Papules, Pustules, Furuncles and Crusts

Silvia Colombo

Abstract

Papules, pustules, furuncles, abscesses and crusts are common lesions in cats. With the exception of abscesses, they are often observed in combinations, representing different stages of the same disease evolving into one another. In general, these lesions are the expression of inflammatory diseases, with infectious, parasitic, allergic or autoimmune pathogenesis. Clinical presentations of papules, pustules, furuncles, abscesses and crusts and their preferential localization in selected feline diseases are described, together with useful diagnostic hints coming from signalment and history. A feline-specific clinical presentation called miliary dermatitis is characterized by multiple, small crusted papules and pruritus. The diagnostic approach to papules, pustules, furuncles, abscesses and crusts requires performing the diagnostic tests in a systematic way. Dermatophytosis is very common in cats, and diagnostic tests to diagnose or rule out this disease should be carried out in all cases presenting with papules, pustules, crusts or as miliary dermatitis.

Definitions

A papule is a solid, erythematous, elevated skin lesion of less than 1 cm diameter [1]. Many papules close to each other may coalesce to form a plaque (Chapter, Plaques, Nodules and Eosinophilic Granuloma Complex Lesions).

A pustule is an elevated, circumscribed, hollow lesion containing pus and covered by epidermis. It may be centered around a hair follicle or may be interfollicular

S. Colombo (✉)
Servizi Dermatologici Veterinari, Legnano, Italy

C. Noli, S. Colombo (eds.), *Feline Dermatology*,
https://doi.org/10.1007/978-3-030-29836-4_5

in location. Pustules usually contain neutrophils, with or without bacteria, or less commonly eosinophils. They are fragile and often transient lesions, uncommonly observed in cats.

A furuncle is similar to a pustule, but it is larger in size and deeper in location, because it results from the complete destruction of the hair follicle. The wall of a furuncle is thicker than the roof of a pustule, and its content comprises pus, blood (in this case, it is also called hemorrhagic bulla) or a mixture. It is usually a very inflamed and painful lesion, centered around a hair follicle. The furuncle may open and drain pus, blood or a hemopurulent exudate.

An abscess is a circumscribed, fluctuant, dermal or subcutaneous collection of pus. It may open and drain on the skin surface, forming a draining tract.

A crust is an accumulation of dried exudate. The crust is yellowish when the dried material is pus, or brownish if dried blood is its main component (hemorrhagic crust). It may also contain microorganisms and epidermal cells, such as acantholytic keratinocytes or corneocytes and, if the crust encloses a tuft of hair, its removal results in focal alopecia.

Pathogenesis

Papules, pustules and crusts represent collections of inflammatory cells in the epidermis (pustule), dermis (papule) or on the skin surface (crust) as dead remnants of these cells. The inflammatory cells are attracted towards the superficial layers of the skin by infectious agents, parasites or allergens, or may be the expression of an autoimmune disease such as pemphigus foliaceus (Fig. 1).

The furuncle is a deeper lesion which results from the complete destruction of the hair follicle. The hair follicle is destroyed by severe inflammation, which is, in the feline species, most commonly induced by a bacterial infection as in complicated

Fig. 1 Severe crusting due to drying of purulent exudate on the pinna of a cat with pemphigus foliaceus

Fig. 2 Furuncles on the chin of a cat affected by complicated chin acne

chin acne (Fig. 2) [2]. The hair shaft may be free in the dermis together with bacteria and other debris, and attracts more inflammatory cells behaving as a foreign body.

The abscess usually occurs following bite or claw wounds, with implantation of bacteria in the deep dermis and subcutis. The presence of bacteria attracts large numbers of neutrophils and other inflammatory cells at the infection site, until a large collection of pus is formed (Fig. 3).

Papules, pustules, furuncles and crusts may represent different stages of the same disease and can evolve into one another. A papule may develop into a pustule, which ruptures and becomes a small crust. Very uncommonly in the cat, a circular rim of scales may form when the crust comes off: this lesion is called epidermal collarette. A pustule may become a furuncle if the infection deepens and extends to involve and destroy the whole hair follicle. If the furuncle opens and drains exudate, a crust may form. When the crust comes off, an area of focal alopecia is the final result. Crusts may also cover other lesions, such as erosions and ulcers (Chapter, Excoriations, Erosions and Ulcers) (Fig. 4). This is important to keep in mind when examining the animal, because we may be able to identify different lesions which represent evolving stages of the disease or we may only find the final result of

Fig. 3 Retroauricular abscess in a stray cat

Fig. 4 Hemorrhagic crust covering an erosion/ulcer on the nose of a cat with herpesvirus infection

this process, which is the crust. Table 1 lists selected causes of papules, pustules, abscesses, crusts and furuncles in cats.

