CHAPTER 1

Clinical approach to feline patients with skin disorders

General considerations

Dermatologic patients are common in clinical practice, and their diagnosis and management can get very frustrating. This is due to a variety of factors such as the chronic nature of most skin disorders, and the fact that many dermatologic manifestations may look very similar to the untrained eye. Primary lesions are rapidly replaced by less specific secondary lesions which provide limited help in identifying the underlying problem.

"Clinicians" should therefore be very familiar with the appearance of primary lesions and should strive to identify them, if possible, on each patient, noting their distribution and characteristics.

A detailed list of primary lesions is provided later in this chapter with a specific definition of each type. However, it is important to realize that over time, with experience, clinicians will be able not only to identify primary lesions but also some of their more subtle features. For example, pustules are primary lesions, but they can be follicular or extra large spanning multiple follicles. Those large pustules that comprise multiple follicles drive the suspicion of diseases like pemphigus foliaceus when located on the ears or face in middle-aged patients, while follicular pustules are more associated with diseases like dermatophytosis or *Staphylococcus* spp. infections.

Pruritus is frequently reported with dermatologic cases, whether coming from underlying diseases or as a consequence of infections developed over time. Primary skin diseases are frequently complicated by secondary infections, which exacerbate the pruritus, hence clinical manifestations might appear even less specific. Thus, the majority of dermatologic patients may be pruritic due to infections, even if the underlying disease is not originally pruritic. For all these reasons, it is very important for practitioners to use a systemic approach when assessing dermatologic cases. This is particularly crucial with any long-standing case where problems have been accumulating over time. For this reason, the leading rule in practice is to treat the treatable and reassess both for the presence of lesions as well as the presence of pruritus. This starts by ruling out common disorders and diagnosing and treating the infections to see what is left after these are gone.

Some feline-specific dermatological challenges include the fact that cats have their own specific syndromes (e.g., miliary dermatitis, eosinophilic granuloma complex) which can be triggered by a multitude of underlying diseases, non-pathognomonic of a single stimulus. For this reason, making a clinical diagnosis of one of those syndromes requires additional work to figure out what triggered that syndrome in that specific patient.

Cats are secretive groomers, so owners may not be aware of their cats' level of pruritus since its manifestation typically occurs when cats are alone under quiet conditions and the owner is not around. Thus, in alopecia cases it is important to assess whether the hair loss is spontaneous or self-induced by pruritus. For that purpose, examination of the tips of the hairs is helpful to know whether trauma has occurred or not.

While internal medicine specialists can rely on tests that will definitively diagnose some diseases, this is seldom the case in the field of dermatology, where the single most important piece of information does not come from a test but from taking an accurate history and a physical exam.

Signalment and history

Signalment and history are crucial in dermatology and significantly narrow down the list of differential diagnoses, greatly helping to pinpoint the culprit for skin disorders. Some disorders are more common in specific age and lifestyle groups, while progression of signs can help rank differential diagnoses.

For example, an itchy young cat is unlikely to have cutaneous lymphoma but is at risk for dermatophytosis, mites or allergies to fleas or food. Knowledge about seasonality and response to previous therapies is very important. A cat that has seasonal pruritus is less likely to have a significant food component (unless owners change the diet on a seasonal basis) and is much more likely to have an insect or environmental (e.g., pollen) allergy. A cat that roams the neighborhood and encounters stray cats is at increased risk of picking up fleas, dermatophytes, mites or developing bacterial and mycobacterial infections compared to one that is kept strictly indoors.

So, while it may sound time-consuming to ask questions about exposure to other animals, lifestyle, response to previous treatments, travel history and seasonality, the answers to those questions can save lots of time and money in the process of narrowing down the list and success of at treatment. For example, a cat living in a multi-cat household is more likely not to have his ear mites cleared unless all his housemates are treated at the same time. Similarly, a flea allergic cat is less likely to be controlled unless all other pets are also treated for fleas.

A dietary and flea control history are mandatory in all cases of itchy cats as they can help the clinician to select a proper food trial if needed, and identify areas of weakness in the flea control program. This is essential particularly when dealing with cats, as there are no really safe insect repellents that can be applied on them, and environmental control is crucial.

Response to prior therapies can also provide clues about the underlying disease. Some diseases are very responsive to glucocorticoids, at least initially, while others are not. For example, flea allergy is typically responsive to glucocorticoids unless they have been abused for a long time, while pruritus caused by *Malassezia* dermatitis is typically not responsive to glucocorticoids. Knowing whether the patient has historically responded to glucocorticoids is helpful. Another example is the response to antibiotics. A lack of response of a pyoderma case to a proper dose of amoxicillin and clavulanic acid increases the suspicion of methicillin resistance and will increase the chances of the clinician to consider a culture and sensitivity test compared to a case that was never prescribed antibiotics or typically has a good response to them.

