

Evidensia Academy

Dermatology module 2019

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Approach to Clinical Cases

Background data / Signalment

Some skin diseases have an association with age, breed, gender which should be considered when listing differential diagnoses. But beware that the signalment can sometimes be misleading. Congenital / hereditary dermatoses are manifest within the first year however some can have a delayed onset. It is important to remember that the skin also undergoes senile changes which are usually thinning of skin and a sparser coat. The age of onset for senile changes will vary between individuals.

Breed predispositions can also vary between regions, countries and continents, reflecting differences in gene pools

History taking

This is an essential part of the dermatological workup and should be undertaken in a standardised format. It is useful to have a standardized dermatological history form and some like to give clients a standardized client questionnaire to complete. The key features are:

1. Husbandry / housing / routine ectoparasite control / in-contacts
2. Age / time of disease onset / seasonality
3. Medical history / previous diagnostic tests
4. Assessment of signs to date e.g. degree of pruritus

Clinical Examination

Each case requires a standard general physical examination. Consider systemic diseases with cutaneous signs such as metabolic and endocrine disease. Concurrent disease should be considered and they may affect therapeutic options. Drug associated skin disease should also be considered in patients already being treated for other conditions.

A detailed dermatological examination should then be performed. This requires good illumination (lighting / hand lens). You may need to clip the hair away in thick coated patients (with client consent!). Skin examination needs time! Sedation may be required with difficult patients. Use a standardised system for examination. Examine mucous membranes, skin and coat. I work from the nose backwards however you can personalise your examination system. Start with the patient standing and then restrained in lateral recumbancy. Examine the feet, claws, footpads and ear canals. Part the fur and look for parasites. Identify and record lesions (primary vs secondary). Palpate the lesions. Try to evaluate the levels of pruritus. Record everything. Use a hand lens, Woods lamp (reveals *M.canis* - 30-90% strains), otoscopy and diascopy (pressing a glass slide onto skin – inflammation blanches / haemorrhage does not) as necessary.

Clinical Notes

A specific dermatology record card should be used which prevents forgetting to cover everything. It is also a useful way of learning a logical approach. See

standard dermatology texts for examples but create your own version. Take photographs of lesions before, during and after therapy.

Dermatology: a problem-solving approach

One or more of the following signs should be recorded and these can be used to create a list of differential diagnoses in a problem-solving fashion.

1. Pruritus
2. Alopecia
3. Scaling & Crusting
4. Pustular
5. Ulcerative
6. Pigmentary disorders
7. Nodules/tumours
8. Sinus tracts

Each case may have one or more of these signs.

Laboratory Investigations:

The modern process of diagnosis of skin disease depends upon a process of problem solving based on the clinical signs present. This is a practical approach to investigation of clinical cases with dermatological disease. The diagnostic techniques will be discussed in the context of this problem solving approach to dermatology which I introduced in the previous module. These will be discussed again in future modules. We document which of the following clinical signs is present and then set out to problem solve the case on the basis of each one. Some are more powerful than others but we need to combine the problem solving in each case to arrive at logical plan for investigation. The patterns we use are:

1. Pruritus
2. Alopecia
3. Scaling & Crusting
4. Pustular
5. Ulcerative
6. Pigmentary disorders
7. Nodules/tumours
8. Sinus tracts

Each case may have one or more of these signs. One or more of the following signs should be recorded and these can be used to create a list of differential diagnoses in a problem-solving fashion.

We will discuss all of the laboratory techniques within the context of the signs above and I will illustrate the problem-solving approach by discussing cases as we progress through the lectures.

Laboratory Techniques in pruritus

Tests:

Skin scraping

Hair examination (brushings/pluckings)

Cytology (acetate strip)

Microbiology

Allergy testing (Intradermal skin testing, serum allergen-specific IgE, food trial)

Haematology, clinical chemistry, biopsy and histopathology

Workup:

Look for parasites in skin scrapes and hair examination

Look for bacteria and yeasts on cytology

Do a dietary trial (home cooked v commercial, N.B. No ideal or perfect diet),

Serum allergen specific IgE by ELISA and / or intradermal skin testing

Biopsy and histopathology.

Skin Scraping

Technique: Select the sites, clip hair away, apply liquid paraffin, squeeze skin and scrape with blunt scalpel blade, collect the suspension, spread it onto a microscope slide and cover with cover slip. Then examine under microscope on low power working up to high power in areas of interest. Try to identify parasites, dermatophytes, keratin, cells.

Hair Examination

The aim is to collect hair samples for microscopic examination

Techniques:

Comb the coat and pluck hairs with forceps. Mount the hairs on a microscope slide in 10% KOH or liquid paraffin and cover with a coverslip. Stain for dermatophytes before covering if needed (a drop of Lactophenol cotton blue or Quink ink or number 3 (blue one) Diff Quik). Then examine under microscope on low power working then high power in areas of interest. Identify surface mites and eggs (e.g. *Cheyletiella*), follicular mites (*Demodex*), lice and eggs, dermatophyte spores and hyphae, hair abnormalities, hair cycle stages

Allergy Testing

1. Intradermal skin testing (IDST) is still considered to be the 'Gold standard'
2. ELISA is as good as IDST when compared in terms of likely response to immunotherapy
3. Food Allergy: A diet trial using unique sources of protein and carbohydrate is the gold standard. Measurement of circulating IgE against foodstuff antigens is an unproven technique because we don't really understand the pathogenesis of food allergy in domestic animals. Food allergy as a distinct entity is in my opinion rare however food components may be involved with other environmental allergens in the pathogenesis of atopic dermatitis.

Histopathology in cases of pruritus are:

1. Perivascular dermatitis - bacterial / fungal / parasitic / allergic
2. Nodular / diffuse dermatitis - parasitic / fungal / lymphoma
3. Intraepidermal vesicular / pustular dermatitis - bacterial / fungal / parasitic / pemphigus
4. Folliculitis - bacterial / fungal / parasitic

Laboratory Techniques in cases of Alopecia**Tests:**

Skin scraping, hair examination (brushings/pluckings), haematology, clinical chemistry, biopsy and histopathology.

Workup:

Look for parasites and dermatophytes in skin scrapes and hair examination
Assess hair morphology in hair plucks and perform a trichogram (count number of anagen and telogen hairs on plucks). High numbers of telogen hair follicles indicate a cycle abnormality.

Biopsy and histopathology.

Haematology, clinical chemistry and serum hormone evaluations

Hormone assays / Endocrine Tests

Disease of the following endocrine glands can lead to skin disease; Adrenal glands (Hyperadrenocorticism, HAC), thyroid gland (Hypothyroidism), gonads (Sex hormone associated dermatoses) and pancreas – hepatocutaneous syndrome

Hyperadrenocorticism (HAC)

Routine screening using haematology (Stress leucogram, mature neutrophilia, monocytosis, lymphopenia, eosinopenia, occasionally a raised PCV), serum biochemistry (raised SAP, ALT, cholesterol / lipaemia, glucose, overt diabetes mellitus), urinalysis (Specific gravity (SG) <1.020, mild proteinuria, evidence of UTI (examine sediment))

Screening for HAC:**ACTH stimulation test.**

Detects 85-90% of pituitary dependent HAC and 90-95% of adrenal dependent HAC. This test measures capacity of adrenal glands to secrete cortisol and can distinguish iatrogenic from naturally-occurring HAC. It is useful for monitoring response to therapy. ACTH stimulation has a sensitivity & specificity of <100%

Low dose dexamethasone suppression test (LDDST)

Detects 90-95% pituitary dependent HAC and nearly all adrenal dependent HAC. This technique tests the negative feedback loop of the HPA axis and is more reliable than ACTH. The sensitivity 95% specificity <100%.

Urine cortisol : creatinine ratio

Effective in ruling out HAC but not diagnostic if elevated ratio *per se*. The urine must be collected by owner at home.

This is a simple, low cost test which is useful to rule out HAC i.e. if normal then HAC can be ruled out. There is large overlap between HAC & other diseases associated with pu / pd. Its sensitivity is good however its specificity very poor

Discriminatory tests used for HAC

The following tests can be used to determine the type of HAC present:

1. High dose dexamethasone suppression
2. Radiography
3. Ultrasonography
4. Computed tomography / MRI
5. Endogenous ACTH measurement

High dose dexamethasone suppression (HDDST)

This is the most commonly used method. The test attempts to answer the question 'is it possible to exert negative feedback of HPA axis?'

