

The 5th Annual Vet Education International Online Veterinary Conference



“This Itchy Cat: The Diagnostic and Therapeutic Approach”

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July 2014

Vet Education is proudly supported by Hill's Pet Nutrition (Australia)

Lecture 1: Diagnostic approach to pruritus in the cat

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Introduction

The diagnosis of pruritic disorders is not always easy in the cat. Cats often groom rather than scratch and in many cases, owners do not believe that the cat is pruritic because they have not seen any evidence of scratching. In addition, some owners fail to recognise excessive grooming as a sign of pruritus and often pruritus is not the reason for the consultation. Some owners may actually cite alopecia as the reason for presentation assuming the hair loss to be spontaneous. Others may be concerned about the presence of an eosinophilic plaque which develops from repeated licking in one area. Owners do not suspect that such problems are self-induced, particularly if the cat hides when it overgrooms. One of the challenges for the clinician is to persuade owners that such lesions can be self-induced and not a spontaneous problem.

Learning objectives: at the completion of this topic, the candidate should be able to:

1. List the four different skin reaction patterns and the common differential diagnoses causing these presentations in pruritic cats.
2. Apply systematic knowledge and problem solving strategies to prioritise these differential diagnoses based on clinical history, signalment and physical examination findings.
3. Perform and interpret the diagnostic testing required to confirm a clinical diagnosis of the pruritic cat.

In cats: four main **types of presentations** are seen either alone or combined in pruritic cats.

1. Miliary dermatitis

Miliary dermatitis is characterised by a small, erythematous, **crusted papules** that are usually non-follicular in distribution. These are most commonly located on the dorsum but can be anywhere. Miliary dermatitis **is not a diagnosis** but rather a **descriptive term**. The differential diagnosis is extensive; the most common being **allergies, ectoparasites** and **infections** (Table 1). Immune mediated diseases such as pemphigus foliaceus may occasionally mimic a miliary dermatitis.

Table 1 Causes of Papulocrustous (miliary) Dermatitis in the Cat	
Mechanism	Aetiological Agent or Disease
Ectoparasites	<i>Notoedres cati</i> <i>Cheyletiella</i> <i>Demodex</i> spp. <i>Otodectes cynotis</i> <i>Sarcoptes scabiei</i>
Allergic skin disease	Flea bite hypersensitivity Mosquito hypersensitivity Food hypersensitivity Atopy
Infectious organisms	Superficial pyoderma Dermatophytes <i>Malassezia dermatitis</i>
Neoplasia	Mast cell tumour Epitheliotropic lymphoma Urticaria pigmentosa
Immune-mediated	Pemphigus foliaceus Cutaneous drug eruptions

2. Self-induced, symmetrical non-inflammatory alopecia

Non inflammatory alopecia is used to describe an acquired syndrome of multifactorial aetiology that results in loss of hair over the perineum, proximal ventral and ventro-lateral tail, hind limbs, ventrum, lateral abdomen and distal forelimbs and on rare occasions extends to the lateral thorax (Table 2). The dorsum is not usually affected and the skin does not appear inflamed.

Feline non-inflammatory alopecia may be **self-inflicted** from licking, biting or pulling the hair as a result of pruritic dermatoses or conditions causing psychogenic disturbances or it may result from **spontaneous hair loss** due to either epilation of hair or hair shaft fracture.

It is critical when presented with this condition to ascertain whether the cat is licking the hair out or whether it is falling out. Many owners will think the hair is falling out. In the vast majority of case, it is being licked out. Most, if not all, such cases are the result of pruritus or self-trauma due to an underlying problem, and are not related to sex steroids or other hormones. If there is any doubt, perform a trichogram (examine some plucked hairs under the microscope).

Table 2 Causes of Symmetrical, Self-inflicted Alopecia in the Cat	
Mechanism	Aetiological Agent or Disease
Ectoparasites	<i>Cheyletiella</i> <i>Demodex</i> spp. <i>Otodectes cynotis</i>
Allergic skin disease	Flea bite hypersensitivity Food hypersensitivity Atopy
Infectious organisms	Dermatophytes
Psychogenic	

3. Eosinophilic Dermatoses (Eosinophilic granuloma complex)

The feline eosinophilic granuloma complex (EGC) comprises a group of clinically well recognised but poorly understood dermatoses that are common in cats. The new term feline eosinophilic dermatoses has been proposed to cover these group of skin diseases that were previously referred to as EGC. The term EGC is not a specific disease but a reaction pattern which includes a group of disorders affecting both skin and mucous membranes subdivided into **eosinophilic ulcer**, **eosinophilic plaque** and **eosinophilic (collagenolytic/linear granuloma)**.

These different clinical lesions often occur in the same patient and may respond to the same type of therapy. They should be thought of as different reaction patterns within the same disease process. To date, the most evidence points towards EGC having an underlying allergic aetiology. There are, however, lesions that do not respond to parasite control or elimination diets and where allergen specific IgE cannot be demonstrated serologically or by intradermal allergy testing. It may be possible that these lesions represent similar conditions to canine atopic-like dermatitis or human intrinsic AD. Single episodes of EGC lesions and those that spontaneously resolve seem unlikely to be caused by allergic disease, as most hypersensitivity disorders cause recurrent, long term disease. A heritable eosinophil dysregulation, predisposing cats to the development of EG and IU was suggested by a study in a colony of related, specific pathogen-free cats that frequently developed lesions. Investigations for allergic disease, including intradermal allergy testing, were negative, but lesions were reported to wax and wane and had seasonal exacerbations, which may suggest the presence of an environmental trigger. Another report of EG and IU in 17 related Norwegian Forest cats further supported a genetic background to EGC. More genetic studies are required to confirm these preliminary findings.

Underlying Causes of Feline Eosinophilic Dermatoses	
Mechanism	Aetiological agent or disease
Allergic skin disease	Flea bite hypersensitivity Adverse food reactions Atopic dermatitis Auto-allergens
Infectious organisms	Viral: feline herpes, FIV, FeLV Bacterial Fungal: dermatophytes
Others	Foreign body: exogenous (insect)/endogenous (hair) Genetic Idiopathic

Clinical presentation and differential diagnosis

1. Eosinophilic ulcer: well demarcated, alopecic, reddish brown ulcers with raised borders that usually occur unilaterally or bilaterally on the upper lips. Pruritus is not usually observed.

2. Eosinophilic plaque: well demarcated, alopecic raised plaques with a moist red surface which may be eroded or ulcerated. They are usually located on the ventral abdomen, thorax and medial aspect of the hind legs but can occur anywhere. They are extremely pruritic. A circulating eosinophilia is often present. Cytology of an impression smear reveals large numbers of eosinophils.

3. Eosinophilic granuloma: well defined, firm, raised, yellow to pink lesions that usually occur on the caudal aspect of the hindlimbs or in the oral cavity but may occur elsewhere. Oral lesions may cause drooling and dysphagia. They are usually pruritic although this may not always be observed. A circulating eosinophilia is occasionally present and there may be a local lymphadenopathy.