The type of flea control used can also help in ruling out some diagnoses. For example, a cat on fluranaler for flea control is less likely to have *Demodex* spp., as this is one of the most effective treatments for this mite.

An accurate history provides the clinician with important clues on where to focus during the physical examination and how to rank differential diagnoses.

While some questions are standard, others may be asked based on the level of suspicion and based on the clinician's experience. Thus, clinicians need to develop appropriate skills on which questions to ask, as sometimes important information is not voluntarily given by owners.

Physical examination

The approach to dermatologic cases needs to be systematic. Once the relevant history questions have been asked, the patient has to be thoroughly examined. A general physical exam is combined with a dermatological exam. Some diseases are associated with systemic signs, while others are strictly cutaneous. For example, when examining a cat showing a crusting dermatitis it is helpful to know whether the patient has systemic signs of lethargy and decreased appetite or not. If systemic signs are present, autoimmune diseases like pemphigus foliaceus should be ranked higher on the list of differential diagnoses. If scaling and hair loss are detected in an animal with a history of weight loss and tachycardia, diseases like hyperthyroidism should be ranked higher than other scaling diseases. Similarly, if a cat with draining nodules and panniculitis is presented for evaluation, it is relevant to know if he/she is otherwise happy and has good appetite. Infections like *Mycobacterium* spp. and *Nocardia* spp. can be clinically indistinguishable. However, while the cat with mycobacterial panniculitis is typically feeling systemically

REMARKABLE TIPS

- It is important for clinicians to be familiar with primary and secondary lesions.
- History, presence of pruritus, and distribution of lesions are all critical factors in the ranking of such differential diagnoses.
- Primary lesions are the direct result of underlying diseases while secondary lesions are evolutionary lesions. Detection of lesions, distribution and information about the presence of pruritus and systemic signs are crucial in ranking differential diagnoses.

well unless another secondary infection is present, the cat with *Nocardia* spp. shows systemic signs and not just a cutaneous disease.

As mentioned earlier, during the dermatologic exam it is very important to search for primary lesions as they provide clues to the primary disease. Skin lesions evolve over time and frequently may look different from how they were originally.

Performing an accurate and systematic physical exam allows detection of primary lesions and their distribution and to formulate a list of differential diagnoses.

Finally, some diseases are known for targeting specific body regions. Thus, in this problem-based approach, emphasis will also be placed on an approach based on body regions.

DEFINITION AND EXAMPLES OF PRIMARY LESIONS

Macules are defined as flat skin areas of different color. Macules can be any color: erythematous (**Fig. 1.1**), hemorrhagic (ecchymosis), depigmented or hyperpigmented (**Fig. 1.2**). Erythematous macules are by far the most common type of macules and they can be linked to either allergic/inflammatory disorders as well as neoplastic diseases. Depigmented macules are typically associated with either diseases where melanocytes are targeted or when the basement membrane is affected.

Figure 1.1 Macules of erythema and papules in a cat with allergic skin disease. Macules are flat, areas while the lesions that owners call "pimples" are papules. When lesions progress, the center of the papule develops a yellow small accumulation of purulent material which is called a pustule.

Figure 1.2 Hyperpigmented macules in a red tabby with lentigo.

TABLE 1.1 Most common differential diagnoses for papular eruptions in cats

Follicular	Non-follicular
• Dermatophytosis	• Flea allergy and flea bites
• *Demodex cati*	• Contact allergy
• *Staphylococcus* spp.	• Pemphigus foliaceus
	• Drug eruption
	• *Notoedres* spp.
	• *Demodex gattoi*

In those cases, there is evidence at histopathologic examination of "pigmentary incontinence", which is dropping of the pigment into the dermis. This is reflected in an area of the skin which is clinically depigmented. Hyperpigmented macules can be the response to chronic inflammation or linked to genetically regulated increased accumulation of melanocytes in some areas.

Papules are defined as circumscribed elevations of skin less than 1 cm in diameter (**Fig. 1.1**). Papules are always erythematous. These are very common primary lesions that can be found in a variety of disorders, and they can be follicular or non-follicular. Non-follicular causes of papules can be mites or allergies, while follicular causes can be dermatophytes, demodex and *Staphylococcus* spp. Common differential diagnoses for papules are provided in **Table 1.1**. Papules can crust over and be described as miliary dermatitis, a common presentation in allergic cats. Papules also progress to pustules, which are typically transient and burst easily. The final result is some scaling and shaping of circular areas rimmed by flaky skin known as epidermal collarettes.