It is not 100% discriminatory. Approximately 20% pituitary-dependent cases fail to suppress.

Imaging techniques

Imaging may help determine whether the primary lesion is pituitary or adrenal.

1. radiography, ultrasonography - standard techniques to evaluate adrenal involvement esp. calcification
2. computed tomography, MRI- specialized techniques to detect masses including pituitary masses

Endogenous serum ACTH measurement

Not useful as screening test as specificity low. Useful to distinguish between adrenal & pituitary based disease however major practical difficulties

Hypothyroidism

Diagnostic techniques:

1. Haematology (Mild normocytic / normochromic anaemia)
2. Serum biochemistry (Hypercholesterolaemia / elevated serum triglycerides)
3. Skin biopsy (non-diagnostic changes)
4. Basal T4 (reduced in non-thyroidal illness, reduced by drugs, but if very low then likely to be significant)
5. TSH response (Used to be 'Gold standard', Human recombinant has become available but is very expensive)
6. Serum TSH assay: (TSH is high in primary hypothyroidism due to a loss of negative feedback, but does it stay high long term?? i.e. after months or years)
7. Thyroid biopsy (Ultimate technique but impractical)

8. Antithyroglobulin antibodies (associated with lymphocytic thyroiditis)
9. Free T4 (FT4) (combined with T4 may be useful)
10. T3 / CITE T4 (Unreliable)

Sex-hormone associated dermatoses

Complex! Straight forward hormone productive ovarian lesions (cyst or neoplasia -> oestrogens) and testicular lesions (sertoli cell tumour -> oestrogens) occur and diagnosis is relatively easy.

Adrenal lesions which produce sex hormones (adrenal sex hormone imbalance) are more difficult to confirm.

Sex hormone assays in neutered animals are difficult to interpret because 'normal ranges' poorly defined

Pre- and Post-ACTH levels of cortisone, testosterone, oestrogen and progesterone can be measured but may also be difficult to interpret

Insulin-like growth factor 1 (IGF-1) correlates with growth hormone levels and has been used as an indirect measurement of growth hormone

Alopecia X

This disease encompasses all of the following diseases found within the literature:

1. Pseudo-Cushing's
2. Adult-onset growth hormone deficiency
3. Hyposomatotropism
4. Castration-responsive dermatosis
5. Growth hormone-responsive dermatosis
6. Gonadal sex hormone dermatoses
7. Biopsy-responsive alopecia
8. Adrenal sex hormone imbalance
9. Congenital adrenal hyperplasia like-syndrome
10. Lysodren-responsive dermatosis
11. Follicular dysplasia of Nordic breeds (Woolly Syndrome)
12. Siberian Husky follicular dysplasia (Woolly syndrome)
13. Follicular growth dysfunction of the plush-coated breeds
14. Black skin syndrome of Pomeranians

Histopathology in cases of alopecia

Primary Hair Cycle/Hair abnormalities:

An atrophic dermatopathy with more telogen and some kenogen hair follicles

Morphological causes e.g. Follicular dysplasia:

Pigmentary dysplasia and hair shaft abnormalities along with atrophic follicular changes in chronic lesions.

Inflammatory causes of alopecia:

1. Perivascular dermatitis - bacterial / fungal / parasitic / allergic
2. Intraepidermal vesicular / pustular dermatitis - bacterial / fungal / parasitic / pemphigus
3. Folliculitis - bacterial / fungal
4. Bulbitis (lymphoplasmacytic) occurs in cases of alopecia areata

5. Cell poor interface dermatitis and follicular fading/atrophy in ischaemic dermatopathies e.g. dermatomyositis, small vessel vasculitis.

Laboratory Techniques in cases of Scaling & Crusting

Tests:

Decide whether the disease is pruritic or not pruritic.

1. If pruritic then problem-solve the pruritus (see above)
2. If non-pruritic then perform
 - a. Skin scraping: look for demodex and dermatophytes.
 - b. Hair examination (brushings/pluckings): look for demodex and dermatophytes.
 - c. Haematology, clinical chemistry, Hormone assays (ACTH stim, Dex suppression, T4/TSH, sex hormones)
 - d. Biopsy and histopathology

Workup:

If pruritic then work up as for pruritus

If non-pruritic then look for parasites, consider keratinisation disorders (primary vs secondary), endocrinopathies, metabolic disease, autoimmune, neoplasia

Hair examination and skin scrapings: see above

Haematology and serum biochemistry: see above.

Hormone assays: see above

Histopathology in cases of scaling and crusting

- A. Non-Pruritic crusting and scaling may produce one of the following:
 - a. Atrophic dermatopathy - endocrinopathies
 - b. Folliculitis - demodicosis
 - c. Interface dermatitis- paraneoplastic
 - d. Diffuse - neoplasia - epitheliotropic lymphoma
- B. Pruritic crusting and scaling may produce one of the following:
 - a. Perivascular dermatitis - bacterial / fungal / parasitic / allergic
 - b. Intraepidermal vesicular / pustular dermatitis - bacterial / fungal / parasitic / pemphigus
 - c. Folliculitis - bacterial / fungal

Laboratory Techniques in cases of Pustular disease

Tests:

1. Skin scraping: look for demodex and dermatophytes.
2. Cytology: look for bacteria, yeasts, inflammatory cells, acantholytic cells
3. Hair examination (brushings/pluckings): look for demodex and dermatophytes.
4. Microbiology: especially in cases resistant to treatment
5. Haematology, clinical chemistry, Hormone assays (ACTH stim, Dex suppression, T4/TSH, sex hormones)
6. Biopsy and histopathology

Workup:

Look for parasites, bacteria, yeasts.

Check for acantholytic keratinocytes within pustules and crusts present in pemphigus foliaceus.

Check for underlying diseases especially if a pyoderma is present e.g. allergies (younger animals) and endocrinopathies (middle age and older animals).

Consider a metabolic dermatosis and neoplasia in old animals (lymphoma)

Hair examination and skin scrapings: see notes above

Haematology and serum biochemistry: see notes above.

Hormone assays: see notes above

Biopsy and histopathology in cases of pustules

Pustular skin disease may produce one of the following:

1. Perivascular dermatitis - bacterial / fungal / parasitic / allergic
2. Intraepidermal vesicular / pustular dermatitis - bacterial / fungal / parasitic / pemphigus
3. Folliculitis - bacterial / fungal / parasitic / pemphigus

Laboratory Techniques in cases of Ulcerative disease

If pruritic then problem-solve on causes of pruritus

If painful then consider biopsy and histopathology.

Hair examination and skin scrapings: see above for details

Haematology and serum biochemistry: see above for details

Histopathological patterns seen in cases of ulcerative dermatitis

Ulcerative dermatitis may produce one of the following patterns:

1. Perivascular dermatitis (The "dermatitis reaction")
 - a. trauma / thermal / chemical / excoriation
2. Interface dermatitis - cutaneous lupus (cell rich) / ischaemia (cell poor)
3. Vasculitis - cutaneous lupus
4. Nodular and/or diffuse dermatitis – neoplasia / leishmania
5. Intraepidermal vesicular/pustular dermatitis - pemphigus

6. Subepidermal vesicular/pustular dermatitis
 - a. bullous pemphigoid / cutaneous lupus / thermal
7. Folliculitis/perifolliculitis/furunculosis
 - a. bacterial / fungal (dermatophytes) / parasitic / pox (cats) / herpes (cats) / pemphigus
8. Panniculitis
 - a. cutaneous lupus / bacterial / fungal / parasitic

Laboratory Techniques in cases with pigment changes

Hypopigmentation

Tests:

Biopsy and histopathology

Differential diagnoses:

1. Epitheliotropic lymphoma
2. Cutaneous lupus
3. Vitiligo
4. Uveodermatological syndrome
5. Vaccine induced

Hyperpigmentation:

1. Pruritic: problem-solve as for pruritus (see above)
2. Non-pruritic
 - a. Alopecia: look for causes of alopecia especially endocrinopathies (see above)
 - b. Non-allopecic: basal cell tumours, canine viral plaques, melanoma

Histopathological patterns seen in cases of pigment disorders

Pigment disorders may produce one of the following patterns:

Hyperpigmentation:

1. Perivascular dermatitis (The "dermatitis reaction") - any chronic dermatitis
2. Folliculitis/perifolliculitis/furunculosis - bacterial / fungal / parasitic / pemphigus
3. Atrophic dermatopathy - endocrinopathies
4. Nodular and/or diffuse dermatitis - melanomas / basal cell tumours

Hypopigmentation:

1. Interface dermatitis - cutaneous lupus
2. Nodular and/or diffuse dermatitis - epitheliotropic lymphoma

Laboratory Techniques in cases with nodules and discharging sinuses

Consider and answer the following:

Is it inflammatory? If so is it sterile or infectious?

