Special issue: Feline dermatology

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feline focus

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Journal for Veterinary Nurses and Technicians

State of the art
Causes of pruritus

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Dermatophytosis

Case study
Alopecia in a young cat

How to...
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Welcome to July’s *Feline Focus*, a special issue on feline dermatology. Cats suffer from various skin conditions and itchy skin can be a distressing problem for both cats and their owners. In our first article, Sophie Tyler discusses the causes of pruritus. Karen Moriello then takes a closer look at dermatophytosis (ringworm), a common fungal condition in cats. Professor Moriello, a world expert on dermatophytosis, discusses the importance of using a Wood’s lamp in the diagnosis, as well as reviewing the various aspects of treatment. Madeleine Totham presents a case study of an alopecic cat, discussing the interaction between stress and dermatological disease. Finally, Emma Marshall provides a ‘how to’ article on taking and examining tape strip samples, a simple technique for diagnosing various dermatological conditions.

Last month we were really pleased to reach the milestone of 10,000 ISFM nurse members! This is a fantastic number of nurses and technicians around the world all learning about cats — keep spreading the word!

Best wishes,

Sam Taylor, Veterinary Editor

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The itchy cat 1: causes of pruritus

Pruritis is defined as an uneasy sensation that provokes scratching, also known as ‘itch’. Pruritis is a very common reason that cats will present to a veterinary surgeon, or owners may mention this during nurse clinics. Cats, unlike dogs, can be secret groomers which means that pruritus in cats may be hard for owners to detect. The most common cause is fleas. Other common causes include infectious disease (eg, bacterial infection) and allergic skin disease. Examples of the latter include cutaneous adverse food reaction (or food allergy) and non-flea non-food feline hypersensitivity (sometimes called atopic dermatitis), which is an allergy to environmental allergens. Simple tests can be performed in order to determine the underlying cause. It is important that the underlying cause is found and managed otherwise the pruritus will recur after symptomatic treatment.

Pruritus may manifest as over-grooming, chewing, licking and rubbing. This article will discuss the causes of pruritus in cats and how they may present. The approach to the pruritic cat and management will be discussed in a subsequent article.

Case investigation

History
When investigating a pruritic cat, a thorough history should be obtained from the owner, focusing on:

• **signalment**: the cat’s age, sex and breed;
• **general health**: cats may display signs of other diseases which may impact on the investigation and treatment of the skin problem (eg, the cat may be prone to diarrhoea so a diet trial may be difficult to pursue, or the cat may have diabetes so we should avoid prescribing steroids);
• **lifestyle**: indoor, outdoor, hunting;
• **management**: diet and ectoparasite control;
• **household history**: are other cats in the household affected? Fleas, Otodectes cynotis (ear mites) and

Key point
Pruritus (itching) can go unnoticed in cats as they tend to over-groom in secret.
Signs of pruritus

The initial sign of pruritus can be over-grooming (Figure 1) which can go unnoticed as cats often do this in secret. This can progress very quickly to hypotrichosis (thinning of the hair coat) and eventually alopecia (complete hair loss; Figure 2).

Figure 1: This cat had been over-grooming the ventral abdomen. Although often attributed to stress, this behaviour is more often due to pruritus. Note the sparse, finer hair coat (hypotrichosis) rather than complete alopecia. (Photograph courtesy of Natalie Barnard)

Figure 2: This patient was so pruritic that she would gnaw at the skin around the dorsal lumbosacral area excessively, eventually resulting in erythema (redness), alopecia (complete hair loss) and pyoderma (bacterial skin infection). The pruritus was so intense that she appeared to be having a seizure at times, whereas in fact the signs were the consequence of her dermatological disease.

dermatophytosis (ringworm) are likely to affect other animals within the household. Are the owners itchy? (Owners may be bitten by fleas themselves or they can develop skin lesions due to Cheyletiella mites or due to dermatophytosis.) These are questions that nurses can ask owners in order to obtain a thorough history.

- **age of onset:** allergic skin disease is generally seen in younger to middle aged cats, whereas dermatophytosis and ectoparasites can be seen in any age of cat;
- **seasonal changes:** is the pruritus worse at certain times of year? This may indicate an environmental allergy;
- **previous treatment:** has the pruritus improved with any previous treatments (eg, with ectoparasite control)?

Clinical examination

General physical examination

A general physical examination should include the oral cavity. Does the patient have signs of disease other than the dermatological disease, such as ocular or dental disease?

