



Tackling ringworm in cats



Ringworm is an infection caused by a fungus that grows in the superficial layers of the skin, hair or nails. It has nothing to do with worms. The scientific name for ringworm infection is dermatophytosis, and fungi which cause the disease are called dermatophytes. There are approximately 40 different species of dermatophyte, each tending to cause infection in particular species of hosts. In the cat, the cause of more than 90 per cent of cases of ringworm is the dermatophyte *Microsporum canis* (*M canis*). This organism can also cause infection in many other species, including dogs and humans. Other dermatophytes that may occasionally cause ringworm in cats are *Trichophyton mentagrophytes* and *M persicolor* (acquired by contact with infected wild rodents) and *M gypseum*, *M fulvum* and *T terrestre* (isolated from the soil).



Longhaired cat demonstrating typical lesions of ringworm such as scaling and hair loss on the face and ears

How do cats become infected with *M canis*?

Ringworm is contagious. Spores are the infectious stage of dermatophytes and are produced by *M canis* during an infection. They are typically found in clusters around infected hairs and can only be seen using a microscope. Infected hairs are shed into the cat's environment. Cats may become infected either by direct contact with an infected animal or by exposure to a contaminated environment or object such as grooming tools, clippers or bedding. Spores in the environment are very robust and without treatment can remain infectious for up to two years. Spores attach to the skin and germinate to produce hyphae that invade abraded skin and hair. It is not known how many spores are needed to start an infection. Self-grooming, particularly licking, may be an effective way of harmlessly removing spores from the skin and haircoat. Intact skin is very resistant to infection. Mites and lice are generally uncommon. The point being made here is that some degree of self trauma is probably required to enable fungal infection to develop and that ectoparasite infestation may be an additional predisposing factor.

Ringworm seems to be more common in young cats less than one year old, and longhaired cats, particularly Persians. The reasons for this are unknown. It is speculated that young cats may have immature immune defence mechanisms which limit their ability to resist infection. In long-haired cats grooming is less efficient and the skin surface is more protected from exposure to the sun (which dermatophytes don't like) than in short-haired cats.

What does a cat with ringworm look like?

The appearance of cats with ringworm is very variable. Some cats have severe skin disease while other cats have only very minor lesions or no lesions at all and look completely normal. Typical skin lesions are discrete, roughly circular areas of hair loss, particularly on the head, ears or extremities of the paws. The hairs surrounding affected areas appear broken. The affected skin is often scaly and may look inflamed. However, ringworm can look very similar to many other feline skin diseases, including some of the clinical manifestations of flea allergy dermatitis, and may present as symmetrical alopecia or even feline acne. Some loss of hair is usually involved, but the amount of inflammation, scaling and itchiness (pruritus) can be very variable.

How is ringworm diagnosed?

It is impossible to diagnose a cat as having ringworm based on its appearance alone because this is so variable and can easily be confused with other skin diseases, or look like a normal cat. Diagnostic tests are used to confirm the presence of *M canis* or other dermatophytes. Most veterinary dermatologists will use at least one of these tests on any cat with skin disease to investigate the possibility that ringworm might be involved. There are three tests that can be used to diagnose ringworm.

The ultraviolet Wood's lamp can be used to examine cats suspected of having ringworm. It is shone onto the haircoat in a dark room and infected hairs may fluoresce with a characteristic apple-green colour. The fluorescence is thought to be due to a metabolite produced by *M canis*. Unfortunately, not all dermatophyte species, or varieties of *M canis*, fluoresce, so failure to demonstrate fluorescent hairs does not rule out the possibility of ringworm. In addition, extraneous substances may cause a similar fluorescence. For these reasons the results of Wood's lamp examination is not definitive, but it can provide a very useful method of selecting hairs for further examination. either by fungal

culture or microscopic examination.

Microscopic examination of suspect hairs can provide a very rapid positive diagnosis. The observer looks for fungal elements and spores associated with hairs. Interpretation can be difficult and it is best performed by an experienced mycologist. It is not possible to determine which species of dermatophyte is involved using this method alone. A negative result is unreliable and may only mean that the sample of hairs examined was not representative and did not include infected hairs.

