



ZOONOTIC RISKS

Limiting the Zoonotic Risks of Fungal Skin Infections

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Abstract

Although a few zoonotic fungal skin infections exist, the one that most commonly affects cats and dogs is dermatophytosis, often called ringworm. Dermatophytes can live in the environment for many months, making this disease difficult to cure and requiring much effort to disinfect the environment. Client education is imperative to prevent the spread of zoonotic fungal diseases to humans and other pets in the household, and the veterinary nurse plays an important role in all aspects of managing these diseases.



Take-Home Points

- The most common zoonotic fungal diseases are dermatophytosis and sporotrichosis.
- The small animal zoonotic dermatophyte species of concern are *Microsporum canis*, *Trichophyton mentagrophytes*, and *Microsporum gypseum*.
- A less common fungal zoonotic species of concern is *Sporothrix schenckii*.
- Other fungal diseases, such as histoplasmosis, blastomycosis, and coccidioidomycosis, are also considered zoonotic hazards.
- Quick diagnosis of fungal disease helps to not only resolve the patient's infection faster but also prevent possible transmission of the fungus to other animals and humans.
- Precautions such as effective cleaning and disinfection of the environment, along with wearing personal protective equipment when handling infected patients, can help decrease zoonotic transmission.

Veterinary nurses play a crucial role in the workup of dermatologic patients as well as in providing thorough client education. Education is vital to help owners successfully treat and manage fungal infections and is especially critical when the patient has been diagnosed with a zoonotic disease. Keeping current with recommendations and being available as a resource to clients aid in preventing transmission of fungal organisms to other pets or humans in the household. This article reviews the most common zoonotic fungal infections, dermatophytosis and sporotrichosis. Less common zoonotic fungal infections can be found in **BOX 1**.

DERMATOPHYTOSIS

One of the most common zoonotic skin diseases, dermatophytosis is a superficial fungal infection of the skin and its adnexa (including the stratum corneum, hair, and claws).^{1,2} Although it is a fungal infection, the common name “ringworm” can give clients the misperception that this zoonotic disease is caused by a worm. The dermatophyte species frequently isolated from small animals include *Microsporum canis* (most common in cats), *Trichophyton mentagrophytes*, and *Microsporum gypseum*.

Transmission

Dermatophytes are transmitted by direct contact; contact with fomites; or exposure to infective organisms in a contaminated environment, such as contaminated catteries, cat shows, and shelters. Infected hairs can remain viable in the environment for up to 18 months under ideal temperature and humidity conditions,^{1,2}

serving as a source of exposure. Animals and humans can be repeatedly infected. Exposure to infected hairs may not result in an infection, and infection may not result in clinical signs. Infection is more likely if the animal has damage to the skin, an immature immune system, or a suppressed immune system. The incubation period is generally 1 to 2 weeks.

Clinical Signs

Dermatophytosis is more common in very young or very old animals, immunocompromised patients, and longhaired cats (Persians may be more susceptible).¹⁻³ Clinical signs can begin as alopecia, with the classic circular alopecia being common in cats. Scales, erythema, hyperpigmentation, and pruritus are variable (**FIGURE 1**). Persian cats may also present with 1 or more subcutaneous nodules, called dermatophytic



FIGURE 1. Kitten diagnosed with dermatophytosis showing alopecia and a scaling lesion.



Identifying the dermatophyte species causing the infection may help to determine how the patient acquired the disease and assist with environmental control.



pseudomycetoma, which can ulcerate and drain. Other patients may present with only a poor hair coat. Cats can also be asymptomatic or subclinical carriers.

Diagnosis

Because of the highly contagious, zoonotic nature of dermatophytosis, it is very important to rule it in or out as soon as possible and to begin treatment once diagnosis is confirmed.¹ Along with a thorough patient history and physical examination, a variety of screening and diagnostic tests can be performed. They include:

- **Wood's lamp:** This test is best used for screening purposes and to help select hairs to pluck for trichogram and culture.
- **Trichogram:** This procedure involves direct microscopic examination of plucked hairs. It can give a rapid diagnosis; however, false-negative results are also possible. An inconclusive trichogram does not rule out dermatophytosis.
- **Dermatophyte test medium (DTM) culture:** Culture is the most reliable means of confirming the diagnosis of dermatophytosis; however, it may take up to 14 days for the culture to grow.^{1,4} For patients with clinical signs, it is best to pluck suspicious hairs that are close to the edge of the lesion(s) using forceps and place them on DTM. For asymptomatic patients (including patients being treated without clinical signs), the Mackenzie brush technique can be used to collect scale and hairs for culture. This technique involves using a new toothbrush to brush the entire patient from head to toe.
- **Skin biopsy:** This test is not usually needed and is more expensive and invasive. It can be helpful in confirming a diagnosis when nodular lesions and kerions (seen more often in dogs) are present.
- **Polymerase chain reaction (PCR) testing:** A PCR test is commercially available in the United States for

the diagnosis of dermatophytosis in dogs and cats.⁵ With a rapid turnaround time of 1 to 3 business days, this test may provide earlier confirmation of the disease, allowing treatment to be initiated sooner.

Identifying the dermatophyte species causing the infection may help to determine how the patient acquired the disease and assist with environmental control. For example, *M canis* is often transmitted from pet to pet or from a contaminated environment or fomite, *T mentagrophytes* is often transmitted by rodents, and *M gypseum* is often transmitted from contaminated soil.