Dermatological examination

There are many different dermatological lesions that may be seen in pruritic cats. Some are subtle and are only found on a careful physical examination; others are far more obvious. A dermatological examination will involve examining the whole coat and skin from the nose to the tip of the tail. Parasites such as *Ctenocephalides felis felis* (fleas) or flea faeces and *Neotrombicula autumnalis* (harvest mites) can be seen with the naked eye. If the patient is showing signs of aural pruritus, otoscopy should be performed. Cats do not generally
like having their ears handled; therefore, this should be undertaken gently. For patients that are very sensitive around its ears, sometimes sedation is required. *O cynotis* can be seen with the naked eye using an otoscope.

The distribution of the alopecia can give an indication as to the underlying cause of the lesion. Flea allergic dermatitis can be generalised or it can be localised to the dorsum, ventrum or caudal thighs (Figure 3).

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**Figure 3:** This cat has over-groomed the dorsum and caudal hind limbs resulting in a sparse hair coat. *(Photograph courtesy of Natalie Barnard)*

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**Dermatological lesions seen in pruritic cats**

There are some dermatological lesions that are commonly seen in cats presenting with pruritus and these are specific to cats. They can also be termed ‘cutaneous reaction patterns’ and are most commonly seen with allergic skin disease. As lesions may also be seen within the oral cavity, it is important to examine the mouth too.

**Miliary dermatitis**

Miliary dermatitis is a crusting dermatitis that is a distinctive feature of allergic skin disease, although it is sometimes seen with certain skin infections such as dermatophytosis. The lesions feel like millet seeds, hence the term miliary dermatitis (see Figure 4).

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**Figure 4:** (a) Miliary dermatitis over the lumbosacral region in a patient with flea allergic dermatitis. (b) A closer look at miliary dermatitis reveals small papules (elevations of skin <1 cm) and crusts. Excessive scale can also be seen in the surrounding hair coat, which is abnormal.
Eosinophilic dermatitis
Eosinophilic dermatitis or eosinophilic granuloma complex (EGC consisting of eosinophilic plaques or granulomas and/or indolent ulcers) are lesions commonly seen in cats (Figures 5 and 6) and it is important that the underlying cause is investigated. The lesions can occur together or separately and are typically seen in cats with allergies to ectoparasites (fleas, mosquitoes or insects), food or environmental allergens.

Most common differential diagnoses for pruritus in cats
Ectoparasites
• fleas: fleas are the most common ectoparasite causing pruritus in cats. Flea bites cause irritation in most cats and marked pruritus in those cats with flea allergic dermatitis (FAD). They are small wingless insects that require a blood meal to reproduce. Life stages other than the adult stage occur within the environment (eggs, larvae, pupae). The main type of flea seen in cats is *C felis*. Flea bites cause mechanical irritation, annoyance and pruritus. Adult fleas can only survive for short periods of time off the host.
  • ear mites: *O cynotis* are often seen in young kittens and in cats living in multi-cat households as they are highly contagious. Some cats will present with large amounts of exudate from the ears and intense pruritus in this area.
  • harvest mites: usually seasonal (July to October in the UK), *N autumnalis* can be seen as bright orange dots often on the...
ear pinna, face and interdigital skin. A magnifying class may help identification.

- **lice and Cheyletiella mites**: these are not seen very often in cats; which may be due in part to the use of flea control products. They are usually visible to the naked eye.

### Allergic skin disease

- **flea-allergic dermatitis (FAD)**: a subset of cats suffer from a hypersensitive state induced by the injection of salivary allergens at the time that the adult fleas feed. These cats are normally extremely pruritic, with the caudal half of the body, abdomen and medial thighs mostly affected (Figure 7). FAD can be seen in any age of cat.
- **cutaneous adverse food reaction (food allergy)**: this manifests as a non-seasonal pruritus, typically in younger cats (Figure 8).
- **non-flea, non-food induced hypersensitivity dermatitis (atopic dermatitis)**: this is a diagnosis of exclusion once FAD and cutaneous adverse food reaction have been ruled out. It is most commonly seen in younger cats. It cannot be diagnosed using blood tests or intradermal tests.
State of the art

Infectious skin disease

- **bacterial infections**: these can complicate pruritic skin conditions and in some cats make a significant contribution to the level of pruritus. They usually have an underlying cause such as FAD.
- **fungal disease (ringworm)**: dermatophytosis is a fungal disease most often caused by *Microsporum canis* in cats. In many cats the disease is self-limiting with alopecia and increased scale. Typically, circular alopecia is seen on the head (Figure 9), but can affect any part of the body. Pruritus is mild to moderate. Sometimes miliary dermatitis is noted. Lesions are more severe when the disease is chronic and there is secondary bacterial infection (see the article Dermatophytosis in cats: treatment and decontamination on pages 181-188 of this issue for more information).

In order to establish the underlying cause of the pruritus, various simple diagnostic tests can be performed, often by nurses. An approach to the pruritic cat and treatment will be discussed in a later article.

