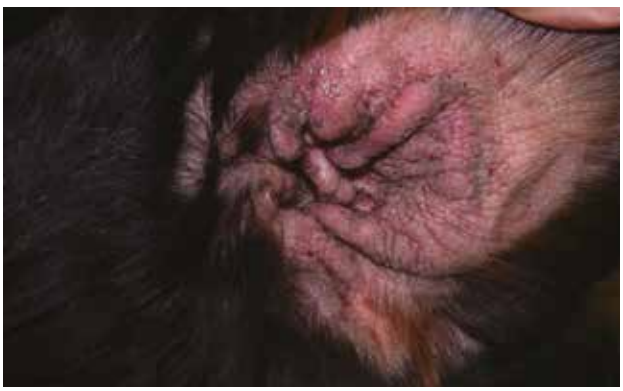
Epidermal collarette
Image courtesy of Peter Hill

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

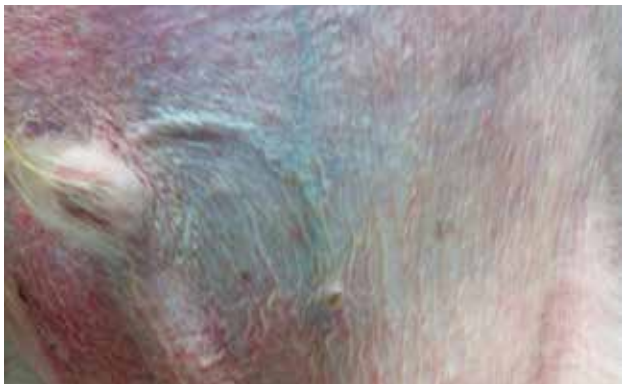


Lichenification
Image courtesy of Peter Hill



Lichenification
Image courtesy of Linda Vogelnest

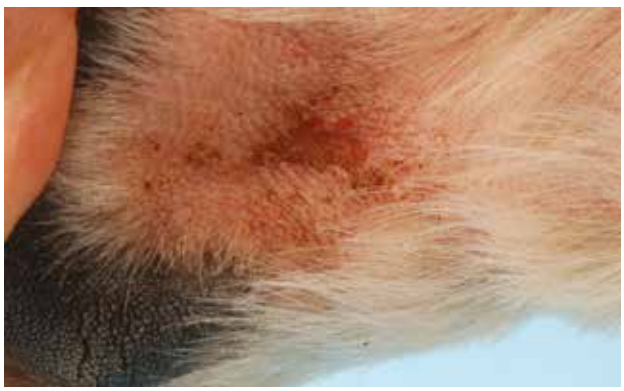
- *Cutaneous atrophy* – skin that is visibly thinner than normal. This may be appreciated because the cutaneous blood vessels become more prominent or the skin may become less elastic and easily wrinkled. In pruritic dogs, cutaneous atrophy would be seen following prolonged treatment with systemic or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



Cutaneous atrophy
Image courtesy of Peter Hill

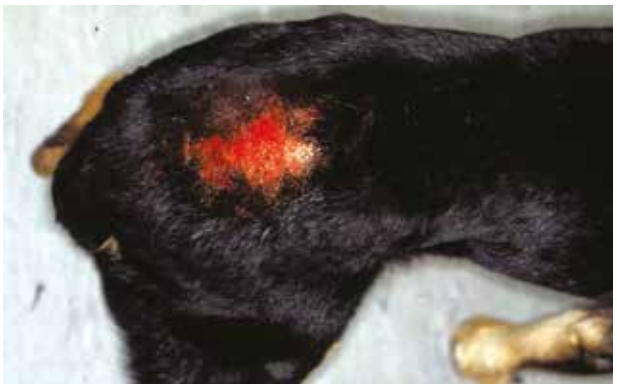
VI. DEFECTS IN SKIN INTEGRITY

- 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

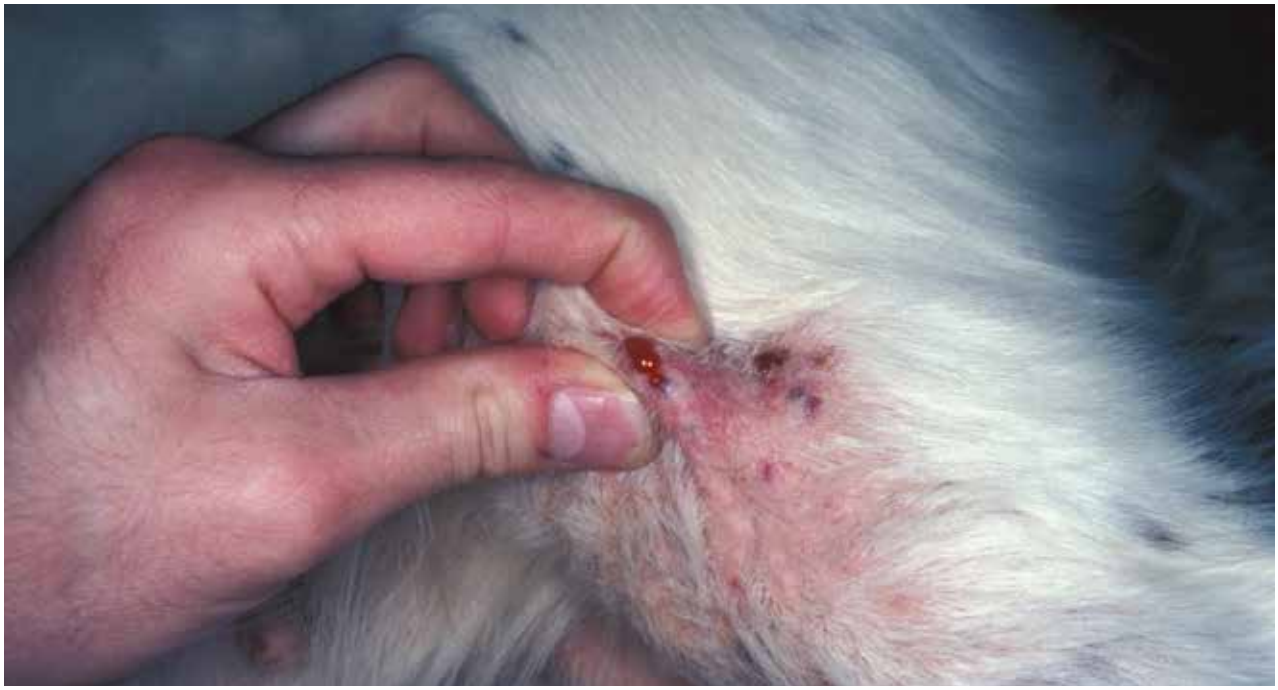
- *Erosions and ulcers* – a defect in the skin in which the epidermis has been removed. Erosions and ulcers occur at sites of intense focal pruritus such as hot spots or acral lick dermatitis



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



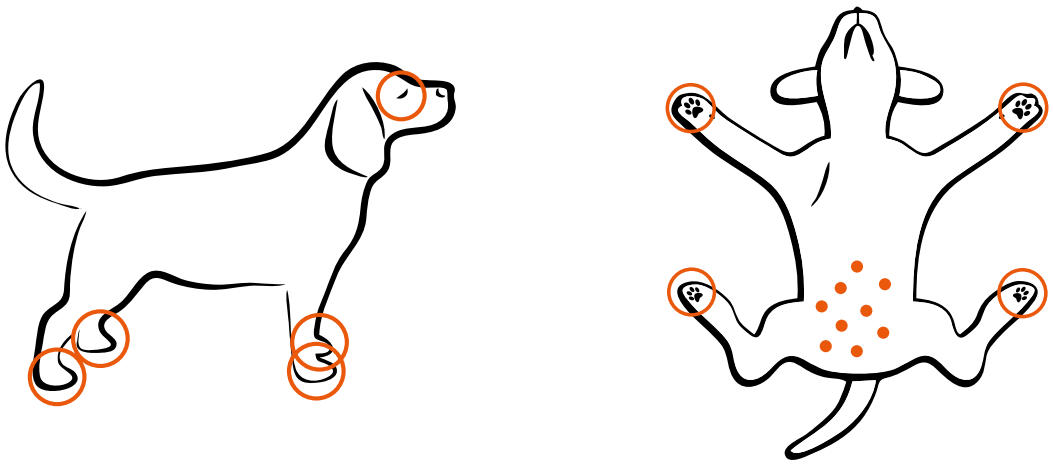
Draining tracts
Image courtesy of Peter Hill

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

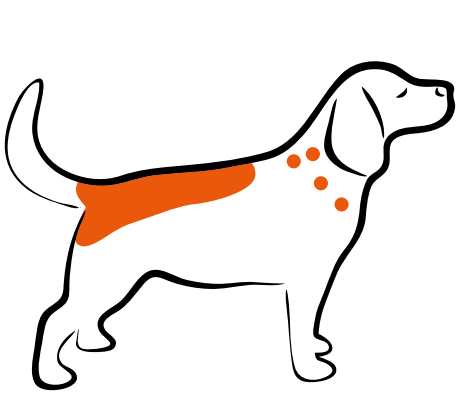
- The distribution of lesions provides important clues as to the possible diagnosis in pruritic dogs
- The distribution patterns of the major pruritic skin diseases in dogs are shown on the following pages. Note that these distribution patterns are of more typical cases and more generalised variations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

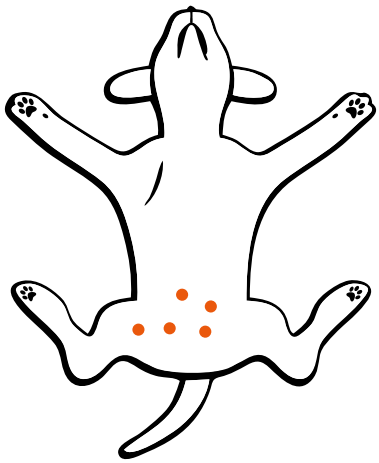
PARASITIC SKIN DISEASES

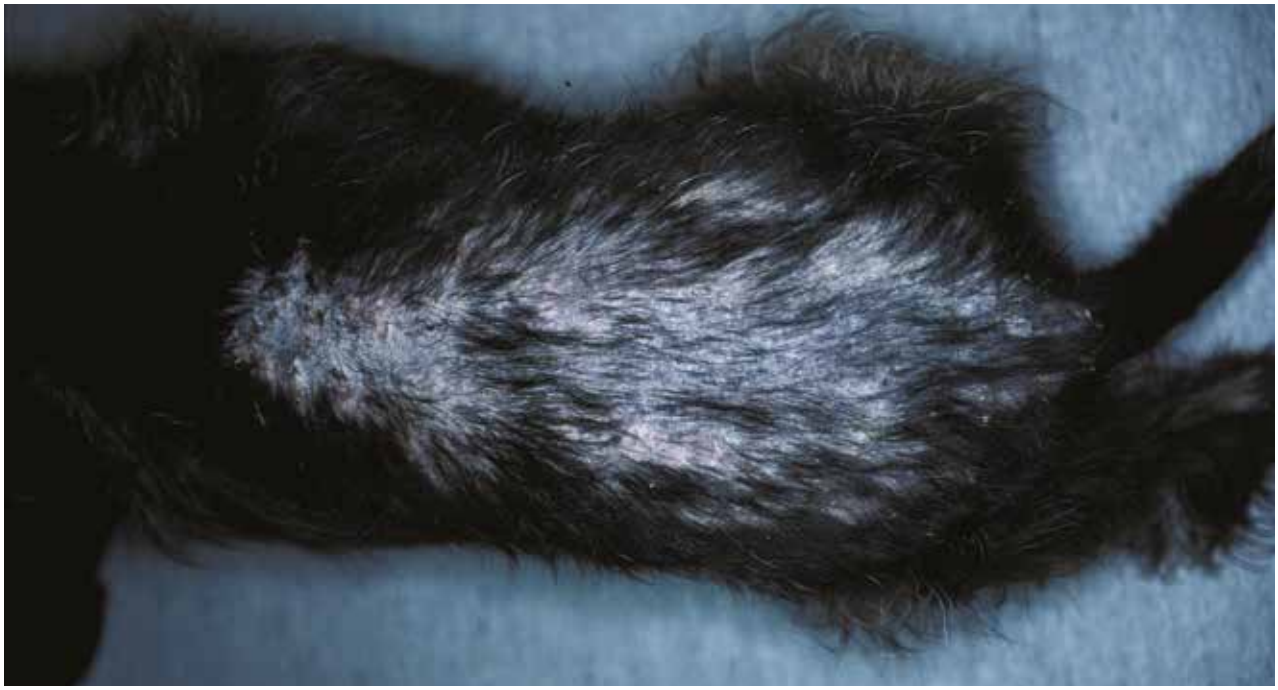
I. FLEA ALLERGY DERMATITIS

Predominant lesions

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



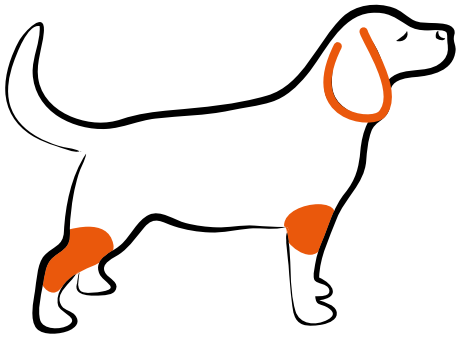


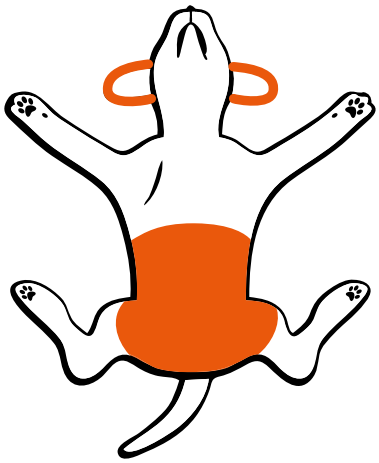


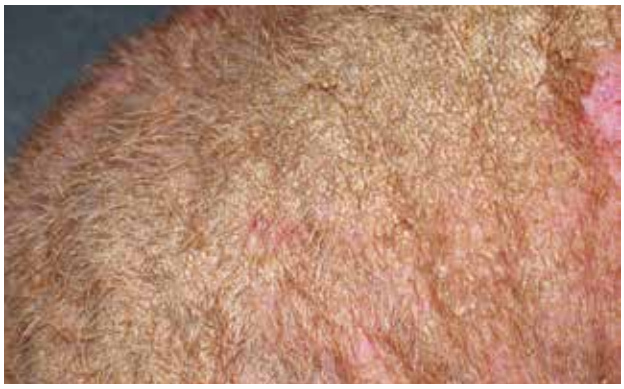
Flea bite hypersensitivity
Image courtesy of Mike Shipstone

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

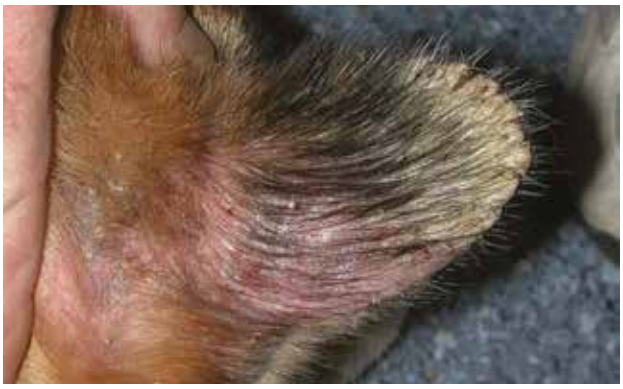
- *Predominant lesions* – papular eruption, erythema, scaling, excoriations. In severe cases the lesions may extend over the entire body







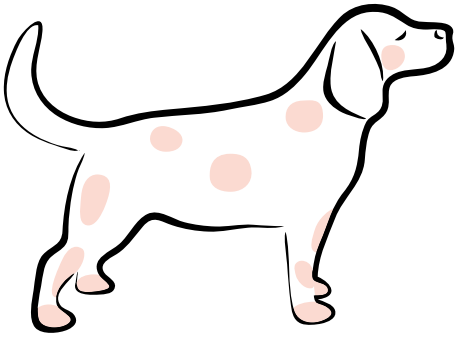
Scale in dog with sarcoptes
Image courtesy of Linda Vogelnest

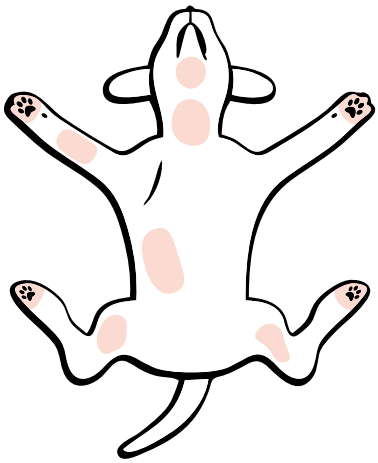


Ear pinna in a dog with sarcoptes
Image courtesy of Mike Shipstone

III. *DEMODEX* INFESTATION

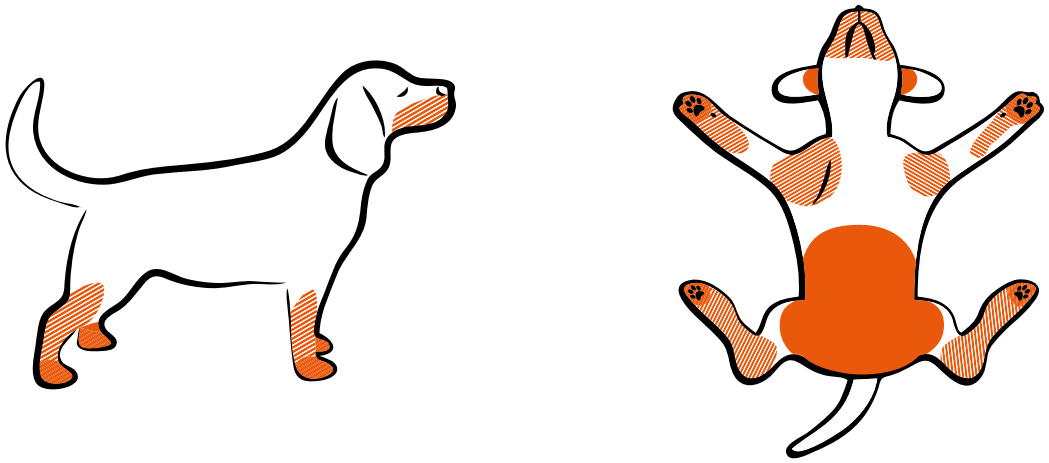
- *Predominant lesions* – patches of focal, multifocal or diffuse alopecia; erythema in pink-skinned dogs; comedones, follicular casts, scale, blue-grey hyperpigmentation in chronic cases. Papules, pustules, furunculosis and ulcers if secondary infection present





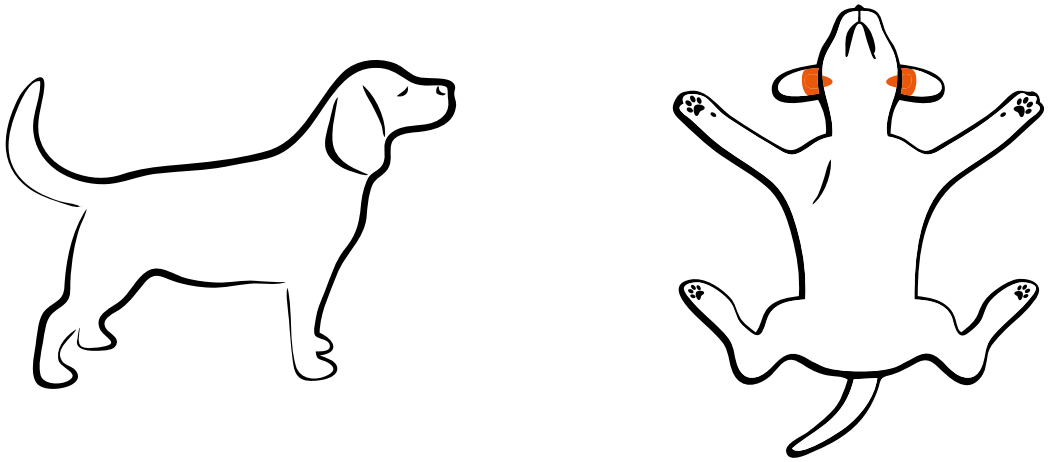
IV. TROMBICULID AND *IXODES* TICK LARVAE INFESTATION (LIMITED GEOGRAPHICAL DISTRIBUTION IN AUSTRALIA)

- *Predominant lesions* – papular eruption/ macroscopically bright orange colour of the larval mites



V. OTITIS (OTODECTES, EAR INFECTIONS, ALLERGIES)

- *Predominant lesions* – erythema, discharge



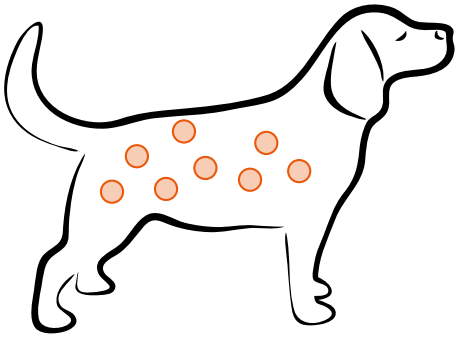
INFECTIOUS SKIN DISEASE

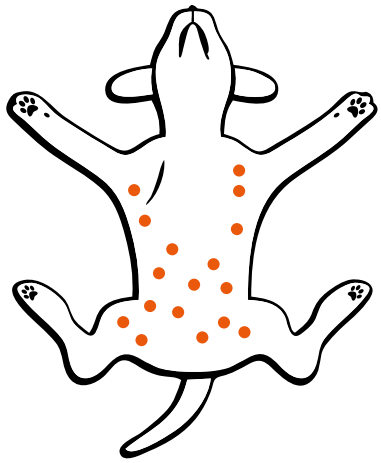
I. STAPHYLOCOCCAL PYODERMA (SUPERFICIAL PYODERMA, SUPERFICIAL FOLLICULITIS)

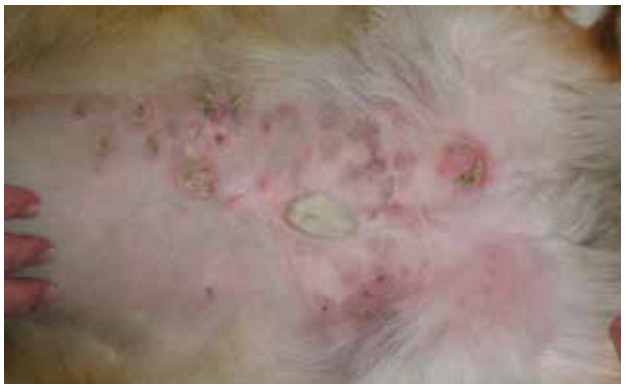
Predominant lesions

- *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.

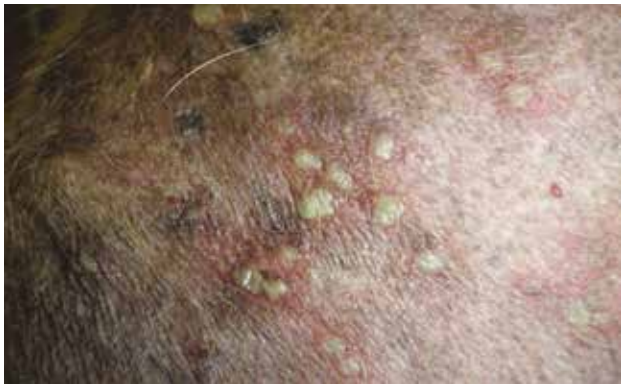






Superficial pyoderma showing papules, crust and epidermal collarettes
Image courtesy of Mike Shipstone

Epidermal collarettes
Image courtesy of Mike Shipstone

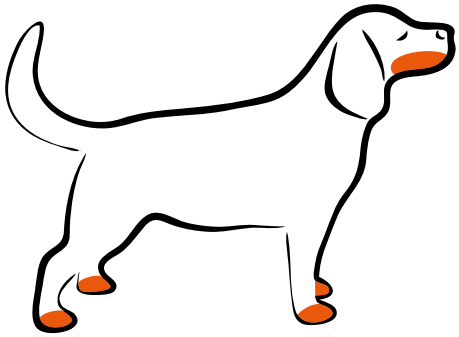


Staphyloccal pyoderma
Image courtesy of Mike Shipstone

Pustules
Image courtesy of Peter Hill

II. *MALASSEZIA* DERMATITIS

• *Predominant lesions* – erythema, yellowish or brownish greasy scale, hyperpigmentation with chronicity

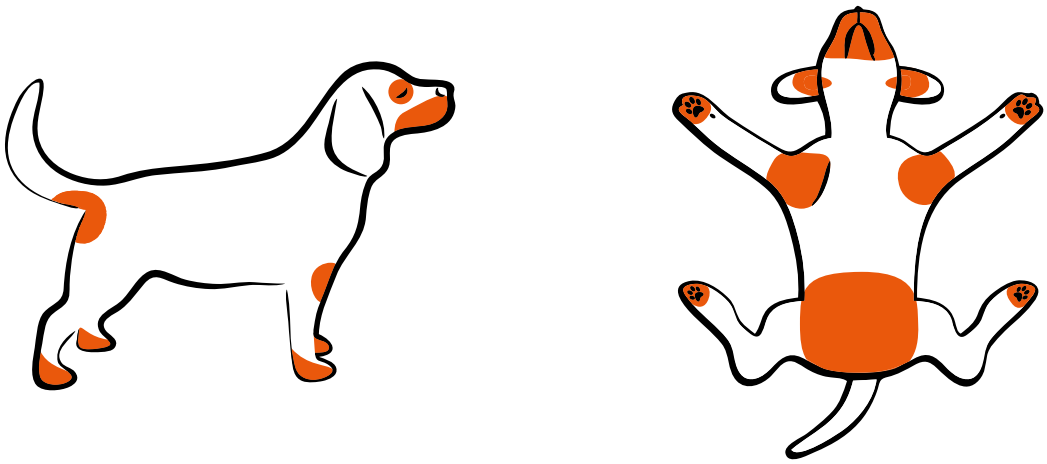


Seborrhoea in a dog with *Malassezia*
Image courtesy of Mike Shipstone

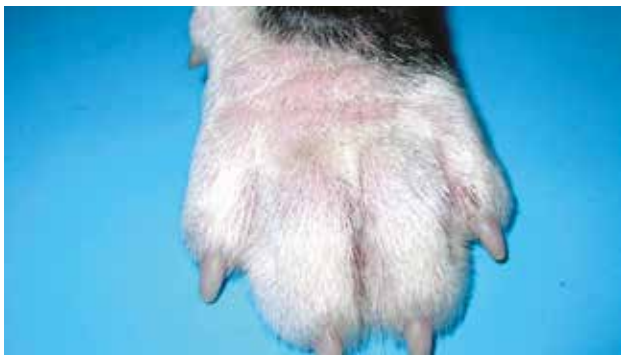
ALLERGIC SKIN DISEASE

I. ATOPIC DERMATITIS AND FOOD ALLERGY

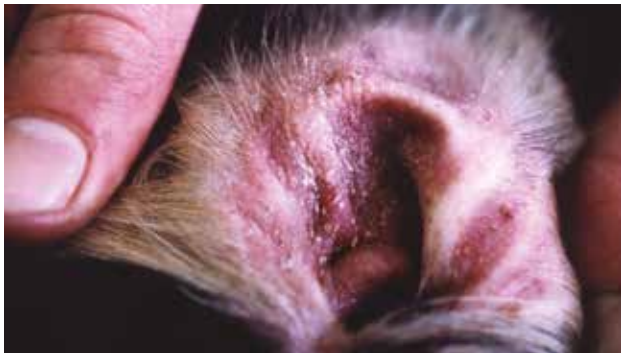
- *Predominant lesions* – erythema, excoriations, lichenification, hyperpigmentation. Often complicated by secondary staphylococcal and *Malassezia* infections



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

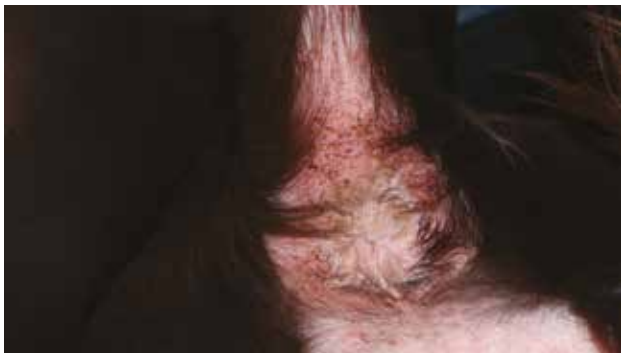


Atopic Dermatitis - Erythema of the medial pinna
Image courtesy of Peter Hill

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

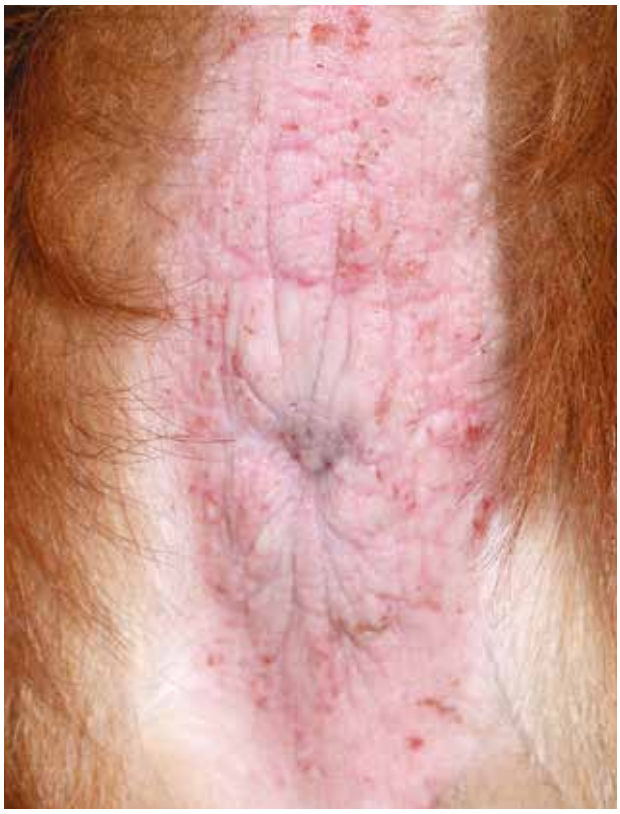
Atopic Dermatitis - Chronic dermatitis, lichenification and hyperpigmentation of the ventrum
Image courtesy of Peter Hill

Atopic Dermatitis - Chronic Atoptic Dermatitis
Image courtesy of Peter Hill

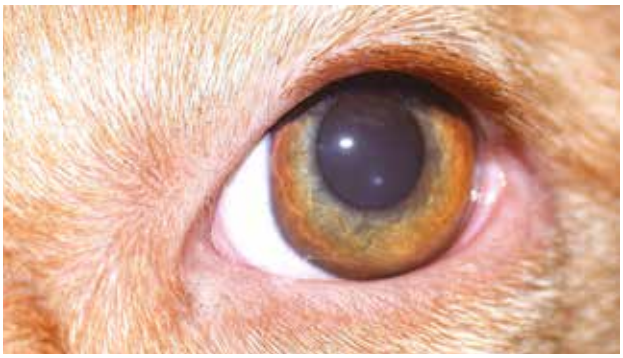


Perianal dermatitis
Image courtesy of Mike Shipstone

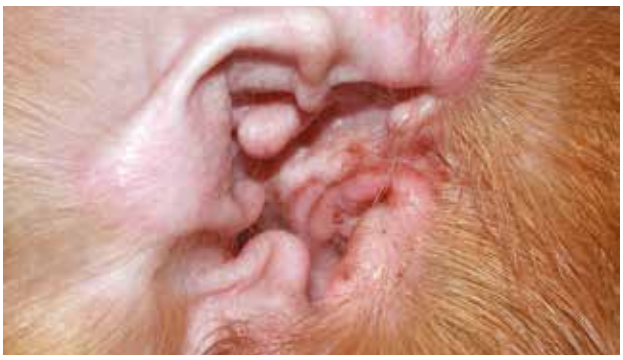
Food allergy – facial dermatitis – 7 month Duck Tolling Retriever - confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows



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



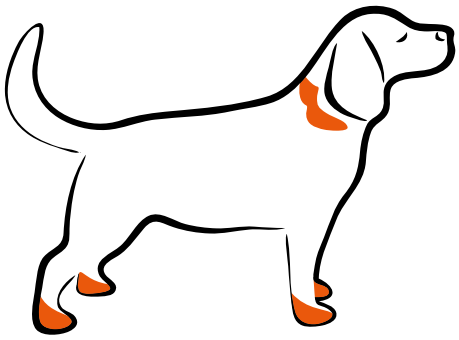
Food allergy – periocular dermatitis – 7 month Duck Tolling Retriever - confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows

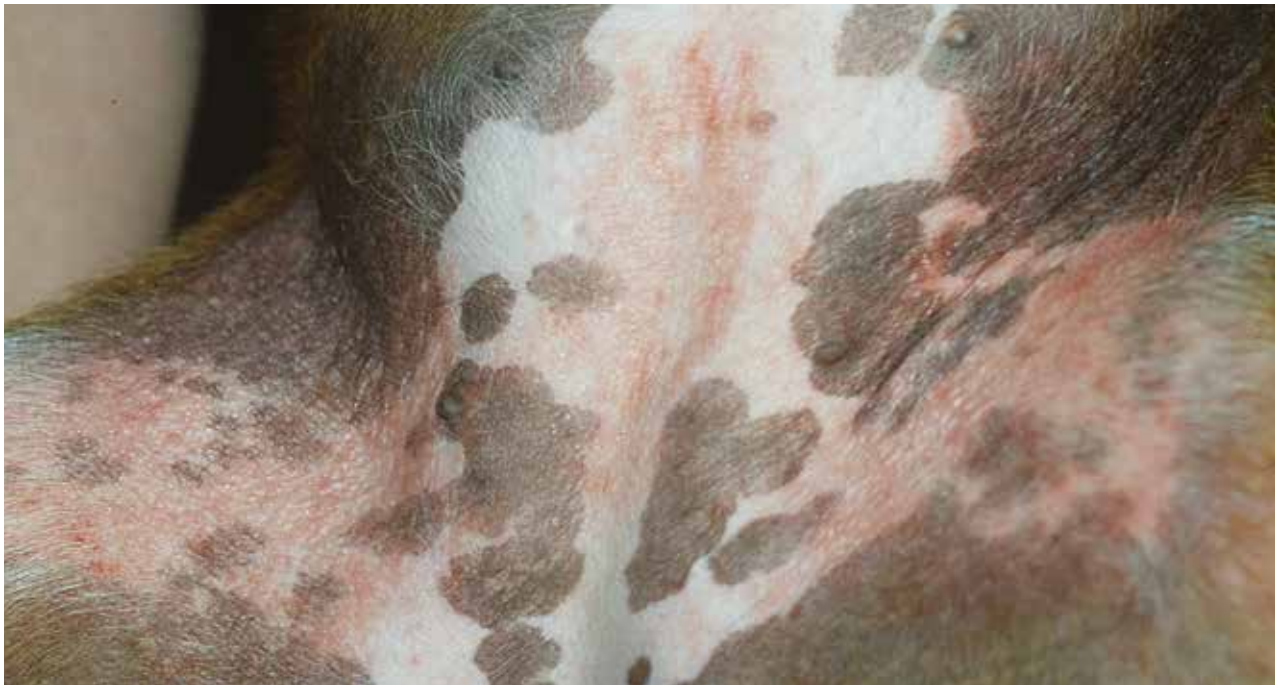


Food allergy – otitis externa – 7 month Duck Tolling Retriever - confirmed chicken allergic on provocative and sequential food trial
Image courtesy of Mandy Burrows

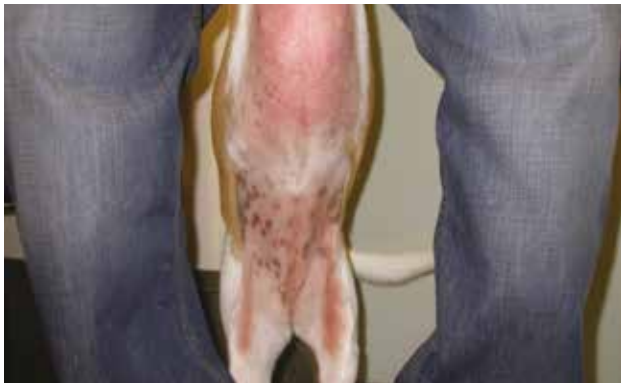
II. CONTACT DERMATITIS

• *Predominant lesions* - erythematous macules, papules, lichenification, hyperpigmentation, erosions





Contact allergy - positive on scratch testing to kikuyi grass
Image courtesy of Mandy Burrows



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

STEP 3: DIFFERENTIAL DIAGNOSIS

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, wandering jew *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

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

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES

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

Diagnostic tests to consider:

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

2 INFECTION

- Bacteria
- Yeast

Diagnostic tests to consider:

- Adhesive tape impression
- Cotton bud
- Glass slide impression

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:

- Dietary exclusion trial

ATOPIC DERMATITIS

Diagnostic tests to consider:

- Intra-dermal testing
- Serology

CONTACT

Diagnostic tests to consider:

- Avoidance and re-challenge
- Patch test

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

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 back half of body
  - Intermittent or waxing/waning pruritus: most consistent with seasonal parasitoses or atopic dermatitis

- **Lesions**
  - Lesions before itch: exclude parasitic and infectious causes first
- **Response to previous medications**
  - Complete resolution of skin condition with oclacitinib (Apoquel®) or glucocorticoids (anti-inflammatory doses): most consistent with allergy
  - Partial resolution of pruritus with oclacitinib (Apoquel®) or glucocorticoids (anti-inflammatory doses): non-specific
  - Poor response to oclacitinib (Apoquel®) or glucocorticoids: exclude demodicosis, scabies and infections

PHYSICAL EXAMINATION FEATURES

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

- **Lesions:**
  - Papules: exclude parasites, bacterial pyoderma, flea allergy
  - Pustules/epidermal collarettes: bacterial pyoderma likely
  - Alopecia
    - 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
- **Lesion Distribution** (once infections excluded):
  - Face, ears, paws, axillae, ventral abdomen: atopic dermatitis, food allergy, *Malassezia* dermatitis, trombicula/*Ixodes* ticks
  - Otitis externa/pinnal lesions: atopic dermatitis, food allergy, scabies
  - Caudal trunk, caudal/medial hind limbs, ventral abdomen: flea allergy
  - Contact regions (sparsely haired muzzle, feet, ventrum): contact allergy, atopic dermatitis, food allergy

3

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 for target organisms.

GUIDE TO LENS CHOICE			
	Objective (lens)	Magnification	Uses
Low power	4x 	40x	Slide scanning, detection of parasites
Medium power	10x 	100x	Slide scanning at higher power
High power dry	40x 	400x	Histopathology, blood smears, neoplasia (less valuable for skin cytology)
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

DIAGNOSTIC PROCEDURES

IDENTIFYING CAUSES OF PRURITUS

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

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- Avoidance and re-challenge
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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

Interpretation

A positive finding is diagnostic; a negative finding is inconclusive

Flea naked eye
Image courtesy of Peter Hill

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:

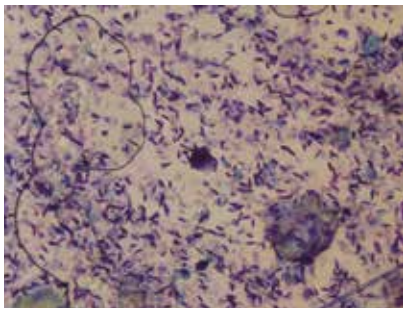
- Adhesive ('sticky') tape should be plain, non-patterned, non-invisible, with good quality adhesiveness, and 2cm wide (to cover the width of a glass slide; e.g. Office Works®, Scotch®). Glass slides ideally have one frosted end (for writing sample location). Most skin sites and lesion types can be sampled 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:

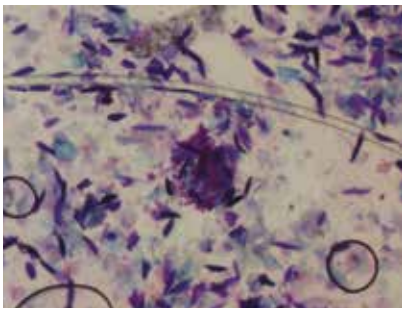
- Stain with a modified Wright's stain (e.g. DiffQuik®), using both the eosinophilic stain (orange or red) and the basophilic stain (blue or purple) but without the fixative
- The tape can be dipped into the stains, while attached to one end of a glass slide. Curling into a loop may facilitate dipping
- 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
- Unstained tapes may be retained for later staining and examination (overnight, and potentially a few days)

Important principles when evaluating adhesive tape impressions

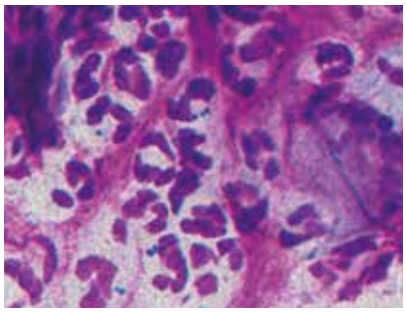
- Scan samples on lower power (4X lens) to identify areas of dense cells, or neutrophil clusters (see below), that warrant examination under higher power
- Most efficient and accurate examination requires repeated scanning under low power, interspersed with closer examination of suspect areas under oil 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



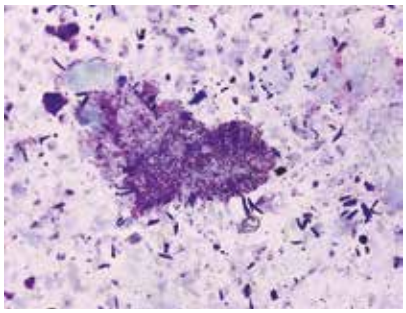
Neutrophilic clump on tape strip low power
Image courtesy of Peter Hill



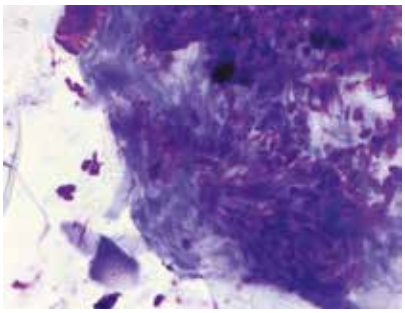
Neutrophilic clump on tape strip medium power
Image courtesy of Peter Hill



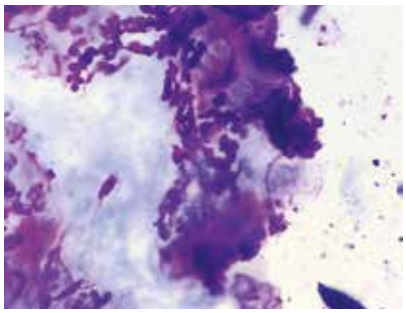
Neutrophilic clump on tape strip high power
Image courtesy of Peter Hill



Neutrophil cluster on adhesive tape impression - 4X lens
Image courtesy of Linda Vogelnest

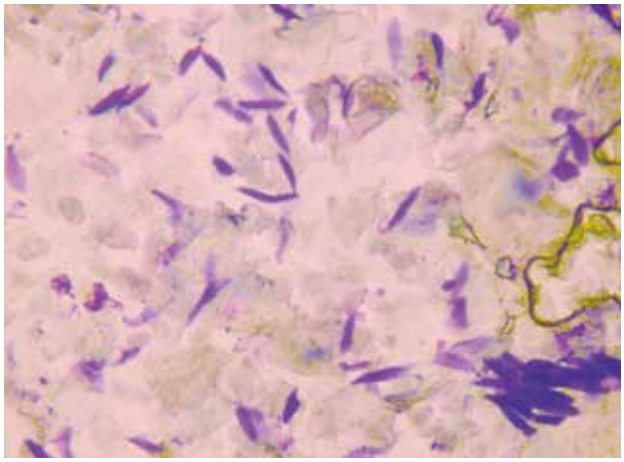


Neutrophil cluster on adhesive tape impression - 40X lens
Image courtesy of Linda Vogelnest

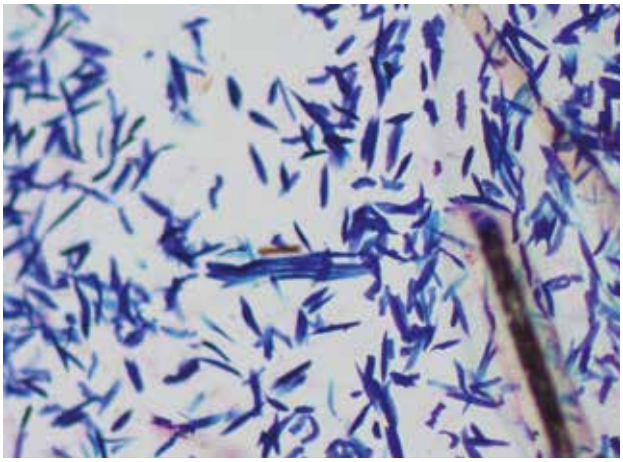


Neutrophil cluster on adhesive tape impression 2 - 40X lens
Image courtesy of Linda Vogelnest

- 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)

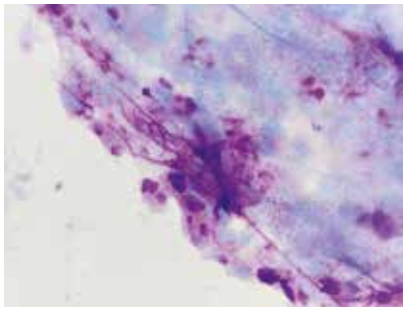


Corneocytes surface and follicular low power
Image courtesy of Peter Hill

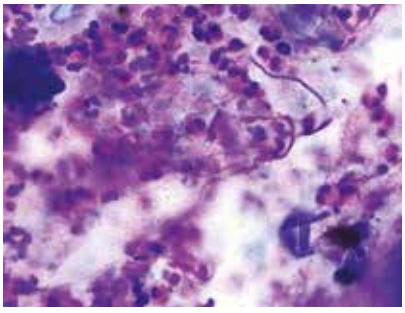


Corneocytes follicular low power
Image courtesy of Peter Hill

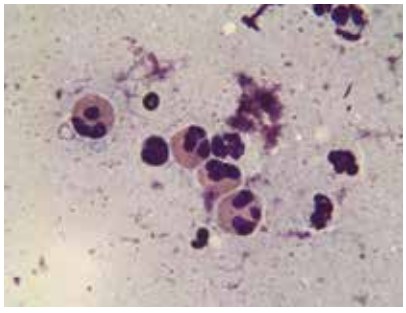
- Neutrophils will be present in conjunction with many inflammatory skin lesions, as they are the first cell type responding to a range of skin insults including microbial infections, physical trauma, and chemical irritants
- Neutrophils tend to form clusters around sheets of keratinocytes, producing 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
- They appear as polymorph cells filled with very pale slightly pink granules on tapes counter-stained with red and blue dyes, or pale blue granules with blue staining alone
- Small numbers of nearby extracellular granules are frequent



Eosinophil cluster on adhesive tape impression - 40X lens
Image courtesy of Linda Vogelnest



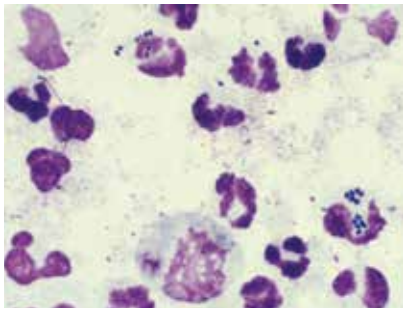
Eosinophil cluster on adhesive tape impression - 100X lens
Image courtesy of Linda Vogelnest



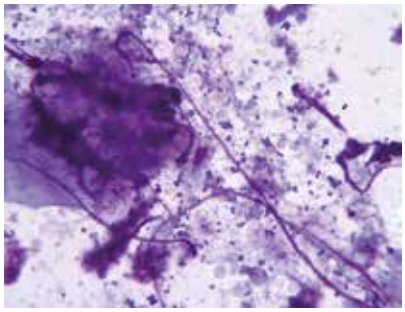
Eosinophil
Image courtesy of Mike Shipstone

Evaluation of tape impressions for superficial bacterial pyoderma

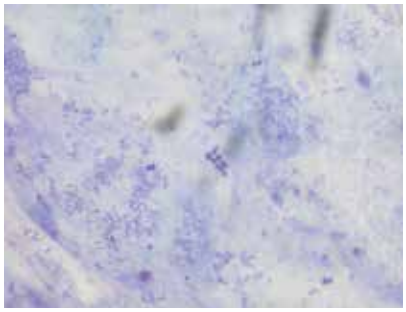
- Bacteria are only accurately recognised on oil immersion examination, and both gram-positive and -negative bacteria stain dark blue with modified Wright's stains
- Bacteria are rarely seen on keratinocytes in normal skin evaluated at oil immersion magnification
- It is important to recognise that although 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
- Occurs often at moist sites, such as interdigital or skin folds and may cause skin irritation and pruritus, but do not reflect active infection



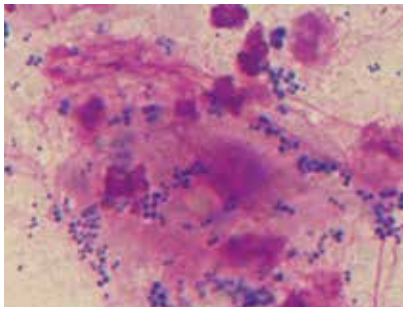
Staphylococci
Image courtesy of Peter Hill



Bacterial cocci
Image courtesy of Mike Shipstone



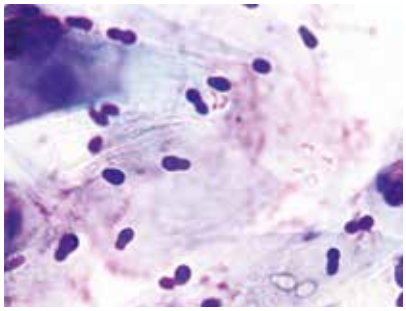
Bacterial rods and sparse cocci - colonising - 100X lens
Image courtesy of Linda Vogelnest



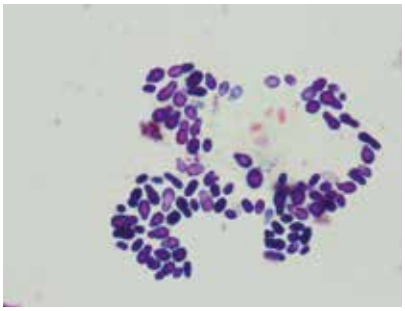
Staphylococci bacterial overgrowth
Image courtesy of Peter Hill

Evaluation of tape impressions for *Malassezia* dermatitis

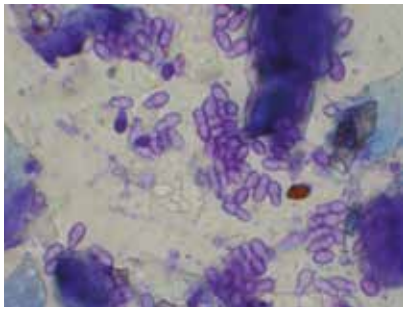
- Malassezia are fairly uniformly distributed amongst keratinocytes and infection occurs with increased numbers of yeast that are typically not associated with inflammatory cells
- They are visible with the 40X objective but are often evaluated under oil immersion while assessing for bacteria
- A cytological 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



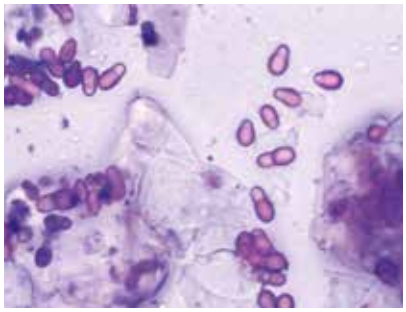
***Malassezia* moderate power**
Image courtesy of Peter Hill



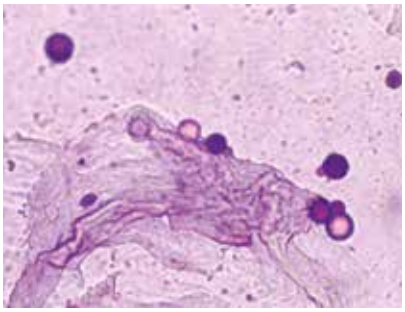
***Malassezia* high power**
Image courtesy of Peter Hill



Yeast in a dog with AD – interdigital tape sample
Image courtesy of Mike Shipstone



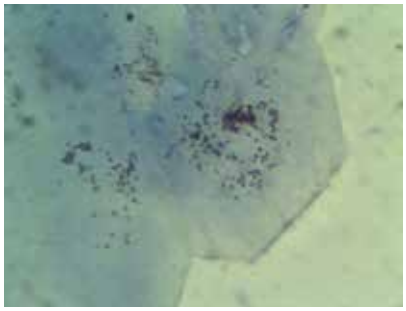
Malassezia
Image courtesy of Peter Hill



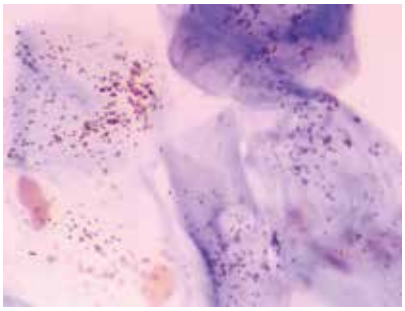
***Malassezia* globoid**
Image courtesy of Peter Hill

Incidental findings on tape impressions

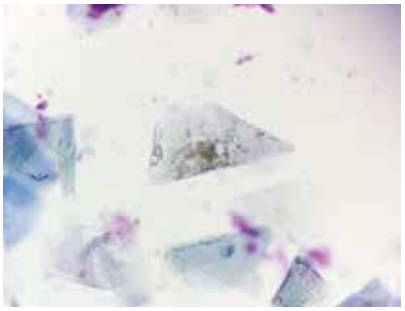
- Melanin granules may be confused with bacteria; they are small ellipsoid brown elements with slight size and shape variation that are scattered in clusters throughout keratinocytes
- Adjustment of the fine focus reveals their multiple levels throughout the keratinocytes, and their distinct brown colouration,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



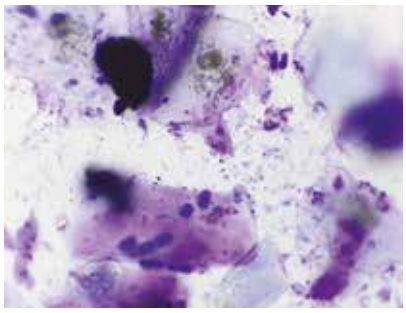
Melanin granules
Image courtesy of Mike Shipstone



Melanin granules in corneocytes
Image courtesy of Peter Hill

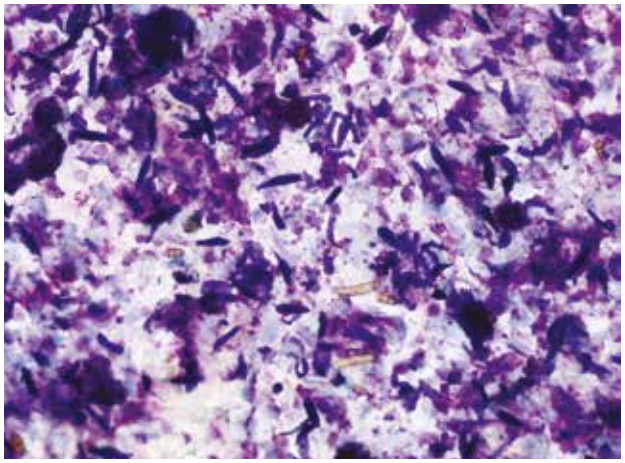


Melanin granules on a keratinocyte - 100X lens
Image courtesy of Linda Vogelnest

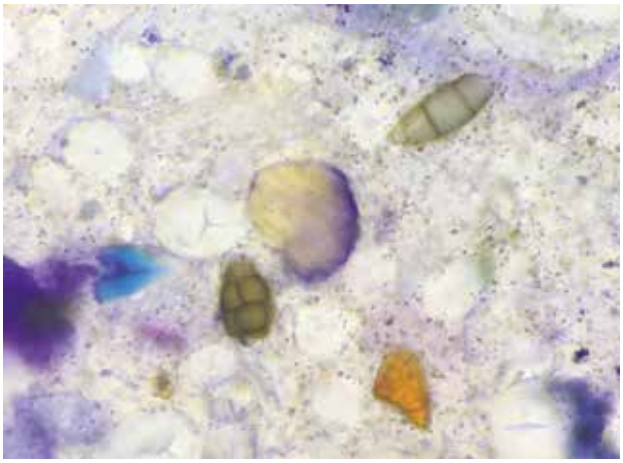


Keratinocytes, melanin granules and simonsiella on adhesive tape impression - 100X lens
Image courtesy of Linda Vogelnest

- 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

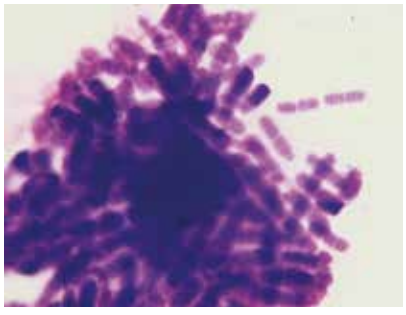


Fungal spore (saprophytic)
Image courtesy of Peter Hill

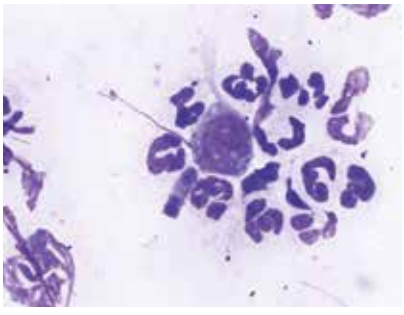


Mould spores and melanin granules on adhesive tape impression - 100X lens
Image courtesy of Linda Vogelnest

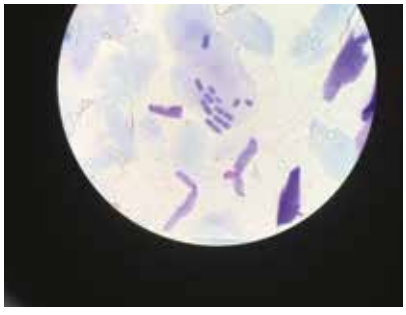
- Simonsiella organisms are large, darkly staining rods that are positioned side by side to give the appearance of a much larger, banded organism. Simonsiella are normal inhabitants of the oral cavity and they are transferred to the skin by licking. Their presence does not indicate skin infection but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



Simonsiella
Image courtesy of Peter Hill



Simonsiella
Image courtesy of Peter Hill



Simonsiella
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

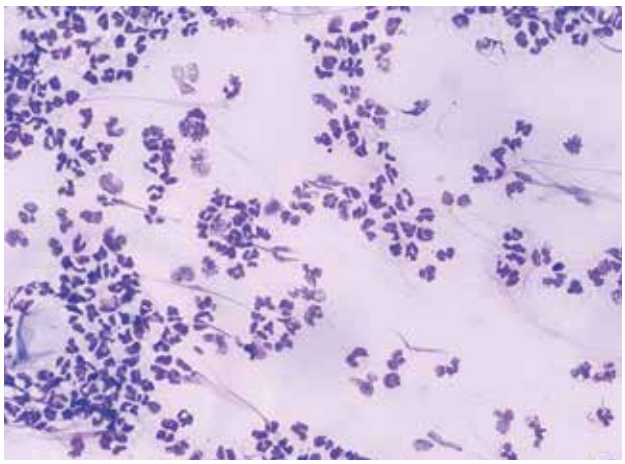
- Exudative erosive/ulcerative lesions – clean excessive discharge gently with a dry or saline-moistened swab then press a glass slide firmly onto affected skin for 2-3 seconds; air dry prior to staining
- Pustules - carefully rupture with a 25g needle, then press the glass slide as above
- Ear cerumen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

Staining

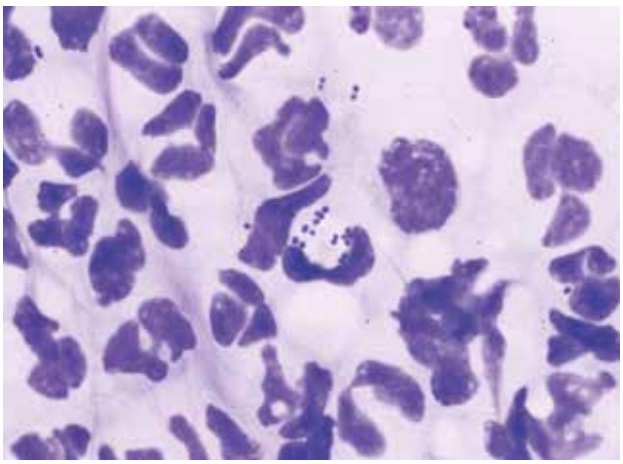
- Samples are most often processed with modified Wright's stain (e.g. DiffQuik®) but may be stained with the Gram stain or a variety of other laboratory stains
- Slides should be placed in the fixative solution prior to staining. Once fixed and stained, glass slide samples can be retained for lengthy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

Microscopic examination

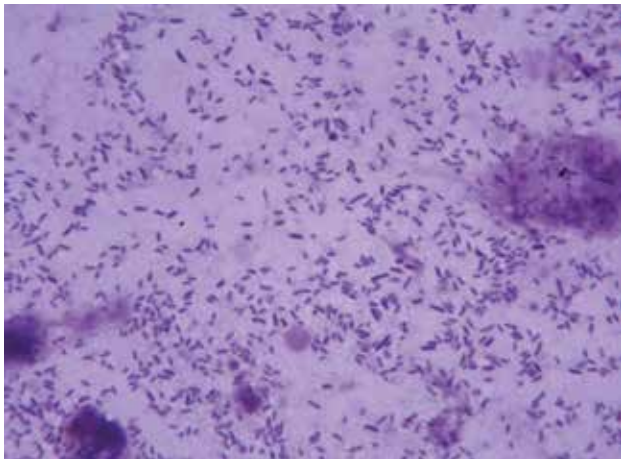
- The evaluation of glass slide impressions is generally more straightforward than from adhesive tape impressions, as cells and microbes typically appear clearer and better defined
- Scan slides initially on low power (4X objective), looking for heavily cellular areas and/or clumps of inflammatory cells
- These areas can be examined under 40X objective 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



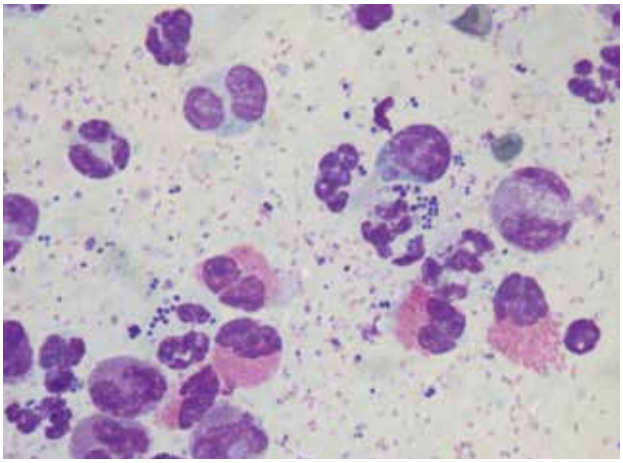
Neutrophils low power
Image courtesy of Peter Hill



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



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



Eosinophils and fewer neutrophils with intracellular cocci from glass slide impression - 100X lens
Image courtesy of Linda Vogelnest

D. SKIN SCRAPING: SUPERFICIAL

Indications

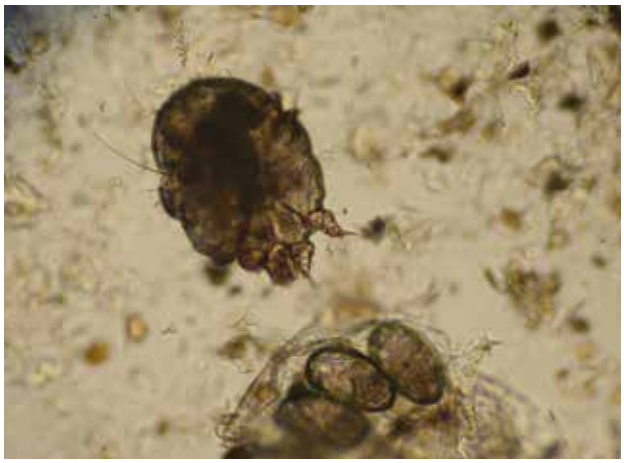
- To evaluate for superficial ectoparasites, including *Sarcoptes, Otodectes*, environmental mites (e.g. trombiculids)

Technique

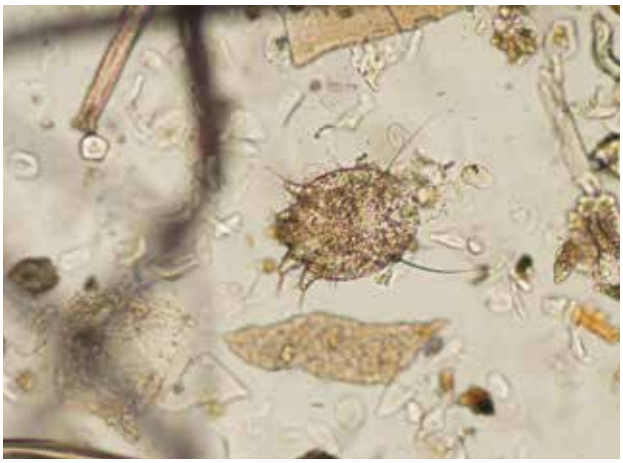
- Place paraffin oil on the skin in the area to be sampled and use a blunt scalpel to collect surface scale and crust
- Densely haired regions should be lightly clipped where necessary to enable scraping. The aim is NOT to cause capillary bleeding as the parasites being collected are in the superficial 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 (40X or 100X magnification) to systematically view the entire slide

Interpretation

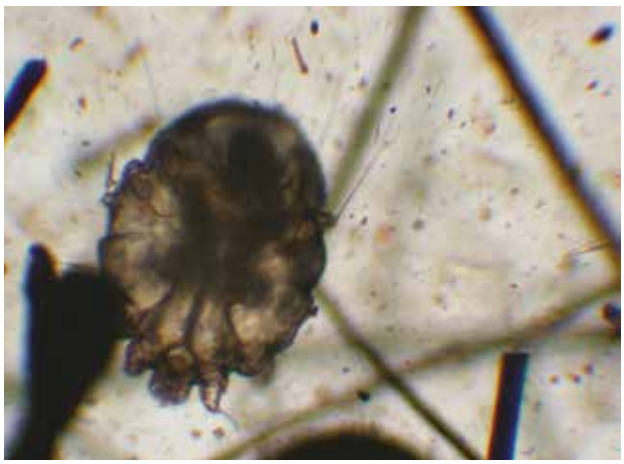
- The presence of any ectoparasites is diagnostic, although care is needed to differentiate dead mites from environmental contaminants (e.g. dust and storage mites). The absence of mites does not exclude any role in disease



***Sarcoptes* mite - adult and eggs - 10X lens**
Image courtesy of Linda Vogelnest



Sarcoptes
Image courtesy of Peter Hill

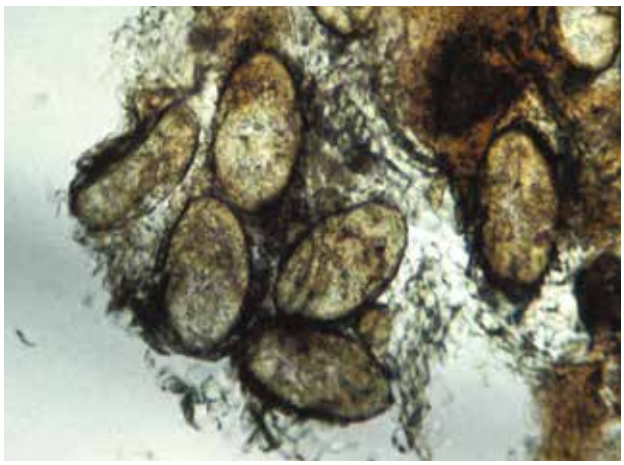


Sarcoptes **seen on superficial skin scrape**
Image courtesy of Mike Shipstone

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

Otodectes **mite - adult - 10X lens**
Image courtesy of Linda Vogelnest

Otodectes cynotis
Image courtesy of Peter Hill



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

Demodex canis **- adult and egg from deep skin scraping - 10X lens**
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

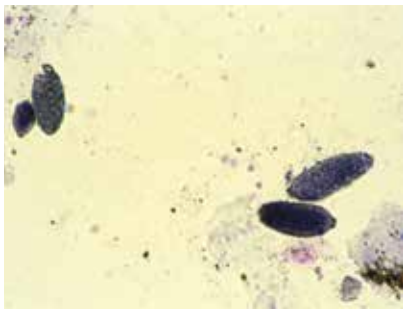
Demodex canis **plus larva high power**
Image courtesy of Peter Hill

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

Demodex canis **larva and egg - 10X lens**
Image courtesy of Linda Vogelnest

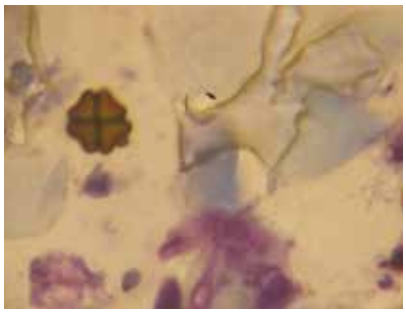
Artefacts

- 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
Image courtesy of Peter Hill

Buffalo grass anther with pollen granules
Image courtesy of Mike Shipstone



Pollen
Image courtesy of Mike Shipstone

F. SQUEEZE TAPE IMPRESSION

Indications

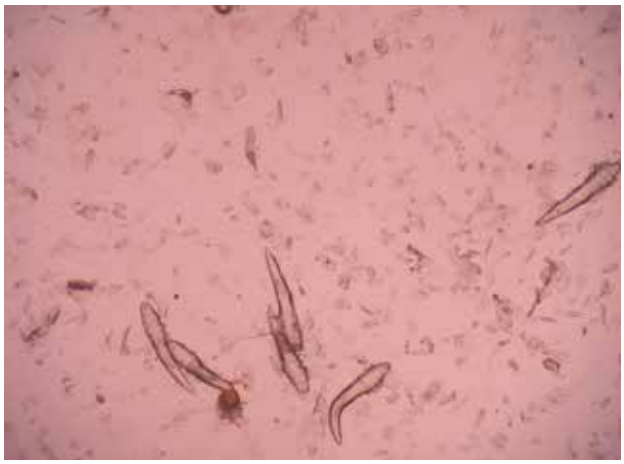
- This technique is useful whenever *Demodex* is suspected, and for monitoring response to therapy
- It causes less patient discomfort, produces no apparent skin trauma, and is readily performed at all body sites, allowing ready sampling of multiple areas
- It is particularly useful for difficult sites, 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 - 10X lens**
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

H. TRICHOGRAM

Indications

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

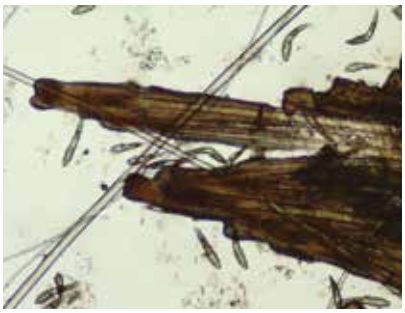
Technique

- 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

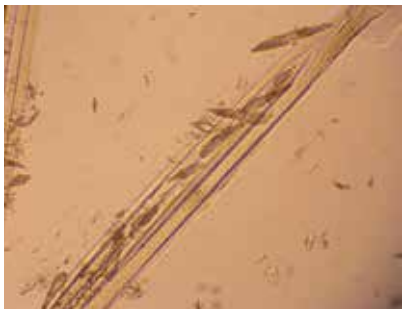
Interpretation

- 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**
Image courtesy of Mike Shipstone



Demodex canis **hair pluck low power**
Image courtesy of Peter Hill

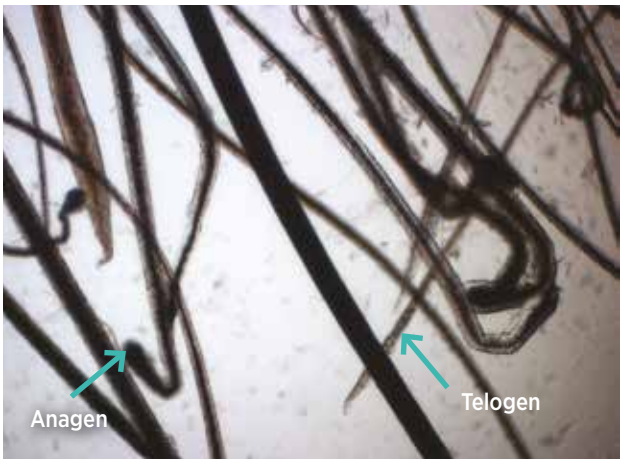


Demodex canis **trichogram**
Image courtesy of Mike Shipstone

Trichogram normal tip
Image courtesy of Peter Hill

Trichogram fractured shaft
Image courtesy of Peter Hill

Trichogram anagen bulb
Image courtesy of Peter Hill



Anagen and telogen hairs on trichogram 10X lens
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
Nitenpyram (Capstar®) PO q 24hrs
Spinosad (Comfortis®) PO every month
Sarolaner (Simparica®) PO every month
Afoxalaner (Nexgard®) PO every month
Fluralaner (Bravecto®) PO every 3 months
Indoxacarb (Activyl®) topical every month
Selamectin (Revolution®) topical monthly

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
Sarolaner (Simparica®) PO every month
Selamectin (Revolution®) topical monthly
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.

- 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 section 3.1 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

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES

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

Diagnostic tests to consider:

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

2 INFECTION

- Bacteria
- Yeast

Diagnostic tests to consider:

- Adhesive tape impression
- Cotton bud
- Glass slide impression

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:

- Dietary exclusion trial

ATOPIC DERMATITIS

Diagnostic tests to consider:

- Intra-dermal testing
- Serology

CONTACT

Diagnostic tests to consider:

- Avoidance and re-challenge
- Patch test

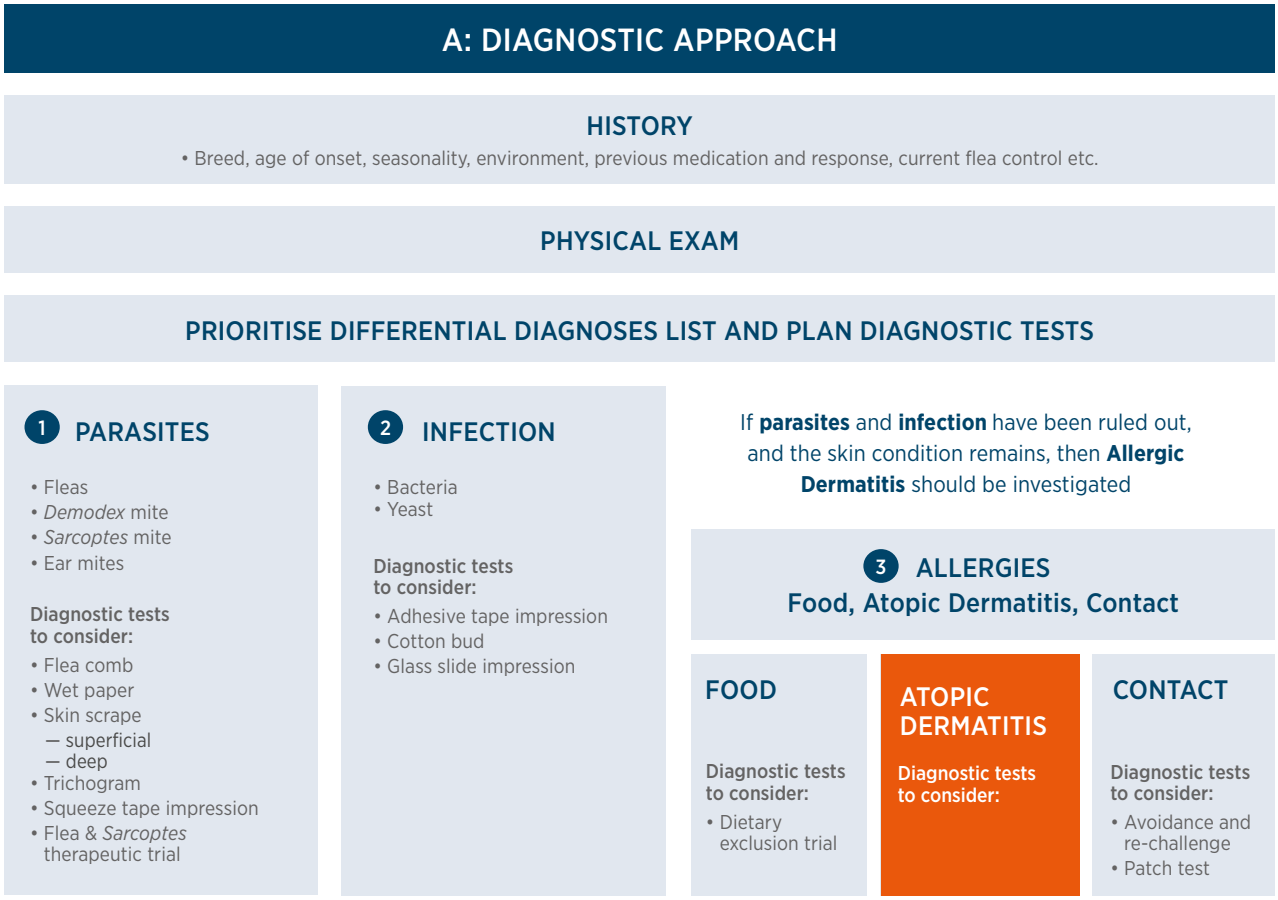
Once infectious and parasitic causes have been ruled out, the next crucial step in the diagnostic work-up involves a food elimination trial. A typical food elimination trial will run for up to 8 weeks prior to confirming the diagnosis by rechallenge with the original diet. Approximately 50% of dogs will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

A food elimination trial includes the following steps:

- **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 ultra®. However, this dietary recommendation may change with the emergence of new evidence and/or new products. Note for dogs allergic to chicken, up to 40% may fail to improve when fed poultry liver hydrolysates
- If a home-cooked diet is chosen, examples of novel proteins may include kangaroo, horse, donkey, crocodile, rabbit, emu or borlotti/pinto beans. 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, toothpastes and gelatin capsules should be avoided
- **Treat** the dog with antipruritics. Oclacitinib (Apoquel®) or prednisolone may 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 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]

ENVIRONMENTAL ALLERGENS WORK-UP

ALLERGY TESTING



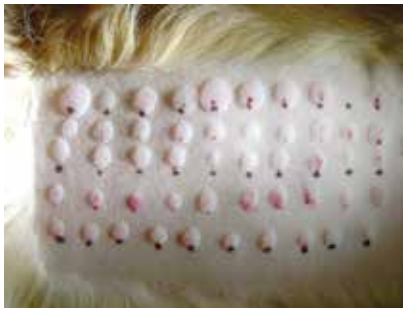
Two methods of allergy testing are routinely available for the further investigation of canine atopic dermatitis:

- 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 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**

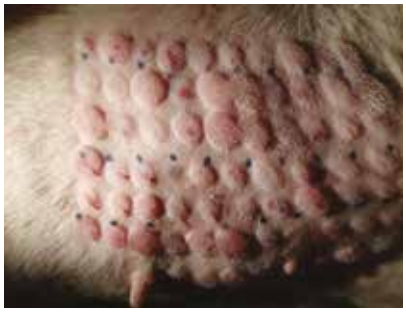
A. Intradermal allergy test

- 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 dustmite 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 technique



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 technique
- 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

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®)	0	0

NOTE: Treatment with Depo-medrone, 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 referral), *in vitro* tests can be used as 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

CONTACT DERMATITIS TRIAL

A: DIAGNOSTIC APPROACH

HISTORY

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

PHYSICAL EXAM

PRIORITISE DIFFERENTIAL DIAGNOSES LIST AND PLAN DIAGNOSTIC TESTS

1 PARASITES

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

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

2 INFECTION

- Bacteria
- Yeast

Diagnostic tests to consider:

- Adhesive tape impression
- Cotton bud
- Glass slide impression

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:

- Dietary exclusion trial

ATOPIC DERMATITIS

Diagnostic tests to consider:

- Intra-dermal testing
- Serology

CONTACT

Diagnostic tests to consider:

- Avoidance and re-challenge
- Patch test

- If the distribution of irritation and the nature of the clinical signs is 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, Wandering jew, dandelion leaves, cedar wood)
- The most common contact allergens are plants especially lawn grasses, "Wandering jew" (*Tradescantia* spp.) and other members of the Commelinceae (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

SECTION B: THERAPEUTIC APPROACH

4

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
- Poor communication is one of the main reasons why owners seek a second opinion. The importance of effective communication should not be underestimated

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

FLEA AND MITE TREATMENT AND PREVENTION

ANTIBIOTICS
- Topical +/- systemic

ANTI-FUNGALS
- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

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

ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

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

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. dietary trials) may occur over the subsequent weeks as part of a sequential work-up. During the diagnostic process, it may be appropriate to prescribe anti-pruritic therapy to provide the dog with 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	First time treatment of pyoderma
Food allergy	First time treatment of *Malassezia* dermatitis
Atopic dermatitis	
Contact dermatitis	

In the case of the parasitic skin conditions, the anti-pruritic therapy is used temporarily to provide relief for the patient whist the anti-parasitic agents have time to work. Similarly, anti-pruritic therapy can be used during the first few weeks of a dietary trial to investigate for food allergy. 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).

Anti-pruritic therapy should not be used in cases of demodicosis because the drugs involved can worsen the condition. It is also not advisable to prescribe anti-pruritic therapy when staphylococcal pyoderma or *Malassezia* dermatitis is first diagnosed because it is important to determine how much of the pruritus will respond to antimicrobial therapy alone and how much remains when these conditions have been eliminated.

In most cases, the most appropriate anti-pruritic agent for these circumstances is oclacitinib (Apoquel®). Its rapid onset of action, excellent safety profile and the ability to start and stop the drug suddenly make it ideally suited for this type of symptomatic management. However, there may be specific circumstances when prednisolone would be a preferred choice (for example, limited finances, very severe inflammation, lichenification, failure to respond to oclacitinib (Apoquel®)).

For further details on the use of these drugs refer to the section titled *Reduce Pruritus and Resolve Skin Lesions* on page 85.

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

ANTIBIOTICS

- Topical +/- systemic

ANTI-FUNGALS

- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

- Oclacitinib • Cyclosporin • Glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

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

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

Flea maintenance programs: current product recommendations	
Sarolaner (Simparica®) PO every month	Fluralaner (Bravecto®) PO every 3 months
Selamectin (Revolution®) topical monthly	Flumethrin, imidacloprid (Seresto®) collar - 8 months
Spinosad (Comfortis®) PO every month	Moxidectin, imidacloprid (Advocate®) topical monthly
Afoxalaner (Nexgard®) PO every month	Imidacloprid (Advantage®) topical monthly
Indoxacarb (Activyl®) topical every month	Imidacloprid, permethrin (Advantix®) topical monthly

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**
Sarolaner (Simparica®) PO every month
Selamectin (Revolution®) topical monthly
Moxidectin, imidacloprid (Advocate®) topical monthly
Fluralaner (Bravecto®) PO every month
Afoxolaner (Nexgard®) PO every month

TREATMENT AND PREVENTION OF DEMODICOSIS

***Demodex* treatment: current product recommendations**
Sarolaner (Simparica®) PO every month
Fluralaner (Bravecto®) PO every 3 months
Afoxolaner (Nexgard®) PO every month

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

ANTIBIOTICS

- Topical +/- systemic

ANTI-FUNGALS

- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

- Oclacitinib
- Cyclosporin
- Glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

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

- 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 or without supportive cytology or bacterial culture
- In those patients that 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 be treated topically or systemically but in many cases a combination of topical and systemic therapy is required
- Most importantly, the management of infection must be suited to the individual patient

Appropriate use of antimicrobials

For further information on the responsible use of antibiotics refer to the AIDAP's (Australasian Infectious Diseases Advisory Panel) Antibiotic prescribing guidelines and the Practical Infection Diseases Control Panel. Both sets of guidelines can be downloaded from **www.vetsaustralia.com.au/EResources/ClinicResources/Detail/103**

USE OF TOPICAL TREATMENT

- Topical treatment can be used to reduce or eliminate a population of bacteria or *Malassezia* on the skin
- They can take considerable time and effort on the owner's part and can irritate the skin if not used appropriately
- In addition, animals will often lick, wipe or groom the product off so 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 they are most often used as an adjunctive therapy with systemic antibiotic or anti-fungal medications

Indications for topical treatment include:

- Surface infection
- Small number of lesions and/or confined to a small area
- Compliant animal
- Owner who has time to apply correctly and prevent product from being removed by animal

COMMONLY-USED TOPICAL TREATMENTS

Topical treatments	Product types	Key ingredients
Antibacterial agents	Shampoos Rinses Leave-on conditioners	Chlorhexidine (2+%) Povidone-iodine Dilute bleach
Antibiotics	Creams Ointments Gels	**Mupirocin*** **Fusidic acid*** Neomycin Gentamicin Bacitracin Polymixin B Silver sulphadiazine, Thiostrepton
Antifungal agents	Shampoos Rinses Creams/spot-treatments	**Miconazole** **Clotrimazole** **Chlorhexidine** (2-4%) Selenium sulphide Enilconazole Nystatin Terbinafine

*mupirocin and fusidic acid are more effective than the others for staphylococcal pyoderma; agents used most commonly are in bold

PRACTICAL TIPS ON THE USE OF TOPICAL THERAPIES

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

- Apply every 12 hours
- 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 shampoo therapy:

- Shampoo must remain on the skin surface for 10–15 minutes before rinsing well
- 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
- Clipping longer hair 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
- 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
- The majority of skin infections in dogs are caused by *Staphylococcus pseudintermedius*
- 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

- Presence of a widespread surface infection or superficial folliculitis (e.g. epidermal collarettes, crusted papules and/or pustules)
- Presence of a deep bacterial infection (e.g. draining tracts, fissures, haemorrhagic crusts)
- Presence of cocci and neutrophils on cytology samples
- When topical therapy is not possible or practical for the dog and/or owner

TIPS FOR SUCCESSFULLY TREATING A SUPERFICIAL BACTERIAL SKIN INFECTION

- Treat with systemic antibiotics 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
- Consider possible concurrent topical antimicrobial therapy 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 possible 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 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

CHOICES OF 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

For more information, visit www.iscaid.org/guidelines#Antimicrobial use

Also, refer to the AIDAP guidelines available at:
www.vetsaustralia.com.au/EResources/ClinicResources/Detail/103

Antibiotic	Dosage
First-line	
Cephalexin	22–30mg/kg q 12 hours with food
Cefovecin (Convenia®)	8mg/kg, subcutaneous injection (see below for further information)
Amoxicillin-clavulanate	13.75–22mg/kg q 12 hours with food
Trimethoprim-sulfadiazine or sulfamethoxazole	15–30mg/kg q 12 hours with food
Second-line	
Clindamycin	5.5–11mg/kg q 12 hours or >11mg/kg q 24 hours with food
Cefovecin (Convenia®)	8mg/kg, subcutaneous injection (see below for further information)
Chloramphenicol	40–50mg/kg q 8 hours with food
Enrofloxacin	10–20mg/kg q 24 hours with food
Marbofloxacin (Zeniquin®)	4.1–5.5mg/kg q 24 hours with food
Doxycycline	5–10mg/kg q 12–24 hours with food
Minocycline	5–10mg/kg q 12–24 hours on an empty stomach
Rifampicin	5–10mg/kg q 24 hours on an empty stomach
Fusidic acid	25–40mg/kg q 12 hours on an empty stomach
Erythromycin	10–15mg/kg q 8 hours
Azithromycin	5–15mg/kg q 24 hours
Clarithromycin	5–10mg/kg q 12 hours

q=every

Additional information for cefovecin (Convenia)
A single dose of Convenia provides a full 14-day course of therapy. When indicated, for skin infections in dogs, a second dose can be administered 14 days after the first dose. Susceptibility of bacterial pathogens should be determined prior to treatment. Therapy with Convenia may be initiated before the results of these tests are known. Consider Convenia where compliance to oral tableting is an issue.

SYSTEMIC ANTI-FUNGALS

- Systemic anti-fungals 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
- Treatment should be administered until clinical resolution on reassessment (physical examination and cytological evaluation) just prior to discontinuing the medication

SYSTEMIC ANTI-FUNGAL DRUGS AND DOSAGES

Anti-fungal	Dosage
Itraconazole	5–10mg/kg q 24 hours with food
Fluconazole (less active against *Malassezia* than itraconazole)	5mg/kg q 24 hours with or without food

q=every

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.

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

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

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 or 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 FOOD ALLERGY

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE

May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION

ANTIBIOTICS

- Topical +/- systemic

ANTI-FUNGALS

- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

- Oclacitinib
- Cyclosporin
- Glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

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

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 recommended with caution to avoid dietary deficiencies. If necessary, consultation with a nutritionist is advised (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®) or prednisolone.

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

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- Topical +/- systemic

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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 dustmites
- 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 contact allergens or other environmental allergens to which the dog is known to be allergic should be avoided or their load reduced where possible

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

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

- Whilst the causes of pruritus are being identified, the patient should be kept comfortable with an appropriate medication to relieve itch yet 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 break the itch-scratch cycle

TREATMENT WITH OCLACITINIB (APOQUEL®) OR CYCLOSPORIN OR ORAL GLUCOCORTICOIDS

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

OCLACITINIB (APOQUEL®)

- Oclacitinib (Apoquel®) 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 dermatitis
- Oclacitinib (Apoquel®) has been shown to reduce pruritus and clinical signs as effectively as prednisolone. The speed of effect of oclacitinib (Apoquel®) has been shown to be more rapid than injectable dexamethasone[8]
- If complete remission of signs is obtained, further tapering may be attempted to a dose that is able to maintain remission
- A tapering of the dose below what is recommended on the product label may not achieve plasma levels sufficient to be efficacious
- Pharmacokinetics would suggest that oclacitinib (Apoquel®) is likely to require daily dosing
- This drug is not approved for dogs less than 12 months of age
- Short-term adverse effects of oclacitinib (Apoquel®) 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[3]
- The most common adverse effects in the oclacitinib (Apoquel®) group was diarrhoea and vomiting at an incidence of 2.3%[3]
- The long-term administration of oclacitinib (Apoquel®) administered once-daily appears to be relatively safe, whereas the long-term safety of other dosing regimens is not known
- 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[4]
- Unlike glucocorticoids, oclacitinib (Apoquel®) does not interfere with intradermal allergy testing, enabling the dog to be comfortable without interfering with further diagnostic work-up
- As most signs of allergic dermatitis respond to oclacitinib (Apoquel®), clinicians should review the diagnoses and the patient for secondary complications, such as skin infections, and ectoparasitism if there is no rapid clinical benefit after treating allergic dogs with this drug

CYCLOSPORIN

- Oral cyclosporin (Atopica®) should be administered at 5 mg/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. Equivalent responses to cyclosporin 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 are of benefit to dogs

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 to the lowest dosage and frequency that maintains an absence of signs and minimises the risk of side effects over the long-term
- Studies using prednisolone as positive treatment controls for comparison with oclacitinib (Apoquel®) or cyclosporin have confirmed the rapid efficacy of oral glucocorticoids for treatment of canine allergic dermatitis
- Adverse effects of oral glucocorticoids are normally proportional to drug potency, dosage and duration of administration. Often times doses low enough to reduce adverse effects are insufficient to adequately control clinical signs
- Long-acting injectable glucocorticoids should be avoided wherever possible as the lack of ability to taper the dose increases the risk of adverse events
- The use of steroids for the management of the chronically pruritic dog should be avoided where possible. Long-term use of steroids is associated with considerable and impactful adverse effects
- The use of corticosteroids will make it difficult to follow a diagnostic work-up plan. Unlike oclacitinib (Apoquel®), glucocorticoids interfere with intradermal allergy testing, and should be withdrawn from the patient prior to performing further diagnostic work-up such as IDT
- As most signs of allergic dermatitis respond to oral glucocorticoids, clinicians should review the diagnoses and the patient for secondary complications, such as skin infections, ectoparasitism and nonatopic food reactions if there is no rapid clinical benefit after treating allergic dogs with these drugs

MAJOR ADVERSE EFFECTS OF GLUCOCORTICOIDS

- The major drawback to the use of systemic glucocorticoids in dogs is the large number of potential adverse effects
- Short-term use of systemic glucocorticoids can lead to polydipsia, polyuria, polyphagia, panting, aggression and diarrhoea
- As busy veterinarians, the impact that these potential side effects have on pet owners are not always front of mind
- Some of these effects include begging for food; stealing food off kitchen table/plates; getting into garbage bins, getting up to let the dog out at night; “accidents” in the house; dealing with urine odours; drinking from the toilet; aggression; guarding food; possessiveness about toys; risk with young children
- Methylprednisolone has fewer mineralocorticoid effects than prednisolone and can reduce the severity of polydipsia and polyuria
- Prolonged use of glucocorticoids can lead to signs of iatrogenic hyperglucocorticism (muscle wastage, pot belly, hepatomegaly, fat redistribution, osteoporosis, calcinosis cutis, alopecia, poor wound healing, recurrent pyoderma, generalised demodicosis, comedones, silent urinary tract infections, pyelonephritis, cataracts, insulin resistant diabetes mellitus)
- Glucocorticoids have caused gastrointestinal ulceration, especially in patients receiving non-steroidal anti-inflammatory drugs
- Glucocorticoids may also predispose the patient to pancreatitis. Glucocorticoids should be avoided in animals with pre-existing renal disease and diabetes mellitus
- Sudden withdrawal of glucocorticoids after prolonged therapy can lead to an Addisonian crisis (adrenal insufficiency)
- Glucocorticoids should not be given to pregnant animals as they can cause foetal abnormalities and spontaneous abortion
- Refer to Appendix 2 for further details of the potential side effects associated with corticosteroid use

CONSIDERATIONS OF ADVERSE EFFECTS

- The prolonged concomitant administration of oral glucocorticoids, cyclosporin or oclacitinib (Apoquel®) in any combination is not recommended because of the theoretical higher risk of immunosuppression predisposing to potentially severe opportunistic infections of the skin or other organs
- There is no consensus on the need for laboratory monitoring (e.g. haematology, serum biochemistry and urinalysis) during prolonged cyclosporin, oclacitinib (Apoquel®) 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[5], it is recommended that dogs receiving these drugs should be monitored with annual urinalyses and urine cultures
- Oclacitinib (Apoquel®) has not been shown to increase the incidence of urinary tract infections[6]
- 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®) 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
- Application should be restricted to two consecutive days a week,[7] and caution should be exercised with the repeated application of moderately potent product to thin- skinned regions, such as the ventral inguinal region and the pinnae

USEFUL PRODUCTS

- 0.0584% hydrocortisone aceponate (HCA) spray (Cortavance®) spray
- 0.1% mometasone (Elocon®) cream and lotion*
- 0.1% methylprednisolone aceponate (Advantin®) lotion*

*not veterinary registered

TIPS FOR USING TOPICAL 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. Fit 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

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

ANTIBIOTICS

- Topical +/- systemic

ANTI-FUNGALS

- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

- Oclacitinib
- Cyclosporin
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ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

MANAGE SKIN BARRIER (DIET, TOPICAL)

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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 q 12 to 24hrs
Hydroxyzine 1 to 2mg/kg q 12hrs (compounded)
Fexofenadine 2-5mg/kg q 12hrs

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, although further studies are required to validate this
- In an attempt to reduce the dose of oral glucocorticoids/cyclosporin/oclacitinib (Apoquel®) required to control clinical signs of chronic allergic dermatitis, veterinarians are encouraged to investigate the simultaneous administration of additional medications or supplements with a drug-sparing effect, such as antihistamines and fatty acids

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

ANTIBIOTICS

- Topical +/- systemic

ANTI-FUNGALS

- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

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ADJUNCTIVE TREATMENTS

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

- 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 with 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

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 also be considered
- The type of shampoo should be tailored to each case: 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 at risk of infection
- 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

- Owners should be reminded that frequent shampooing may dry and irritate the skin, especially with antimicrobial products and shampoo detergents
- Any exacerbation of inflammation and pruritus following bathing should be reported to the veterinary clinic
- Shampoo bathing may be drying and irritating. If necessary, clinicians should consider changing products or protocols and/or adding post-bathing topical moisturizers

USEFUL PRODUCTS

- Pure Animal Wellbeing® Nutriderm shampoo and conditioner
- Episoothe® shampoo and conditioner
- Resisoothe® lotion
- Aloveen® 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 benefit 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 provide higher amounts of EFAs than oral administration of EFA
- Side effects of EFA are uncommon

USEFUL PRODUCTS

- Pure Animal Wellbeing® fish oil supplement
- Megaderm®
- Hill's™ Prescription Diet™ Derm Defense™ Canine
- Royal Canin® Skin Support diet

APPLICATION OF TOPICAL EFA-CONTAINING FORMULATIONS

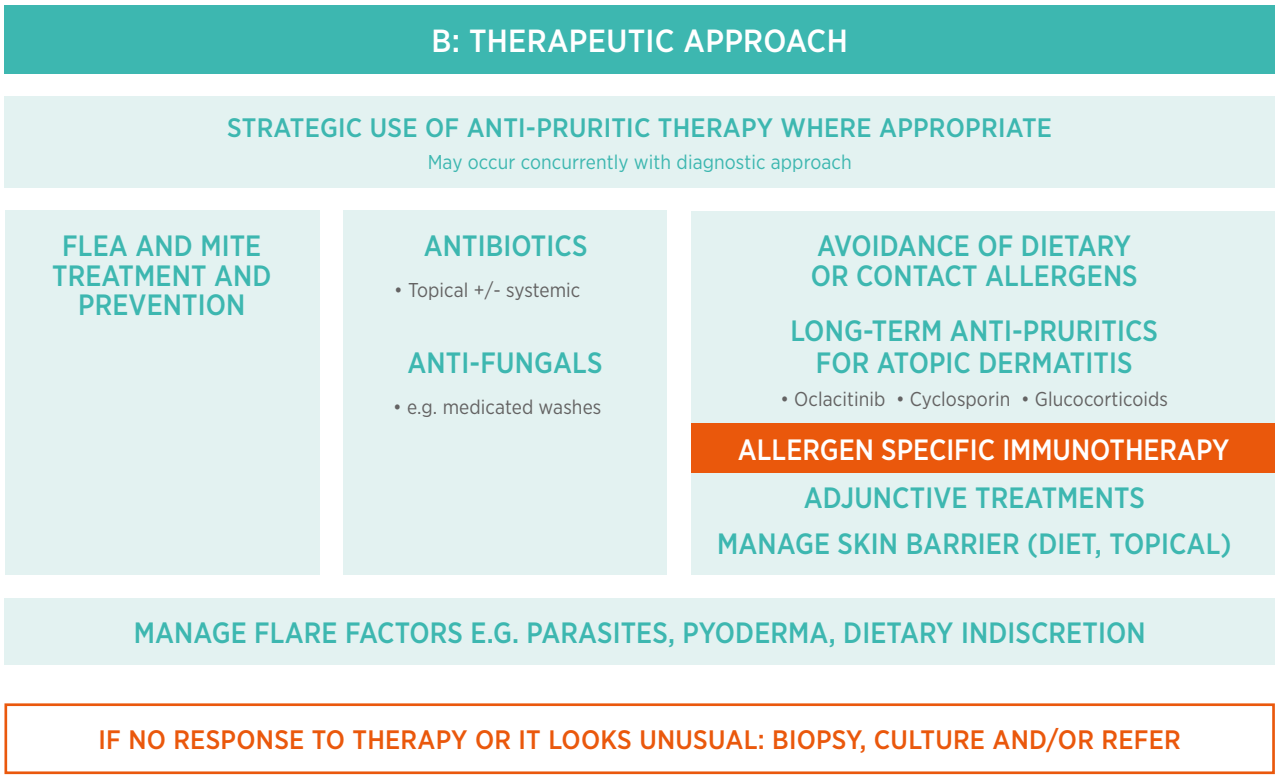
- Topical lipid formulations can help normalise existing stratum corneum lipid barrier defects in dogs with chronic allergic pruritus
- There is still insufficient evidence for the benefit of lipid-containing topical formulations to be able to recommend these as a monotherapy for chronic allergic pruritus

IMPLEMENT STRATEGIES TO PREVENT RECURRENCE OF SIGNS

PROACTIVE PREVENTIVE PHARMACOTHERAPY

- In humans with chronic allergic pruritus, there is evidence of high benefit, cost effectiveness and low risk of proactive intermittent applications of topical glucocorticoids to skin areas repeatedly affected during flares of pruritus and have been shown to delay or prevent flares of allergic skin lesions
- In dogs, the application of a topical 0.0584% hydrocortisone aceponate spray (Cortavance®) to areas of previously-affected skin (e.g. feet, external ear canals), two consecutive days each week can delay the recurrence of lesions at these sites without causing visible skin atrophy[9]
- A similar beneficial effect of proactive topical glucocorticoid therapy is likely to be observed with the intermittent use of other moderate potent topical glucocorticoids at previously affected skin sites. When using potent topical glucocorticoid formulations, even intermittently, care must be taken to avoid glucocorticoid-induced skin atrophy

IMPLEMENT ALLERGEN-SPECIFIC IMMUNOTHERAPY



- Allergen-specific immunotherapy (ASIT) is a safe treatment that is effective in some dogs to reduce 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 good to excellent response can probably be achieved in 30-40% of cases
- 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®)) 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 has not been determined in dogs. The need to continue the vaccine is based on the individual's response to the injections

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 IMMUNOTHERAPY

- There is some evidence that ASIT administered via the sublingual route (sublingual immunotherapy; SLIT), is safe and effective for treatment of atopic dogs
- Studies are needed to evaluate the relative efficacy and safety in a large number of allergic dogs to compare sublingual versus conventional immunotherapy
- SLIT can be a useful alternative for dogs and owners averse to the administration of subcutaneous injections

Summary: management of pruritus

IDENTIFY TRIGGERS

- Implement flea and mite control
- Evaluate and treat for skin and ear infections
- Institute elimination diet if pruritus is continual/present all year round
- Identify allergens with allergy testing (note: oclacitinib, can be used to keep the patient comfortable whilst allergy testing is being undertaken)

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

- Oclacitinib, cyclosporin, systemic glucocorticoids, +/- antihistamines
- Topical glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

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

- Bathing
- Oral fatty acids

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CHAPTER 5:
MONITORING PRURITUS TREATMENT AND PROGRESS

- 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 to 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 are also a useful way of assessing 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)
  - Photos of lesions
    - One of the best ways for vets and owners to track the progress of the patients' response to management is through the use of a series of photographs comparing the dog's lesions to baseline photographs prior to 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

6

CHAPTER 6:

WHEN TO OFFER REFERRAL TO A DERMATOLOGIST

B: THERAPEUTIC APPROACH

STRATEGIC USE OF ANTI-PRURITIC THERAPY WHERE APPROPRIATE

May occur concurrently with diagnostic approach

FLEA AND MITE TREATMENT AND PREVENTION

ANTIBIOTICS

- Topical +/- systemic

ANTI-FUNGALS

- e.g. medicated washes

AVOIDANCE OF DIETARY OR CONTACT ALLERGENS

LONG-TERM ANTI-PRURITICS FOR ATOPIC DERMATITIS

- Oclacitinib
- Cyclosporin
- Glucocorticoids

ALLERGEN SPECIFIC IMMUNOTHERAPY

ADJUNCTIVE TREATMENTS

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

- A veterinary dermatologist is a veterinarian who has been trained in a 2- or 3-year residency program, and has sat and passed a difficult 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

Tips for referral include:

- Recommend that the animal not be bathed for a week 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

REFERENCES
APPENDICES

REFERENCES

REFERENCES

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APPENDICES

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®) 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

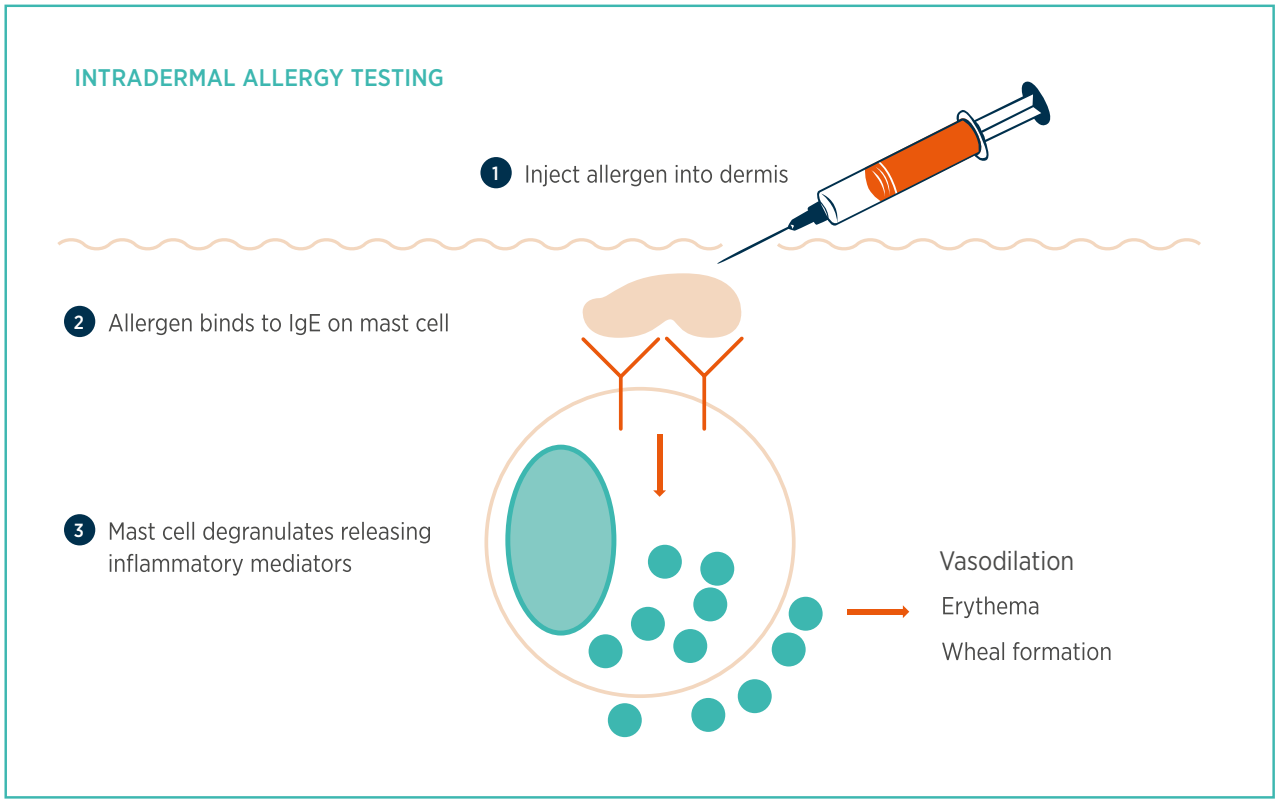


Diagram courtesy of Peter Hill

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

IN-VITRO MEASUREMENT OF ALLERGEN-SPECIFIC IGE

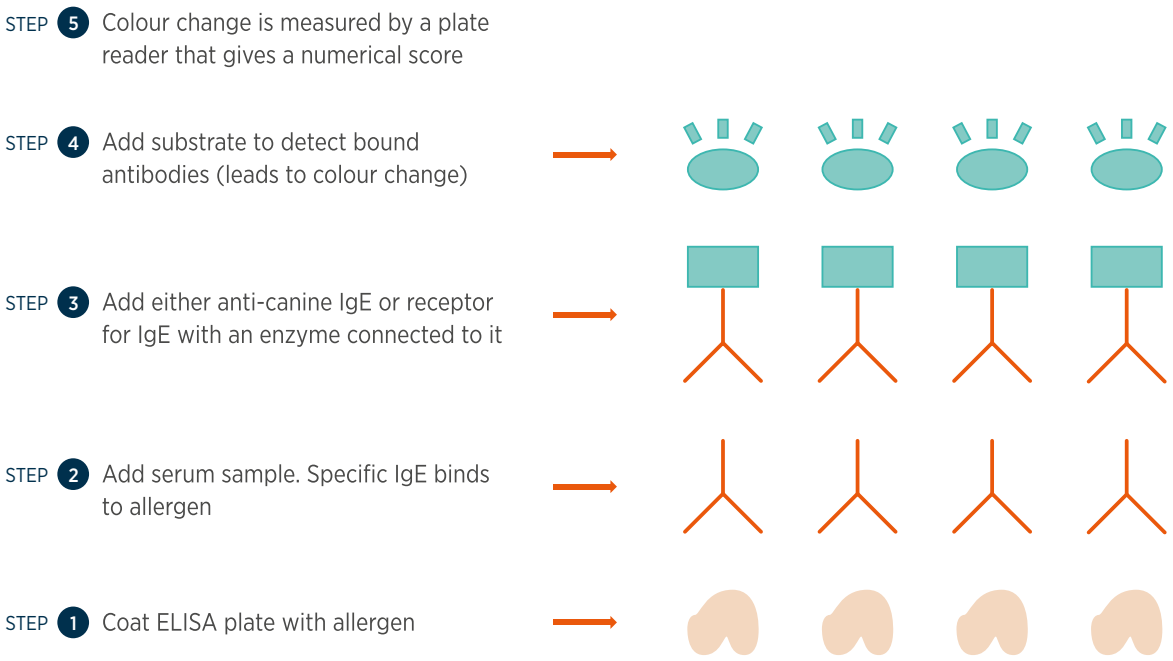


Diagram courtesy of Peter Hill

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

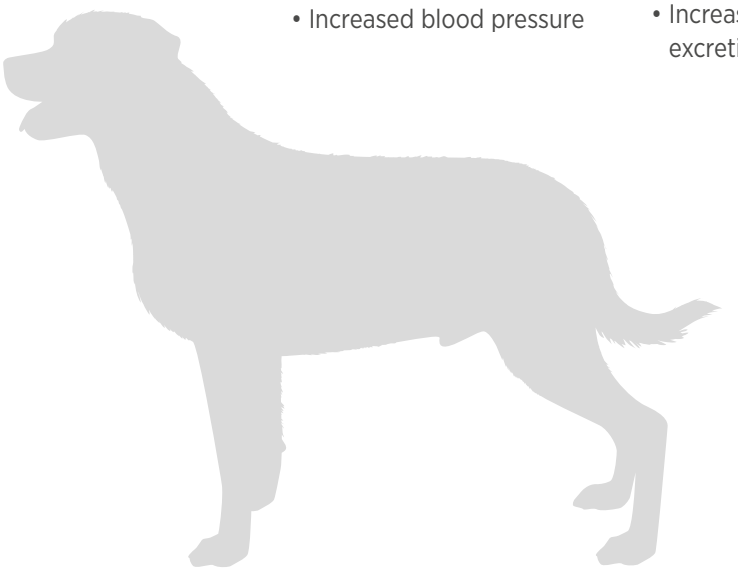
EYES
- Cataract
- Glaucoma

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
- Glomeruler 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

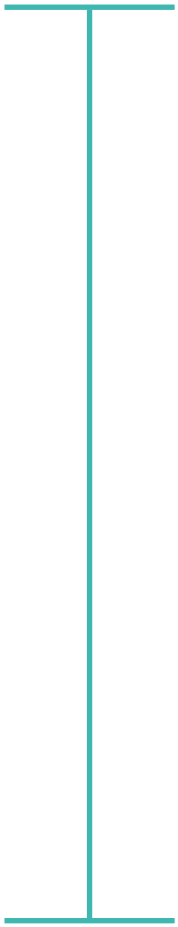
LIVER
- Elevated liver enzymes
- Fat accumulation
- Hepotomegaly
- Hepotopathy
- Micronodular cirrhosis

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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