Diagnostic Approach

Signalment and History

Contagious diseases such as notoedric mange and dermatophytosis are most commonly observed in kittens, while neoplasia is typically seen in older cats. Cutaneous abscesses occur more often in intact male cats, as a consequence of fighting. Breed may be a relevant point in the diagnostic approach: Persian cats are predisposed

Table 1 Selected causes of papules, pustules, furuncles, abscesses and crusts

Papules	Notoedric mange
	Dermatophytosis
	Mosquito-bite hypersensitivity
	Allergic diseases
	Urticaria pigmentosa-like dermatitis
	Xanthomas
	Mast cell tumor
Pustules	Pemphigus foliaceus
Furuncles	Complicated chin acne
Abscess	Bacterial infections
Crusts	Trauma (including self-inflicted)
	Pyoderma
	Notoedric mange
	Dermatophytosis
	Subcutaneous and systemic fungal infections
	Herpesvirus dermatitis
	Poxvirus infection
	Allergic diseases
	Mosquito-bite hypersensitivity
	Adverse drug reactions
	Pemphigus foliaceus
	Complicated chin acne
	Perforating dermatitis
	Idiopathic facial dermatitis of Persian and Himalayan cats
	Squamous cell carcinoma
	Idiopathic/behavioral ulcerative dermatitis

to dermatophytosis and idiopathic facial dermatitis [3]. Urticaria pigmentosa-like dermatitis has been described in Devon rex and Sphynx cats [1, 4].

History is obviously of paramount importance for the diagnosis when previous trauma (including self-induced) is suspected in a cat examined for a crusting lesion. Especially in kittens, detailed information on where the pet was acquired must always be collected. Being found as a stray or adopted from a cattery may represent a predisposing factor for dermatophytosis, notoedric mange and herpesvirus dermatitis. Lifestyle is also relevant, because outdoor cats may be affected by mosquito-bite hypersensitivity and development of abscesses more commonly than indoor cats. Regularly hunting mice and voles is a predisposing factor for Poxvirus infection. Contagion of in-contact pets or people should prompt investigation for dermatophytes and ectoparasites.

Last but not least, one very important question to ask when taking the history is whether the cat is pruritic or not, and if pruritus is continuously present or seems to occur at a specific time of the year. Notoedric mange is a severely pruritic disease, and seasonal pruritus may suggest flea-bite or mosquito-bite hypersensitivity, and feline atopic syndrome.

Clinical Presentation

Papules and pustules are in most cases multiple lesions, sometimes with a grouped configuration. In feline urticaria pigmentosa-like dermatitis, papules may have a linear configuration [1]. A single or many furuncles may be observed in chin acne. The distribution of papules, pustules, furuncles and crusts may be localized or generalized. The abscess is usually a single lesion.

Papules and pustules are primary skin lesions; however, in most diseases, they represent one step in a pathological *continuum* of lesions. For example, although papules are the primary lesions in notoedric mange, they may not be visible, because they are covered by very thick crusts. Multiple, erythematous small papules covered by crusts, especially on the dorsum, may develop representing a feline-specific clinical presentation called miliary dermatitis [5, 6] (see later) (Fig. 5). The location of the lesions on the cat's body may be helpful in developing a correct list of differential diagnoses (Table 2).

An erythematous to hyperpigmented papular eruption, which may have a linear distribution on the ventrolateral chest and abdomen, is often pruritic and occurs in a Devon rex or Sphynx cats, is consistent with urticaria pigmentosa-like dermatitis (Fig. 6) [1, 4]. Small, erythematous, and crusted papules may suggest mosquito-bite hypersensitivity, when distributed on the dorsal nose, pinnae and footpads (Fig. 7) [7]. Pustules may be difficult to observe because they are transient, fragile lesions, but, when observed on the face, inner pinnae and abdomen, close to the nipples and on footpads should prompt investigation for pemphigus foliaceus (Fig. 8) [8].

Furuncles in cats are usually observed on the chin, where they develop when chin acne becomes complicated by secondary bacterial infection. A soft, fluctuant swelling, occasionally with a draining tract from which purulent exudate comes out, located on the face, neck, or tail base, most likely represents an abscess.