Further reading


Figure 9: Dermatophytosis lesions over the face. (Photograph courtesy of Dr Aiden Foster)
Dermatophytosis in cats: treatment and decontamination

Karen Moriello
DVM DACVD
Karen Moriello is a professor of dermatology at the University of Wisconsin-Madison's School of Veterinary Medicine and a member of the Veterinary Medicine Editorial Advisory Board. She is coeditor of Veterinary Dermatology and is the author of numerous journal articles and books, including Self-Assessment Colour Review of Small Animal Dermatology. She most recently co-chaired the Clinical Consensus Guidelines for the Diagnosis and Treatment of Small Animal Dermatophytosis.

Dermatophytosis is the most common fungal infection of cats, and is highly contagious, but not life-threatening.1 It is of zoonotic importance and often affects kittens, with treatment decisions important, particularly in shelters and breeding establishments. This article will cover the causes, diagnosis and management of this skin condition.

Pathogens
The most commonly isolated dermatophyte pathogen from cats is *Microsporum canis*, although infections with *Microsporum persicolor*, *Microsporum gypseum* and *Trichophyton* species have been reported.1 *M. canis* is not part of the normal fungal flora of cats and isolation on fungal culture is compatible with true infection or fomite carriage. Careful history and examination are needed to differentiate between these two scenarios.

Young or immunosuppressed individuals appear more likely to be affected. Importantly, for infection to develop, skin trauma (from increased moisture, ectoparasites, scratches due to pruritus or playing/fighting or clipping) is required, as healthy skin is an effective barrier to fungal infection.

Cats in overcrowded or unhygienic conditions may be more likely to be infected. Grooming is an important defence against dermatophytosis,
A closer look at...

and anything that limits grooming increases the risk of infection — for example, osteoarthritis in older cats, or upper respiratory tract disease in an unowned kitten in a shelter environment.²

**Clinical signs**
The classic dermatophyte lesion of regular and circular alopecia with central healing, and an erythematous margin may be seen, along with scale and alopecia affecting the head most frequently (Figure 1), but also other parts of the body. Lesions may vary in size from very small to much larger (4–6 cm diameter), and be single or multiple. Pruritus varies between affected cats but is usually mild to moderate. Miliary dermatitis (see page 177 of this issue) may occur in some cats.

The clinical signs of dermatophytosis are related to the interplay between two things:
- the pathogenesis of the infection; and
- the overall health of the cat.

Variations in disease presentation and severity within a community of cats have been found to be more dependent upon an individual’s health than on any other factor that could be evaluated. In other words, cats with severe widespread disease have a much more severe health problem than dermatophytosis (Figure 2).

**Diagnosis**
There is no perfect test for dermatophytosis. The diagnosis is made using a variety of different methodology including, and most commonly, Wood’s lamp examination and fungal culture. Other tests include direct examinations of the hair and skin, biopsy and histopathology, and PCR.

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**Figure 1:** Alopecia and scale characterise these dermatophytosis lesions on the head of this cat

**Figure 2:** Generalised dermatophytosis in a kitten with malnutrition, diarrhoea and upper respiratory tract infection

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Key point
Cats and kittens with underlying health problems are more likely to develop dermatophytosis.
**Wood's lamp examination**

Wood’s lamps (Figure 3) emit long wave radiation and are fitted with a filter that is opaque to all visible light rays except for bands between 320 and 400 nm (peak 365 nm). *M canis* infected hairs fluoresce apple-green under the Wood’s lamp, but correct procedure and training is required, or false negative results may be obtained. Of importance is a darkened room and examination of a restrained cat with the lamp held close to the skin.\(^2\) Contrary to what has been previously published, 91–100% of uninfected untreated cats will show positive fluorescence with a Wood’s lamp.

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**Top tips for using a Wood’s lamp**

- The room needs to be darkened.
- Use a plug-in long wave Wood’s lamp with magnification.
- Hold the lamp close to the skin (at a distance of 4–10 cm).
- Move the lamp slowly over the cat and examine the entire cat but concentrate on areas that have lesions and areas where infection often starts first (face, ears, etc).
- Infected hairs are often found under crusts.
- Positive hairs fluoresce brightly and are apple-green or blue-green (Figure 4).
- Dust and dander fluoresce white or blue-white and are negative.
- Medications and oils on the hair coat can fluoresce yellow, orange, etc, and are negative.
- Carpet fibres also fluoresce, even some apple-green.
- Use the Wood’s lamp to examine hairs in toothbrush samples, as positive hairs are often trapped.

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It is very helpful to use a ‘positive’ control for reference and for training. This can be made using clear sticky tape. Press the tape over an area of strong fluorescence and then mount it on a glass slide. The edges can be sealed with clear finger nail polish. Fluorescence will last for years; the author has one 18-year-old specimen.