Plaque is the term used to describe a raised flat-topped solid lesion (**Fig. 1.3**) resulting from papules coalescing together. A feline specific example of plaques are the eosinophilic plaques. These lesions are very pruritic and associated with allergic diseases and a common location is the inguinal area.

Pustules are defined as circumscribed epidermal or dermal accumulations of purulent exudate. They are very transient and quickly replaced by secondary lesions such as crusts and epidermal collarettes. Pustules can be filled with a variety of inflammatory cells like neutrophils and eosinophils. In some cases they may contain acantholytic cells (epithelial cells detached from each other due to either autoimmune disease or excessive infiltration of inflammatory cells in the epidermis). It is always helpful to perform

Figure 1.3 Clearly demarcated plaques on the abdomen of a severely flea allergic cat. A more generalized erythema is also evident. These lesions are frequently consistent with a clinical diagnosis of eosinophilic plaque.

TABLE 1.2 Common differential diagnoses for nodules in cats

Categories of diseases	Examples
Bacterial infections	• Staphylococcal deep pyoderma • *Nocardia* spp. • Atypical mycobacteria • Less common: leprosy
Fungal infections	• Pseudomycetoma (caused by *Microsporum canis*) • Sporotrichosis • Cryptococcosis • Less common: systemic fungal infections like blastomycosis, *Coccidioides* spp.
***Oomyces* spp., algae**	• Pythiosis, *Prototheca* spp.
Sterile (immune-mediated)	• Plasma cell pododermatitis, sterile panniculitis
Neoplastic	• Mast cell tumor, squamous cell carcinoma, follicular tumors

cytology tests from a pustule to obtain information about the types of cells and the presence of bacteria.

Nodules are defined as a circumscribed lesion raised above the level of the epidermis (**Fig. 1.4**). Common differential diagnoses for nodules are provided in **Table 1.2**. Nodules can be caused by the accumulation of inflammatory or neoplastic cells. It is important for clinicians to perform cytologic tests from nodules and consider the possibility of infection any time a pyogranulomatous infiltrate is detected.

Tumors are defined as swelling or enlargements of skin tissues. They are usually, but not always, neoplastic.

Vesicles are defined as circumscribed elevations of the epidermis caused by accumulation of clear fluid within or beneath the epidermis. They are very transient and

Figure 1.4 Large nodule on the footpad of a cat with plasma cell pododermatitis. In this case the nodule was soft with an ulcerated surface.

rupture easily. They are typically associated with viral or autoimmune diseases.

Wheal is defined as a circumscribed skin elevation caused by edema of the superficial dermis. Urticaria is a term used to describe multiple wheals on a patient. A typical characteristic of a wheal is that it blanches upon pressure. This is because the swelling is caused by vasodilation rather than by accumulation of inflammatory infiltrates. This type of lesion is associated with a type I (IgE mediated) hypersensitivity and lesions develop within 15 minutes after allergen exposure.

Bulla is the term used for a large vesicle, an intraepidermal or subepidermal accumulation of serous fluid. Like vesicles, bullae are very fragile and transient lesions that break easily leaving an ulcerated area. They are commonly associated with autoimmune diseases affecting the basement membrane.

EXAMPLES OF SECONDARY LESIONS

Crusts. These result from dry exudates and epithelial debris such as prior pustular eruptions (**Figs. 1.5-1.6**).

Epidermal collarette. These are the result of pustules coalescing, breaking and flaking off leaving a rim of flaky skin.

Scales. When pustules dry and break, scales are visible on the hair (**Fig. 1.7**).

Excoriations and ulcerations. Excoriations are superficial erosions or ulcers; usually they imply scratching (**Figs. 1.8-1.9**). Histologically, in excoriations the defect of the epidermis does not go beyond the basement membrane epidermis. Histologically, in ulcerated lesions the defect of the epidermis goes beyond the basement membrane, so these lesions are more severe than excoriations. Ulcer is the term to describe full thickness loss of epidermis. It can be the result of severe pruritus (**Fig. 1.10**).

