

## Histoplasmosis: Useful Information for Pet Owners

### 1. Introduction

Histoplasmosis (Histo) is a fungal infection that is common in animals and humans. Though it cannot be spread from one species to another, it often occurs in both at the same time because both are exposed to similar environments. Veterinarians who are familiar with the signs of infection may consider this diagnosis and can obtain rapid results by testing samples for presence of antigen. Antigen is a by-product of the Histo yeasts that may be found in the urine and blood. This method of testing may eliminate the need for surgical biopsies of tissues infected with the fungi. Diagnosis also can be made by testing the blood for antibodies to Histo. Treatment with antifungal medication (such as itraconazole) is recommended. The effectiveness of treatment can be assessed by determining if antigen levels in the urine or blood decline. Blood levels of itraconazole may be measured to determine if they are high enough to treat the infection but not so high as to cause side effects.

### 2. Where is Histo found?

Histoplasmosis caused by *Histoplasma capsulatum* is prominent in certain areas of North and South America (Figure 1). In some endemic areas, (regions known to have high levels of infection) Histo was the most common systemic (total body) fungal infection in animals. The areas endemic for histoplasmosis are the Mississippi, Missouri, and Ohio River valleys. Infection does occur in areas outside of the endemic area. Bats may play a role in spreading the organism in the environment.

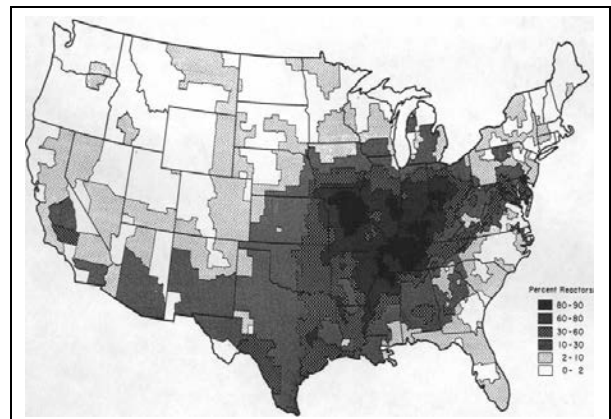


Figure 1. Endemic distribution, based upon Histoplasmin skin reactivity

### 3. Who is susceptible and how do they get it?

All mammals are susceptible to Histo, but cases have been reported most often in dogs, cats, and horses. Birds, because of their high body temperature, are not susceptible to natural infection. Histo is acquired by breathing in spores that have been aerosolized from soil containing the organisms. Histo cannot be spread from animal to animal or person to person, but disease in one can be a signal of exposure to Histo in the other due to shared activities. In other words, if a pet had Histo, it would not infect another pet or the pet owner, but both were exposed to the same contaminated soil, both could have been infected.

#### *4. What are the clinical signs?*

The severity of the signs corresponds with the intensity of the exposure and the animal's underlying health conditions. Fever, cough, difficulty breathing, and enlarged lymph nodes may be seen. Disseminated histoplasmosis (affecting the entire body), may also cause weight loss, fever, and reduced activity (cats) and diarrhea, bloody stool, anemia, and reduced activity (dogs). Any tissue, however, may be involved so signs may be seen in bone, nervous systems, eyes, etc. In horses, rare instances of spontaneous abortion in pregnant mares can occur. In most cases the mare appears healthy, and the placenta is involved causing either the foal to be aborted or to die shortly after birth.

#### *5. How is Histo diagnosed?*

Several tests are available to detect Histo. More than one test method may be necessary in order for your veterinarian to achieve a diagnosis. Available methods include antigen tests, aspirates or biopsies for examination under the microscope, and blood tests for antibodies to Histo.

*Antigen testing.* Based on findings in humans, the most sensitive and rapid test for diagnosis of Histo is antigen detection. The antigen is produced by the yeast as it grows in the tissues, and is released into the blood and the urine, where it can be detected. This test is performed on samples of urine or serum. The antigen test does not require obtaining biopsy specimens from the infected tissues. The antigen test is positive in 94% of cats with Histo, and a similar sensitivity is expected for dogs. A negative result does not completely rule out a diagnosis of Histo. Follow-up specimens may be positive if the disease progresses. Also, other testing methods may be positive despite a negative antigen result.

*Cytology or histology.* If aspirates or biopsies are performed, the specimens can be examined under the microscope by a pathologist for presence of the typical Histo yeasts. One drawback of a biopsy could be the need for anesthesia or an invasive procedure to obtain the specimen.

*Antibody testing.* Detection of antibodies to the fungus is useful in some cases of Histo. Antibody tests may be negative during the first month of infection, however.

*PCR testing.* Some laboratories are currently offering a PCR test to detect Histo genetic material. Methods vary widely, and good studies are lacking to prove the clinical utility of PCR.

#### *How is Histo treated?*

Antifungals may be effective in treating Histo, although the medication is often costly and treatment must be continued for many months. Itraconazole is currently the antifungal drug of choice for Histo in animals. It may be given in pill or liquid form once or twice daily. The capsules should be taken with food and the liquid form on an empty stomach.

The amount of itraconazole in the blood may be measured to assure that drug is being absorbed and levels are in the proper range. Symptoms of drug toxicity include loss of appetite, vomiting, and diarrhea. Itraconazole may also cause liver impairment, which may be assessed by blood tests during treatment.

Fluconazole is a much lower cost alternative to itraconazole, although it was shown to be less effective than itraconazole in humans. It may be as effective as itraconazole in dogs and cats; however, further studies are needed. Fluconazole also may require longer treatment duration. Posaconazole and voriconazole have been used in a few cases but are very expensive.

In severe cases, amphotericin B may be used in addition to itraconazole or fluconazole. Careful monitoring of kidney function is required when amphotericin B is used.

During treatment, antigen testing can be performed to determine the effectiveness of the antifungal therapy. As the animal's health improves, antigen levels decline and eventually become undetectable.

#### *What is the prognosis?*

The prognosis is good for successful treatment in dogs that have lung signs only. If the gastrointestinal tract or whole body is involved, or if the illness is severe, prognosis is guarded. The prognosis for cats is fair to good, unless they are severely debilitated. Long term (4-6 months at minimum) treatment will be required.

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