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**Key point**

Wood’s lamps do not need time to warm up and are ready to use as soon as they are turned on. However, 2–3 mins in the darkened room is required to allow the observer’s eyes to light-adapt.
A closer look at...

**Direct examination**
A study has shown that the best way to collect specimens for examination under the microscope is a combination of superficial skin scraping and plucking of hairs from lesions. When both techniques were used unaided by a prior Wood’s lamp examination, the combined technique was positive in 87.5% of cats.³

**Fungal culture**
Fungal culture is the only test to identify the pathogen species. (A recent consensus study concluded there is no gold standard for diagnosis.)¹ In general, dermatophyte test medium (DTM) is recommended. DTM is a specialised agar that changes to a red colour when dermatophytes produce alkaline by-products in the medium (Figure 6).

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**Maximising the success of direct examination**
- Examine only Wood’s lamp positive hairs.
- Hair should be plucked in the direction of growth using forceps and mounted directly onto a small drop of mineral oil.
- A drop of new methylene blue can be added to the mineral oil, as it will be absorbed into the damaged hairs, making them easier to visualise.
- It can be difficult to find infected hairs on the slide; however, a Wood’s lamp can be held over the slide to identify hairs to move into the field of vision.
- Infected hairs (Figure 5) are readily identified at ×4 or ×10 magnification and appear pale, wide and filamentous compared with normal hairs. At high magnification (×40) cuffs of arthrospores are visible.

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**Figure 5:** Microscopy of Wood’s lamp positive hairs mounted in mineral oil. Infected hairs are wider and paler (arrow) than normal hairs

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**Tip**
When sampling with a toothbrush, the cat/lesion should be sampled until there is visible hair on the toothbrush.

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**Figure 6:** A positive fungal culture indicated by the colour change in the dermatophyte test medium to a red colour
**In-house fungal culture**

- After inoculation of a flat fungal culture plate with DTM, make sure you add a date and patient identification underneath.
- Place all culture plates into a plastic bag to prevent cross-contamination and contamination from the environment.
- Incubate at room temperature (23°C) to promote sporulation (a digital aquarium thermometer is useful to monitor temperature).
- Examine the plates daily by holding them up to the light and looking for pale to white colonies that develop a red ring of colour around them.
- Pathogens are never pigmented, grossly or microscopically.
- Pathogen identification must be made with cytological examination of the culture. Using clear acetate tape, gently brush the sticky side against the colony and place over a drop of lactophenol cotton blue or new methylene blue stain.
- Allow the stained samples 5–10 mins for spores to absorb the stain.
- Cultures that are negative should be held for 21 days to ensure there is no late growth of a pathogen (eg, *Trichophyton* species or post-treatment cultures of *M canis*).

**Key point**

Suspected positive cultures should be examined microscopically to confirm the diagnosis. The red colour change should be considered a ‘flag’ to prompt examination, rather than a diagnosis per se.

**Figure 7:** Inoculating plates ‘upside down’ over a disinfectant wipe minimises contamination

surface (Figure 7). To avoid the effects of residual topical therapy, the plate should be inoculated starting in the centre and continuing in a centrifugal direction. This means residual topical therapy is deposited in the centre and fungal growth will occur at the edges. Many clinics perform in-house fungal culture (see box). Stab the plate 5–6 times; over-inoculation may delay sporulation.

**Treatment**

There is, unfortunately, no ‘best treatment protocol’. Treatment should be based on the number of cats involved, the owner’s/shelter’s resources and the cat’s health in general. The author uses the ‘CCATS plan’ as a reminder of the essential components of therapy.

**CCATS plan**

- **confinement:** keep it reasonable and situation appropriate;
- **cleaning:** if you can wash it, it can be decontaminated;
- **assessment:** is the infection resolving?;
- **topical therapy:** kills spores on the hair coat, minimises spores shed into the environment;
- **systemic therapy:** kills spores in the hair follicle.
Effective disinfectants

There are many effective antifungal disinfectants; however, several are worth special mention because of their widespread use in homes or in veterinary clinics. The following compounds were tested in suspension studies with increasing challenges of spores 1:10, 1:5 or 1:1. Neat plates had confluent growth of *M canis* or *Trichophyton* species and a compound was considered efficacious at <10 spores per plate.

**Sodium hypochlorite**

Sodium hypochlorite at 1:10 and 1:32 dilution is consistently antifungal even after short contact times; however, it can fail if out of date or the dilution is not freshly prepared. Reasons not to use sodium hypochlorite include, but are not limited to:

- lack of detergency;
- potential to react with other chemicals to create toxic gases;
- unpleasant odour;
- damage to hard surfaces, discoloration of fibres and coloured surfaces, damage to floor finishes, rapid loss of efficacy once diluted.