4. Erosive and crusting dermatosis of the face and neck

These cases are usually markedly pruritic around the head and neck resulting in alopecia, excoriations and ulceration. There are often severe lesions on the cheeks. It has been suggested that pruritus restricted to the back of the neck may also be due to herpes virus infection of nerve endings following vaccination.

Table 4 Causes of Facial Pruritus in the Cat	
Mechanism	Aetiological Agent or Disease
Ectoparasites	<i>Notoedres cati</i> <i>Cheyletiella</i> <i>Demodex</i> spp. <i>Otodectes cynotis</i> <i>Sarcoptes scabiei</i>
Allergic skin disease	Flea bite hypersensitivity Food hypersensitivity Atopic dermatitis
Infectious organisms	Superficial pyoderma Dermatophytes <i>Malassezia dermatitis</i>
Neoplasia	Mast cell tumour Epitheliotropic lymphoma
Immune-mediated	Cutaneous drug eruptions
Psychogenic	

Diagnostic Approach

The clinician must decide whether the cat is truly pruritic or if the cat is exhibiting a stereotypic behaviour pattern of excessive grooming (psychogenic dermatitis). The latter condition is rare. Though we can identify several specific causes of pruritus in the cat, bear in mind that in any individual cat the clinical picture may represent a combination of several different diagnoses. This combination may include both pruritic and behavioural aspects in some cases.

The approach to the diagnosis of pruritus is best logically approached by posing a number of diagnostic questions. The clinician will use the information derived from the history and the signalment to rank the likelihood of each of these differential diagnoses. A number of very straightforward in-house diagnostic tests can be used to assist in answering most of the following questions:

Step 1. Does this cat have a mite infestation?

A coat combing and multiple superficial and deep skin scrapings should be performed to evaluate for ectoparasites (e.g. fleas, flea faeces, *Demodex*, *Cheyletiella*, *Otodectes*, *Notoedres* and *Sarcoptes* species). If the tests are positive, the cat should be treated for the specific disease identified.

Otitis or pruritus involving the head in any animal is a clear indication for performing an ear smear. This technique is used primarily to find *Otodectes cynotis* and other species of ear mites. Occasionally *Demodex* mites may be found. The pruritus from ear mite infestations is believed to be due to mechanical irritation and hypersensitivity reaction; do not discount the finding of one mite or egg especially in intensely pruritic adult animals; many species of ear mites migrate to the ear margins to deposit eggs, therefore if swabs from the ear canal are negative; skin scrapings from the ear margins or periaural skin are indicated.

Notoedres mites are usually relatively easy to locate on skin scrapings but *Demodex*, *Cheyletiella*, *Otodectes* and *Sarcoptes* mites can be more elusive. If there are no mites seen in skin scrapings and coat brushings then we implement an acaricidal trial using selamectin 6mg/kg applied topically q 14 days for three treatments on all affected and in contact animals. Selamectin is not licensed for this purpose but when applied using this dosage regime is effective at eliminating infestation with *Notoedres cati*, *Sarcoptes scabiei*, *Otodectes cynotis* and *Cheyletiella blakei*. It is not effective at eliminating infestation with either *Demodex* species and the clinician needs to remember that this mite has not been reliably eliminated from the differential diagnoses list at this stage.

Step 2: Does this cat have a dermatophyte infection?

A Wood's lamp examination should be performed. When present, fluorescent hairs should be plucked for fungal culture. If the Wood's lamp examination is negative then a sample should be obtained with a toothbrush and submitted for fungal culture. This technique involves brushing the cat's entire hair coat with a new toothbrush and submitting it to the laboratory in its original wrapper. Make sure to brush the entire hair coat thoroughly until the bristles are full of hair or the

cat has been combed for at least one minute. It is important to brush the non-lesional part of the body initially and the alopecic region last. This serves two purposes; firstly it **minimizes the chance that tooth brushing mechanically spreads spores over the body**; secondly, if cultured last, **spores are present in the largest numbers on the tips of the bristles**.

Step 3. Does this cat have a bacterial or yeast infection?

Feline superficial pyoderma is a cutaneous disease caused by bacterial infection, typically involving the epidermis and/or follicular epithelium. The common causative agents include *Staphylococcus intermedius*, *Staphylococcus aureus* and *Staphylococcus simulans*. The disease frequently occurs secondarily to trauma, drug- or disease-induced immunosuppression, or a variety of underlying dermatological problems, such as ectoparasitism, hypersensitivities (atopic dermatitis, flea or food adverse reactions) and autoimmune skin diseases.

While there is no apparent breed or sex predispositions, young and aged cats appear to be more commonly affected.

Cutaneous lesions associated with feline superficial pyoderma are most commonly crusted papules, crusts, alopecia, erythema and ulceration/excoriation affecting the face, neck, limbs and ventral abdomen most frequently.

Pustules, epidermal collarettes, hyperpigmentation and lichenification, which are common manifestations of canine superficial bacterial pyoderma are rare (hyperpigmentation and lichenification) or not observed (pustules, epidermal collarettes) in cats.

Pruritus is a common feature.

Eosinophilic granuloma complex lesions (rodent ulcers, eosinophilic plaques) often have large numbers (moderate to abundant) of intracellular bacteria evident in surface cytology, further supporting the association between eosinophilic granuloma complex lesions and superficial pyoderma.

Diagnosis

Clinical presentation of feline superficial pyoderma is not readily distinguishable from other feline dermatoses, highlighting the importance of skin surface cytology for diagnosis.

Diagnosis is confirmed by compatible cytology (neutrophils and concurrent intracellular bacteria) using adhesive tape impressions or slide impression smears, or by complete resolution of lesions following appropriate antimicrobial treatment.

For **impression smears** we rub or press a glass slide onto the surface of the lesion or exudate. This works extremely well when the skin is greasy or exudative. Do not exert too much pressure or the slide may snap. Ulcers and the surface of "pricked" papules and pustules may also be sampled in this fashion.

Sampling with a cotton bud is useful if the skin is dry and is the method of choice for evaluating the external ear canal. Moisten with saline solution, rub on the surface of affected skin and then roll the tip onto the glass slide.

Using **clear sticky tape** is also a useful technique. The type of tape used is very important because there is a marked variation in degrees of adhesiveness and transparency between brands. Press tape sticky side down repeatedly onto the lesional skin surface until it loses its adhesiveness. This means that it is covered in corneocytes. Stick one end of the tape onto a glass slide to facilitate staining. When assessing cytological specimens it is important to scan at low power initially and then under oil immersion and assess for presence or absence of inflammatory cells, organisms and keratinocytes.

Malassezia dermatitis

M. pachydermatis is present as a commensal of the skin and mucosae of most dogs. In healthy animals it exists at higher population densities at the lips and interdigital skin than in the ears. The anus seems to be the most frequently colonised mucosal site. *M. pachydermatis* acts as an opportunistic pathogen and factors promoting its pathogenicity may include increased temperature and humidity, excessive lipid secretion and pruritic inflammatory diseases (allergic and parasitic), endocrinopathies and some metabolic (hepatocutaneous syndrome, zinc-responsive dermatoses) and occasionally cutaneous or internal neoplasia. *Malassezia dermatitis* is typically secondary to allergy, endocrinopathy, or neoplasia (reported with thymoma-induced exfoliative dermatitis and pancreatic and/or hepatobiliary paraneoplastic alopecia) in cats and may play a primary role in feline acne. *Malassezia dermatitis* is rare in cats when compared to dogs.

