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UNDERSTANDING THE LANGUAGE OF THE SKIN

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The skin can only respond to injury in a limited number of ways. These pathological changes (or lesions) represent a form of visual language that can communicate to the clinician what type of disease process is occurring. Hence, in order to be able to diagnose skin diseases, clinicians must learn to understand this language and appreciate what the skin is trying to say. However, clinicians should be aware that a single type of lesion is rarely pathognomonic for a particular disease, in the same way that a single word does not convey as much meaning as a sentence. The information derived from all the lesions must therefore be assimilated and processed, allowing the clinician to determine what major patterns of changes are present.

Skin lesions can be classified in a number of ways. Many veterinary dermatologists like to describe lesions as either primary or secondary. Primary lesions occur as a direct result of the disease process whereas secondary lesions result from progression of the disease or self-trauma. Primary lesions therefore provide more specific diagnostic information. However, some skin lesions can be either primary or secondary depending on the disease concerned so this classification can, at times, be confusing.

In this lecture, skin lesions will be classified into categories based on how they actually appear to the clinician during a dermatological examination. These categories are: Changes in skin colour; Rashes; Loss of hair; Excessive scaling; Changes in skin thickness; Draining tracts; Defects in skin integrity; Abnormal components on the skin surface; and Lumps and swellings

CHANGES IN SKIN COLOR

- **Erythema** - skin that is redder than normal, implying that the skin is inflamed.
Erythema occurs most commonly in allergic, parasitic, infectious and immune-mediated skin diseases.
- **Hyperpigmentation** – skin that is darker than normal.
Excessive pigment in the epidermis leads to black coloured skin. This occurs most commonly as a chronic change in allergic diseases and *Malassezia* dermatitis, and in endocrine disorders.
Excessive pigment in the dermis leads to blue-grey coloured skin. This occurs most commonly in demodicosis.
- **Hypopigmentation** – skin or hair that is paler than normal. Loss of pigment from the skin or hair may result from hereditary, autoimmune, nutritional, neoplastic and idiopathic diseases.
- **Macules** – circular, flat areas of abnormally coloured skin, up to 1 cm in diameter.
 - Erythematous macules are commonly caused by staphylococcal pyoderma and fleabite hypersensitivity. They are also seen with fly bites, contact dermatitis, and erythema multiforme.
 - Haemorrhagic macules (ecchymoses) may be seen with vasculitis and coagulopathies.
 - Hyperpigmented macules are commonly seen with staphylococcal pyoderma at the sites of resolving

lesions and on the scrotum, prepuce and anus associated with testicular tumours.

- Hypopigmented macules may be seen with vitiligo and idiopathic depigmentation.

RASHES

A rash is a collection of skin lesions usually comprised of erythematous macules, papules and pustules.

- Erythematous macules – defined above.
- Papules – small, red, circular pimples less than 1 cm in diameter.
Papules are most commonly seen with staphylococcal pyoderma, fleabite 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 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.
- Pustules – red, circular spots containing a central, yellow sac of pus.
Pustules are commonly seen with staphylococcal pyoderma but may also occur with demodicosis, pemphigus and some rare sterile pustular disorders.
- 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 are commonly seen in miliary dermatitis in cats. Crusted pustules are seen in all pustular diseases due to the fragile nature of canine and feline pustules.
- The 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).

LOSS OF HAIR

Loss of hair is a common presenting sign in both dogs and cats. It may occur spontaneously or be secondary to pruritus. Spontaneous alopecia is a cardinal sign of disorders affecting the hair follicle such as follicular infections and endocrine diseases. If secondary to pruritus, the hair is removed by the animal itself by scratching, rubbing, biting, chewing or excessive grooming. Terms used to describe hair loss include:

- Alopecia – loss of hair in any amount up to complete baldness.
Alopecia may be partial, in which the hair density is merely reduced, or total, in which the area of affected skin is devoid of hair. In animals, alopecia usually occurs as one of four patterns:
 - Focal – a single, small patch of alopecia.
 - Multi-focal – multiple, small, circular patches of alopecia giving the coat a moth-eaten appearance.
 - Regional – alopecia affecting a region of the body such as one leg.