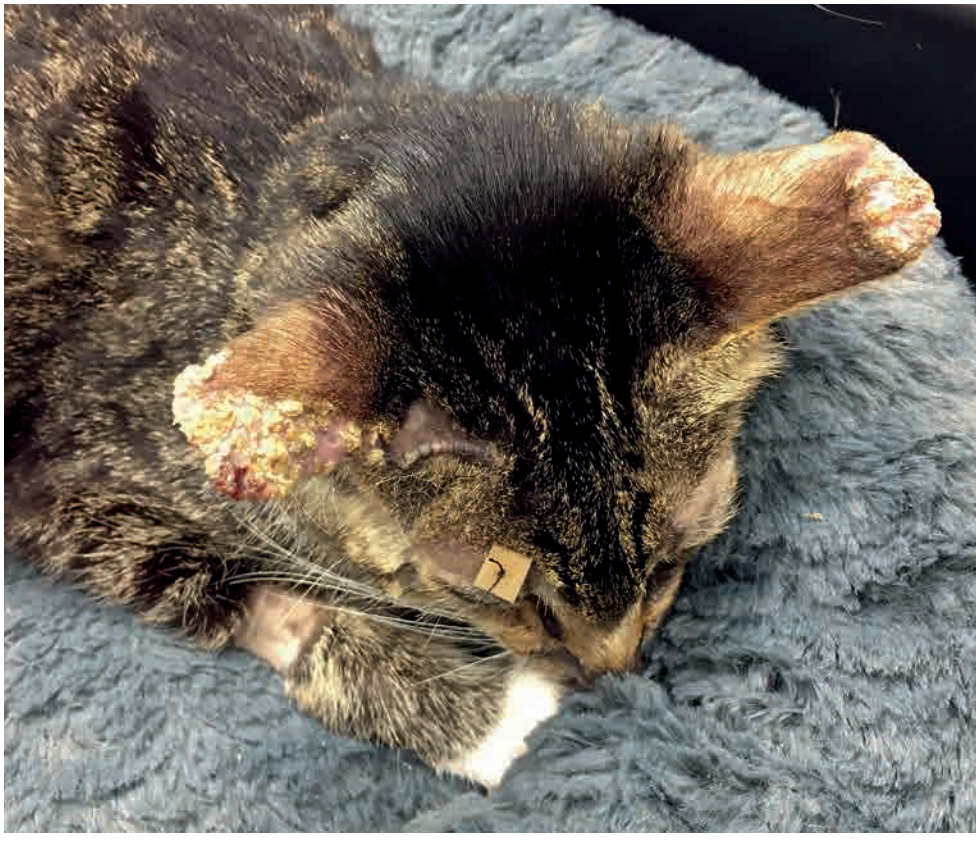

Figure 1.5 Large crusts on the pinnae of a cat suffering from pemphigus foliaceus. Pustules are very transient and rapidly replaced by crusts. Note the fact that crusts are circular in shape, which is consistent with the prior presence of pustules. When finding crusts on the ears of cats it is important to note whether they are on both sides of the pinnae and whether they are primarily on the margin or not. Crusts that focus on the margin should raise the suspicion of mites like *Notoedres* spp., while the ones on the pinna surface like this cat's should trigger differential diagnoses of pustular diseases like dermatophytosis or pemphigus foliaceus.

Figure 1.6 Crust on the face of a severely flea allergic patient. Lesions are the result of self-trauma. Exudate and debris dry to form thick crusts. In this case the crust was covering a plaque lesion as the skin was thicker than normal. Facial pruritus is present in many feline diseases and flea allergy should always be considered as a differential diagnosis, for it is a very common trigger for head and neck pruritus.

Figure 1.7 Lose scales on the hair of a cat with pemphigus foliaceus. Note that the scales are large, consistent with the prior presence of pustules. This is different from the fine scaling that can be seen on dry skin.

Figure 1.8 Excoriations due to self trauma in an allergic cat. Note the erythema and the loss of integrity of the skin.

Figure 1.9 Excoriations and ulcerations in the preauricular area of an allergic cat.

Figure 1.10 Ulcerations and crusts on the shoulder of a flea allergic patient. The lesions are the result of severe pruritus and self trauma. The skin in this area is thicker and lesions are consistent with a crusted plaque.

Figure 1.11 The same patient of Fig. 1.6 healed, showing a scar that partially contracted the skin surrounding the eye.

Figure 1.12 Scar in a patient that had severe nodules and ulcers on his face due to an infection with *Cryptococcus* spp. Scars are frequently depigmented when damage of the basal cell layer has occurred. This is the layer in the epidermis where melanocytes are present and if damage is severe, permanent loss of pigment ensues.

Scars are fibrotic areas resulting from healing of deep wounds (**Figs. 1.11-1.12**). They are frequently associated with contraction, as scars do not have the same elasticity of normal skin. Scars are frequently also depigmented as the melanocytes present in the lower level of the epidermis have been damaged.