Is it non-inflammatory?

Is it neoplastic?

Tests:

Cytology (smears, fine needle aspirates)

Microbiology (bacterial, fungal)

Molecular biology e.g. PCR for mycobacteria, leishmaniasis

Biopsy and histopathology

Histopathological patterns in cases of nodules & discharging Sinuses

Nodules & discharging sinuses may produce one of the following patterns:

1. Vasculitis
 - a. cutaneous lupus
2. Nodular and/or diffuse dermatitis
 - a. neoplasia / bacteria / fungi / parasites / foreign body
3. Folliculitis/perifolliculitis/furunculosis
 - a. bacterial / fungal / parasitic / pemphigus
4. Panniculitis
 - a. cutaneous lupus / bacterial / fungal / parasitic / sterile idiopathic

Cytology

Cytology is examination of individual cell morphology and is a commonly used technique in dermatology to investigate pustules, tumours and sinus tracts. We will talk more about cytology in the tumour and nodule module.

Techniques

There are a number of different techniques available for the collection of cells for cytological examination.

These include:

- 1) Fine needle aspirate biopsy
- 2) Impression smears
- 3) Acetate strip preparation.

See standard cytology texts for detailed information with regard to sample collection

The cells collected can be stained with 'Diff-quick' in general practice but are usually stained with Giemsa in commercial laboratories. Some specialist laboratories can perform immunocytology on smears (e.g. for lymphoma).

Acetate Strip Preparations:

Used to, detect fur mites or *Malassezia pachydermatis*.

Technique employed are

1. Run tape through coat to collect fur mites
2. Clip hair and apply tap to skin to collect *Malassezia pachydermatis*

3. Stain (Diff-Quik) and examine

Aim of Cytology

Cytology tries to answer the following questions:

1. Are the cells neoplastic or inflammatory or both
2. If the cells are neoplastic then what cell line are they most like?
3. Are the cells of an epithelial or mesenchymal (spindle vs round) phenotype?

Microbiology

The following type of microbiology may be required in skin disease.

1. Bacterial culture

- a. Aerobic bacteriology – surface and deeper lesions
- b. Anaerobic bacteriology – deep lesions

2. Mycobacterial culture

This is particularly important in nodular lesions and lesions with sinus tracts. Mycobacterial infection is much more common in cats c.f. dogs in the UK

3. Fungal culture

Dermatophyte culture may be required in cases with folliculitis or pustular lesions.

Microbiology techniques

The following samples can be collected for microbiology:

- Swabs
- Tissue biopsies
- Fluids

In the future we will use PCR technology for the identification of microorganisms including bacteria on the skin. The normal skin microbiome is being studied

Skin biopsy and histopathology

Biopsy techniques

1. Incisional – Wedge or Punch biopsies remove part of the lesions
2. Excision biopsies remove an entire lesion e.g. masses

General considerations

Multiple samples are essential in the diagnosis of diffuse skin disease

Samples from skin lesions and local lymph nodes may be needed

It is essential that you state the sample sites on submission form

Tag margins of concern and state this clearly on submission form

Dermatopathology

The pathologist should identify patterns present and use these, in light of the clinical features, to arrive at a list of differential diagnoses or specific aetiology.

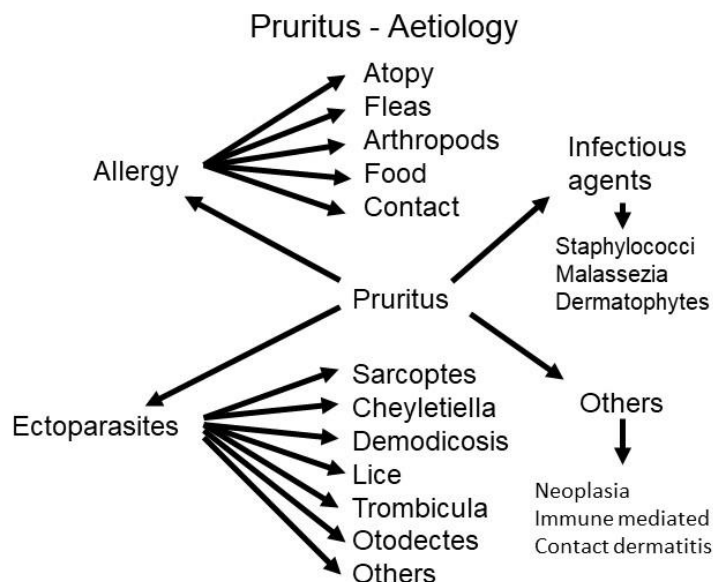
Pruritus

Pruritus is the sensation which stimulates scratching / licking and is synonymous with itch. Epicritic itch is sharp and localised. Protopathic itch is a poorly localised burning.

Pruritus can be Physiological or Pathological. Pruritus can be scattered, generalised or focal.

Causes of pruritus:

1. Ectoparasites
2. Allergy (environmental allergens, food allergens, parasite allergens, microbial allergens)
3. Infection – staphylococcus, malassezia, dermatophytes (a rare cause)
4. Other – autoimmune disease, neoplasia



Clinical manifestation:

Pruritus results in one or more of the following: 1) scratching, 2) rubbing 3) overgrooming

History:

The history and the results of the clinical examination should provide a list of differential diagnoses and thereby a guide to investigations. In particular consider the following points in a case with pruritus:

1. Family history. Allergic skin disease usually has a familial tendency which may be reflected in affected siblings or a breed predisposition.

2. Age of onset. Animals with allergic skin disease tend to be young at the age of onset however old animals can develop clinical signs of allergy
3. Diet. As a general rule animals develop allergic responses to allergens and have to be exposed to these for a variable period of time before an allergic reaction occurs. Therefore an animal with food allergy will be reacting to an allergen present in its diet for some time and not a recently introduced allergen.
4. Environment. Consider the patients home environment and elsewhere. e.g if the dog goes to stay with the mother-in-law three days a week then it is important to check flea control at her house as well as the owners. Dogs in single pet houses infrequently have a flea allergic dermatitis unless they are frequenting other environments e.g. relations (parents, siblings) houses or even the local pub.
5. Routine preventive therapy. Check that there is effective flea / endoparasitic, other routine treatments and bear in mind the comments in 4 above.
6. Anatomical regions affected. The distribution of the pruritus varies with diseases i.e. atopy vs flea allergy vs sarcoptes.
7. Localised vs. generalized. Some patients have localized pruritus which provides a clue to the cause e.g. the pinnae and elbows in dogs with sarcoptic mange.
8. Initial lesions vs. chronic lesions. It is important to try and find out what initial lesions appear like compared to chronic changes e.g. papules, pustules, excoriations, lichenification etc.
9. Type of lesions present: Papules / pustules / crusts / excoriations / alopecia
10. Response to therapy: has there been any response to therapy given in the past.
11. Seasonality. Was there any seasonality either initially and now
12. Level of pruritus. What is the degree of pruritus and has it varied over time
13. In-contact animals: have any incontact animals developed pruritus – consider the home and elsewhere
14. Humans; are any incontact humans now also pruritic? If so then consider parasites or dermatophytes
15. If the pruritus is severe then always consider scabies, food allergy, contact allergy, Malassezia dermatitis or insect hypersensitivity