Crusts are extremely common lesions, as they are the final result of the pathological *continuum* of lesions described in this chapter, as well as of traumatic lesions.

Fig. 5 Miliary dermatitis in an allergic cat

Table 2 Common locations of papules, pustules, abscesses, crusts and furuncles in selected feline skin diseases

Papules	
Distribution	Disease
Head, pinnae, neck, paws, perineum	Notoedric mange
Head, pinnae, paws, tail, generalized	Dermatophytosis
Head, pinnae, paws	Mosquito-bite hypersensitivity
Rump	Flea-bite hypersensitivity
Head, paws, bony prominence	Xanthomas
Pustules	
Head, pinnae, claw folds, abdomen	Pemphigus foliaceus
Furuncles	
Chin	Complicated chin acne
Abscesses	
Neck, shoulders, tail base	Bacterial infections
Crusts	
Site of previous trauma	Trauma
Face	Herpesvirus dermatitis
Face, ear canals	Idiopathic facial dermatitis of Persian and Himalayan cats
Head, pinnae	Squamous cell carcinoma

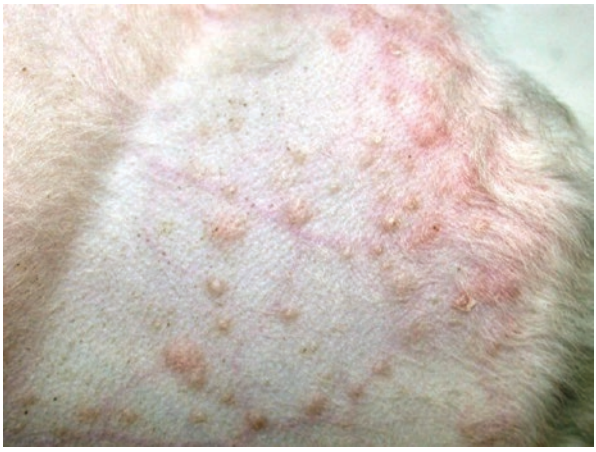

Fig. 6 Multiple erythematous papules in a Devon rex cat with urticaria pigmentosa-like dermatitis

One helpful clinical hint, when crusts are observed, is their color. If the crusts are dark brown, they are composed by dried blood and the lesion was most likely caused by a deep skin disease (ulcer) or (self-)trauma. If they are yellow, they represent dried purulent material and intact pustules should be carefully searched for. Very thick and dry light-colored crusts on the head, margins of pinnae, neck, paws,