Fungal culture is the most reliable way of diagnosing ringworm. Cat hairs are collected and used to inoculate plates of a special culture medium, which are then incubated in a laboratory. Hairs for culture can be selected because they are damaged or closely associated with skin lesions or because they fluoresce when examined with the Wood's lamp. Hairs are collected from cats that look completely normal by whole body brushing using a sterile toothbrush or massage brush. Culture enables precise identification of the species of dermatophyte involved, but because dermatophytes are slow growing it may take several weeks for laboratories to report a result. A positive result indicates that the cat is infected with ringworm or is carrying dermatophytes on its coat (due to exposure to an infected environment). If one cat in a household is diagnosed as having ringworm then all the other animals will need to be examined, even if they seem to be completely unaffected. In most cases all cats in a household will be culture-positive and require treatment.

Please note that the absence of dermatophytes on microscopic examination of a skin biopsy does not rule out dermatophytosis.

How is ringworm treated?

Although in most healthy cats ringworm infection will resolve spontaneously after many weeks, treatment is necessary in all cases to speed this up because of the risk of infection of humans and contact animals. Some cats will not eliminate infection unless they are treated. In some cases, prolonged courses of treatment will be needed to achieve a cure. Treatment can be broken down into several elements, all of which are essential.

Treatment of predisposing conditions

Any pre-existing skin condition or ectoparasitic infestation (particularly fleas and cheyletiella mites) which causes skin damage can predispose to ringworm and should be treated specifically.

Treatment of the affected animals

All affected animals should be treated by administration of both oral medication (systemic therapy) and by treatment applied directly to the haircoat and skin (topical therapy).

Systemic therapy:

The principal product licensed for veterinary use in the cat is Itrafungol (Janssen), a liquid containing **itraconazole**. The recommended regimen is one week of therapy followed by one week off therapy, repeated for three weeks of treatment. This approach is used because studies have shown incorporation of the drug into the skin and slow break down, leading to a depot effect or build up of the drug. The product is safe to use in kittens from 10 days of age and caution should be employed when considering treatment of pregnant queens.

Historically, griseofulvin has been the drug most commonly used for the treatment of dermatophytosis. In recent years, the veterinary licence has not been renewed for commercial reasons and only human and farm animal versions are available.

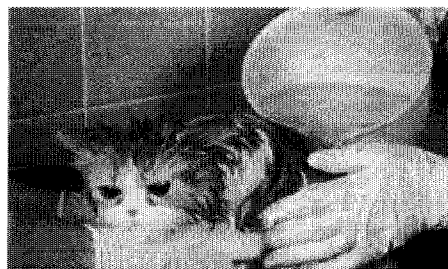
Terbinafine (Lamisil; Sandoz) There are reports of the use of this prohibitively expensive product which is used for various persistent human dermatophyte infections. There is a long duration of activity and this may allow relatively short courses of therapy followed by careful monitoring. The recommended dose in cats is of the order of 10-30 mg/kg per day, with two to six weeks of therapy. There is a persistent effect for several further weeks.

Lufenuron (Program; Novartis) Lufenuron is available as a flea control product. Lufenuron is a very safe product and very unlikely to cause adverse effects - even at high dosages and has been investigated as a treatment for ringworm. However, carefully controlled experimental studies have failed to demonstrate that lufenuron can prevent dermatophyte infection, or result in faster resolution of infection, when cats are challenged by direct inoculation or contact with an infected cat. In some situations it may be useful as an adjunctive treatment.

Topical therapy:

Topical therapy can play a very important role in reducing environmental contamination. Spot therapy with one of the human anti-fungal creams is not recommended because the area of infected skin is often considerably wider than the skin lesions might suggest. Topical therapy is best applied to the whole body by either shampooing or dipping. Clipping of cats will make this much easier, particularly for long-haired cats, and also reduce environmental contamination. Clipping should be done with care to avoid traumatising the skin, as this can spread infection and make the skin lesions look worse for a short time. It is advisable to repeat clipping several weeks after the start of treatment with systemic agents, as by this time the drug should be incorporated into the hair. If whole body clipping is not chosen then local clipping around the lesions should be done with care. It is recommended that clipping should extend 6 cm around visible lesions. It is normally necessary to sedate cats to clip them safely. Infected hair should be disposed of by burning and clippers should be disinfected carefully.