**Enilconazole**

Enilconazole is available as concentrated spray or as a fogger. It is widely available in many countries and in the United States is formulated as Clinafarm spray or Fogger (Eli Lilly). A major obstacle to more widespread use in the United States is that it is not produced in reasonably priced small quantities. A 10 min contact time is recommended even though enilconazole was antifungal at shorter contact times.

**Accelerated hydrogen peroxide**

Accelerated hydrogen peroxide (AHP) is a proprietary compound that is increasingly available worldwide. What makes this product different from over-the-counter hydrogen peroxide is that it contains surfactants (wetting agents) and chelating agents that help to reduce metal content and/or hardness of water. This product has been tested using isolated infective spore suspensions of both *Trichophyton* species and *M canis* and is an effective disinfectant. A 10 min contact time is recommended even though AHP was antifungal at shorter contact times.4

Materials Safety Data Sheet states that AHP should not be mixed with concentrated sodium hypochlorite product. If recommending AHP to clients, it is important to make this clear.

**Potassium peroxymonosulfate**

Potassium peroxymonosulfate is the main component of Trifectant (Vetoquinol) and has broad spectrum antibacterial and antiviral properties. In studies this product was found to be antifungal against both *M canis* and *Trichophyton* species when applied liberally and with a minimum contact time of 10 mins. More recent studies found a 2% solution to be more effective than 1% against dermatophytes.5

**Over-the-counter products**

A recent study investigated the efficacy of over-the-counter products as alternatives to sodium hypochlorite. The criteria for selection were easy access by the consumer, preferably ready-to-use formulation, and label claim as antifungal against *Trichophyton mentagrophytes*. Active ingredients included sodium hypochlorite, quaternary ammonium, lactic acid, AHP and an ethoxylated alcohol mixture.5

Ready-to-use over-the-counter products are the author's first choice for pet cats.
Treatment: the CCATS plan
Confinement of the cat/kitten to an easily cleaned room
Confinement needs to be reasonable and appropriate for the pet. Kittens should not be left alone in a home unsupervised and older cats may have other diseases that require intense monitoring.

Confinement shortens treatment time because it makes cleaning easier and minimises the spread of infective material into the home. Treatment needs to be as short as possible because many infected animals are new family members and need to be socialised.

Cleaning
Cleaning removes infective material from the environment. It shortens total treatment time because it helps prevent false positive fungal cultures. The most important part of disinfection is the so-called ‘hard clean’ — removal of debris and thorough washing with a detergent until visibly clean. Soft materials can be washed in hot or cold water using the longest cycle possible as agitation removes spores. If concern is high, wash the laundry twice. If only one or two cats are involved, the author recommends thorough cleaning once or twice weekly, with removal of cat hair and use of ‘one step’ cleaners (ready to use disinfectants with efficacy against dermatophytes) on a daily basis in-between cleanings. A Wood’s lamp can be used to examine the environment and cats can be confined to an unexposed clean room after applying a topical antifungal product, with culture repeated after 72 h. (See box on page 186 for effective disinfectants.)

Assessment
Assessment refers to monitoring of treatment. The recommendation is to treat cats until they have two negative fungal cultures. The global cost of treatment needs to be considered when determining how the cat/kitten will be monitored. This global cost includes time and money spent on: systemic drugs, topical rinses and time to apply them/dry the cat/clean up after the treatment, money spent on buying cleaning supplies and time spent doing extra cleaning (if what is required is above what the client normally does), behavioural issues and time spent on confining the cat. The last is an overlooked cost as this may be an emotional cost. It could also include money and time spent interacting with the kitten/cat and then washing clothes specifically identified for this purpose. If children are involved, this magnifies the problem as children are more likely to contract dermatophytosis and most likely to circumvent any ‘confinement’ measures. The author recommends weekly fungal cultures, especially if children are in the home. The goal of treatment is to shorten the course of the disease as rapidly as possible.

Systemic therapy
The recommended drug for cats is itraconazole, although terbinafine can be used. Fluconazole has poor efficacy against dermatophytes and should be avoided. Terbinafine was shown to have residual activity in the hair, and to be effective in a 21 days continuous treatment protocol with adjuvant topical therapy. Systemic therapy pharmacokinetic studies are performed in healthy adult cats. Pharmacokinetics will be different in cats with complicated infections; adjust treatment to fit the patient.
A closer look at...

**Topical therapy options**

- **whole body rinses:** enilconazole (1:100), lime sulphur (1:16), AHP (Pure Oxygen Derma Wash Concentrate 1:20 or 1:40). Twice weekly application is recommended.