The skin of healthy cats is often colonized by yeasts of the genus *Malassezia*. Healthy Devon Rex cats, but not Cornish Rex cats, seem to be more frequently colonized by larger populations of *M pachydermatis* than healthy Domestic Short-haired cats. Devon Rex cats that are otherwise healthy may also present with a *M pachydermatis*-associated greasy, seborrhoeic dermatitis associated with high populations of *Malassezia* that significantly exceed those of both healthy Devon Rex and healthy Domestic Short-haired cats. The factors responsible for this susceptibility remain to be determined.

More recently it has been demonstrated that the cutaneous carriage of *Malassezia* species in Sphynx cats exceeds those of healthy Domestic Short-haired cats, healthy Devon Rex cats and Cornish Rex cats and are comparable to those of seborrhoeic Devon Rex cats. In view of the close phylogenetic relatedness of the Sphynx and the Devon Rex cat, it is possible that similar or identical genetic factors in Devon Rex cats and Sphynx cats linked to these haircoat genes promote *M pachydermatis* colonization in these breeds.

Predisposing factors for *Malassezia* species overgrowth in feline species have not been elucidated. In a retrospective study, the presence of *Malassezia* spp. on histopathological cutaneous sections was frequently related to thymoma-associated dermatitis and pancreatic and hepatobiliary paraneoplastic alopecia. In addition, *Malassezia* spp. have been more frequently

isolated from healthy ear canals and skin in feline leukaemia (FeLV)-or feline immunodeficiency virus (FIV)-infected cats than in healthy, non-infected cats.

Based on these findings, *Malassezia* spp. overgrowth in cats is reported as a marker of serious, underlying diseases, including retrovirus infection and neoplasia. However, *Malassezia* spp. overgrowth has been described also in feline localised benign exfoliative skin diseases, such as chin acne and the idiopathic facial dermatitis of Persian cats and feline *Malassezia* overgrowth has been also associated with allergic skin diseases in cats but the association with allergic disorders is not as well established as in dogs.

Clinical signs

Feline *Malassezia* dermatitis is characterised clinically by greasy exudation; a reddish-brown discolouration and erythema and alopecia affecting the axillae and groin or localised involving the face, neck, abdomen and perianal region.

Malassezia spp. yeasts are common inhabitants of feline nail folds, especially in Devon Rex and Sphynx cats, and the presence of a high number of yeasts on cytology correlates with the clinical observation of tightly adherent brown greasy exudate on the interdigital skin or around claws and claw folds.

Cats with *Malassezia* otitis externa present with pruritus and head shaking and scratching, with accumulation of brown to black exudate and/or cerumen in the external ear canals and mild to moderate inflammation

Diagnosis

The criteria required for the diagnosis of *Malassezia* dermatitis have not been definitively established in the cat. It has been proposed that such a diagnosis is based on clinical signs, presence of elevated numbers of the yeast in lesional skin, and a clinical and mycologic response to antifungal therapy.

Cytological examination is the most useful technique for assessment of *Malassezia* density on the skin surface. In dogs, the diagnosis is confirmed by cytology using tape strip samples, slide impressions or swab smears demonstrating elevated populations of *Malassezia*. Several cytological criteria have been proposed to diagnose *Malassezia* overgrowth including the observation of more than two organisms per high power field (400x) in skin specimens.

The tape strip technique is convenient and reliable in cats: clear adhesive tape is pressed on the surface of the skin, thus collecting the stratum corneum cells and any superficial microbes using one of the criteria proposed for diagnosis of *Malassezia* overgrowth in dogs. To the authors' knowledge, no reports have been published that provide details of yeast density on the surface of normal feline skin. Although *Malassezia* spp. are part of the microflora of the skin of clinically normal cats, it is difficult to detect the organism by the tape strip method in the majority of healthy cats. Moreover, *Malassezia* organisms on the skin of healthy cats are found in low numbers and predominantly at only one anatomical site.

For diagnosis of *Malassezia* paronychia, the broken end of a wooden cotton-tip swab is used to scrape the claw fold, and exudate is pressed and rolled onto a glass slide..

In dogs, *Malassezia* paronychia and brown discoloration of the claw are commonly associated with atopic dermatitis and paw licking. In cats, it seems that the presence of brown, greasy material in the nail folds is associated with the presence of *Malassezia* spp. yeasts, particularly when present in high numbers. However, as these cats are not pruritic, the presence of *Malassezia* yeasts seems to be completely asymptomatic, even in Devon Rex and Sphynx cats with high numbers and the presence of more than one species. The yeasts would seem to be residents of this specialised region of the skin surface ecosystem, at least in these breeds of cats.

For examination of ear exudate in cats with ceruminous or exudative otitis externa, rolling of exudate in a thin layer on a glass slide with a cotton-tip swab is the preferred method

Step 4. Does this cat have flea bite hypersensitivity dermatitis?

If the skin scrapings and Wood's lamp examination are negative, then we usually implement a thorough flea control program to evaluate for the diagnosis of flea bite hypersensitivity (FBH) dermatitis. In Australia, FBH is undoubtedly the major cause of miliary dermatitis and non-inflammatory alopecia in cats and should always be evaluated before more extensive diagnostic investigation is undertaken.

In a multicentre European study of 502 cats with pruritic dermatitis, 29% were diagnosed with flea allergy, while 12% were diagnosed with food allergy and 20% were atopic. There is no breed, age or sex predilection reported for FBH in the cat but in our experience flea allergy often affects young cats of 6 months of age or older. The pruritus may be seasonal or non-seasonal depending on the geographic region.

Pruritus is moderate to severe. Unlike dogs that have a fairly typical clinical presentation associated with FAD, cats can present with a variety of clinical signs. In the previously mentioned study of 502 cats, four common reaction patterns were identified: miliary dermatitis; symmetrical alopecia, head and neck excoriations and eosinophilic granuloma complex. These patterns were mainly seen alone, but 25% of the flea allergic cats presented with a combination of patterns.

Miliary dermatitis is a unique clinical pattern seen in cats and is a common clinical presentation for FAD; in the study of 502 cats, 35% of cats with flea bite allergy presented with miliary dermatitis as part or all of their clinical signs. The lesions consist of multiple, small crusted papules with alopecia, excoriations, crusting and scaling confined to the dorsal lumbosacral region, caudomedial thighs, ventral abdomen, flanks and neck or generalised. Less frequently the distribution of the papules is confined to a very distinct area of the body such as the pinnae, the forelimbs or the pre-auricular area.