- Symmetrical – alopecia that has the same distribution on one side of the body as the other.
- Hypotrichosis – less than the normal amount of hair. This term is rarely used in veterinary dermatology and normally describes a congenital deficiency of hair.
- Defluxion / effluvium – a sudden, widespread loss of hair
- Easy epilation – the ability to easily remove excessive quantities of hair with little resistance during physical examination. This implies that many hairs are in the resting (telogen) phase. This can be physiological (due to shedding) or pathological. When an animal is shedding, it is not possible to remove enough hair to leave a patch of alopecia. Hence, regardless of the amount of hair being removed, the owner can be reassured that nothing is wrong. On the other hand, if the epilation leads to the development of a bald patch, there is an underlying abnormality that is leading to spontaneous hair loss.
- Scar – the abnormal skin at the site of a healed wound. Scars are usually characterised by a lack of hair and pigment, are slightly raised and may have a shiny surface. Linear scars are usually hidden by the hair coat in animals. More extensive scars are visible as large patches of alopecia. Because scars lack hair follicles, the alopecia is irreversible.

EXCESSIVE SCALING

In normal skin, the superficial layers of the stratum corneum (corneocytes) are being continuously desquamated into the environment. These cells are microscopic so are not visible on the skin surface or in the coat. However, in some disease states, this process is disrupted leading to visible skin lesions.

- Scale – grossly visible accumulations of corneocytes (dandruff). Excessive scale may form as a result of any disease that disrupts the normal process of cornification.
- 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.
- 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 invariably associated with staphylococcal pyoderma and may be seen alone or in conjunction with papules and pustules. An epidermal collarette often surrounds a staphylococcal ring.
- Exfoliation – the shedding of very large sheets of scale over large areas of the body.
- Hyperkeratosis – a pathological term meaning thickening of the stratum corneum. On the skin surface, hyperkeratosis is only seen histologically. It would be manifested clinically as excessive visible scale. Clinically, the term hyperkeratosis should only be used for pathological accumulations of thick, adherent keratin on the nasal planum or the footpads.

- Comedone – an accumulation of keratin within a hair follicle (blackhead). Comedones occur with diseases that affect hair follicles such as demodicosis, endocrine diseases and cornification defects.
- Follicular cast – an adherent sheath of scale surrounding a hair shaft above the skin surface. This lesion results from follicular hyperkeratosis and is usually found in association with cornification defects.

CHANGES IN SKIN THICKNESS

Some conditions lead to a change in skin thickness. 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.

- 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 most commonly occurs with chronic pruritic skin diseases.
- Plaque – a localised patch of thickened skin with a flat surface. Plaques are either caused by thickening of the epidermis or by infiltration of inflammatory or neoplastic cells. The most common example is feline eosinophilic plaques.
- Callus – a thickened, rough, alopecic, lichenified plaque that forms over pressure points
- Myxoedema – a puffy, thickening of the skin caused by excessive quantities of mucin in the dermis. This is a feature that can be seen with hypothyroidism and in the Chinese Shar Pei breed of dog.
- 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 hypotonic. Hypotonic skin is less elastic and is easily wrinkled. Cutaneous atrophy may be seen with hyperadrenocorticism and following the excessive local use of glucocorticoids (topical application of creams or subcutaneous injections).

DRAINING TRACTS

- Furunculosis – rupture of hair follicles beneath the skin surface. Furunculosis normally occurs due to bacterial infection or demodicosis and results in sinus tracts.
- Sinus – an opening between the underlying dermis or subcutis and the skin surface, through which exudate is normally discharging. Sinuses are normally associated with deep infections.