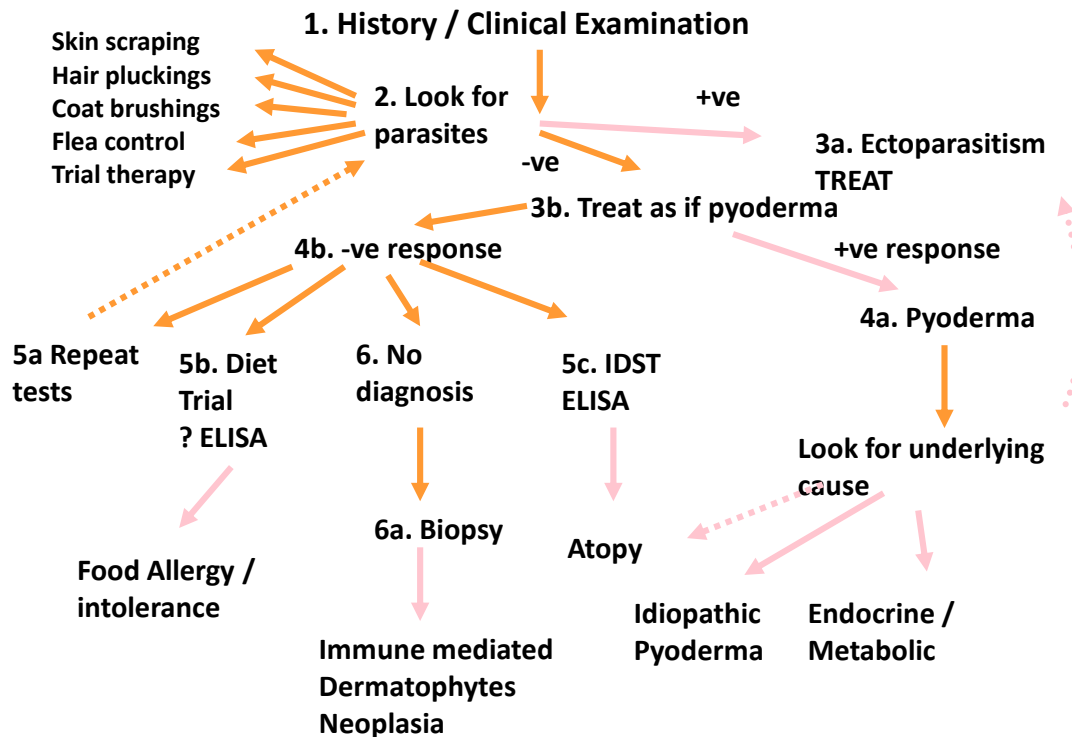
Clinical Examination:

Perform a complete clinical examination. Then perform a skin examination:

Consider:

1. Lesion distribution
2. Primary vs. secondary lesions
3. Consider whether secondary infections are present especially bacterial pyoderma and treat if necessary.

Diagnostic Workup- Pruritus



The history and clinical examination should provide a list of differential diagnoses which can be ruled out in sequence using diagnostic tests and in some situations a response to therapy.

Therapy for pruritus:

Ideally identify the cause and the specifically treat the cause.

Therapy for atopic dermatitis

Consider the following modes of control:

1. Allergen avoidance
2. Antihistamines
3. Essential fatty acids
4. Immunotherapy (desensitisation)
5. Glucocorticoids
6. Cyclosporin (Atopica)
7. Oclacitinib (Apoquel)
8. Lokivetmab (Cytoint)
9. Secondary infections – Staphylococci and Malassezia
10. Topical therapies

Allergen avoidance:

1. The aim is to reduce the total amount of allergen exposure
2. This should be part of a complete management programme
3. This alone can be very effective in some cases
4. You need committed owners

5. It may reduce the amount and number of therapeutic agents required
6. Encourage good bed hygiene. The dogs bed should be regularly washed to remove allergens and prevent house dust mite (HDM) colonisation
7. Access to old furnishings to be reduced or ideally prevented because they will contain high levels of HDM antigens – carpets / chairs / beds
8. You can have plastic covers for bedding that cannot be washed e.g. beanbags. The cotton cover should be washed regularly but covering the bag with plastic will prevent HDM colonisation.
9. Remove carpets and replace with solid flooring or keep the allergic pet in rooms with solid cleanable floors
10. Dehumidifiers will reduce HDM colonisation because the HDM likes warm humid conditions.
11. Air conditioning need regular servicing to prevent the build up of allergens
12. House plants and aquaria can be the source of moulds which can be allergenic
13. Vacuums with HEPA filters should be used.

Antihistamines

Although antihistamines are only effective in a small number of atopic animals they may contribute to a management strategy by reducing the dose of other medicines e.g. glucocorticoids. Dermatologists have differing approaches to their use. In man there is some evidence that they may take months to start having an effect however in the dog and cat most try a particular antihistamine for 2-3. My own approach is to give 3 different antihistamines sequentially, each for 2 weeks and ask the owners to monitor the pruritus. Please note that antihistamines are unlikely to be effective in the face of pyoderma or malassezia dermatitis. These flare factors must be controlled before trying antihistamines.

The following antihistamines are reported in the literature:

1. Chlorpheniramine (Piriton 4mg) 2-12 mg q12hr (Dog) 2mg q12hr (Cat)
2. Hydroxyzine (Atarax 10 / 25mg) 2mg/kg q8hr (D,C)
3. Clemastine (Tavegil 1mg) 0.5-1mg q12hr (D)
4. Cyproheptadine (Periactin 5mg) 2-8mg q12hr (Dog) 2-4mg q12hr (Cat)
5. Promethazine (Phenergan 10 / 25mg) 1-2mg/kg q12hr (D/C)
6. Trimeprazine (Vallergan 10mg) 1.25-10mg q8-12hr (D,C)
7. Terfenadine* (Triludan 60mg / 120mg) 30-60mg q12hr (D)

*do not use with cyclosporin/ketoconazole/erythromycin

Essential Fatty acids

Essential fatty acids are thought to 1) change the epidermal lipid barrier and 2) reduce PGE2 / Leukotriene B4 production in the skin. There are a variety of commercially available products containing essential fatty acids. These should also be included in an overall plan to control the atopic dermatitis.

Allergen-specific immunotherapy (desensitization)

This is considered by many to be the most elegant approach to control of atopic dermatitis. There are varying reports of efficacy. I find that 1/3 of my patients are completely controlled by immunotherapy. In a further 1/3 the therapy has some effect however other treatments are required. The final 1/3 fail to respond to therapy. As with all other therapies it is essential to control flare factors (Malassezia, Pyoderma, Fleas).

Consider the following points:

1. SQ inj. Increasing in dose and interval (induction) until q28d maintenance
2. Adjust administration for maintenance as required; e.g. every 3 weeks or 5 weeks if necessary.
3. Continue for up to a year before judging efficacy
4. 50-80% cases respond to some degree or other
5. Aqueous vs Alum-precipitated vaccines can be used; I prefer an alum-precipitated vaccine
6. Schedules vary between types.

Artuvetrin therapy schedule:

Induction:

Day 1	0.2ml
Day 15 (week 2)	0.4ml
Day 29 (week 4)	0.6ml
Day 43 (week 6)	0.8ml
Day 64 (week 9)	1.0ml
Day 85 (week12)	1.0ml

Maintenance;

Day 113 (week 16)	1.0ml
Day 141 (week 20)	1.0ml

every 4 weeks thereafter

Immunotherapy – other thoughts:

1. Anaphylaxis – rare
2. If there is some sort of history of reaction then you can pretreat with antihistamines or glucocorticoid 2-3 hours beforehand
3. Effect may take months
4. If you have a case on glucocorticoids and want to use immunotherapy you need to stop therapy either side of the injections; there is no definitive answer as how to do this. Inflammation is vital for any immune response therefore I give 48hrs clear before and 72 hours clear of glucocorticoids after the immunotherapy however this is not based on any published studies.
5. In cases doing very well and the owner wants to stop I suggest extending the interval a week at a time until every 8 weeks and then stop. Most cases require re-introduction within 6 months if ceased.
6. Although the safety of concurrent cyclosporine therapy has been debated many dermatologists do use both in some cases with the objective of using a lower cyclosporine dose.

Glucocorticoids:

Try to use oral preparations especially in dogs. Aim to use every other day or less frequently. Use at lowest dose required. Never use daily in the longterm. I weigh the dog and calculate a target q48hr dose for the client based on 0.5mg/kg. I have had some dogs on prednisolone 0.5mg/kg q5-7d.

Prednisolone

0.5-1mg/kg po q48hr - dog

1-2mg/kg po q48hr - cat

Methylprednisolone

0.4-0.8mg/kg po q48hr

1-2mg/kg po q48hr

There is individual variation with the dose required. Use with other therapies to reduce dose required (Antihistamines / EPO / Topical washes). Use for part of year if possible

e.g. winter / spring / summer. A dog with 6 weeks of pruritus every summer can be easily managed with glucocorticoids with minimal if any longterm side effects.