- **climbazole mousse:** 0.5% climbazole mousse used as directed by the manufacturer. This may be an option for cats with simple infections and/or older cats that have contracted the disease from exposure to a kitten and it is limited in scope.

- **shampoo alternatives:** first, comb the hair coat to remove any easily displaced hairs. Use products with 1–2% ketoconazole, miconazole or 0.5% climbazole at 1:10 or greater. Use no less than twice a week, preferably more frequently, with a minimum 3 min contact time. Another option is to shampoo the cats, rinse with water and then apply AHP rinse.

- **difficult-to-treat areas:** spot therapy as sole therapy is not recommended; however, persistent culture-positive status can occur if infected hairs are not treated in ‘hard-to-treat areas’ such as ears. Adjuvant focal therapy includes: 0.5% climbazole, terbinafine 1% (human product), thiabendazole in a commercial preparation, or any of the following compounds at ≥1%: clotrimazole, ketoconazole, miconazole.

**Clipping of the hair coat**

- Clipping infected hairs grossly debunks the amount of infective material.

- Clipping needs to be carried out carefully to avoid traumatising the skin; electric clippers can cause thermal burns. Use blunt-tipped scissors.

- Ideal in long-haired cats, but sedation may be necessary.

- Scissor clipping is the recommended method to clip cats. Children’s round-tipped metal scissors are ideal. They are inexpensive so they can be discarded and are blunted so there is minimal risk of injury.

**Key point**

All topical therapy should be carried out in a well-ventilated area, with cats monitored for hypothermia (especially kittens and those with other illnesses or in poor body condition). It is important to consider the application method and the risk of owner exposure.

**References**


**Further reading**

Baxter: alopecia in a young cat

A 3-year-old male neutered domestic shorthair cat from a multi-cat home was examined due to hair loss on the dorsum, ventrum and medial thighs. The owner also reported inappropriate elimination and conflict between cats. Dermatological examination revealed broken hairs and miliary dermatitis. As flea control was sporadic, flea allergic dermatitis was suspected and the cat was treated with appropriate flea control products including treatment of the environment and other animals. Antihistamines were prescribed to reduce pruritus. The cat responded well, and the client was also advised on measures to minimise stress in the home.

Baxter, a 3-year-old, male neutered domestic shorthair cat, weighing 4.5 kg, was presented with hair loss. The cat’s hair had become thinner on the dorsum and tail base over the previous few weeks. He was otherwise well, vaccinated and had access outdoors. Flea control was sporadic. Baxter lived with several other cats and was fed a complete dry diet. Occasional conflict within the home was reported, along with occasional inappropriate defaecation.

Physical examination
Baxter was bright and alert (Figure 1), with pink, moist mucous membranes and a normal capillary refill time. Vital parameters were normal, as were thoracic auscultation and abdominal palpation. Body condition score was 5/9, and apart from the dermatological lesions, no abnormalities were detected.

Dermatological examination
Dorsally over caudal spine the hair was obviously thinned, slightly more to the left hand side (Figure 2). The ends of the hair in this region felt sharp (broken) suggesting self-trauma due to pruritus. There was further alopecia on the ventrum and medial thighs.

Figure 1: Baxter was bright and alert, and in good body condition

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Madeleine Totham graduated as a vet with Honours from the Royal Veterinary College in 2012 and has been working as a small animal veterinary surgeon since. She has a particular interest in feline medicine and was awarded the ISFM prize for Best Feline Project and the BSAVA Clinical Abstract Poster Award for her pilot study on feline injection-site sarcomas; phase 2 of this study is currently underway. Madeleine has recently completed the ISFM Feline Medicine course and practises at the Manor Veterinary Clinic in Folkestone, UK.
Case study

(Figure 3), with mild erythema and very superficial epidermal trauma/excoriations. A few miliary dermatitis papules and crusts were felt on the neck and over the dorsum.

Differential diagnoses

- **ectoparasite infestation:** fleas are the most likely, causing pruritus and self trauma:
  — other ectoparasites diagnosed in cats include *Cheyletiella* species, *Demodex gatoi/catii*, lice such as *Felicola subrostratus* and, rarely, *Notoedres* or *Sarcoptes* species;
- **hypersensitivity disorders:** flea allergic dermatitis (FAD), cutaneous adverse food reactions and non-flea non-food hypersensitivity;
- **dermatophytosis:** less likely due to the type of lesion, and lack of scaling;
- **psychogenic alopecia:** this condition can occur due to stress in the home, and conflict and inappropriate elimination is reported;
- **other alopecic disorders:** alopecia can be seen with underlying endocrine or neoplastic conditions, but these were considered less likely as the cat was not unwell.