Treatment and Prevention

Available treatment options include topical therapy and systemic therapy. Systemic treatment helps resolve the infection faster and is usually required for cats since they often have generalized disease; topical therapy may be beneficial as adjunctive therapy in these patients.^{2,3}

Even though dermatophytosis can be self-curing in pets with a competent immune system, disinfecting the household is an extremely important component of treating the patient and should be recommended in all cases. Cleaning the environment helps remove infected hairs, which can prevent exposure of other animals and



SCAN THE QR CODE
for a handout you can share with clients on dealing with dermatophytosis.



FIGURE 2. Child with ringworm lesion on their arm.

Figure 2: courtesy Jessica Weigel, CVT. Opposite Figure 3: courtesy Mariana Mascarenhas, DVM, DLACVD



BOX 1

Other Zoonotic Fungal Diseases: Histoplasmosis, Blastomycosis, and Coccidioidomycosis

Although histoplasmosis, blastomycosis, and coccidioidomycosis are less common in small animals, they are considered zoonotic hazards.¹

These diseases are caused by fungal species found primarily in soil, and humans and animals usually become infected by inhaling aerosolized spores from the environment; spores cannot be transmitted via aerosols from animals to humans.² In the United States, distribution of these fungal species tends to be regional.

These diseases are considered to have public health significance since accidental inoculation of organisms (e.g., contaminated needles during fine-needle aspiration) or exposure to mycelia growing on in-house cultures can be infectious.²⁻⁴ If any of these fungal diseases that cause deep infection are suspected, it is best to submit samples to a veterinary microbiology laboratory.

References

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humans as well as decrease the possibility of reinfection for the patient. Any humans who are infected should be advised to contact their physician (**FIGURE 2**).

Aggressive cleaning is necessary for decontamination. Detailed instructions should be provided to the owner.

Until the patient is cured, the disinfecting process should be repeated once to twice weekly. Keeping the infected patient confined to a small room that can easily be cleaned, such as a bathroom, will help with this rigorous process. Young patients in the critical socialization period and geriatric patients may not adapt well to isolation; therefore, owners need to be made aware of the importance of continued interaction, social enrichment, and monitoring of appetite and attitude during the treatment period.

Preventing infection in the veterinary clinic requires that all team members who had contact with the infected animal wash their hands and change their lab coat or scrubs prior to seeing another patient. The examination room should be cleaned (remove physical debris) and then disinfected with accelerated hydrogen peroxide and ideally not used for the rest of the day. If this is not possible, the disinfectant solution should have a minimum wet contact time of 10 minutes and the team should try to avoid bringing any young, immunocompromised, or sick and debilitated patients into this examination room for the rest of the day.

Client Education

Because the haircoat can look completely normal before the dermatophyte infection has resolved, owners should be reminded that follow-up rechecks are mandatory to ensure treatment is continued until their pet is cured. Educating clients so that they have a good understanding of the disease and setting realistic expectations are extremely important. It is essential for owners to be aware of the length of treatment, aggressive cleaning, and financial and time responsibilities needed to help them adhere to the recommended treatment plan and prevent frustration. Providing handouts can help clients understand and remember recommendations.



FIGURE 3. Cat diagnosed with sporotrichosis showing facial involvement.



FIGURE 4. Cat diagnosed with sporotrichosis showing distal limb involvement.

SPOROTRICHOSIS

In the United States, sporotrichosis is caused by *Sporothrix schenckii* and considered uncommon to rare in small animals. The highest incidences reported are in intact male cats that roam outdoors and dogs that hunt.³ Infection from this environmental (i.e., soil and organic debris) saprophyte occurs via puncture wounds when the dimorphic fungal organism penetrates and inoculates subcutaneous tissue. Sporotrichosis is zoonotic and can be found worldwide, with *Sporothrix brasiliensis* emerging as a species in Brazil that can cause more severe disease among humans.⁶

Patients usually present with skin lesions, which are more commonly found on the head (**FIGURE 3**) and distal limbs (**FIGURE 4**). Diagnosis can be made by skin cytology, biopsy and dermatohistopathology, immunofluorescent tests, fungal cultures (easier in cats;

however, fungal cultures are considered highly infectious³), and PCR analysis.

Long-term (i.e., weeks to months) systemic antifungal therapy is required for treatment and should be continued for at least 1 month after clinical resolution.³ Although the prognosis is fair to good, owners need to be aware that relapses can occur. Zoonotic transmission from dogs to humans has not been reported³; however, infected cats are considered highly contagious to humans, and transmission can occur via bites and scratches as well as contact with an ulcerated wound or exudative material.²

The zoonotic potential of sporotrichosis should be taken seriously; therefore, personal protective equipment, especially gloves,^{2,3} should be worn when handling a cat suspected (e.g., fight-wound abscesses) or confirmed to have sporotrichosis, followed by thorough handwashing.

SUMMARY

Skin diseases are common in small animals. Veterinary nurses play an extremely important role in many aspects of these cases. Suspicion of a fungal zoonotic disease allows for quick action to isolate the patient, thereby preventing accidental exposure of other pets and clients. Being proactive with personal protective equipment can prevent team members from becoming infected. Educating clients about the zoonotic disease along with recommended treatment plans, including disinfecting the environment, is a crucial component of managing these patients. **TVN**

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After working in both small and mixed animal practices, Kim spent most of her career at the University of Minnesota Veterinary Medical Center, where she found her passion in dermatology. She is one of the cofounders of the Academy of Dermatology Veterinary Technicians and is a coeditor of the book *Small Animal Dermatology for Technicians and Nurses*. Although Kim is now retired, she is still very active in her state and national veterinary technician associations.

