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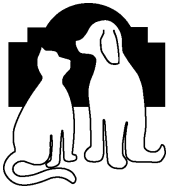
Ringworm (Dermatophytosis)

Ringworm is not caused by a worm as the name implies, but rather by a fungus. Dermatophytosis is a more correct term that is derived from the Greek words 'derma' and 'phyton' meaning skin and plant respectively. There are many species of fungus that cause ringworm. Some of these species tend to live on animals, others on humans, and there are even some that live in the soil. Although ringworm infects many species of animal, this article will focus on dogs and cats. The most common species to infect dogs and cats are *Microsporum canis*, *Microsporum gypseum*, and *Trichophyton mentagrophytes*. Of these three *Microsporum canis* is the most common cause of ringworm in dogs and cats.

PET INFECTION: Dogs and cats rarely get ringworm. The prevalence of ringworm infections in dogs and cats is only approximately 2% of all dermatologic cases. In dogs and cats the most common presentation of ringworm is circular bald areas which are sometimes associated with crusting or scaling. Other conditions, most commonly, bacterial infections and demodicosis (mite infestation) can also cause similar appearing lesions and so a diagnosis must be made before treatment can be initiated. Ringworm less commonly may also appear as multiple draining tracts, greasy scale, or even nail bed infections. Infections can be spread by direct contact with the pet or through environment contaminated with infected hairs or scale. The incubation period before signs of ringworm are seen usually ranges between 4 days and 4 weeks. Infection is more common in animals less than 1 year of age or immunosuppressed animals. The presence of ectoparasites (ie: fleas, mites) may also play a role. Some breeds may be predisposed to ringworm infections; these include Persian and Himalayan cats and Jack Russell Terriers, Yorkshire Terriers, Pekinese and German Shorthaired Pointers. It is possible for an animal to be a ringworm carrier, meaning that it has ringworm, but is not showing clinical signs of the infection.

DIAGNOSIS: There are several methods used to diagnose ringworm. One may examine a sample of hairs and scale under the microscope in an attempt to see fungal elements. A Wood lamp (black light) can be used to see if the hairs fluoresce. Only certain types of ringworm fluoresce. Of the types of ringworm that fluoresce only a certain percentage will glow as the fluorescence is caused by a metabolite of the fungus at a specific time during infection. The most reliable diagnostic test is a fungal culture. This can be performed either by plucking hairs or by combing a sterile toothbrush over the pet. The hairs or toothbrush bristles are then applied to culture media. It can take several weeks to see culture results. Even though this is the most reliable test, it can still be falsely positive if the animal has the fungus on its fur from the environment but is not actually infected with ringworm. Falsely negative results with fungal cultures are possible as well. If the significance of the culture result is in question a biopsy can be performed for proof of infection.

TREATMENT: Healthy dogs and shorthaired cats usually will undergo spontaneous remission within 3 months without treatment. Healthy longhaired cats may also go through spontaneous remission, but it can



take 1.5 to 4 years for this to occur. Treating ringworm in these pets will decrease the likelihood of spreading the infection as well as shorten the time period for the animal to get rid of the infection. Different types of treatments may be used depending on the length of the pet's hair and whether the infection is focal or all over the body.

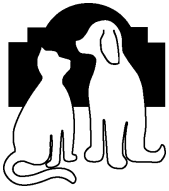
Clipping: Some veterinarians recommend clipping the fur around infected lesions or even the whole animal to get rid of infected hairs. This may make it easier to treat longhaired animals. Clipping may cause the lesions to worsen 7 to 10 days post-clipping due to skin trauma and mechanical spread of infection.

Topical Creams/Lotions/Sprays: Creams, lotions and sprays can be used to treat focal lesions. These are usually applied twice a day to the lesions and a 6cm (approximately 2.5 inches) margin of normal skin surrounding the lesion. One needs to be careful to keep the pet from licking the medication off before it can be effective. Continue to apply the medication for two weeks after resolution of the lesion.