Diagnostic tests

Further testing is indicated to investigate the cause of the alopecia, and was performed as follows:

- **trichogram:** this revealed many broken hairs and no evidence of fungal infection;
- **Wood’s lamp examination:** this test
for dermatophytosis was negative;
- **coat brushing**: no flea dirt was noted;
- **skin scrape**: (Figure 4) no evidence of ectoparasites or other pathogens (eg, bacteria/yeasts);
- **further testing**: (eg, dermatophytosis culture) was postponed pending response to initial treatment.

Given the sporadic flea control, miliary dermatitis and absence of other causes of pruritus and alopecia, FAD was suspected. Other causes such as food allergy, or non-food, non-flea allergic disease are not excluded but initial treatment of FAD and assessment of response was indicated.¹

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**Box 1: Effective flea control**
Flea control is vital in cats with dermatological conditions, but several factors are important for an effective eradication programme including:
- **use of an effective adulticide**: at the correct intervals to prevent egg laying and the reproductive cycle;
- **treatment of all animals in the home**: treatment of just the affected individual is unlikely to be successful;
- **treatment of the environment**: environmental sprays reduce environmental contamination and prevent growth of immature life stages;
- **client education**: ensuring clients understand the importance of regular treatment according to the product used, and that infestations may take months to be effective.

Nurses and technicians may be particularly effective at informing and following up with clients to improve compliance.

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**Tip**
Cats are such fastidious groomers that fleas and flea dirts may not be seen, yet may be present and causing a hypersensitivity reaction in cats with FAD.

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**Treatment**
The most common cause of pruritic disorders and hair loss in cats is flea infestation. Baxter received only intermittent flea control, and lived an indoor/outdoor lifestyle in a multi-cat home. Thorough flea control is indicated (see Box 1) and was discussed with the client in a nurse consultation.

There are many options for flea control, but for cats with FAD speed of kill is important. Some oral treatments such as spinosad (eg, Comfortis; Bayer) kill fleas within the first 4 h (repeated every 28 days) and can be combined with topical treatments for maximal flea control (eg, spinosad at the start of the month, topical adulticide after 14
**Case study**

days, repeated monthly). Environmental control with sprays (eg, Indorex [Virbac] and Acclaim [Ceva]) is also vital, along with treatment of other pets. Additionally, antihistamines (chlorphenamine 4 mg q12h) were provided to reduce pruritus.

As conflict has been observed in the home, with inappropriate elimination, stress is likely and measures to reduce stress may improve recovery from dermatological disease. Advice was therefore given about resource management and harmony in multi-cat homes including: use of pheromone diffusers, improving access to litter trays for all cats and elevated resting areas. (See Managing stress in cats: single vs multi-cat housing — is it that simple? Feline Focus 2016; 2[4]; 121–128 and the webinar Harmony in multi-cat homes at icatcare.org/nurse-members/webinars.)

**Outcome**

Baxter was examined 2 weeks later and significant improvement was noted, with evidence of hair regrowth in the alopecic areas. The client was given further advice on on-going flea control and directed to the International Cat Care website (www.icatcare.org) for more information on environmental enrichment to further reduce stress at home.

**Discussion**

Fleas are the most common ectoparasite affecting cats in most countries of the world, and flea control is vital in cases of pruritus.5 There are a variety of flea control products now available, but all rely on consistent application/administration, environmental control and treatment of all animals in the home. In this multi-cat home, application of flea control was sporadic, and therefore unlikely to be successful. In a multi-cat home

**Psychogenic alopecia**

The association between dermatological disease and stress is recognised,2,3 and can manifest in over-grooming, creating patches of thin hair (Figure 5). Affected cats have broken hairs, but no underlying inflammation or skin lesions such as miliary dermatitis. Diagnosis of psychogenic alopecia is challenging, as dermatological disease must be ruled out: this relies on veterinary examination and further testing, as well as excellent parasite control measures. However, stress may also play a role in primary skin diseases, and exacerbate allergic skin disease in cats, as it does in allergic disease in humans.4 Although more research is needed, addressing stress in cats with dermatological disease may positively impact welfare and assist control of the underlying skin problem. This again underlines the role of the nurse or technician in the management of chronic disease.

**Figure 5:** Over-grooming due to stress. Dermatological conditions may also be exacerbated by an inadequate environment and conflict with other cats, for example
with inconsistent flea control, the product may be deemed ineffective, yet it is the way it has been used that caused treatment failure. Over-grooming due to stress is reported in cats,2,3 and stress may also exacerbate an existing pruritic condition. However, before putting all signs down to stress, other causes of pruritus (most commonly fleas) must be excluded. Baxter was exhibiting signs of stress, with aggression to other cats in the home, and inappropriate elimination, which may worsen his existing dermatological disorder. A holistic approach to such cases is necessary, and nurse or technician input to discuss stress reduction and compliance with flea control measures, are likely very important for the cat’s full recovery.

