DERMATOPHYTE - DIAGNOSIS AND TREATMENT

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Dermatophyte fungal infection remains as one of the most over-diagnosed and under-diagnosed diseases in dogs and cats. The clinical presentation may be variable and can even resemble neoplasia. There is an increased incidence among young and immune suppressed animals. The purpose of the presentation is to review the clinical findings and diagnostic procedures necessary for an accurate diagnosis of dermatophytosis. Current treatment options will also be reviewed.

The term “ringworm” is a generic word for a fungal infection of dermatophyte organisms because of the clinical findings in human beings. These fungi like the keratin of the hair and skin surface and rarely deeper tissues are involved. All forms of dermatophyte are zoonotic. Some forms of human dermatophytes can be a reverse zoonosis for dogs and cats.

*Microsporum canis* is the most common cause of dermatophyte infections in dogs and cats. This fungus survives in the environment on an animal host, most commonly a cat. It is one of the species that can exhibit fluorescence upon exposure to a Wood’s lamp examination. Macroconidia are large spores produced by dermatophytes in culture, and are the most important for identification of the genus and species involved. *M. canis* has six or more septations on average.

*Microsporum gypseum* is the second most common cause of ringworm in dogs and cats. This species lives in the soil (geophilic). Dogs that dig into the soil are at an increased risk of infection. The macroconidia are more rounded than *M. canis* and contain less than six septations on the average.

*Trichophyton mentagrophytes* is a zoophilic dermatophyte that can be found on many species of domestic animals. Small rodents are believed to be the reservoir. The macroconidia are long and “cigar-shaped” with variable septation number. Lesions associated with this fungus are highly inflammatory. If this species is found on dogs and cats, a search for immune suppression of the animal should be sought. *T. mentagrophytes* is far less common than the other two species already mentioned.

The clinical symptoms of dermatophyte infection are variable. Alopecia with or without scaling may be present. Pruritus is variable. The classic lesion is a ring-like area of alopecia that spreads outward. Over time, hair may regrow within the center. Cats tend to exhibit broken hairs due to the damage the fungus does to the cuticle of the hair. The skin may become highly inflamed due to a hypersensitivity reaction to the fungus. In rare instances, the dermatophyte may get under the skin and cause a pseudo-mycetoma or kerion reaction. Some cats can harbor *M. canis* and show almost no skin lesions. They tend to be the source of infection to kittens shortly after birth. Interestingly, most dermatophyte infections are self-limiting. It is important to treat the infection to reduce the risk of spread to human beings and other pets.
Because of the variety of presenting clinical symptoms, the list of differential diagnoses is lengthy. Bacterial skin infections and demodex are primary differentials for dogs. Any cat with hair loss should be a ringworm suspect.

A Wood’s lamp examination is a useful screening tool. Some forms of M. canis will exhibit an apple green fluorescence some of the time. A negative test does not rule out a dermatophyte infection. Some scale and crust can give a false positive reaction. Bacteria and topical medications may also give a false positive reaction. It is important to identify individually glowing hairs.

A quick and easy diagnostic technique is called a trichogram. Basically, hairs are plucked from the base and placed into a drop of mineral oil. A cover slip is added and microscopic examination is performed at 10X magnification. Potassium Hydroxide (KOH) is sometimes used as a clearing agent but mineral oil is usually sufficient. Dermatophytes produce microconidia (spores) that can be identified on the hairs. Damage to the cuticle from the invading fungus will give the hair a “fuzzy” appearance. Affected hairs are distorted, fractured, and usually wider than normal hairs on microscopic examination. No conclusions may be drawn with respect to genus and species. Identification of these hair characteristics is important because you may inadvertently identify fuzzy hairs on examination of a skin scraping and hence, prompt the need for a fungal culture.

A fungal culture is the only way to definitively diagnose a dermatophyte infection. It also provides identification of the genus and species of the fungus so that the source of infection can be identified and treated. Most fungal culture media contain a phenol indicator that turns red as the fungus begins to grow. The inoculated samples should be placed in a moist dark environment at room temperature, and observed daily for changes. If ignored for an extended period of time, the culture will eventually turn red from the presence of mold organisms that may not be pathogenic. If culture media is not available, a sample of hair can be collected and placed into a sterile vial or dish for shipment to the laboratory. Since dermatophytes are zoonotic, it is wise to identify the shipment as a risk to handlers. The best samples are collected from the leading margin of the lesion.

Skin biopsy with histopathology is not usually needed for the diagnosis of ringworm. However, subcutaneous infections (pseudo-mycetoma) and granulomatous forms (kerion) are rarely culture positive on fungal cultures of sampled hairs. These lesions may be suggestive of neoplasia or panniculitis and would be biopsied for obvious reasons.

Topical antifungal therapy may be very effective. Active ingredients with known efficacy include: Miconazole, Ketoconazole, Enilconazole, Clotrimazole, and Lime sulfur preparations. These products are best applied as a leave-on product for their residual effect. The author does not advocate the use of shampoo therapy for dermatophyte infections. The reasons for not using shampoo products include: limited residual effect, contact risk to the person bathing the pet, and the risk of spreading the infection to non-infected hairs. Not everyone shares my philosophy. Research has indicated that bathing cats 3 times per week with Malaseb shampoo did not improve the cure rate or decrease the time to cure. It was shown that environmental contamination was decreased. This benefit may not be worth the effort. Clipping the entire hair coat is usually not recommended due to contamination of the
environment and personnel. However, gently trimming localized areas with a scissors, and removing the hairs can greatly limit environmental contamination.

There are limited treatments for the environment. Thorough vacuuming the pet contact areas may be helpful. Care should be taken when handling to contents. Straight bleach may be fungicidal but the potential harm to clothing, carpeting and fabric limits its usage. Enilconazole (not available in the U.S.A.) has been shown to be effective as an environmental control agent. It is usually best to confine pets to limit the spread of infected hairs throughout the environment. It is our job as health care specialists to limit the risk of contamination to human beings and other pets.

The basis of therapy with systemic antifungal agents is selected upon the severity of the disease, the risk to human beings, and owner compliance. Griseofulvin is used at 50mg/kg/day. Splitting the dosage may help reduce gastrointestinal upset. Side effects include teratogenicity (same as for all the oral antifungal medications) and possible hepatotoxicity. FIV positive cats are at increased risk of bone marrow suppression but this can occur with any cat. Ketoconazole can be used 5-10mg/kg qd. This drug should not be used for treating cats due to hepatotoxicity. Side effects are common. This drug decreases liver enzymes and may affect the metabolism of other medications. Also, this drug will decrease cortisol and testosterone. Itraconazole is used at 5-10 mg/kg qd. Anorexia in cats is common. This is a broad spectrum antifungal agent and is associated with fewer side effects than ketoconazole but is significantly more expensive. Fluconazole has become available as a generic product so the cost is greatly decreased. The recommended dosage is 5-10 mg/kg qd. This product reaches high tissue levels in mucosal surfaces but is also effective against dermatophytosis. Terbinafine is also available to treat dermatophyte. The current recommended dosage is 10-40mg/kg qd. This drug concentrates in cornified tissues making it an excellent product for dermatophyte and nail bed fungal infections. Unfortunately, the pharmacokinetics have not been studied in dogs and cats so accurate dosing and toxicities are not documented.