DEFECTS IN SKIN INTEGRITY

The most common example of a defect in skin integrity is a wound. A wound is a traumatically or surgically induced breach in skin continuity. Other defects in skin integrity that can be caused by dermatological problems include:

- Erosion – A shallow defect in which the epidermis is missing but the basement membrane is intact.
- Ulcer – A deeper defect in which the epidermis is absent exposing the underlying dermis. In dogs and cats, the epidermis is so thin that virtually all erosions

become ulcers. Ulcers can be caused by diseases that damage the epidermis or underlying dermis (autoimmune and immune-mediated diseases, deep infections, severe self-trauma, neoplasia, burns).

- Vesicle – a blister less than 1 cm in diameter. Blisters form due to lack of cohesion between the epidermis and dermis. The resulting space becomes filled with tissue fluid. In dogs and cats, the epidermis is so thin that vesicles on the skin are virtually never seen. Diseases that would cause cutaneous blisters in humans cause ulcers in dogs and cats. However, vesicles can occasionally be seen in the oral cavity of dogs and cats where the epithelium is thicker. Blistering disorders are caused by autoimmune or congenital diseases of the epidermis or dermo-epidermal junction.
- Bulla – a large blister greater than 1 cm in diameter, virtually never seen in dogs and cats.
- Excoriation – a defect (scratch) in the skin caused by trauma (thorns, barbed wire etc.) or self-trauma. Excoriations often have a linear configuration and may be grouped in parallel rows that correspond to the animal's claws. Excoriations due to self-trauma occur with pruritic diseases.
- Fissure – a spontaneously occurring linear split in the epidermis that exposes the underlying dermis. Fissures usually occur with diseases that affect the nasal planum or footpads.

ABNORMAL COMPONENTS ON THE SKIN SURFACE

- Exudate – a mixture of body fluids and cells that comes out onto the skin surface. Exudates may contain pus, serum and/or blood and are usually associated with infections or ulcerative diseases.
- Crust – an adherent mixture of stratum corneum and other components such as serum, blood or pus. Crusts form when exudates or blood dry on the skin surface.
- Hyperhidrosis – excessive quantities of sweat on the skin surface. Hyperhidrosis may be seen with inflammatory skin diseases, especially atopic dermatitis.
- Calcinosis cutis – deposition of calcium into the dermis which may penetrate through to the exterior exposing white, chalky pieces of grit-like material. Calcinosis cutis can be seen with hyperadrenocorticism.

LUMPS AND SWELLINGS

The presence of a cutaneous lump or swelling is one of the most common reasons for dogs and cats to be presented to veterinary surgeons. For obvious reasons, lumps are a source of great anxiety for owners and the clinician should try and determine as quickly as possible what has caused the lump to occur.

- Abscess – a cavity in the skin filled with pus. Abscesses are invariably caused by infections, although sterile abscesses can rarely form at the sites of injections.
- Haematoma – a cavity in the skin filled with blood. Haematomas are usually caused by trauma.
- Wheal – a circumscribed, circular, raised area of skin caused by oedema in the dermis. Wheals are seen in urticaria, an immediate hypersensitivity reaction. Wheals are also produced at the site of positive skin test reactions when animals are allergy tested.
- Cyst – an epithelial lined cavity filled with skin components such as keratin, corneocytes, hair or sebum.
- Nodule – a firm, solid cutaneous swelling up to 1 cm in diameter caused by infiltration of inflammatory or neoplastic cells.
- Tumour – a solid mass of tissue caused by infiltration or expansion of neoplastic cells.

LESION CONFIGURATIONS

The shape and appearance of lesions can also provide diagnostic information to the clinician.

- Circles – circular lesions usually imply spots or peripherally spreading lesions. They are most common in staphylococcal pyoderma but can occur with dermatophytosis, demodicosis, alopecia areata, other pustular diseases and injection site reactions.
- Lines – linear lesions usually imply external trauma, such as excoriation with the claws. Occasionally, linear lesions may follow the bodies natural lines (linear epidermal naevus).
- Symmetry – symmetrical lesions will occur with endocrine disease, allergic disease, auto-immune disease, systemic disease, nutritional disease and paraneoplastic syndromes. However, symmetrical lesions are also seen with some parasitic disorders.
- Asymmetry – non symmetrical lesions are often seen with bacterial, fungal, traumatic and environmental diseases.

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