Symmetrical alopecia is a common sign of FAD. In the study of 502 cats, 39% of flea-allergic cats presented with symmetrical alopecia. The distribution of the alopecia can vary. Bilaterally

symmetrical alopecia of the caudal dorsum and flank area is the most common distribution. The ventrum, forelimbs, head and neck are also commonly affected. Signs of inflammation, such as erythema, erosions or crusting are not usually observed or the alopecia may be associated with miliary dermatitis. In cases with just alopecia many owners are convinced that the fur is falling out rather than being traumatically removed by the cat because cats can be extremely secretive about their excessive grooming. However individual hairs do not epilate easily and when examined microscopically the hairs have blunted or fractured ends instead of tapered ends. This indicates the hairs were traumatically removed.

Head and neck excoriations are most commonly associated with adverse food reactions (64%) but flea allergic cats also present with this pattern (38%)

Eosinophilic granuloma complex lesions can occur alone or in combination with each other. In the study of 502 cats, only 14% of FAD cats presented with EGC compared to 25% of food allergic cats and 26% of atopic cats, however it is recommended to investigate flea allergy as a cause of FAD.

The presence of fleas, flea faeces or flea eggs may be demonstrated during the physical examination and in coat brushings although in many instances it is impossible to find definitive evidence of flea infestation which probably reflects the grooming activity and prompt removal of fleas by affected cats. In many cases, response to flea eradication measures is the best confirmation of a putative diagnosis of FAD. We call this a “**flea therapeutic trial**”

The time taken for clinical improvement depends on the severity and chronicity of the disease, the degree of hypersensitivity and the magnitude of the flea challenge. As a general rule the response (or lack thereof) of a therapeutic trial is initially assessed at Week 4, but depending on the severity of the disease, it can take until Week 8 to 12 for these cats to recover.

Flea avoidance is clearly the goal for a cat with FAD. This is difficult and takes time. Symptomatic, anti-pruritic therapy is often necessary. Furthermore there are many opportunities for a cat with severe FAD to pick up fleas (e.g neighbourhood, occasional visiting pets, wildlife, vermin etc). The ideal product to protect an animal with FAD against fleas would be one with repellent action, that is a product that would prevent newly emerged adult fleas from jumping onto the host, or leaving the host rapidly without feeding. The best repellent against fleas is permethrin, which is highly toxic to cats and should never be used in this species and unfortunately no other effective repellent exists. It is important to remember that the majority of fleas feed within the first 3–5 minutes on the host before most modern products can kill fleas. Therefore, effective modern products must actually **diminish rather than prevent flea feeding** before the flea is killed. Consequently, flea allergy is now recognised as simply another **dose dependent hypersensitivity** contingent on the dosage of antigen (flea salivary proteins) injected into the host. The severity of flea allergy is dependent on the magnitude of hypersensitivity elicited in that animal, the number of fleas successfully feeding, plus the amount of antigen injected by fleas during feeding. Since rapid flea kill will reduce antigen access, products that shorten the blood meal duration should diminish antigen access (flea saliva injection) more effectively.

A flea therapeutic trial in the cat in our dermatology clinic involves giving oral **spinosad (Comfortis® Elanco) 50 to 100mg/kg PO q 14 days**. Spinosad is registered for use in cats at this dose rate administered every 30 days. Oral nitenpyram (Capstar® Novartis) at 1mg/kg PO q 24hrs for 30 days is another alternative.

Step 5. Does this cat have a food allergy?

At the same time we commence a “flea therapeutic trial”, we usually begin an elimination diet trial to investigate the possibility of an **adverse food reaction (AFR)**.

AFR are usually non seasonal and often occurs suddenly after **months or years of consuming the diet containing the inciting foodstuff**. The occurrence of symptoms is usually consistent with subsequent challenges: each intake of allergen causes symptoms. An inconsequent response can be explained by a variation in dose of allergen ingested, interference with food ingested simultaneously or an altered method of food preparation.

The most common clinical sign of AFR in cats is a **non-seasonal pruritus**. The response of pruritus after administration of corticosteroids is variable. It has been considered that approximately 50 to 80% of cats with AFR respond with a marked reduction in pruritus following treatment with corticosteroids.

Signalment

No sex predilection has been reported for AFR in cats. Although an AFR can occur in any breed of cat, the Siamese and Birman cat have been reported to be at risk. Burmese cats are also suggested as being at increased risk but none of the published reports appear to support this. In a recent study, Abyssinians appeared to be over-represented (Vogelnest 2013).

Food allergies can develop at any age. A wide age range of cats are affected with the age of onset ranging from 6 months to 11 years. This is in contrast to studies in dogs where the onset of clinical signs in dogs with confirmed AFR is one year of age or younger in approximately 50% of confirmed cases. Hobi et al found that the mean age of initial signs was the same with food-allergic and environmentally allergic cats with most cats exhibiting initial signs prior to 3 years of age. However 26% of food allergic cats experienced their first clinical signs after 6 years of age, in contrast to only 12% of environmentally allergic cats.

Clinical signs

The most common clinical sign of AFR in cats is a moderate to severe, non-seasonal, constant pruritus. The head and neck including the preauricular, pinnae and periorbital regions are commonly affected. Other less commonly affected regions include the limbs, ventrum, paws and perineum.

Cats with food allergy can be clinically indistinguishable from cats with environmental allergies. Attempts to develop criteria to distinguish food allergic cats from environmentally allergic cats have not been successful thus far. Cats can present with a miliary reaction pattern accompanied

by varying erythema, alopecia, erosions and crusting. Other common cutaneous reaction patterns include symmetrical, self-induced alopecia and eosinophilic granuloma complex lesions (eosinophilic ulcer and eosinophilic plaques). Less common cutaneous clinical signs associated with AFR in cats include angioedema and urticaria. *Malassezia* otitis is reported as a complication of cutaneous AFR in cats some studies. Bacterial pyoderma is a common secondary complication of cutaneous AFR in cats.

Gastrointestinal tract symptoms including vomiting, diarrhea and lymphoplasmacytic colitis have been variably reported. In Hobi's study, food allergic cats were presented more frequently with gastrointestinal signs, although this still only accounted for 21% of food allergic cats. In cats, diagnosed with AFR, up to 65% are reported to have concurrent cutaneous hypersensitivities including hypersensitivity (atopic) dermatitis and flea-bite hypersensitivity. This is important from a clinical perspective as cats with concurrent atopic dermatitis may only demonstrate a partial reduction in pruritus while receiving an elimination test diet and may also exhibit perennial clinical signs of pruritus with a seasonal flare.

Diagnosis

The gold standard to achieve a diagnosis of feline AFR is based on feeding an elimination diet and documenting the resolution of clinical signs followed by a demonstrated relapse of clinical signs after the introduction of the previously fed foods (provocative challenge). Diagnosis is confirmed after resolution of clinical signs when fed the elimination diet again. Intradermal testing, ELISA and RAST in vitro allergy testing and gastroscopic food testing are not reliable for the diagnosis of AFR in cats.

Elimination diets

The selection of an appropriate elimination test diet is dependent on the dietary history. Most cats have eaten commercial diets containing a variety of different ingredients from protein and carbohydrate sources. Selecting items that are unique to the diet can be challenging. An appropriate elimination diet should consist of a novel protein source for each individual animal, which requires collection of a thorough dietary history. Elimination diets used in veterinary medicine include commercial novel protein, commercial hydrolysed protein and home-prepared diets using fresh ingredients. It is recommended that a home prepared elimination diet should be considered as the gold standard for diagnostic purposes.