Lichenification. This is the term used to describe increased thickness of the skin. It is frequently associated with increased pigmentation, chronic disease and pruritus.

Hyperkeratosis. Histological term, meaning increased thickness of the stratum corneum that is frequently used in the clinical description of crusting of footpads and noses.

DERMATOLOGICAL TERMS FREQUENTLY USED

Alopecia. This is the proper dermatological term to describe lack of hair. It can be generalized or localized to an area. Alopecia can be the result of pruritus and hair plucking inflicted by the patient as a manifestation of excessive grooming or the result of a folliculitis as it is observed in the case of dermatophytosis (**Fig. 1.13**).

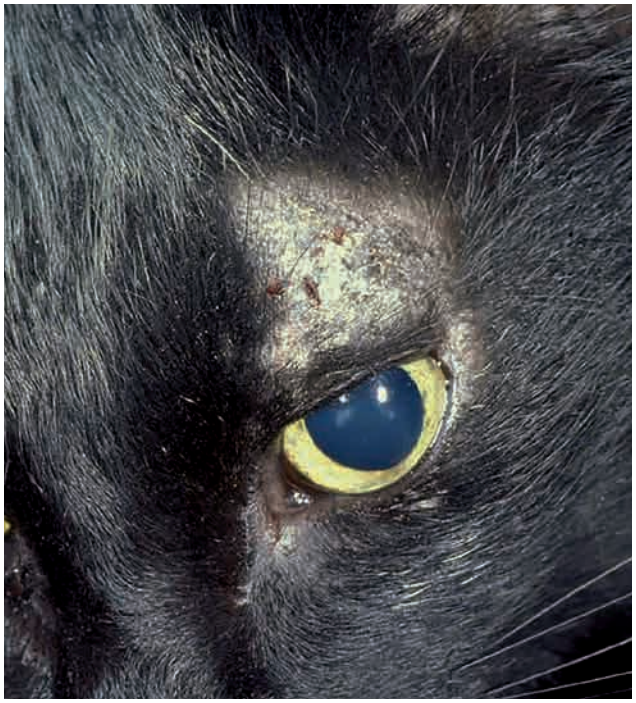

Figure 1.13 Patient diagnosed with dermatophytosis due to *Microsporum canis*. This is a case of folliculitis: the hair loss is focal and caused by a direct attack to the hair follicle. Dermatophytes spread towards the periphery, so lesions are typically circular. The face is a common area where lesions are developed.

The distribution of alopecia is very important in the ranking of differential diagnosis. For example, symmetric alopecia is the result of pruritus and a manifestation of which areas of the body various patients are able to comfortably reach (**Fig. 1.14**).

Hypotrichosis. This is the term used to describe a decreased number of hairs in one region. Thus, the coat looks less thick but there are still hairs in the area (**Fig. 1.15**).

This is different from alopecia, which indicates complete absence of hair in an area.

Erythema. Redness of the skin caused by vasodilation (in which case the color returns to normal applying light pressure) (**Fig. 1.16**), or due to an inflammatory process (**Fig. 1.17**), in which case no change is seen when applying pressure. Erythema can be generalized or be presented in the form of present in patches (e.g., macules). A flow chart on how to approach erythematous macules is provided.

Hyperpigmentation. Excessive pigment in the epidermis makes the skin appear darker than normal. This occurs most often with chronic skin conditions.

Hypopigmentation. The skin or hair are lighter than normal. This is frequently the result of some damage to the basement membrane zone leading to damage of the melanocytes and drop of pigment in the upper dermis. This may be seen in autoimmune or post-inflammatory cases.