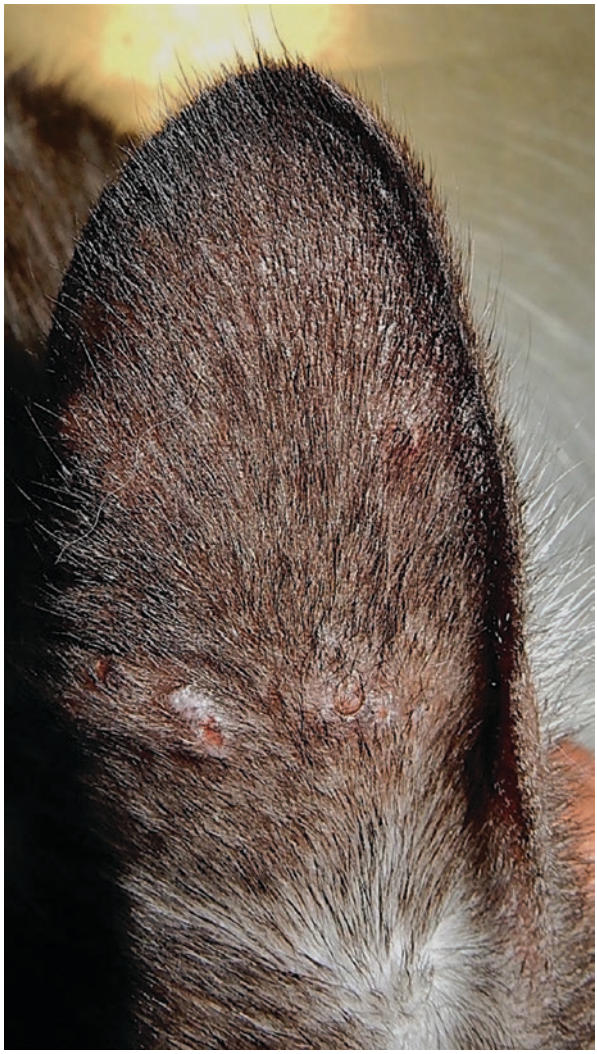

Fig. 7 Papules on the pinna of a cat affected by mosquito-bite hypersensitivity

and perineum, associated with severe pruritus, are the predominantly observed lesions in notoedric mange. Multiple, conical, very dry and thick crusted lesions (eschars) developing at sites of previous trauma may indicate a rare feline disease called acquired reactive perforating collagenosis or perforating dermatitis (Fig. 9) [9]. These lesions are difficult to remove and usually cover an ulcerated, hemorrhagic area. Pruritus and adherent, black, variably dried exudate covering areas of erythema or erosions distributed around the eyes, mouth, and chin are typical of idiopathic facial dermatitis of Persian and Himalayan cats, also called dirty face disease [3].

Fig. 8 Pustules and crusting on the inner pinna of a cat with pemphigus foliaceus

Miliary Dermatitis

Miliary dermatitis is a peculiar clinical presentation observed only in the cat. It is characterized by small, crusted papules "resembling millet seeds", hence the name, which are more easily felt by touching through the haircoat then seen. Miliary dermatitis mainly affects the trunk and neck and is often associated with pruritus and self-induced alopecia (Fig. 10) [5, 6]. Differential diagnoses of miliary dermatitis are listed in Table 3. Miliary dermatitis should be investigated following the diagnostic approach to pruritus (Chapter, Pruritus).

Fig. 9 Dry, thick, adherent yellow crust on the inner pinna of a young cat with perforating dermatitis

Fig. 10 Alopecia and miliary dermatitis on the dorsum of a cat affected by flea-bite hypersensitivity

Table 3 Differential diagnoses of miliary dermatitis

Miliary dermatitis	Cheyletiellosis
	Other ectoparasites (*Lynxacarus radowski*)
	Dermatophytosis
	Flea-bite hypersensitivity
	Adverse reaction to food
	Feline atopic syndrome
	Adverse drug reaction
	Pemphigus foliaceus

Diagnostic Algorithm

This section is illustrated in Fig. 11. Red squares with numbers represent the steps of the diagnostic process, explained below.

1 Consider signalment, history and physical examination

Signalment, history, and physical examination may give the clinician extremely useful information for the diagnostic process. In a primarily outdoor intact male cat presenting with a fluctuant mass on the neck, for example, the most likely diagnosis is an abscess. When the main presenting signs are furuncles on the chin of a cat that suffers from chin acne, it is very likely that acne has become secondarily complicated by a bacterial infection. If physical examination reveals papules, pustules or crusts, a standardized sequence of diagnostic tests is usually required to make the diagnosis.

2 Perform skin scrapings

Skin scrapings must be performed whenever papules, pustules, crusts or furuncles are observed. Skin scrapings are diagnostic for notoedric mange and may identify *Demodex cati* mites in cases of chin furunculosis [10].

3 Perform Wood's lamp examination and fungal culture

These two diagnostic tests, taken together, are diagnostic for dermatophytosis or, if negative results are obtained, are helpful to rule it out. Since dermatophytosis may present with papules, pustules, miliary dermatitis and crusts in cats, a fungal culture is appropriate in all cases presenting with these lesions (Fig. 12).

4 Perform cytology

When the physical examination reveals the presence of an abscess, cytology from the purulent exudate should always be performed to support the diagnostic hypothesis. Usually, large numbers of degenerate neutrophils are visible, admixed with bacteria and variable numbers of macrophages, lymphocytes and plasma cells. To identify the bacteria species causing the abscess, bacterial culture and sensitivity testing should be performed. It is also advisable testing cats with abscesses for FIV and FeLV. Cytological examination of exudate draining from furuncles on the chin usually shows pyogranulomatous inflammation with bacteria. Bacterial culture and sensitivity testing for aerobes and anaerobes may be required to identify the causative microorganism and choosing the most effective antibiotic for treatment, if needed [2].

Papules, pustules and crusts should always be investigated by cytological examination, a simple test that often gives very useful information. The observation of large numbers of non-degenerate neutrophils admixed with many acantholytic keratinocytes suggests pemphigus foliaceus. Eosinophilic inflammation is very common in cats. If eosinophils are present in large numbers within a mixed inflammatory infiltrate in samples obtained from crusted, papular lesions on the bridge of the nose, mosquito-bite hypersensitivity is a likely diagnosis [7].