Glucocorticoid – side-effects

1. Polyphagia
2. PD
3. PU
4. Lethargy
5. Exercise intolerance
6. Muscle wasting
7. Panting
8. Secondary infections
9. Delayed wound healing
10. Calcinosis cutis

Cyclosporine (Atopica):

Inhibits IL-2 production leading to T cell inhibition. Metabolized by the liver (ketoconazole 5-10 mg/kg increases serum $\frac{1}{2}$ life so that the dose decreased by 40-90%). Dose for atopic dermatitis is 5mg/kg q24hr but can be reduced over time.

Adverse reactions:

Vomiting / diarrhoea at 5mg/kg.

Gingival hyperplasia / wt. loss / lameness / increased hair and nail growth at 15mg/kg q24hr.

Once signs controlled you can try to go onto every other day or less frequently.

Oclacitinib maleate (Apoquel)

Blocks IL-31 mediated activation of JAK1 on neurones thereby reducing pruritus. 0.4-0.6 mg/kg body weight q12hr for 2 weeks then q24hr thereafter. Seems effective in up to 60% of cases. Thought to have effects other than blocking IL-31 mediated activation of neurons.

Lokivetmab (Cytoint)

Anti-IL-31 monoclonal antibody. Injection every 4 – 8 weeks. Very effective in most but not all cases of atopy. Expensive but safe and effective.

Topical Therapy:

Topical therapy is an important adjunct to systemic therapy. There are a variety of topical treatments available which are designed for particular clinical problems.

Classification of topicals:

1. Antipruritic
2. Dry scaling
3. Greasy scaling
4. Antibacterial
5. Demulcents and moisturizers

All of these need to be matched to the patient's requirements.

Parasites – Therapy

The efficacy of antiparasitic agents is affected by:

1. Identification / type of parasite
2. knowledge of its life cycle
3. duration of therapy
4. environmental treatment if needed or effective e.g. fleas cf lice

The choice of an antiparasitic agent is affected by:

1. product safety
2. pet, owner, environment
3. ease of application
4. owner compliance

Types of ectoparasiticide

There are several possible methods of classification:

1. Neurotoxin vs. repellent vs. insect growth regulator vs. dessicant
2. Adulticide vs. larvicide vs. ovidicide
3. Topical vs. systemic vs. environmental
4. Delivery system: e.g. spot-on, collar, powder, shampoo, spray, dip

Topical antiparasitic agents:

Consider the following:

1. They do not enter the host's bloodstream
2. They are usually parasitocidal but may be repellent

3. Ideally they should have a rapid knock-down effect & residual activity
4. There are many formulations e.g. spot-ons, collars, mousses, dips & sprays
5. There are many different antiparasitic compounds e.g. OP's, pyrethroids, fipronil, imidacloprid, selamectin, IGR

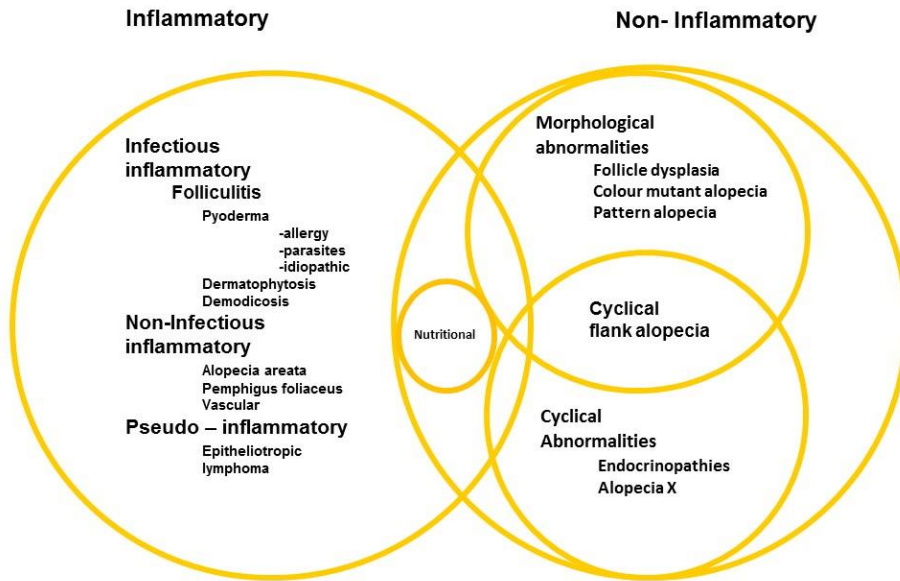
Systemic agents:

Consider the following:

1. These are absorbed into host's bloodstream
2. They can be delivered by injection, spot-on or by mouth
3. They must have low host species toxicity. e.g. selamectin, ivermectin, lufenuron, OP's.
4. They may not have effect on parasitic stage of ectoparasite per se e.g. lufenuron
5. The parasite may have to feed on the host for toxic effect and therefore an allergic dermatitis can still occur.

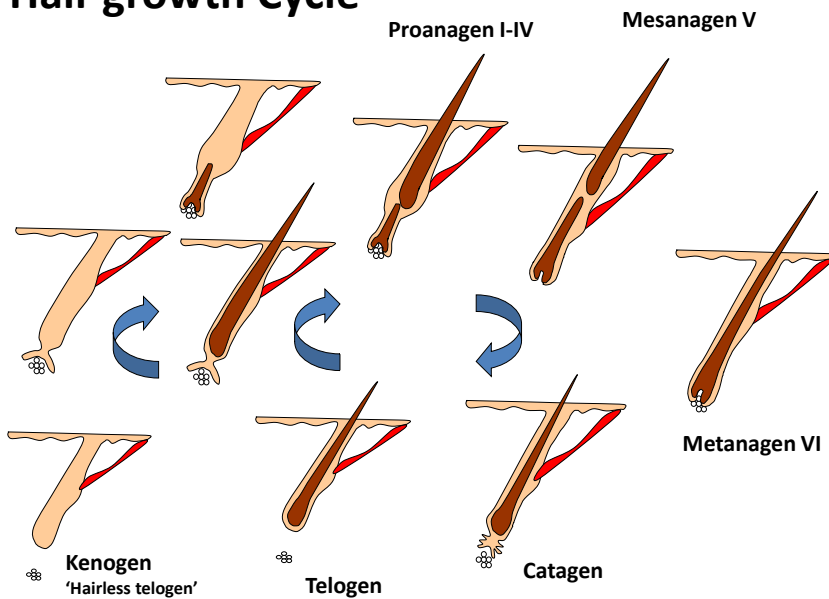
Alopecia

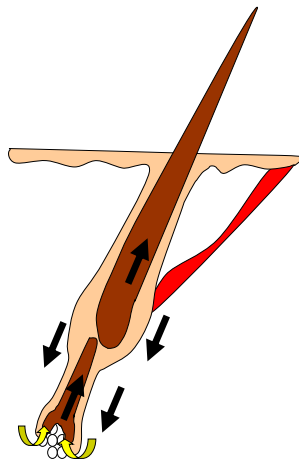
Alopecia - aetiopathogenesis



In order to understand alopecia you need to understand the hair growth cycle and various pathological processes that can lead to hair loss.