Commercially available novel protein diets usually contain a single protein and a source of carbohydrate that, ideally, most animals are unlikely to have received regularly in their diet. However, the novel protein commercial diets in Australia are rarely suitable for cats, because lamb, duck and turkey (potentially cross-reactive with chicken) and fish are the major available options, all of which are common ingredients in a range of commercial foods. There is limited scientific evidence which shows that some cats will improve on a home cooked diet but experience a recurrence of signs when fed a commercially available diet containing the same ingredients and commercially available novel protein diets have been contaminated with non-labelled food proteins. Commercial novel protein diets may therefore be more useful in Australia as long-term maintenance diet options rather than diagnostic elimination diets.

Commercial hydrolysed protein diets contain smaller peptides and amino acids with reduced antigenicity and allergenicity. There is limited published data on the efficacy of hydrolysed protein diets as elimination diets in cats. In dogs, hydrolysed products are reported to accurately diagnose AFR in 50–94% of cases but 5–30% of dogs reported reactive to a protein source also reacted to the hydrolysed version of that protein. This may be due to an insufficient degree of enzymatic proteolysis, which is an important variable for the successful outcome of a hydrolysed diet. Reactions to partial whey-hydrolysed formulas have been reported in cow's milk-allergic children, and occasional reactions to even the most extensively hydrolysed casein or whey formulas have been demonstrated in highly sensitive children. Interestingly, previous exposure to duck may predict hypersensitivity to other closely related avian meats. The possibility of an adverse reaction to a hydrolysed formula to cats sensitized to the parent protein, should always be considered and close monitoring during introduction of the diet is recommended.

Table 1 Hydrolysed diets	
Diet	Constituents
Hill's Prescription diet z/d ultra canine and feline canned	hydrolysed chicken, corn starch and soybean oil
Hill's Prescription Diet z/d low allergen feline	hydrolysed chicken, rice and vegetable oil
Royal Canin Hypoallergenic feline	hydrolysed soya protein isolate and hydrolysed poultry liver, rice, beet pulp, animal fats, vegetable oils, fish oil
Nestle-Purina HA (NZ only)	hydrolysed soy, corn starch, cellulose, vegetable gums, coconut oil, canola oil, corn oil

Home-prepared elimination diets consist of a novel protein with or without a novel carbohydrate. Cats do not require dietary carbohydrates, but they can utilise them if present. Cross-reactivity of poultry meats limits the value of turkey and duck. Cross-reactivity of mammalian meats may also occur in humans and has not been studied in animals. Human-grade meat is recommended, to avoid the excessive preservatives that may occur in pet food meats, with the potential to cause thiamine deficiency. Minced meats should be avoided because of the possibility of contamination with other meat sources. The recommended length of the dietary trial in cats is 6 to 8 weeks.

Interpretation of the Response on the Diet

In patients with dermatologic signs, pruritus is the most important symptom that is evaluated during the elimination diet. The interpretation of a patient's response to the elimination diet can be hampered by a partial or coincidental response, the influence of secondary bacterial infection or a treatment that has been used simultaneously to manage pruritus.

A **partial response** occurs when concurrent allergies are present or in atopic patients that go through a fluctuation in severity. This can be responsible for a false diagnosis of AFR. To prevent this problem, it can be necessary to repeat the food trial, until both the owner and the clinician are fully convinced that the diet is the determining factor in preventing the symptoms.

Secondary bacterial infections occur frequently in cats with AFR and treatment is often prescribed simultaneously with the start of an elimination diet. It is important to maintain the treatment during challenge testing, because otherwise infections can reappear and wrongly suggest that the patient relapsed on the food.

Related problems are the cases of recurrent pyoderma following AFR in cats. Pruritus in these patients is only caused by the bacterial lesions and completely resolves after treatment with antibiotics. Diagnosis of this non pruritic form of AFR with secondary pruritic pyoderma is very difficult, especially if the period between the relapses is significant. In this situation, the clinician has to determine if the elimination diet prevents the relapse of the pyoderma but this can take a substantial period of time. It can be difficult to maintain the cooperation and the compliance of the owner in these circumstances.

Treatment with corticosteroids is only advised when absolutely necessary in cats with intense and severe pruritus and then should only be prescribed for a short period (1 to 3 weeks).

Finally, if there is no improvement after the elimination diet, then the owner must be informed that the pruritus is due to another cause or an allergen in the elimination diet.

Confirming food allergy

A diagnosis of AFR is confirmed by demonstrating that the clinical signs recur when previously fed foodstuffs are re-introduced. This is achieved by feeding a test meal of the cat's previous diet including treats for 10 to 14 days. Some owners will refuse to a challenge with the former food after reduction in clinical signs, but it is important to underline the importance of the challenge test, because a significant placebo affect can occur in 20% of cases. This means that continuing the elimination diet will be of limited value in some patients.

When the clinical signs will reappear is a subject of debate. Recurrence of pruritus is typically reported within hours to 7 days of re-challenge, but may take up to 14 days. In the recent Australian study, more than half (63%) of the affected cats recrudesced within 2–7 days of dietary re-challenge, although 24% took up to 14 days. The time to relapse in the re-challenge phase may or may not accurately guide the time to relapse for individual foods in the sequential re-challenge phase, and the validity of current guidelines on the duration of appropriate re-challenge and sequential re-challenge phases for cats with AFR is unclear. Once a documented reaction is noted the animal should be placed back on the elimination test diet.

Identification of specific food allergies

A sequential rechallenge involves feeding each of the major food items that were contained in the original diet reported to cause AFR in cats (beef, fish, chicken and dairy) by adding one pure food

ingredient to the restrictive diet to determine which individual allergen or allergens is incriminated. Most cats are only allergic to a single protein.

The lengthy time taken to complete a full sequential dietary re-challenge may limit accurate and complete determination of causative foods, as exemplified in the Australian study where the sequential re-challenge phase was only completed for 6 affected cats (35%). Indeed, clear identification of a causative food protein was only possible in 4 of the affected cats (23%). In previous studies, beef, dairy, fish, poultry and lamb have been common foods causing adverse reactions in cats, with food additives less commonly incriminated and similarly in this study, fish, chicken and beef were confirmed causes of AFR.

Step 5. Does this cat have feline atopic dermatitis?

If parasites, infections and food allergies have been ruled out and pruritus remains, then the likely diagnosis is environmental allergies. The term feline atopic dermatitis should probably be avoided because its clinical presentation and histologic features differ markedly from those of its human and canine counterparts and because of the controversy associated with the role of feline IgE in its pathogenesis. It has been suggested that the more generic term of feline hypersensitivity dermatitis (FHD) be used to describe these cats until the role of feline IgE in its pathogenesis has been more firmly demonstrated.