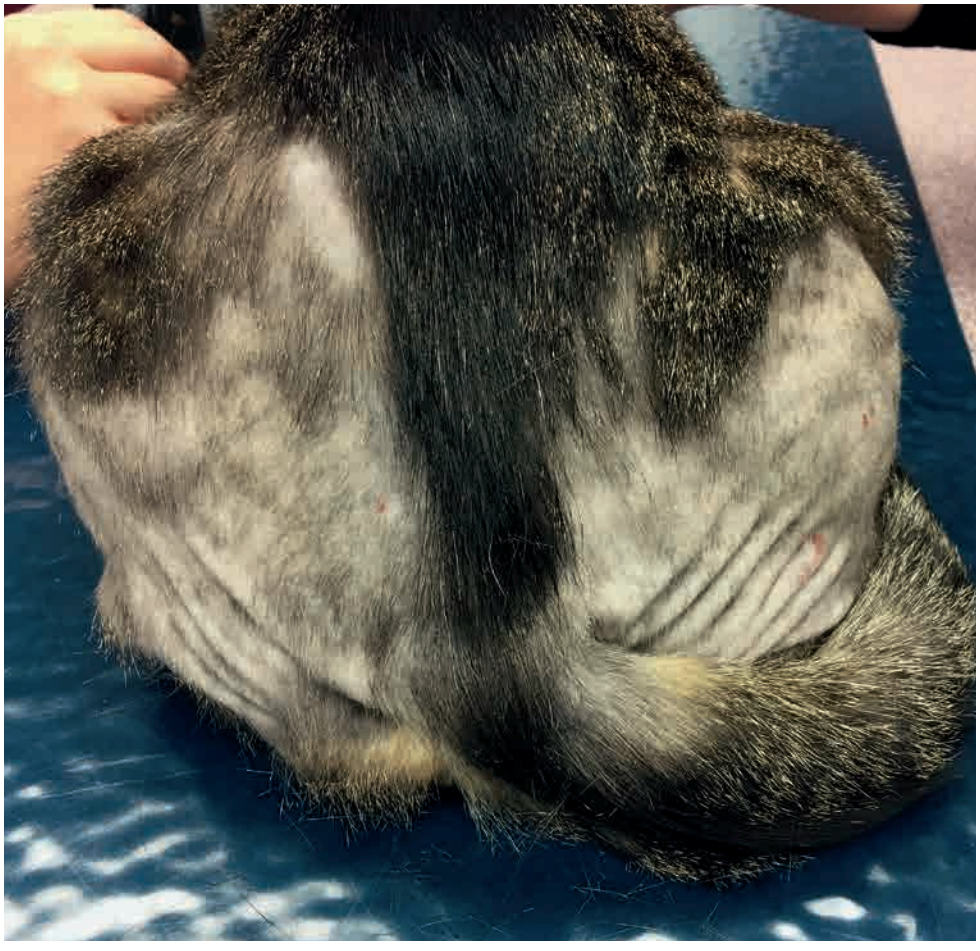

Figure 1.14 Symmetric alopecia affecting the flanks and thighs in a flea allergic cat. The underlying skin is normal while the hair has been plucked in a symmetric way on both sides. When evaluating a patient with alopecia it is important to assess whether the hair is easily epilated (like on folliculitis) or if it is pulled due to pruritus. In this case it was pulled by the patient. In the absence of an accurate history, this can be established by examining the tip of the surrounding hair. If it is broken, it means that there was trauma.

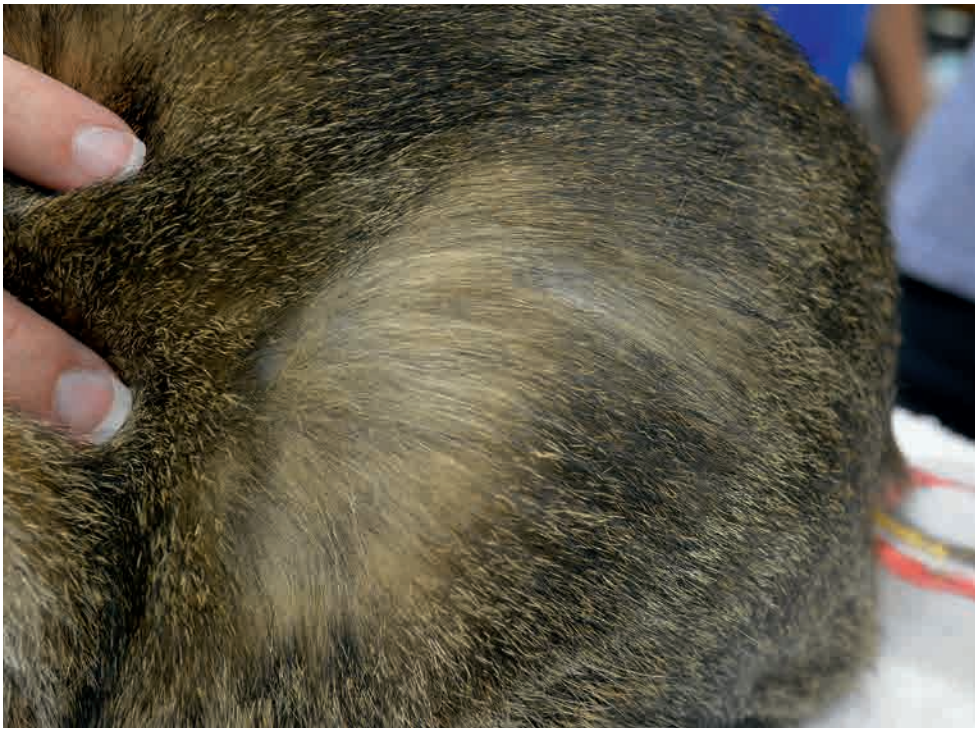

Figure 1.15 Hypotrichosis in a flea allergic patient who has been partially controlled through treatment. The area is not completely devoid of hair but has a more sparse coat than the surrounding areas.