Shampoos/Dips: For animals that have multifocal (multiple lesions) or generalized (all over the body) ringworm antifungal shampoos, antifungal dips, or leave in antifungal conditioners can be used. This form of treatment is often utilized for cats with a focal lesion, as the fungus will often spread over the whole haircoat in cats. Shampoos have no residual action and so therapy with shampoos may be combined with other topical therapy. When applying a shampoo try not to scrub vigorously as this may increase the spread of ringworm. Dips are often preferred over shampoo, as their application does not require rubbing and they also have residual antifungal effects. Leave in antifungal conditioners also have residual antifungal effects. Dips and conditioners should be applied twice weekly. As with the creams, lotions and sprays continue to apply the medication for two weeks after resolution of the lesion. Ideally, topical treatments should be continued until 2-3 cultures (performed at weekly intervals) are negative. Noninfected animals living in the same household as infected animals may be treated with a topical dip weekly to prevent infection.

Oral Medications: For multifocal/generalized lesions, longhaired animals, or pets that live in multipet households oral medication is recommended. There are several oral antifungal agents including Griseofulvin, Ketoconazole, and Itraconazole. Griseofulvin is the only one of these labeled for use in treating ringworm infections. It usually requires 4-20 weeks of therapy to reach a complete cure. Systemic medications are often used in conjunction with topical therapies.

Program (Lufenuron): This flea control product has shown some efficacy in treating ringworm infections when used at high doses. It is not labeled for this use at this time. One study indicated that a one time oral administration of Program cured the infection and resolved the skin lesions in an average of 12 days for cats and 21 days for dogs. The author of that study recommends repeating the dose every 2 weeks until at least two consecutive weekly fungal cultures are negative. Program may not work for ringworm in all cats.



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Ringworm Vaccine: There is a vaccine for ringworm which, unlike other vaccines, is not used to prevent ringworm but to treat it. There is no published scientific information on this vaccine in pets. Anecdotal reports indicate that the ringworm lesions do regress more quickly, but cultures done after lesions are gone are still positive. The injection may also cause a sterile abscess, which is a pocket of pus with no associated bacteria.

ENVIRONMENTAL CLEANUP: To prevent further spread of infection to other pets or humans, and to prevent the pet from re-infection it is very important to treat the environment of the pet as well as the pet itself. Separate infected animals from other household pets and restrict them as much as possible to an easy to clean area. Infective fungal elements can live in the environment for up to 18 months. To remove the fungus from the environment all surfaces should be vacuumed or disinfected daily. This includes walls as well as floors and countertops. Remove and either destroy or disinfect all removable items that have come in contact with the pet. This includes combs, brushes, bedding, carriers, and rugs. Vacuum all heating and cooling vents and dispose of vacuum bags and furnace filters weekly. A 1:10 ratio of bleach to water solution makes an appropriate disinfectant. Steam cleaning is an option as long as the water temperature reaches 110 degrees Fahrenheit. Most do-it-yourself steam cleaners cannot maintain this temperature of water. This is all a lot of work, but it will help clear up the infection and prevent it from spreading.

HUMAN INFECTION: Humans can contract ringworm from infected animals and *M. canis* can be transmitted from people back to their pets. Approximately 50% of humans exposed to an infected cat will become infected with ringworm. That being said, it is important to note that many species of ringworm live in the environment and humans and pets can become infected from these sources. There are also specific types of ringworm that infect humans such as "athlete's foot" and "jock itch" that have nothing to do with animals. Ringworm lesions in humans often appear to be a raised red and scaly circle that spreads outward leaving healed skin in the center. This raised 'ring' like appearance is most likely where the name "ringworm" originated. The most common areas effected in humans who become infected with animal ringworm are the trunk, scalp, and arms.

If you believe your pet has ringworm please bring it to a veterinarian. If you believe that you have become infected with ringworm go see your doctor; if it is a form that may be transmissible to or from animals make sure to get your pet checked.