Cats with feline HD are usually presented to veterinarians with one of several clinical reaction patterns: head and neck excoriations, symmetrical self-induced alopecia, miliary and/or eosinophilic dermatitis triggered by one or more of several groups of airborne environmental allergens. These clinical reaction patterns are not specific for any particular group of allergens and the final diagnosis of feline HD is based on the exclusion of other pruritic diseases, such as ectoparasites and bacterial and fungal infections, as well as an evaluation of the role of flea, food allergens as flare factors, compatible clinical signs and a positive response to therapy. Allergic skin disease due to environmental allergens is a clinical diagnosis. Intradermal and serological allergy testing can be performed to select the allergens for an immunotherapy regime and to implement allergen avoidance measures.

If an owner elects not to pursue allergy testing then the most appropriate course of action is to commence symptomatic medical therapy. Recommended treatments for feline HD include allergen specific immunotherapy, allergen reduction, ciclosporin, glucocorticoids, antihistamines and fatty acids. Paradoxically, the use of allergen specific immunotherapy based on intradermal or serological allergy tests can be successful in ameliorating the symptoms of feline atopic skin disease, although reports in the literature relate to open and poorly controlled studies.. We will be covering more detail on the management aspects in the lecture tomorrow.

Step 6. Could this cat have psychogenic factors contributing to the overgrooming?

In cat with persistent non-inflammatory alopecia then it is worthwhile at this stage to consider the possibility of psychogenic alopecia. In our dermatology referral practice, psychogenic alopecia is uncommon as a sole primary clinical entity in the cat. Assessing how often cats with primary pruritic skin disease develop a stereotypic component to their overgrooming, however as part of

the disease process can be difficult. In some cases the initial pruritic trigger may no longer be present and identifiable but overgrooming has become self-reinforcing. Some individual cats have a temperament that predisposes to this outcome. The possibility of both a pruritic component combined with a psychogenic component should be considered in some cases. We would estimate that 10% to 15% of cats with chronic non inflammatory alopecia in our referral dermatology practice have a psychogenic component reinforcing a primary pruritic skin disease. This may account for the partial success seen in some cases with symptomatic anti pruritic therapy. No single diagnostic test can confirm psychogenic alopecia. Cats that are typically affected include the Siamese, Burmese, Abyssinian and Himalayan breeds. The primary abnormality is thought to be excessive grooming that may result from an anxiety neurosis caused by psychological factors such as displacement phenomena; for example a new pet or baby in household; a move to new surroundings, boarding, hospitalisation, loss of a favourite bed or companion, or competition for a social hierarchy position with other pets in the household or in response to other cat's entering the affected cat's territory.

Lack of improvement in either cutaneous or behavioural signs after drug treatment of any sort is of no diagnostic value. Equally the efficacy of corticosteroids or synthetic progestagens cannot be used to conclude that a hypersensitivity skin disease is present. For instance, megestrol acetate has marked neuroleptic activity and conversely many of the psychotropic drugs have sedative or antihistamine activity. An accurate diagnosis of feline psychogenic alopecia involves a complete diagnostic work-up as this condition is diagnosed primarily by ruling out all other differential diagnoses.

Lecture 2: Therapeutic management of the itchy cat

Dr Mandy Burrows

A. Identify and avoid flare factors

Currently recognised flare factors of feline hypersensitivity include fleas, infection, food and environmental (e.g. house dust mites, pollens) allergens.

1. Implement flea control:

In geographic regions where flea infestation is endemic, all cats with feline HD should be treated with year-round flea adulticides combined with relevant environmental measures.

2. Evaluate for bacterial and yeast infection:

Cats with feline allergic dermatitis are predisposed to secondary infections with *S.pseudintermedius* and *Malassezia pachydermatis*, and *Malassezia* otitis externa is a common complication of feline allergic dermatitis. If bacterial or yeast infections are identified using a combination of clinical signs and cytological evaluation, then antimicrobial therapy is indicated, and in cats, injectable and oral antimicrobial therapies are more useful than topical medications, except for aural preparations. More information on secondary bacterial pyoderma and *Malassezia* infections in cats is available in the previous lecture.

3. Perform an elimination diet trial:

Food allergens can cause flares of clinical signs of feline allergic dermatitis in cats hypersensitive to such allergens. An elimination diet should be performed in all cats with non-seasonal pruritus to determine whether food allergens are contributing to the clinical signs.

4. Identify possible environmental allergen flare factors:

If there has been no response to a flea therapeutic trial or an elimination diet then the cat should be evaluated for environmental allergens, such as house dust mites and pollens with allergen-specific intradermal testing (IDAT) and/or serological tests. These results can serve as the basis of allergen-specific immunotherapy and to implement allergen avoidance measures. IDAT is more technically demanding to perform in the cat than in the dog and will require referral to a veterinary dermatologist. Although positive reactions are commonly obtained using IgE serology, their precise significance is not known and no test should be used to differentiate cats with feline HD from other causes of pruritic dermatitis.

If an owner elects not to pursue allergy testing then the most appropriate course of action at this stage is to commence symptomatic medical therapy. Recommended treatments for feline HD include topical and systemic glucocorticoids, ciclosporin and barrier protection.

5. Investigation of the relevance of other flare factors:

In human patients with AD, psychological factors (e.g. stress) are known contributors to the severity of clinical signs of AD. At this time, there is insufficient evidence regarding the role of these factors in cats with HD but a similar link between anxiety and feline HD probably does exist.

B. Reduction of pruritus and skin lesions with pharmacological agents

1. Topical glucocorticoids:

There is some evidence for the efficacy of the diester glucocorticoid hydrocortisone aceponate (HCA) licensed for topical use in dogs as a 0.0584% spray (Cortavance®) for reduction of skin lesions and pruritus in feline allergic dermatitis. Unlike conventional topical glucocorticoids, HCA is metabolised within the skin into a largely inactive moieties within the skin allowing it to maintain local potency without the risk of systemic side effects. Such treatment is suitable for daily to alternate daily application for six to eight weeks. In cats that do not tolerate the application of the spray, the product can be wiped on lesional skin using cotton wool.

Other medium potency topical corticosteroids that can be useful for local topical application include 0.1% mometasone or 0.1% methylprednisolone aceponate fatty ointment, ointment, cream or lotion.

Clinicians must tailor the frequency and duration of application to the severity of clinical signs and should note that these treatments are intended for use only over a limited period and caution is advised with long-term use, as adverse effects including dermal atrophy can occur following prolonged application.

2. Oral glucocorticoids:

The efficacy of glucocorticoids for treatment of feline allergic dermatitis is well established. Such medications are especially suited for cats with non-localised disease, and when other flare factors have been identified and eliminated.

Injectable glucocorticoid preparations are popular, especially with cats that resent the administration of oral medication. Methylprednisolone acetate is often successful at 20mg (or 4mg/kg) every two to three weeks for a total of three injections. Maintenance doses may be given every 6 to 12 weeks. Unfortunately an initial beneficial response to injectable therapy can be followed by a reduced response and consequently a reduction in the interval between injections. Therefore, in the author's opinion, methylprednisolone acetate should not be a standard therapy for feline allergic dermatitis.