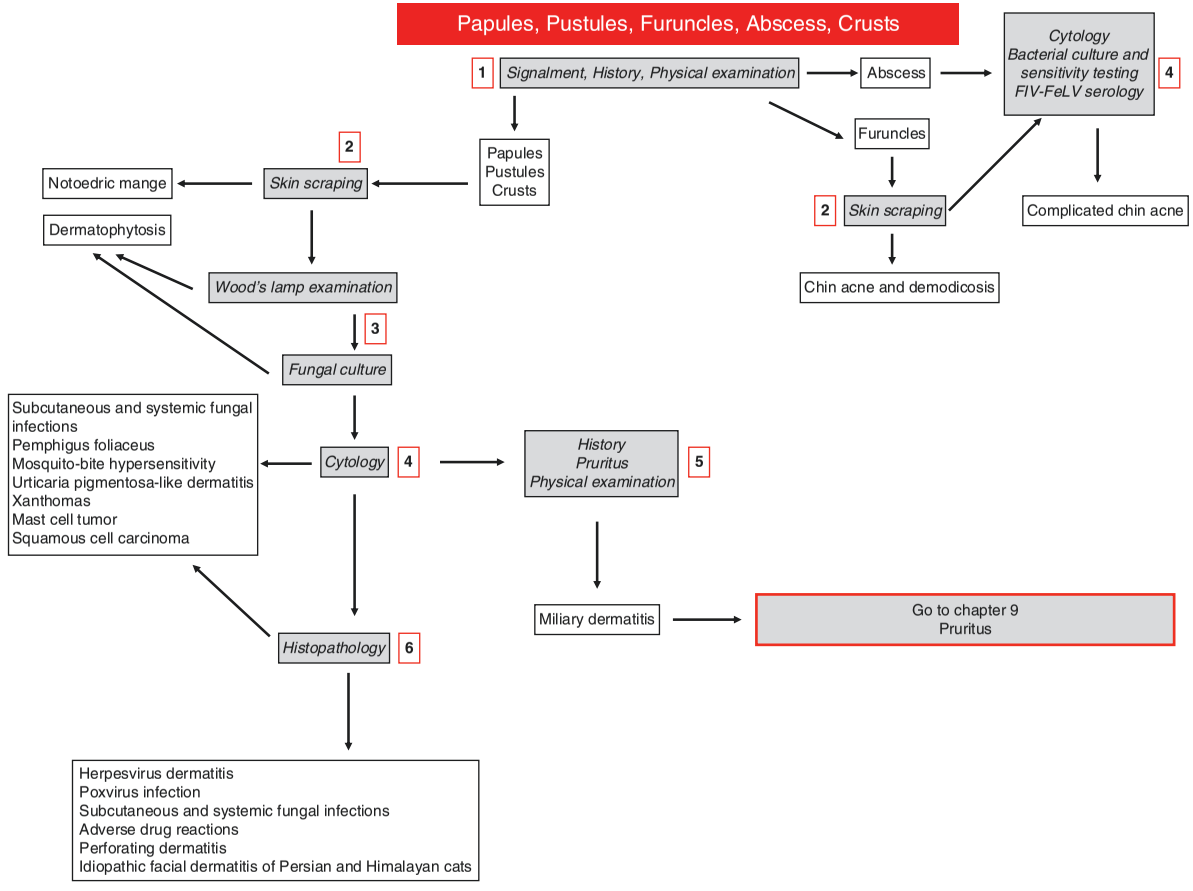

Fig. 11 Diagnostic algorithm to papules, pustules, furuncles, abscesses and crusts

Neutrophils, eosinophils and occasionally mast cells observed in samples from erythematous, hyperpigmented papules on the skin of a Devon rex or Sphynx cat are suggestive of urticaria pigmentosa-like dermatitis [4]. Finally, cytological examination may show a monomorphic population of well-differentiated mast cells in mast cell tumors or epithelial cells in small aggregates or as single cells, with aspects of squamous differentiation, often admixed with neutrophils and other inflammatory cells, in squamous cell carcinomas (Fig. 13). Cytological findings obtained from crusting, papular or pustular lesions must always be confirmed by biopsy and histopathological examination.