The only product licensed for the topical treatment of ringworm in cats is a **chlorhexidine and miconazole** shampoo (Malaseb: Leo Laboratories). It is usually applied twice a week. The coat is first completely wetted and the shampoo is then lathered on and massaged well down into the skin. The shampoo is left in contact with the skin for 10 minutes (timed with a clock) before rinsing. Most cats tolerate this remarkably well. Leo Laboratories have produced a leaflet giving tips about shampooing cats. The shampoo should be used with caution around the eyes and if shampoo enters the eye it should immediately be rinsed with large amounts of clean warm water. In order to obtain a veterinary licence a product has to be both effective and safe and, unless there is a very good reason for not doing so, such products



should be used in preference to unlicensed products. Other products which may be suggested for topical therapy, but which are not specifically licensed for use in cats, include:



Enilconazole (Imaverol; Janssen) which is used as a dip. It is licensed for use in dogs, horses and cattle. There have been some reports of cats suffering fatal toxic reactions following its use. These have not been well documented. Limited experimental work has failed to reproduce these effects. Enilconazole appears to be effective at killing *M canis* spores on hairs. Owners who decide to use Imaverol will be doing so at their own risk. To reduce the risk of toxicity it is recommended that cats have an Elizabethan collar fitted following dipping until the coat has dried.

Chlorhexidine (eg, Hibiscrub) - recent studies suggest that some other products, such as Malaseb, may be better at killing *M canis* spores on hairs.

Pet Virkon (Germicidal skin cleanser; Antec) may be useful as a topical treatment. It is applied as a spray or dip and then rinsed off after 10 minutes. It is not a licensed veterinary medicine.

Decontamination of the environment and objects

Decontamination is much easier if infected cats can be restricted to one easily cleanable room and this will reduce human exposure to the cats and sources of infection. All areas of the house to which infected animals have had access will require decontamination, but the majority of effort can then be concentrated on the room in which the cats are confined.

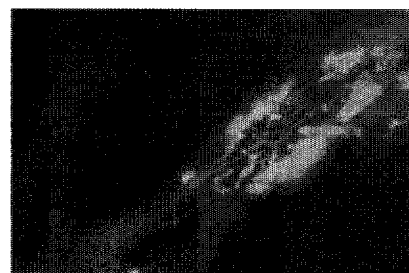
Any contaminated objects such as collars, baskets, igloos, bedding, soft toys and grooming tools which cannot be disinfected should be disposed of, preferably by burning. Cardboard boxes can be used as temporary disposable beds and these should be disposed of at least once a week.

The source of environmental contamination is fungal spores on shed hairs. The amount of contamination can be reduced by topical therapy and clipping as discussed above.

Decontamination is achieved by a combination of two approaches: physically removing the infected hairs from the environment and the use of chemical agents in the environment to kill the spores.

Physical decontamination

Thorough vacuuming of contaminated rooms and/or cages on a daily basis is recommended. Vacuum cleaners with a beating action are best for cleaning spores from carpets. Heating and ventilation ducts and fans often become contaminated and should be vacuumed. Vacuum bags should be disposed of by burning. Under suitable circumstances a blow-lamp can be used to burn hairs off wire runs and cages. Steam cleaning is of limited use because the temperature of water that contacts the item being cleaned is unlikely to be sufficient to kill spores.



Microscopic appearance of a ringworm-infected hair demonstrating the presence of numerous tiny spores around the outside of hair and hyphae invading the hair

Chemical disinfection

Many disinfectants that claim to be effective against dermatophytes do not have very good activity against *M canis* spores on hairs. Recent experimental work has demonstrated that there are two products that do work. These may not be suitable for use on carpets and other soft furnishings.

- Bleach. The stronger the better, but dilutions up to 1 in 10 of household bleach with water have been shown to be adequate. Use for washing all hard surfaces (floors, worktops, litter trays and cages) at least twice a week.
- Virkon (Antec) is a disinfectant powder that is made up with water to a 1 per cent solution. Use for washing all hard surfaces at least twice a week.

Treatment regimes in particular cases

The single cat household

Dermatophytosis affecting a cat in a single cat household is usually relatively easily contained and managed. The problem of infection being transmitted to humans is an important issue as in any outbreak of *M canis* infection. However, once the cat is on a programme of treatment and environmental contamination is carried out the problem will usually resolve within a couple of months.