Hair growth Cycle





Hair growth cycle:

The cycle is controlled by both intrinsic and extrinsic factors:

Intrinsic factors:

The intrinsic factors are those within the hair follicle unit itself. These are poorly understood. Intrinsic factors include the following:

1. Adhesion molecules in dermal papilla during anagen (ICAM-1 + CD44 + VCAM-1)
2. Growth factors / Cytokines +/- effects on hair growth
3. Insulin-like growth factor stimulates hair growth
4. IL-10 stimulates hair growth
5. IL-1 inhibits hair growth (therefore dermatitis inhibits hair growth)
6. Other cytokines are involved
7. Oncogenes and tumour suppressor genes affect mRNA synthesis and apoptosis

Extrinsic factors:

These are factors from outside the hair follicle unit. These factors include:

1. Environmental factors – photoperiod / temperature – these stimulate or inhibit the hair cycle.
2. Hormones (Melatonin, prolactin, sex hormones, glucocorticoids, growth hormone). These have various effects on growth and differentiation.
 - a. Melatonin initiates hair growth
 - b. Prolactin inhibits hair growth
 - c. Androgens -> DP -> shortens anagen + minaturisation of follicles
 - d. Oestadiol delays anagen onset + shortens anagen
 - e. Cortisones delay anagen

- Superficial vs deep bacterial pyodermas
- Generalised vs localised pyoderma
- Primary idiopathic (rare) vs pyoderma secondary to other disease
- Underlying causes of canine pyoderma include:
 1. Parasites - e.g. demodex, cheyletiella, sarcoptes.
 2. Allergies e.g. flea, atopy and more rarely food.
 3. Endocrinopathies (middle aged and older animals in particular).
 4. Local predisposing microenvironmental abnormalities, e.g. folds.

b. Demodicosis

- Host specific species of demodex
- Alopecia is most common sign in dogs and cats
- Pruritus varies in the dog and is often related to staphylococcal pyoderma but is not usually a feature in the cat
- Juvenile vs adult onset demodicosis. Demodicosis can be divided into juvenile or adult in onset.
- Localised (pedal) vs generalised demodicosis
- Pruritus varies (may be absent) in the dog and is often related to a concurrent staphylococcal pyoderma but usually not a feature in the cat (but demodicosis in the cat is extremely rare).
- Treatment:
 1. Treat any pyoderma present
 2. Isoxazoline is the most effective treatment (as per flea allergy)

c. Dermatophyte. A number of species can be involved in domestic species.

- Classification:
 - Zoophilic e.g. *M. canis*, *M. Equinum*
 - Sylvatic e.g. *T. mentagophytes*, *M persicolor*
 - Geophilic e.g. *M. fulvum*, *M gypseum*
 - Anthropophilic e.g. *Epidermophyton floccosum*, *M. audouinii*, *T. Rubrum*
- Dermatophytosis usually causes alopecia / scaling disease but in some cases can produce a pruritic skin disease which mimics atopy.
- Many cases of dermatophytosis self-resolve.
- Some animals can become persistent carriers esp. Persian cats

d. Immune-mediated hypersensitivity e.g. eosinophilic folliculitis and furunculosis, pemphigus foliaceus.

2. Bulbitis

a. Alopecia areata.

- Pathogenesis
 1. An immune-mediated attack on anagen hair bulbs.
 2. Antifollicular antibodies and T lymphocytes affect anagen bulbs
- Common in man but rare in domestic animals.
- It presents and areas of multifocal alopecia.
- Head / neck / trunk (Tail and mane in horses)
- Hair regrowth may be white initially
- Diagnosis by biopsy
- Treatment:
 - Most spontaneously recover
 - Glucocorticoids and cyclosporin can be used but not proven to be effective in domestic animals

b. Alopecia universalis.

- Very rare but can occur in domestic animals. This disease presents as generalised alopecia.

3. Miscellaneous follicular inflammatory or pseudo-inflammatory diseases:

a. Eosinophilic folliculitis and furunculosis

b. Pemphigus foliaceus (PF): The pustules in pemphigus can form within the hair follicle outer root sheath epithelium leading to alopecia as well as crusts and scales on the surface.

- PF is an autoimmune skin disease of unknown aetiology. It is a type II hypersensitivity. Antibodies are produced which recognise a component of the desmosome within the stratum spinosum.
- Pemphigus foliaceus is the most common form of pemphigus in the dog, cat and horse.
- In PF there are circulating antibodies produced which recognise a component of the desmosome (desmocollin-1 is the major autoantigen and desmoglein 1[Dsg I] is a minor autoantigen which are members of the cadherin family of adhesion molecules and forms part of the desmosome).
- In panepidermal pustular pemphigus (a form of PF) the autoantibodies are thought to be directed at Desmoplakins
- In paraneoplastic pemphigus antibodies are thought to be directed at Desmocollins
- Ig A Pemphigus is a form seen in man.

c. Epitheliotropic lymphoma: Neoplastic cells infiltrating the hair follicle outer root sheath epithelium leading to alopecia as well as crusts and scales.

- This is a T cell form of cutaneous lymphoma
- This is the most common form of cutaneous lymphoma in the dog however it is very rare in cats

- The tumour cells arise from $\gamma\delta$ T cells (as opposed to $\alpha\beta$ T cells) in the dog
 - This disease can manifest as alopecia and scaling with depigmentation for a prolonged period before becoming nodular and ulcerative lesions. It mimics a folliculitis and clinically may be mistaken for a bacterial pyoderma or dermatophytosis.
- d. Chemical / physical / thermal damage
- These directly damage the epidermis and the follicles leading to hair loss.
- e. Sebaceous adenitis (SA).
- Inflammation and destruction of the sebaceous glands leads to scaling and alopecia. The exact pathogenesis of the alopecia in cases of sebaceous adenitis is not known however the hair follicle stem cells are adjacent to the sebaceous glands and this may explain the alopecia that develops in cases of SA.
 - Standard poodles appear to be genetically predisposed to the disease and in the UK there is an open register of dogs tested for SA run by the standard poodle club.
 - The main clinical signs in SA are alopecia and severe scaling
 - SA can be a localized or generalised disease
 - Diagnosis of SA is by biopsy however the inflamed sebaceous glands may have been entirely destroyed by time of biopsy and the histological changes look like an atrophic dermatopathy without any sebaceous glands.

Non-inflammatory Alopecia:

1. Cycle abnormalities:
 - a. Endocrinopathies
 - b. Cyclical seasonal alopecia
 - c. Alopecia X
2. Morphological / structural abnormalities
 - a. Dysplasias
 - b. Pattern alopecia
3. Miscellaneous
 - a. Vasculopathies / vasculitis leads to cutaneous ischaemia.
 - i. Post-ischaemic changes – vasculopathies or vasculitis. In cases of dermal microvascular disease chronic poor perfusion appears to lead to a fading of the hair follicles. The stem cell population within the hair follicle appears to gradually disappear as a result of the intermittent ischemia leading to permanent alopecia. An example is dermatomyositis which is thought to be due to a microvasculopathy or microvasculitis.
 - b. Nutritional
 - i. Zinc responsive dermatosis

Hair cycle abnormalities:

The following hair cycle abnormalities can lead to alopecia:

1. Cycle arrests:

The hair cycle can be arrested in either telogen or anagen:

- a. Telogen effluvium. This is an uncommon. In this disease some insult leads to the hair follicles becoming synchronized into telogen and at the next moult there is a transient alopecia. Thereafter the hair follicles return to asynchrony and mosaic moulting occurs at the next moult. It may be associated with stress, pregnancy, parturition, lactation, systemic illness, pyrexia, drugs Patchy to diffuse alopecia (trunk) occurs within 2-4 months of the insult at the time of the next moult because the hair follicles are synchronised. A trichogram reveals telogen hairs with minimal pigment
- b. Anagen alopecia (anagen defluxation). In this disease an insult on anagen hair follicles leads to immediate cessation of hair growth and hair loss. This can only occur to hair follicles in anagen and will only produce areas of alopecia in species and breeds with an anagen dominant skin e.g. Poodles. There is abrupt cessation of mitotic activity in follicular matrix cells during anagen. This is associated with severe systemic disease or toxicity e.g. cyclophosphamide in man causes anagen defluxion. There is synchronous hair loss within days or weeks of drug administration or illness Multifocal to diffuse alopecia occurs. A trichogram is said to reveal anagen bulbs with irregular hair shafts and marked pigmentation Since most canine breeds have a telogen dominant hair coat most of the year the opportunity for anagen defluxion is

limited. In theory you might expect to see it more often in anagen dominant breeds e.g. poodle.

2. Cycle disturbances e.g. Endocrinopathies

- a. Hyperadrenocorticism (HAC). HAC is a classic cause of a hair cycle disturbance leading to alopecia.
- b. Sex hormone / alopecia X. A testicular sertoli cell tumour is the classic example of a sex hormonal cause of a hair cycle abnormality and alopecia. Alopecia X is the current term to encompass a huge list of diseases including growth hormone responsive dermatosis, castration responsive dermatosis and others.
- c. Hypothyroidism. Some cases of hypothyroidism may have alopecia due to a reduced hair growth cycle.