Figure 1.16 Erythematous hives secondary to an allergic reaction to sedation. The erythema is due to vasodilation and will blanche upon pressure.

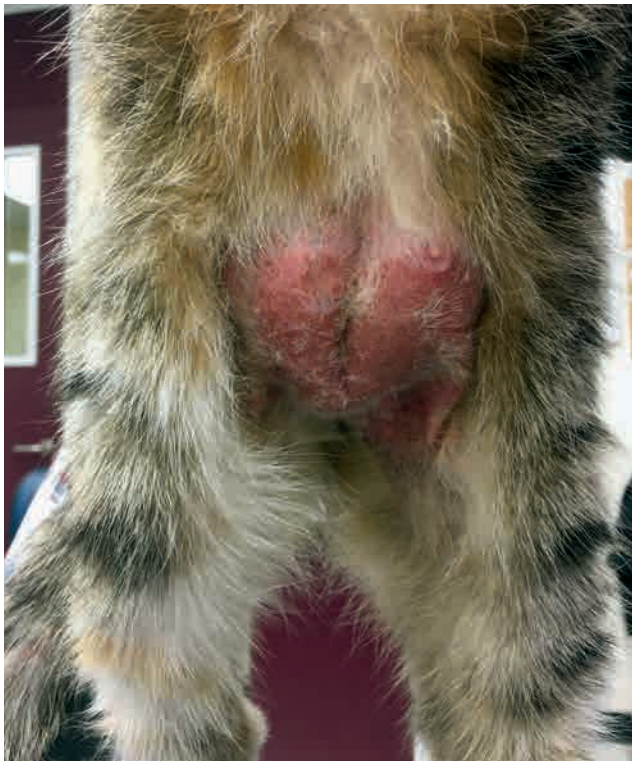

Figure 1.17 Erythema and excoriations in an allergic patient. In this case the erythema is due to an inflammatory infiltrate and does not blanche upon pressure. In some areas the skin is thick and consistent with a concurrent plaque.

