

## Dermatophytosis

McKeever Dermatology Clinics

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### DEFINITION

Dermatophytosis is an infection of the skin, hair, or nails with fungi of the *Microsporum*, *Trichophyton*, or *Epidermophyton* genus. Dogs, cats, humans and other mammals can be affected.

### ETIOLOGY AND PATHOGENESIS

The most common cause of dermatophytosis in cats is *M. canis*; in dogs the most common causes are *M. canis* and *M. gypseum*. Other less frequent species include *Trichophyton mentagrophytes*, *M. persicolor*, *T. erinacei*, *M. verrucosum*, *M. equinum*, and *T. equinum*.

Infection occurs by contact with hair on infected animals. Dermatophytosis commonly affects cats; they can be asymptomatic carriers and unwitting sources of infection for other mammals. Fomites are also sources of dermatophyte infection. Infected hairs can contaminate collars, brushes, toys, etc. The environment is also a source of dermatophyte infection. Dermatophyte infected hair can remain viable in the environment for years; carpeting and upholstery are especially good environments for harbouring infected hairs. Soil is also a source of dermatophyte exposure.

Predisposing factors for infection include: young age, immunosuppression, malnutrition, concurrent disease, high temperature and humidity, and skin trauma. The incubation period varies from 1–3 weeks. Dermatophytes infect growing hairs and living skin.

Dermatophytosis is often self-limiting in immunocompetent cats; these cats are more resistant to subsequent dermatophyte infections in the future.

### CLINICAL FEATURES

Classic signs include multifocal alopecia and scaling, typically on the face, head, and feet. Other clinical signs include folliculitis and furunculosis, feline acne, onychomycosis, granulomas, and kerions. Pruritus and inflammation are usually minimal, but occasionally pruritic, pustular, or crusting forms occur. These signs may mimic allergies, ectoparasites, miliaria dermatitis, pyoderma, or pemphigus foliaceus. Dermatophyte mycetomas or pseudomycetomas are subcutaneous nodular and ulcerating forms with draining sinus tracts seen in Persian cats and, occasionally, in other long-haired breeds. This is often associated with a generalized greasy seborrhea. *T. mentagrophytes* typically causes more severe inflammation, alopecia, furunculosis, crusting, and granulomas of the face and feet, especially in small terrier breeds. Dermatophytes are a rare cause of otitis externa.

### DIFFERENTIAL DIAGNOSES

Because the clinical presentation can be so variable, dermatophytosis should be considered in almost any animal, but especially a cat, that presents with focal to multifocal alopecia, scaling, and crusting; diffuse alopecia, seborrhea, and scaling; nodules and draining sinus tracts; inflammation, erythema, erosions, and ulcers; and folliculitis and furunculosis.

## DIAGNOSIS

Diagnosis relies on fungal culture of hair and scale. Hairs can initially be examined by microscopy for the identification of ectothrix arthroconidia spores. It is sometimes possible to identify fungal elements on tape-strip or impression smear cytology. Up to 50% of *M. canis* strains fluoresce green under a Wood's lamp. Skin biopsies may be submitted, but histology is not as sensitive as culture.

Dermatophytes readily produce whitish colonies on dermatophyte test medium (DTM), inducing a red color change that coincides with early fungal growth, usually within 7–10 days (faster if incubated above 25°C). Green or black colonies and/or color changes that coincide with late fungal growth all indicate a saprophyte.

Fungal elements should be examined under the microscope. A tape mount can be prepared and stained with new methylene blue. *M. canis* macroconidia spores are characterized by a spindle shape, thick wall, terminal knob and 6 or more cells.

## TREATMENT

Clipping is not necessary in all cases, but it can facilitate topical therapy and remove infected hairs, reducing the pathogenic load and environmental contamination. This should be done with care to avoid further contamination from the clipped hair and skin trauma.

## TOPICAL THERAPY

Topical therapy reduces environmental contamination and the time to clinical and fungal cure. Lime sulfur solutions are highly effective and well tolerated, although staining and pungent. Chlorhexidine is less effective. Many other antifungal shampoos are available and have variable efficacy. Topical therapy should be applied to the entire body 1-2 times per week until the patient is cured.

## SYSTEMIC THERAPY

Clinical cure occurs before mycological cure and animals should not be regarded as cured until they have had 2 negative cultures at least seven days apart. Duration of therapy may range from 2-6 months.

Itraconazole (5 mg/kg q24h) is highly effective and well tolerated in cats and dogs. It can be administered daily. It can also be administered daily on alternating weeks, or every other day. Itraconazole persists in the hair for 3–4 weeks after dosing. Therapeutic concentrations are maintained in the skin and hair for at least two weeks after the final dose.

Terbinafine (20–30 mg/kg q24h) has been used successfully for dermatophytosis and dermatophyte mycetomas. There is a long duration of activity and this may allow relatively short courses of therapy followed by careful monitoring. Terbinafine appears to be well tolerated in cats and dogs.

Ketoconazole (5–10 mg/kg q24h) is effective and usually well tolerated, but it can cause anorexia and vomiting and is potentially teratogenic and hepatotoxic. It should be administered with food. Dogs tolerate ketoconazole fairly well. Cats are particularly susceptible to side effects, and itraconazole or terbinafine are better treatment options.

Griseofulvin can be used to treat dermatophytosis in dogs. The dose depends on the formulation and is as follows: (micronized formulation) 50–100 mg/kg q24h; (ultramicrozoned/PEG formulation) 10–30 mg/kg q24h. Doses can be divided and given twice daily with a (fatty) meal until the infection has resolved. It is well tolerated, but should not be used in animals under six weeks of age. Side effects include pruritus, anorexia, vomiting, diarrhea, liver damage, ataxia, and bone marrow suppression. Griseofulvin is teratogenic and may affect sperm quality. Griseofulvin should only be used if other treatment options are not available. Itraconazole and terbinafine should be considered first.

Fluconazole (5-10mg/kg q 24h) is effective in many, but not all, cases. It is well tolerated, with minimal GI or hepatic side effects.

#### ENVIRONMENTAL DECONTAMINATION

The major source of contamination is the fungal spores on hairs. These may be removed with a combination of disposal, physical cleaning (including daily vacuuming) and wiping surfaces with 1:10 bleach-water solution. Removal of infected hairs in the environment is particularly important for resolution of dermatophytosis.

#### Control of dermatophytosis in catteries and multi-cat households

The principles for controlling dermatophytosis in catteries and multi-cat households are:

- Isolate the cattery and suspend breeding until the outbreak is controlled.
- Separate infected and non-infected cats on the basis of culture and use barrier precautions to prevent spread of the infection. If it is impossible to isolate culture-negative cats, they should all be treated as culture positive.
- Treat infected cats.
- Eliminate environmental contamination.
- Prevent reinfection.

Pregnant queens and kittens can be isolated and treated with topical lime sulfur or miconazole/chlorhexidine. Negative cats should be re-cultured and any that become positive moved. Ideally, infected cats should not be moved until all of them are cured.

New cats and animals that have been to shows and/or stud should be isolated and cultured; many owners can be taught to use DTM in-house. Wood's lamp is also useful for identifying dermatophyte positive cats. Prevention is better, less expensive, and less time consuming than treatment.

#### KEY POINTS

- Dermatophytosis is zoonotic.