References
Step-by-step guide to taking an adhesive tape strip sample

Adhesive tape cytology is a common diagnostic technique used in veterinary dermatology. It can be used to identify bacteria, yeasts, parasites and inflammatory cells. In most cases this diagnostic method can be performed and assessed in-clinic, and is cost-effective for clients. It can be performed without the need for sedation and is non-invasive.

There are many dermatological conditions that can affect patients within the veterinary field. Diagnostic testing is a huge part of defining these conditions and there are multiple ways in which this can be carried out (see Box 1). This article discusses adhesive tape cytology, providing a simple guide to performing this technique.

Box 1: Common dermatological tests

The most common diagnostic techniques used in veterinary dermatology are:
- adhesive tape cytology;
- skin scrapes;
- hair plucks and coat combings;
- blood tests;
- dermatophyte culture;
- impression smears;
- microbiological swabs;
- histopathology; and
- otoscopy.

Dermatological tests are used to identify:
- ectoparasites;
- yeasts;
- bacteria; and
- inflammatory cells.

Key point

Tape strip cytology is quick and easy to perform in unsedated patients and may identify parasites, inflammatory cells, yeast and bacteria.

Tape strip cytology

Indications for performing tape strip cytology:
- to identify parasites, bacteria and yeasts (eg, *Malassezia* species);
- to look for inflammatory cells, as seen in infectious and immune-mediated diseases; and
- to further investigate cases with ulcerative lesions, crusting or moist inflamed skin.
How to perform tape strip cytology

1. Identify the skin lesion to be sampled.
2. Prepare a clean microscope slide and cut off a length of clear adhesive tape, at least 50% longer than the length of a slide (usually around 10 cm in length).
3. Gently press the tape strip onto the lesion/area of skin you want to sample three or four times. This is non-invasive and generally doesn’t cause any stress or discomfort to the patient. Try, where possible, to handle the adhesive tape strip minimally.
4. Attach one end of the tape to a labelled slide then form a loop (sticky side of the tape uppermost) before sticking the other end of the tape to the slide. (Figure 2).
5. The sample slide must then be dipped into a DiffQuik type solution (Figure 3) for staining. Dip for 1–2 seconds into the first (light blue) stain (this step can be omitted). Then dip into the red stain five times for 1 second or submerge fully for 6–10 seconds. Repeat in the dark purple stain; there is no need to rinse the slide between stains.

The ‘dermatology testing box’

The most commonly used piece of equipment in dermatological practice is the microscope and many tests can be carried out in-house. It is useful to have a ‘dermatology testing box’ with the equipment needed for tape strip cytology, and other tests such as skin scrapes and hair plucks.

Essential items for the dermatology testing box (Figure 1) are:
- clear adhesive tape;
- microscope slides and coverslips;
- electrical clippers or scissors;
- cotton buds;
- microbiology swabs;
- number 10 blades (for skin scrapes);
- forceps (for hair plucks);
- liquid paraffin;
- pencils (for labelling slides).

Figure 1: Equipment for dermatological testing is useful to keep together for easy access in the consulting room

Performing tape strip cytology

1. Identify the skin lesion to be sampled.
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6 The slide must then be carefully rinsed until the water runs clear to remove any excess stain from the sample (Figure 4).
7 One end of the tape should then be detached from the slide, allowing the previously sticky side of the tape to be placed in contact with the slide.
8 The slide can be blotted and allowed to dry for a few minutes before microscopic evaluation.
9 Keeping the tape closest to the lens, first survey the slide under low power (×4 objective), then areas of interest can be examined more closely using the ×100 objective. Microorganisms and cells will be seen at the higher magnification using the oil immersion lens.
10 Alternately, this can be carried out without the use of a DiffQuik solution; staining is usually not required when looking for ectoparasites, for example.

Assessing an adhesive strip sample

Corneocytes (non-nucleated keratinocytes) may be found in tape strip samples from normal skin. An abnormal appearance of the keratinocytes can suggest underlying disease (eg, acantholytic cells in pemphigus foliaceus). Tape strips allow identification of parasites such as fleas (and flea dirt and eggs, Figure 5), lice or *Cheyletiella* species, for example.

Yeast such as *Malassezia pachydermatis* (Figure 6) may be seen on cytology, as well as bacteria, commonly *Staphylococcus* species. Degenerate neutrophils, or neutrophils with intracellular bacteria, may indicate bacterial infection.

All photographs in this article are courtesy of Sarah Warren unless otherwise stated.