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Dermatophytosis, *Microsporum canis*, *Trichophyton mentagrophytes*, *Microsporum gypseum*
Ringworm, fungal infection

Affected Animals:

Dogs, cats, humans, horses, cows, and other mammals. Ringworm can be transmitted between humans and animals.

Overview:

The fungal skin disease dermatophytosis has come to be called ringworm because of the appearance of the skin lesion that characteristically occurs with this disorder: a circular area of hair loss with a red, raised outer rim. These lesions result from an inflammatory reaction to the fungus. Most often, dogs and cats are infected by the *Microsporum canis* fungus, but other types of fungi cause ringworm infections as well.

Cats, especially longhaired breeds, have a more generalized form of infection than dogs. These animals can be chronic carriers of a fungus even though they may not show any signs of infection themselves.

Ringworm fungi can be transmitted to humans; therefore, owners of infected animals should consider quarantining the pet indoors until the infection is cured. Precautions should be taken while treating animals in order to prevent human infection and environmental contamination.

Clinical Signs:

Clinical signs include circular or patchy alopecia; scales; follicular papules and pustules; erythema; hyperpigmentation; and pruritus. The skin lesions most commonly are localized to the tail, paws, face, and pinnae. However, clinical syndromes can vary. Therefore, dermatophytosis should be considered in the differential diagnosis list of other skin eruption patterns.

Symptoms:

Hair loss that is patchy or circular may be noted. Increased scales, reddened skin, bumps or pimples, darkened skin tone, and itching may be present. The face, ears, feet, and tail are the most commonly affected areas.

Description:

Ringworm is an infection by a fungus that most often affects the hair, nails, and superficial layers of the skin. The most commonly noted fungal types seen in cats and dogs are *Microsporum canis*, *Trichophyton mentagrophytes*, and *Microsporum gypseum*.

Animals can come into contact with infective fungal spores in the indoor or outdoor environment. Contaminated soil is a common source of infection, as are other animals

infested with ringworm. Not all animals that are exposed to fungal spores develop a fungal infection, and if an infection does occur, the dog or cat may not show clinical signs of the disease but instead serve as asymptomatic carriers.

The classic clinical sign of ringworm is the circular patch of hair loss with a red ring of inflammation. However, not all animals infected by ringworm will have this type of lesion. In fact, because the symptoms of this disease can vary greatly, ringworm should be considered as a possible cause of skin disease in any eruptive skin disorder.

Although most healthy dogs and cats can rid themselves of a fungal infection on their own, some cases can be very frustrating to cure. The asymptomatic carrier state can complicate matters. Since the presence of disease is hidden in these cases, owners will not know to take precautionary measures to protect against the spread of infection. Animals that do not respond to treatment, especially those living in multiple-cat households, should be referred to a veterinary dermatologist or specialist.

Diagnosis:

Following a thorough history and physical exam, testing will be performed to rule out other skin diseases that have similar signs, such as a bacterial skin infection and skin mite infestation. A special light, called a Wood's lamp, can be used as a crude screening test for ringworm. Unfortunately, only 50 percent of a specific type of ringworm called *Microsporum canis* will fluoresce within the animal's fur with the characteristic apple green color. Therefore, a negative result from a Wood's lamp does not rule out the possibility of ringworm.

A more reliable way to diagnose ringworm is to conduct a fungal culture on hairs taken from around the skin lesions by plucking them with a clean instrument or brushing them with a new toothbrush. In order to identify the source of the infection, the fungal growth is evaluated under a microscope to determine the type of fungus present. This assessment of the material subsequent to its growth in a medium will rule out false positives that would otherwise be caused by environmental contaminants.

The veterinarian may evaluate plucked hairs under a microscope to look for evidence of fungal units associated with the hair shaft. However, this test is more time-consuming and only carries a 40 to 70 percent success rate in detecting a ringworm infection.

In animals with severe skin abnormalities, skin biopsies may be obtained. Although a skin biopsy can indicate a true fungal infection of the skin as opposed to a temporary presence, this procedure offers a less reliable diagnosis than a fungal culture. Often, this test is performed when the skin lesions are impossible to culture for ringworm.

Prognosis:

Most healthy animals are capable of clearing a fungal infection on their own, but this process takes months. Because of the zoonotic potential of the disease, medical treatment should be used in order to expedite the elimination of ringworm and to decrease the contamination of the environment with infective fungal spores.

Transmission or Cause:

Ringworm is transmitted fr

Risk factors include poor nutrition, poor hygiene, and housing situations in which a large number of animals are closely grouped together. In addition, there is an increased risk for animals that are immunocompromised due to disease or immunosuppressive medications.

Treatment:

Because ringworm is infectious, animals with the disease should be quarantined within the owner's home until the disorder can be cured. All infected animals or asymptomatic carriers within the household should receive topical therapy, which may include clipping down the hair and applying an antifungal ointment to the skin or shampooing and dipping the entire dog or cat in medicated products. The examining veterinarian will recommend the best approach depending on the location of the lesions. Topical treatment is continued until a negative fungal culture is obtained.

Animals that do not appear to respond to topical treatment within two to four weeks may be given supplemental oral drug treatment in order to eradicate the infection more quickly. The most commonly used oral antifungal medication is griseofulvin, but some fungal infections may be resistant to it. Also, some animals, especially cats, cannot tolerate griseofulvin and may develop a serious side effect of fatal bone marrow suppression. Thus, serial complete blood count tests are performed on cats taking this drug to watch for evidence of bone marrow problems. Also, cats with the feline immunodeficiency virus should not be given this drug. Ketoconazole and itraconazole, two drugs that are not licensed currently in the United States for the treatment of ringworm, nevertheless are used effectively as an alternative to griseofulvin for animals that cannot tolerate this medication. Typically, griseofulvin is safe for dogs.

A vaccination against *Microsporum canis* has been developed for cats, but the safety and efficacy of this vaccination still needs to be researched. The use of the vaccine may be recommended in frustrating cases of ringworm infection.

Infections can be very difficult to eradicate in multiple-cat households or breeding facilities and often require the consultation of a veterinary dermatologist. Humans should wear gloves while treating the infected animal and follow the recommended protocol for avoiding infection, including a thorough disinfection of the indoor environment. If human infection does occur, prompt medical attention is advised.

Prevention:

Avoid geographical areas suspected of containing fungal spores. The animal's environment, brushes, bedding, and other potentially contaminated objects should be disinfected periodically with a 1:10 dilution of bleach to water. In multi-animal households, all animals should be tested with a fungal culture even if they are not exhibiting clinical symptoms of infection. Some animals, especially longhaired cats, can be asymptomatic carriers of ringworm for long periods of time. The examining veterinarian may recommend additional measures of prevention.