The multi-cat household

The situation where there is an outbreak in a multi-cat household is very different, particularly if longhaired cats are infected in a domestic environment. All cats in the unit could be tested by fungal culture to identify those which are infected. However, it is usual to find that all in-contact cats are culture-positive and clearance is most rapidly achieved by treating all the cats from the outset. In any case, separation and isolation of cats is frequently impossible so treatment of all the cats in the unit is the only practical option. If culture-negative cats are separated this should be to an uncontaminated environment and topical therapy is recommended, as is intermittent monitoring by fungal culture. When cats on full treatment become culture-negative, ideally they should be kept as a third group until a second or third consecutive negative culture result confirms the permanence of this state. Complete resolution of the problem can take from months to years and be very time consuming and expensive to achieve. However, with commitment and determination this is achievable. Throughout the period of infection the household should be isolated, no cats should enter or leave and breeding should cease.

The pregnant queen

There are no systemic agents that can safely be used in pregnancy. Queens should be isolated from other cats and dipped and treated topically twice a week. Once the kittens are born the itraconazole can be added to the regime from

10 days of age.

Kittens

Topical therapy can be used from about four weeks of age, taking special care to keep the kitten warm when wet. Kittens should not be rehomed until two negative fungal cultures have been obtained at intervals of two weeks. The need to reduce direct contact with kittens, particularly by children, to avoid human infection should be stressed.

How long will it take for cats to get better?

Treatment should be continued until all of the affected animals have recovered and are negative on fungal cultures. Skin lesions will often resolve before the cats have eliminated the fungal infection, so it is necessary to monitor progress by taking hair samples (whole body brushing) for fungal culture. If treatment is stopped prematurely the ringworm may seem to recur after a time, although in fact it was never eliminated. In most cases cats will need treatment for a minimum of six weeks and in some cases much longer. Typically, the more cats in a household, the harder it is to resolve the problem.

Prevention

New cats are an important potential source of ringworm. To prevent the introduction of *M canis* into a house or cattery, new cats should be sampled for fungal culture and isolated until the results of this are known. Any situations where there is mixing with unknown cats carries a risk of exposure to dermatophyte spores, even if there is no direct contact between cats. Cat shows are a common example of this. There should be no sharing of grooming equipment with other exhibitors at shows. Bathing, spraying or dipping using an antifungal agent after a show is the best available means of preventing any dermatophyte spores on a cat from starting an infection. Similar precautions should be taken whenever a cat returns to the cattery from anywhere where direct or indirect contact with other cats is a possibility, eg, other catteries or the veterinary surgery. Although ringworm is dreaded by cat breeders, by taking sensible precautions and using good husbandry it can be avoided.

M canis infection in humans

Ringworm can easily be spread from cats to people. Children are particularly at risk. Direct contact with infected animals should be minimised. Gloves and protective clothing should be worn when administering treatment. Efficient environmental decontamination will reduce exposure to dermatophyte spores. Dermatophytosis in humans presents as circular patches of thickened, inflamed skin or hair loss with scaling. These may be itchy. Lesions may occur anywhere on the skin or scalp. If any skin lesions develop the family doctor should be consulted. Ringworm in humans usually responds well to treatment.



Ringworm infection on human skin

The Governing Council of the Cat Fancy (GCCF) and ringworm

Some understanding of procedures regarding cat showing and breeding required by the GCCF following notification or identification of ringworm in a cat and the reasons for this is helpful. If any skin lesions (remember that ringworm may be associated with any type of skin lesion) are noted when a cat is presented for vetting in at a show it can be given a section D rejection. The exhibitor will then not be allowed to exhibit any cat at that show or to attend the show. The cat should be presented within seven days for a veterinary examination and fungal culture. Until the results of the culture are known exhibition or attendance at shows is prohibited. If the culture is negative then a clearance certificate is given. If the culture is positive or an owner self-reports that a cat has ringworm, then the GCCF requires that all cats in the unit are presented for veterinary examination, microscopic examination of hairs and fungal culture from whole body brushings. No cats are allowed in or out of the unit and all breeding should cease. The owner is not allowed to exhibit at or attend cat shows or meetings. These conditions remain in force until a clearance certificate is issued. This will only happen when there are negative culture results from two sets of tests taken eight weeks apart for all the cats in the unit. Following the first negative result no topical therapy should be used. This regime may seem harsh but it is necessary to ensure that ringworm has been completely eradicated and that cats are unlikely to pose a risk to other cats or people.

FAB works with several breeders who are willing to support other breeders who are tackling ringworm problems. They do not give veterinary advice or diagnosis but are happy to talk through, and give practical guidance on, management of the household, cleaning etc.

Call the FAB office (0870 742 2278) or e-mail information@fabcats.org for contact details.

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