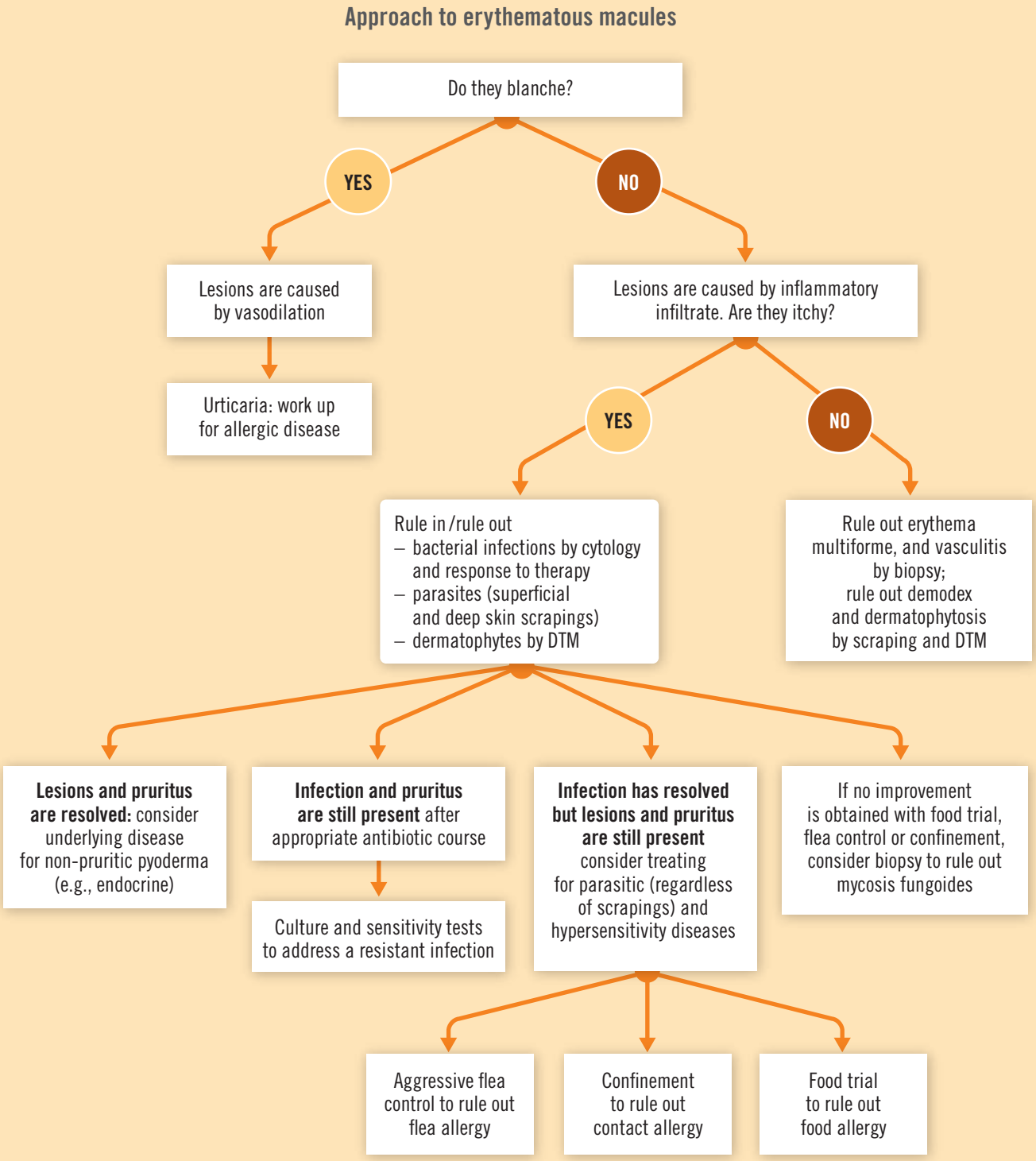

Figure 1.18 Approach to erythematous macules.

Approach to the disease

Once the history and physical examination have been completed, the clinician will formulate a list of disorders and a list of differential diagnoses for those problems.

In selecting the list of problems, it is most helpful to focus on the primary lesions rather than the secondary lesions, as they are more likely to provide insight on the underlying disease.

The approach needs to be systematic. The flowchart provided (**Fig. 1.18**) gives an example of how erythematous macules can be approached going in sequential steps.

For example, on patients that present with both ulcers and plaques, it is more helpful to consider a list of differential diagnoses for plaques rather than ulcers as almost any dermatological disease can eventually lead to an ulcer. For example, ulcers may be the result of ruptured bullae, ruptured nodules, secondary to pruritus, due to a direct insult of the vessels like in vasculitis or a toxic insult. Focusing on the finding of ulcers could end in a very long and not very particularly helpful list of differential diagnoses. When focusing on the plaques, the list will be more precise and shorter and the diagnostic approach will be more likely to be successful.

Two crucial factors in ranking the list of differential diagnoses are pruritus and the observation of the distribution of lesions. For example, two cats may be presented with crusts on their pinnae. One is very pruritic and the crusts are particularly concentrated on the margins of the pinnae, while the other has crusts both on the concave and convex aspects of the pinnae and is not pruritic at all (**Fig. 1.19**). In the first patient the most likely differential diagnosis is a parasitc infestation caused by *Notoedres* spp., while the second patient should be suspect for pustular diseases like pemphigus or dermatophytosis.

Figure 1.19 Example of crusting on the pinnae concave surfaces. Crusts are not focused on the margin and in some areas they look circular, suggesting prior presence of pustules.

Concluding remarks

A fundamental component of the evaluation of the dermatological patient is an accurate clinical history that focuses on seasonality of lesions, presence of pruritus or systemic signs, evolution of the lesions and response to prior therapies. This is followed by a thorough physical examinations where the clinician should look for primary lesions and note the distribution of lesions and pruritus. A list of differential diagnoses will be formulated based on these elements, and diseases will be ranked based on age, distribution of lesions and any other relevant information provided in the history. Based on the ranking the clinician will decide which diagnostic tests should be performed and in which order of priority to either verify or rule out diseases and narrow down the list of differentials.

TAKE HOME MESSAGE

- A thorough clinical history is crucial to diagnose dermatological patients and properly rank differential diagnoses.
- Most dermatological cases present with secondary lesions and infections that complicate the picture and increase pruritus.
- Cats are secretive groomers, therefore owners may not be aware of the level of pruritus in their pet cats.
- Looking for primary lesions is crucial as well as considering their distribution to have an insight of the underlying disease.

Useful references

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