Prednisolone or methylprednisolone are used orally at a dose of 1 to 2mg/kg once daily, and then the dose reduced by 50% for a further seven days followed by alternate day therapy reducing to the lowest effective minimum dose. Although glucocorticoids are effective and safer in cats than dogs, they are not without potential side effects. Adverse effects include polyuria, polydipsia,

polyphagia, diabetes mellitus, iatrogenic hyperadrenocorticism with fragile skin syndrome and urinary tract infections and generally occur proportional to dosage and duration of administration.

3. Cyclosporin (CsA):

There is good evidence for the efficacy of CsA for reduction of the skin lesions and pruritus in feline allergic dermatitis and eosinophilic dermatoses used at various dosages, generally ranging from 5 to 10mg/kg. The dose of 7mg/kg given daily, mixed with food has recently been tested in a randomised, blinded parallel group, placebo controlled study and was shown to be efficacious and well tolerated. In a cats with head and neck excoriations, self-induced alopecia, eosinophilic plaque and/or miliary dermatitis, the administration of 7mg/kg CsA daily for 6 weeks resulted in a decrease in total lesion and owner-assessed pruritus severity scores. Higher dosages of 10 to 15mg/kg for up to 12 weeks can be required for some eosinophilic dermatoses, particularly oral eosinophilic granuloma and indolent ulcer.

After beginning CsA administration, a significant improvement in cats with feline allergic dermatitis is usually noted within 10 to 14 days and complete remission achieved after four to six weeks. Consequently, the response to this drug should not be assessed, nor dose adjustments be made, for at least four weeks after commencing therapy. As previously mentioned a satisfactory response can take longer, with several months of daily administration required for some eosinophilic dermatoses.

After four weeks, the dose should be reduced by increasing dosage intervals to alternate daily for four weeks and then clinicians should attempt to reduce the CsA administration to twice a week. In a recent study, after receiving a dose of 7mg/kg for four weeks, the dose of CsA could be tapered in 70% of cats and in 57% of cats to twice a week without deterioration of the clinical response. The frequency and the extent of dose tapering appears to be higher in cats than in dogs, where the frequency of alternate day treatment following an induction period is close to 50% and no more than 20% of dogs can be dosed twice a week for maintenance. To increase the speed of clinical improvement, some clinicians advocate the administration of a short course of oral prednisolone during the first two weeks of CsA administration as beneficial for some cats.

A number of studies have examined the pharmacokinetics of CsA in cats. The elimination half-life following administration ranges from 6.8 to >40hrs in normal healthy cats. The bioavailability of orally administered CsA in one study was reported to be 29% and 25% on days 7 and 14 respectively with substantial individual variation. There is no significant difference with dosing with or without food though consistency in dosing with respect to time and feeding is recommended for individual cats. The drug is metabolised in the liver and intestines, and excreted in the faeces with a small amount of inactive metabolite in the urine. It reaches steady state in one week of commencing administration of the drug. Use of compounded CsA is not recommended as this is very likely to have a reduced bioavailability and increased variability of absorption compared with commercially available CsA.

Drug interactions

CsA is a drug with numerous possible interactions because of its liver metabolism and because it is a P-glycoprotein substrate. Coadministration of CsA with other P-glycoprotein substrates can potentially decrease the efflux of drugs from blood brain barrier cells potentially resulting in signs of ventral nervous system toxicity. CsA increases the risk for ivermectin toxicity in dogs and in a recent study, 70% of cats that were treated with CsA and a macrocyclic lactone (selamectin or milbemycin) experienced an adverse event, predominantly digestive tract disorders.

Recent studies have shown that in dogs, metoclopramide can be dosed with no change to CsA concentrations however in contrast, concurrent dosing of metoclopramide and CsA resulted in some cats showing decreased CsA concentrations. Concurrent dosing of 10mg/kg itraconazole allowed 50% dose reduction of CsA in cats and concurrent dosing of 10mg/kg q24hrs clarithromycin allowed about a 65% reduction in CsA dosing in cats.

Previously vaccinated cats treated with CsA 24mg/kg q 24hrs and subsequently re-vaccinated for FCV, FPV, FeLV, and FHV-1 generated lower but adequate titres compared with normal control cats. FIV vaccine administered to naïve cats on this dose failed to develop titres. The effect of more routine doses of CsA (5-8mg/kg q24hrs) on vaccination for viral diseases remains unknown.

Adverse reactions

In cats, few adverse reactions to CsA have been reported. Gastrointestinal signs including vomiting, diarrhoea and reduced appetite are most frequently reported. In most cases these occur within the first few weeks of therapy and are mild and transient. Some cases are more severe and persistent and require intervention and drug cessation. In cats, vomiting and weight loss has been reported after months to years. Hepatic lipidosis can occur secondary to persistent weight loss. Options for vomiting include concurrent dosing with maropitant at 1mg/kg q 24hrs or freezing the capsule (if used in lieu of liquid) prior to administration (anecdotal). Other considerations for both vomiting and diarrhea include halving the dose and giving it twice daily, administration with food, starting at a lower dosage and gradually increasing to a therapeutic dosage.

Reversible gingival hyperplasia has been reported in cats. Drug cessation typically results in improvement. Azithromycin 5 to 10mg/kg q 24hrs or compounded azithromycin toothpaste have been used successfully in dogs but no such reports exist in cats. Plaque control has shown to be of benefit.

Elevated urea, creatinine, alanine transferase, cholesterol, hyperproteinaemia and hyperglobulinaemia as well as hyperglycemia have been described in cats receiving CsA at 7.5mg/kg q 24hrs. CsA has been shown to inhibit insulin secretion in vitro in dogs and it seems possible that CsA may be able to convert clinically pre-diabetic dogs with suboptimal endogenous insulin concentrations to clinically diabetic animals, however this has not been recorded in cats. Caution is however recommended in dosing cats with evidence of renal disease or diabetes.

Dosing of CsA is not recommended in cats with FIV, FeLV or a history of neoplasia or suspected neoplasia. CsA may also precipitate relapse of clinical signs of feline herpesvirus, but at 8mg/kg q

24hrs in one study these signs were mild and self limiting. The risk of significant herpes relapse may be greater in cats with trough CsA concentrations > 1000ng/ml.

A recent concern associated with CsA therapy in cats is the increased risk of developing systemic toxoplasmosis. Therapeutic doses of CsA have induced fatal toxoplasmosis in a small number of cats either by reactivation of latent infection or by primary infection in naïve cats. It has been suggested that cats most at risk are those with a negative antibody status to *Toxoplasma* at the commencement of therapy and the risk for fatal toxoplasmosis is greater in cats with trough CsA concentrations >1000ng/ml (assay type not specified) and those receiving concurrent prednisolone administration. Routine measurement of CsA trough concentrations in cats 1 to 2 weeks following commencement of therapy to try and detect at risk cats has been recommended. In one pharmacokinetic study in cats it was found sampling two hours after dosing at 7 and 14 days after commencement of therapy represented a better correlation with the AUC, so these recommendations may change in the future.