5 Consider history, pruritus and physical examination

When skin scrapings, Wood's lamp examination and fungal culture yield negative results and cytological findings are nonspecific (e.g., neutrophilic inflammation), one must carefully re-consider the history and clinical findings. In a continuously or seasonally pruritic cat, presenting with crusted papules on

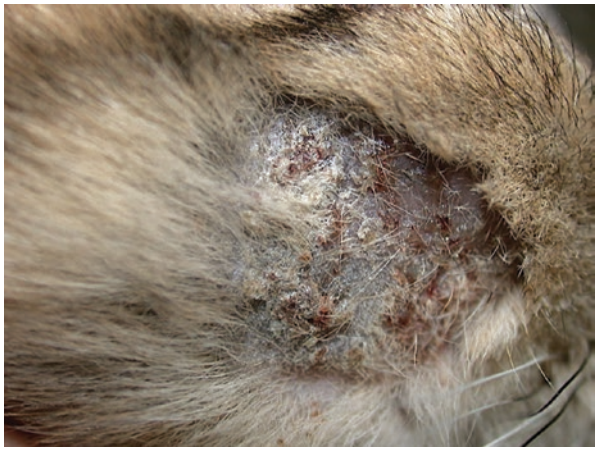

Fig. 12 Alopecia and crusting on the face of a cat with dermatophytosis

Fig. 13 Hemorrhagic crusting on the nose of a cat with squamous cell carcinoma

the dorsum, or, less commonly, with generalized distribution, miliary dermatitis should be further investigated following the diagnostic approach to pruritus (Chapter, Pruritus).

6 Take biopsies for histopathological examination

Histopathological examination should always be performed if pemphigus foliaceus, mosquito-bite hypersensitivity, urticaria pigmentosa-like dermatitis, or infectious, metabolic and neoplastic diseases are suspected, based on cytological findings. Other diseases with nonspecific cytological findings and requiring histopathological examination for the diagnosis are, for example, viral diseases, perforating dermatitis, idiopathic facial dermatitis of Persian and Himalayan cats and adverse drug reactions.

References

1. Vitale C, Ihrke PJ, Olivry T, Stannard AA. Feline urticaria pigmentosa in three related Sphinx cats. Vet Dermatol. 1996;7:227–33.
2. Jazic E, Coyner KS, Loeffler DG, Lewis TP. An evaluation of the clinical, cytological, infectious and histopathological features of feline acne. Vet Dermatol. 2006;17:134–40.
3. Bond R, Curtis CF, Ferguson EA, Mason IS, Rest J. An idiopathic facial dermatitis of Persian cats. Vet Dermatol. 2000;11:35–41.
4. Noli C, Colombo S, Abramo F, Scarampella F. Papular eosinophilic/mastocytic dermatitis (feline urticaria pigmentosa) in Devon rex cats: a distinct disease entity or a histopathological reaction pattern? Vet Dermatol. 2004;15:253–9.
5. Hobi S, Linek M, Marignac G, Olivry T, Beco L, Nett C, et al. Clinical characteristics and causes of pruritus in cats: a multicentre study on feline hypersensitivity-associated dermatoses. Vet Dermatol. 2011;22:406–13.
6. Diesel A. Cutaneous hypersensitivity dermatoses in the feline patient: a review of allergic skin disease in cats. Vet Sci. 2017:25. https://doi.org/10.3390/vetsci4020025.
7. Nagata M, Ishida T. Cutaneous reactivity to mosquito bites and its antigens in cats. Vet Dermatol. 1997;8:19–26.
8. Olivry T. A review of autoimmune skin diseases in domestic animals: I – superficial pemphigus. Vet Dermatol. 2006;17:291–305.
9. Albanese F, Tieghi C, De Rosa L, Colombo S, Abramo F. Feline perforating dermatitis resembling human reactive perforating collagenosis: clinicopathological findings and outcome in four cases. Vet Dermatol. 2009;20:273–80.
10. Beale K. Feline demodicosis: a consideration in the itchy or overgrooming cat. J Feline Med Surg. 2012;14:209–13.

General References

For definitions: Merriam-Webster Medical Dictionary. http://merriam-webster.com Accessed 10 May 2018.
Albanese F. Canine and feline skin cytology. Cham: Springer International Publishing; 2017.
Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, Wolff K. Fitzpatrick's dermatology in general medicine. 8th ed. New York: The McGraw-Hill Companies; 2012.
Miller WH, Griffin CE, Muller CKL. Kirk's small animal dermatology. 7th ed. St. Louis: Elsevier; 2013.
Noli C, Foster A, Rosenkrantz W. Veterinary allergy. Chichester: Wiley Blackwell; 2014.
Noli C, Toma S. Dermatologia del cane e del gatto. 2nd ed. Vermezzo: Poletto Editore; 2011.