Endocrinopathies

Endocrinopathies can cause alopecia. They are the most common internal cause of skin disease. The following endocrine glands should be considered:

1. Adrenal glands – Hyperadrenocorticism(HAC)
2. Thyroid - Hypothyroidism
3. Gonads - Sex hormone associated dermatoses
4. Liver/pancreas – hepatocutaneous syndrome

Hyperadrenocorticism

Pathogenesis:

Pituitary based – microadenoma – commonest form
Adrenal based

Signs:

PU/PD

Polyphagia

Lethargy

Exercise intolerance

Alopecia

Calcinosis cutis

Muscle atrophy – temporal muscles, abdominal muscle

Hepatomegaly

Alopecia

Diagnosis:

Clinical chemistry: Raised SAP, ALT, raised cholesterol / lipaemia, raised glucose, overt diabetes mellitus, BUN & creatinine may fall (pu/pd)

Haematology:

Stress leucogram / mature neutrophilia / monocytosis/ lymphopenia / eosinopenia. Occasionally, raised PCV

Urinalysis:

Specific gravity (SG) <1.020, mild proteinuria, evidence of UTI (examine sediment)

Urine cortisol:creatinine ratio:

Effective in ruling out HAC. Must be performed on sample collected at home

Low dose dex suppression:

Detects 90-95% pit. dependent HAC and nearly all adrenal dependent HAC

ACTH stimulation test:

Detects 85-90% pit. dependent HAC and 50% adrenal dependent HAC

Discriminatory tests for HAC - Adrenal or pituitary - based?

1. High dose dex suppression
2. Radiography
3. Ultrasonography
4. Computed tomography / MRI
5. Endogenous ACTH measurement

High dose dexamethasone suppression (HDDST)

Most commonly used method. It asks the question is it possible to exert negative feedback of HPA axis? 0.1mg/kg dexamethasone is given IV. Serum samples 0, 3hr and 8hr. The test is not 100% discriminatory and approximately 20% pituitary-dependent cases fail to suppress. Pituitary dependent HAC suppress to less than 50% baseline at 3hr but some are >50% at 8hr. Cases with an adrenal tumour the serum cortisol is >50% at both 3 and 8 hr i.e. they are not suppressed by the high dose of dexamethasone.

Imaging techniques

Radiography, ultrasonography: standard techniques to evaluate adrenal involvement esp. calcification

Computed tomography (CT) and MRI: specialized techniques to detect masses including pituitary masses

Endogenous ACTH measurement

Useful to distinguish between adrenal & pituitary based disease. Non-diagnostic results in 5% cases. Some practical difficulties in measurement so not routinely performed.

Treatment:

Trilostane is the standard treatment for HAC.

Surgical removal of an adrenal tumour.

Mitotane (Lysodren) was the standard treatment in the past and is still sometimes used.

Hypothyroidism

This is usually an acquired disease. Predispositions include: neutered dogs and the following breeds: Dobermans, retrievers, dachshunds, Irish setters, miniature schnauzers, Gt. Danes, poodles, boxers, shar pei, Irish wolf hounds, English bulldogs, Afghans, Newfoundlands, malamutes, Airedales, cocker spaniels, old English sheepdogs, and shelties

Clinical features:

These are numerous but include the following: Bradycardia and first degree heart block, muscle atrophy, heat-seeking, weight gain or weight loss
Cutaneous signs: scaling, alopecia, and secondary dermatoses (pyoderma and Malassezia dermatitis)

Diagnosis

This is notoriously difficult in some cases.

1. Haematology / serum biochemistry: Mild normocytic / normochromic anaemia can be seen in hypothyroidism. Hypercholesterolaemia / elevated serum triglycerides
2. Skin biopsy but histopathology gives non-diagnostic changes
3. Basal T4: Can be reduced in non-thyroidal illness. Reduced by drugs. If very low then likely to be significant
4. TSH response: Used to be 'Gold standard' when bovine TSH was available. Can be performed using recombinant human TSH (Iddex) when available. Human recombinant is extremely expensive
5. Serum TSH assay: Serum TSH is high in primary hypothyroidism (because of a loss of negative feedback). Therefore a high serum TSH and low serum T4 should be seen in hypothyroidism
6. Thyroid biopsy: This is ultimate technique as it demonstrates a thyroiditis in the early stages or post inflammatory atrophy. This is an impractical approach
7. Antithyroglobulin antibodies: Circulating antithyroglobulin antibodies are associated with active lymphocytic thyroiditis
8. Serum free T4: FT4: combined with T4 may be useful
9. T3 / CITE T4: unreliable test

Sex-hormone associated dermatoses

This is a complex area which is poorly understood apart from testicular neoplasia.

Ovarian lesions (cyst or neoplasia -> oestrogens). Testicular lesions (sertoli cell tumour -> oestrogens). Adrenal lesions may produce an adrenal sex hormone imbalance rather than HAC.

Sex hormone assays:

1. 'normal ranges' poorly defined in all the breeds
2. Pre- and Post-ACTH levels sex hormones may be measures in an attempt to identify excess sex hormone production by the adrenal glands.
3. Insulin-like growth factor 1 (IGF-1) correlates with growth hormone levels

Alopecia X

Alopecia X may not be a single disease but may be better considered a syndrome at this time. This term is used to encompass the following diseases that you may find in the literature:

1. Pseudo-Cushings
2. Adult-onset growth hormone deficiency
3. Hyposomatotropism
4. Castration-responsive dermatosis
5. Growth hormone-responsive dermatosis
6. Gonadal sex hormone dermatoses
7. Biopsy-responsive alopecia
8. Adrenal sex hormone imbalance
9. Congenital adrenal hyperplasia like-syndrome
10. Lysodren-responsive dermatosis
11. Follicular dysplasia of Nordic breeds (Woolly Syndrome)
12. Siberian Husky follicular dysplasia (Woolly syndrome)
13. Follicular growth dysfunction of the plush-coated breeds
14. Black skin syndrome of Pomeranians

Cyclical, seasonal flank alopecia:

This is a poorly understood condition in which the hair cycle is thought to undergo some sort of short circuit leading to alopecia. Hair growth starts which leads to moulting however the growth appears to stop prematurely. Are they a cyclical abnormality or a morphological abnormality; they have features of both.

3. Morphological hair follicle and hair abnormalities:

Hair follicle dysplasias are diseases in which there is a morphological abnormality of the hair and hair follicles. This abnormality leads to the production of brittle hairs which fracture easily leading to alopecia. This may be a congenital/inherited disease however it may also be a post-inflammatory phenomenon.

1. Follicle dysplasia – black hair follicle dysplasia. In this disease there are abnormal macromelanomes within the hair shafts which interfere with the structure and make the shaft brittle and liable to fracture.
2. Colour dilution (colour mutant) alopecia – this is similar to follicular dysplasia but is seen in colour dilute animals e.g. blue doberman
3. Acquired pattern alopecia – this is most like pattern baldness in man. The hair follicles appear to become miniaturized. Examples are greyhounds with bald thighs and pinnal alopecia in dachshunds and yorkies.
4. Follicular lipidosis. This is a rare disease seen in the tan hairs of some Rottweillers. There are abnormal lipid vacuoles in the hair shafts which lead to brittle hairs.

Follicle dysplasia

Hair follicle dysplasias are usually heritable disorders which have been reported in a number of different breeds e.g. Irish water spaniel, Italian spillone, dobermann.

There is usually a progressive flank and dorsal alopecia

Microscopic examination of the hair reveals pigment clumping (acromelanosomes), follicular keratosis and dysplastic hairs. Diagnosis is based on the signs, history, hair examination and biopsy results. Please note that hair follicles can become dysplastic as the result of inflammation e.g. in areas of chronic folliculitis and furunculosis.

Colour dilution alopecia

This is a form of hair follicle dysplasia which is seen in colour diluted dogs e.g. blue Dobermans

It is considered to be a heritable disorder caused by abnormal pigment clumping and structure changes in the hair shafts.

There is progressive alopecia starting between 3 months to 3 years of age

Scaling and comedo formation may also be a feature.

Diagnosis by history, signs and examination of plucked hairs and skin biopsy

Acquired pattern alopecia

This is a relatively common disease and is similar to male pattern baldness in man.

The cause unknown however the hair follicles become miniaturised.

A number of syndromes have been described:

1. Dachshund – alopecia of the thighs, ventrum and pinnae
2. Greyhound – alopecia of the thighs and ventrum

Miscellaneous diseases

Congenital alopecia can be seen occasionally. In these cases there may be either follicle aplasia or a reduced size and number of hair follicles.