Further recommendations to reduce the risk of this disease include feeding only processed foods (or if meat is fed then cooked or frozen/thawed), avoiding raw meat, poultry, viscera or bones and preventing hunting and scavenging. With respect to oocyst shedding, administration of 7.5mg/kg CsA prior to *T.gondii* infection lessened oocyst shedding (likely from the anti-*T.gondii* effects of the drug) and administration of CsA in *T.gondii* carriers did not precipitate shedding.

When seroconversion occurs, or significant rises in toxoplasma antibody titres are observed in association with developing clinical illness in cats which were seropositive prior to initiation of immunosuppressive treatment, antitoxoplasma chemotherapy should be commenced immediately to prevent acute systemic toxoplasmosis.

In humans, one of the concerns regarding long term therapy with CsA is the increased risk of development of neoplasia, especially lymphoma and ultraviolet light associated skin tumours such as squamous cell carcinoma. There is limited information to suggest that dogs receiving CsA are not at risk for increased rate of lymphoma, however in renal transplant cats on CsA, there was more than six times higher odds of developing post-transplant metastatic neoplasia compared with control cats. Lymphoma has been reported in cats on 7mg/kg (1/205, <18 weeks therapy) and 40mg/kg (1/40, < 6 months of therapy). There are numerous other factors that could account for increased cancer risk in those cats in general (metabolic and systemic derangements from the renal disease, chronic antigenic stimulation from the allograft, etc.); therefore, those findings may not be directly applicable to patients being treated with CsA for dermatological disease.

In summary, although there is some risk with CsA therapy, the risk is low and does not invalidate CsA as a reasonable option for feline allergy. To limit opportunities for infection, we recommend that cat owners should be advised to maintain the cat indoors only, not to feed raw or unpasteurised meat or dairy products, and to prevent the cat from hunting or getting into fights with other animals. Likewise, clinicians should attempt to taper to the lowest effective dose of CsA. Furthermore, maintaining close follow-up, with at least biannual physical examinations and monitoring of laboratory parameters such as serum chemistry, complete blood counts and urine

analyses and evaluating *Toxoplasma* titres, before and after starting the CsA, can further help to limit risks with CsA use.

4. Antihistamines

There is limited evidence that antihistamines are of clinical benefit in cats with feline allergic dermatitis. Until recently, there were no placebo controlled studies of antihistamine use in cats and dosages recommended were empirical and based on open trials. A recent placebo controlled, blinded, cross over study demonstrated no statistical difference in the reduction of pruritus between placebo and cetirizine at 1mg/kg q 24hrs administered to cats with hypersensitivity dermatitis. There are no antihistamines with proven effect available for cats, although some authors report anecdotal responses to hydroxyzine 2mg/kg q 12hrs and cetirizine 1 to 2mg/kg q 12hrs.

5. Essential Fatty Acid (EFA) Supplements

There is little to no evidence that EFA supplements, EFA enriched diets and nutritional or herbal supplements provide meaningful benefit for reducing pruritus in cats with feline HD. In several open trials, cats with pruritus, eosinophilic granuloma complex and miliary dermatitis were treated with various combinations of evening primrose oil and fish oil and these studies suggested that cats respond favourably to EFA with variable efficacy.

Side effects of EFA are very uncommon but palatability in cats is often considered to be poor. EFA might be useful to improve coat quality and ameliorate dry skin, but, at this time, there is no evidence of superiority of any particular EFA combination, dosage, ratio or formulation (including enriched diets) to achieve skin barrier, coat quality or anti-allergic effect in cats with feline HD.

C. Improve Barrier Function

1. Bathing:

In cats, shampoo therapy is rarely used. However shampoo therapy, when it is possible for owners to bath cats with minimal stress can be effective adjunctive therapy. Weekly bathing with a mild non irritating shampoo and lukewarm water is likely to be beneficial for a direct soothing effect to the skin, the physical removal of surface allergens and microbes and an increase in skin hydration.

2. Dietary supplementation

In normal cats, dietary supplementation with EFA, or the feeding of EFA-rich diets, especially those rich in the omega-6 EFA linoleic acid usually results in improvement in coat quality and lustre. At this time, there is no evidence of superiority of any particular EFA combination, dosage, ratio or formulation (including enriched diets) to improve skin and coat quality in cats with feline HD. In general, EFA-enriched diets provide higher amounts of EFA than their administration as oral supplements. The benefit of EFA, if any, might not be seen before two months of supplementation.

3. Topical lipid formulations

At this time, there is insufficient evidence supporting the use of topical formulations containing EFA, essential oils, or complex lipid mixtures for improvement of coat quality, barrier function or any other clinically relevant benefit in cats with feline HD. Some lipid-based topical emollient products appear effective in human AD, however and a complex lipid mixture has been shown recently to help restore pre-existing ultrastructural lipid anomalies in a small number of dogs with AD. Further studies are required to evaluate the use of this or other topical lipid formulations in cats with feline HD.

D. Implement strategies to prevent recurrence of signs

1. Allergen-specific immunotherapy:

Allergen-specific immunotherapy (ASIT) is the practice of administering gradually increasing quantities of an allergen extract to an allergic subject to ameliorate the symptoms associated with subsequent exposure to the causative allergen. ASIT is the only intervention that has the potential to prevent the development of signs and alter the long-term course of the disease. Few studies have been performed in feline HD patients and most of the information is anecdotal. The mechanism of action has not been elucidated.

The reported success rates of ASIT vary from 50 to 100% in feline HD patients, however there are no placebo controlled trials and in the majority of studies, the time period of evaluation is less than a year and the success rate tends to decrease when the follow-up period is longer.

Rush allergen-specific immunotherapy (RIT) is a technique of advancing an allergic patient to a maintenance dose of an extract over a shorter period of time than that required for the traditional induction period. At this time, there appears to exist no clear advantage of a particular ASIT protocol (traditional, rush or low-dose), however our dermatology clinic performs all our immunotherapy protocols using RIT and the reduced burden of frequent injections at the beginning of ASIT and resulting improved owner compliance are definite advantages of this approach.

Most cats that demonstrate a response to ASIT exhibit a good response within 6 to 12 months. The current recommendation is to encourage owners to continue ASIT for at least 12 months. Because of the delay in ASIT effect, anti-inflammatory drugs should be administered and the improvement may be monitored by the dose and frequency required of additional medications and the pruritus scores that owners assign to their cats. There is currently no evidence suggesting that the concurrent administration of such drugs alters the clinical benefit of ASIT. Although immunotherapy can be administered over the long term, in some cases, it can be discontinued without recurrence of clinical signs.

Conclusion

In summary, the treatment of feline HD must be an individual prescription for each patient and in the majority of cases, a combination approach is required. Treatment can be challenging and should incorporate identification and elimination of flare factors, a reduction of skin lesions and pruritus, protection of the skin barrier and prevention of recurrence of signs after remission. Not all treatments will be suitable for every patient and not all drugs will be equally effective for, or tolerated by, every cat. We should try to abide by evidence-based veterinary principles and at the same time consider the cost and ease of the various treatment options and the quality of life of each patient.