Zinc Responsive Dermatitis

Syndrome 1:

Inherited zinc absorption problem. Malamute, Husky, Dobermann, Great Dane. Young dogs affected with crusting / scaling / erythema

Diagnosis:

Signs and dermatohistopathology. Histopathology reveals a diffuse parakeratotic hyperkeratosis

Treatment:

Zinc supplementation

Syndrome 2:

Abnormal diet high in Calcium or phytates (cereals).

Manifestations of Internal disease

Internal diseases which cause skin disease:

1. Endocrinopathies
 - a. Hypothyroidism
 - b. Hyperadrenocorticism
 - c. Sex hormone associated skin disease e.g. sertoli cell tumour
2. Metabolic disease
 - a. Hepatocutaneous syndrome
3. Paraneoplastic diseases

Necrolytic migratory erythema (Hepatocutaneous syndrome, superficial necrolytic dermatitis)

Aetiology and pathogenesis:

Hypoaminoacidaemia, biotin deficiency, essential fatty acid deficiency have been proposed.

Variable abnormal serum amino acid concentrations occur in affected dogs and this is considered the likely cause of the skin lesions.

Hyperglucogonaemia, liver dysfunction and malabsorption can be involved.

In man glucagon producing pancreatic islet cell tumour is a cause. In the literature 8% of dogs have been reported as having a pancreatic tumour and may have elevated serum glucagon.

In dogs liver disease appears to be the main factor/cause. Occasionally it occurs with end-stage liver disease. The liver disease is usually idiopathic. Occasionally it is seen in dogs with HAC and DM.

It is rare but has been reported in the cat (one case with a pancreatic lesion and one with a hepatopathy)

Clinical features:

Old dogs. Crusting, scaling, erosion, ulceration. Face, muzzle, feet and pads.

Diagnosis:

Clinical signs, Clinical chemistry, ultrasound of liver and pancreas, biopsy and histopathology. 'Red-white-blue' appearance of epidermis.

Although total amino acids may be reduced they may be normal with some individual amino acids may be low.

Differential diagnoses include:

In dogs pemphigus, systemic lupus erythematosus, zinc deficiency (including generic dog food dermatosis).

In cats thymoma-associated exfoliative dermatitis, pancreatic paraneoplastic alopecia, Fe-LV dermatitis, PF, acquired skin fragility syndrome.

Management / treatment:

1. Remove a glucagonoma if present.
2. Treat DM and HAC if present.
3. Treat secondary infections.
4. Supplement amino acids

- a) 1 egg yolk/4.5kg body weight daily
- b) IV amino acids; Aminosyn 10%; 500ml/dog or 25mg/kg over 6-8 hours
5. Supplement with zinc; zinc methionine 2mg/kg/day
6. Give essential fatty acid supplementation
7. Treat any specific liver disease.

Internal Neoplasia affecting the skin (Paraneoplastic syndromes [PNS] paraneoplastic skin disease)

1) Mast cell tumours

Clinical features:

- internal or cutaneous/subcutaneous
- Local or distant pruritus
- Cutaneous flushing
- Local haemorrhage
- Local inflammation
- Vomition

Diagnosis:

FNABs

Biopsy and histopathology

1. Staging
2. Ki67 / AgNOR
3. PCR for tyrosine kinase mutation

Management / treatment:

- 1) excision
- 2) Chemotherapy

2) Endocrine skin diseases (see above):

Aetiology:

Pituitary adenoma – hyperadrenocorticism

Adrenal adenoma or carcinoma – hyperadrenocorticism

Clinical features:

PU/PU, alopecia etc. See endocrine diseases

Diagnosis:

Signs, Clinical chemistry, ACTH stim, Low dose dexamethasone suppression, High dose dex suppression, serum ACTH, imaging

Management / treatment:

- 1) Excision of adrenal tumour
- 2) Trilostane (Vetoryl)
- 3) Mitotane (Lysodren)

3) Ectopic production of ACTH

Aetiology and pathogenesis:

Primary lung tumour in a dog and abdominal neuroendocrine tumour in a dog. These are very rare.

Clinical features:

HAC-like signs produced.

Diagnosis:

Clinical signs, elevated serum ACTH, imaging

Management / treatment:

Remove tumour

4) Glucagonoma

metabolic dermatosis / hepatocutaneous syndrome / necrolytic migratory erythema / superficial necrolytic dermatitis

Aetiology and pathogenesis:

Clinical features: Old dogs. Crusting, scaling, erosion, ulceration. Face, muzzle, feet and pads.

Diagnosis: Signs, biopsy, clinical chemistry, imaging, elevated serum glucagon.

Management / treatment: Remove glucagonoma

5) Pancreatic carcinoma

Causes alopecia in cats

Aetiology and pathogenesis:

Alopecia associated with malignancy, usually a pancreatic carcinoma. The pathophysiology of the alopecia is unknown. Solution of alopecia after removal followed by recurrence when there are metastases supports the link.

Clinical features:

Acute onset of alopecia. Usually starts on ventrum and spreads. The alopecic skin has a characteristic shiny appearance. Brown exudate is associated with secondary Malassezia. The hair is easily epilated.

Diagnosis:

Clinical signs, biopsy and histopathology, imaging abdomen.

Management / treatment:

Remove the pancreatic carcinoma

6) Pheochromocytoma can produce cutaneous flushing

7) Nodular dermatofibrosis

Aetiology and pathogenesis:

Associated with renal cysts or cystadenocarcinomas.

The exact link between the renal lesions and cutaneous lesions is unknown however it is thought to be genetic i.e. folliculin gene mutation.

Clinical features:

Multiple cutaneous/subcutaneous fibrous nodules.

Diagnosis:

Clinical signs, biopsies of masses and histopathology. Imaging of kidneys, biopsy and histopathology.

Management / treatment:

There is no effective treatment

8) Feline malassezia dermatitis has been reported associated with exocrine pancreatic carcinoma; see above.

9) Paraneoplastic pemphigus in dogs with

1. Mediastinal lymphoma
2. Splenic sarcoma
3. Dogs have circulating IgG against desmoglein 3.

10) Thymoma-associated exfoliative dermatitis in the cat.

Aetiology and pathogenesis:

Thymoma anterior to heart. Link to interface skin disease is not known.

Clinical features:

Usually middle aged and older cats. Lethargy, anorexia, weight loss, dyspnoea if mass becomes large, generalised scaling and crusting including face and feet.

Differential diagnoses:

These include FeLV dermatitis, drug reaction, demodicosis, dermatophytosis, bacterial pyoderma, malassezia dermatitis and systemic lupus erythematosus (SLE).

Diagnosis:

Clinical signs, lack of anterior thorax compression on palpation, rule out differentials, skin biopsy and histopathology, imaging of anterior thorax.

Management / treatment:

Surgical excision of thymoma may be curative.

Immunosuppression may provide short term improvement.

11) Erythema multiforme (EM)

EM in association with thymoma in a dog has been reported. This is a very rare disease but should be considered in all dogs with signs and histopathological features consistent with EM.

Problem – based approach to cases

Case 1:

History and signs:

- 2 year old female English Setter
- 12 month history of pruritus and alopecia affecting the ventrum, legs and feet
- There is erythema and lichenification of ventrum and legs
- There is periorbital and facial erythema
- No other abnormalities

Differential diagnoses:

Laboratory investigations:

Treatment:

Case 2: Laddie

History and signs:

- 4 year old male Rough collie
- Poor coat with scaling and generalized pruritus for 3 weeks
- Family member has recently acquired a 10 w.o. puppy
- 2 cats in household
- No other abnormalities

Differential diagnoses:

Laboratory investigations:

Treatment:

Case 3: Pepper

History and signs:

- German Shorthaired pointer / 14 months old entire male
- Generalized scaling and alopecia with mild to moderate pruritus for 4 months
- No other abnormalities

Differential diagnoses:

Laboratory investigations:

Treatment:

Case 4: Sherry

History and signs:

8 year old female Doberman

5 month history of generalized scaling and alopecia

There is thick scale on the dorsal nose, ear margins and neck

There is malodour and mild pruritus

Differential diagnoses:

Laboratory investigations:

Treatment:

Case 5: Sasha

History and signs:

- German S shepherd Dog
- 11 years old female
- 8 month history of crusting and scaling, painful lesions
- Pinnae, periorbital, dorsum of nose, feet, generalized

Differential diagnoses:

Laboratory investigations:

Treatment: