

Histoplasmosis

Information for Dog Owners



Key Facts

Histoplasmosis can be acute or chronic in presentation. In dogs, clinical signs can be:

- Subclinical, without overt signs
- Nonspecific, consisting of weight loss, lack of appetite, and fever
- Associated with signs in a specific organ/system, such as:
 - Respiratory, e.g. cough, difficulty breathing
 - Gastrointestinal, typically diarrhea containing frank blood and mucus
 - Other body systems, such as ocular (eye) involvement

Prognosis can be good for respiratory disease; however, disseminated disease can be difficult to treat and is poorly responsive to therapy. Long-term, expensive treatment is typically required.

Dogs living in or traveling to specific locations (see below) are at greatest risk of infection.

Dogs involved in hunting or field trials, particularly those in areas with high levels of bird or bat droppings, are at increased risk of disease.

What is it?

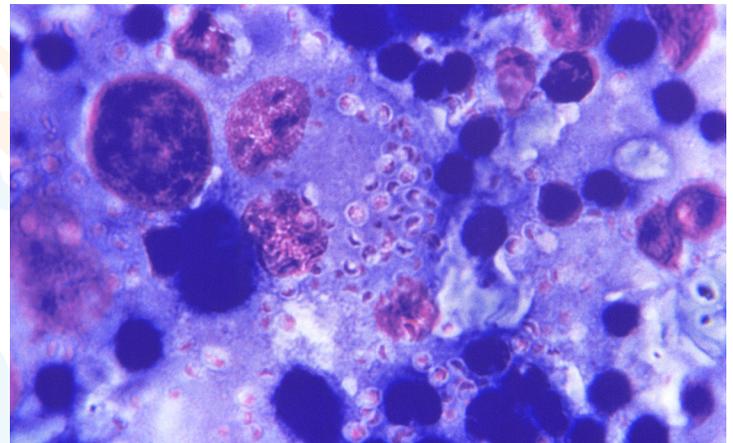
Histoplasmosis is caused by the fungus *Histoplasma capsulatum*. The fungus is found in the environment, most often in soil that contains large amounts of bat or bird droppings.

Disease in dogs typically begins in the lungs where the yeast form of the fungus develops. Infection can spread from the lungs to other body sites (dissemination). Most commonly, clinical signs include weight loss, lack of appetite, and fever, along with cough, difficulty breathing, and/or diarrhea which is often associated with fecal protein loss.

Aspects of the disease (e.g. locations where it is most common, signs of disease, route of infection) are similar to other fungal diseases, such as blastomycosis.

Where is it?

The fungus has a worldwide distribution (excluding Antarctica), but it is most commonly found (aka endemic) in parts of the USA (central and eastern states, especially areas in and around the Ohio and Mississippi River valleys) and in Central America.



Histoplasma capsulatum fungal organisms in liver tissue under microscopic examination (Public Domain: Centers for Disease Control and Prevention)

Who gets it?

Dogs, humans, and rarely cats may experience clinical disease once infected.

Can people get sick with it?

Yes. Although many people living in areas where the fungus is common are exposed to the fungus, human disease is relatively uncommon (one study estimated the incidence of histoplasmosis in adults aged 65 years and older as 6 cases per 100,000 people in the Midwest USA; Baddley JW, et al).

However, as disease can be severe, people need to be careful to avoid infection, particularly those who live in regions where the fungus is most common (see *Where is it?*).

People who have a weakened immune system or are at the extremes of age (infants, older individuals) are at higher risk for developing severe forms of the disease – these individuals should avoid activities that expose them to the fungus, such as disturbing material (e.g. digging in soil) where there are bird or bat droppings.

Dogs may serve as sentinels for human disease, as people can be infected from the same outdoor environmental exposure sources (e.g. soil) as dogs.

How is it spread? (Transmission & Infection Risk)

The fungus has two distinct forms: the mycelial form (mold) which is present in the soil and forms spores, and the yeast form.

In dogs, infection typically occurs through inhalation of mold spores into the lungs. Once within the dog's lungs, the mold form transforms into the yeast form and thickened inflammatory (granulomatous) lung lesions containing pus can result. The fungus can also circulate in the dog's blood, moving to other organs or tissues and causing disease in these locations.

Dogs of any age can be infected, but risk appears to be highest for young to middle aged dogs. Hunting and sporting dogs (e.g. hound and retriever breeds) are at higher risk of disease, likely due to their greater exposure to contaminated soil in endemic regions (see *Where is it?*). In general, histoplasmosis cannot be spread



between people and/or animals; however, blood transmission (e.g. from dog bites, used needles) could occur as documented with other fungal diseases.

What should I look for? (Signs of Disease)

The most commonly affected organs include the lungs and gastrointestinal tract, with the eyes and neurologic systems less commonly impacted.

In dogs, disease signs can be non-specific, such as lethargy, fever, weight loss and lack of appetite. Signs of respiratory disease (e.g. cough, increased breathing effort, exercise intolerance), gastrointestinal disease (diarrhea often with blood and/or mucous), and ocular (eye) disease (i.e. uveitis or internal eye inflammation) can occur.

How is it diagnosed?

A history of your dog living in or having traveled to an endemic region (where histoplasmosis is common) will increase your veterinarian's suspicion for disease. Your veterinarian may discuss performing blood and urine testing, imaging (radiographs, ultrasound), and cytology or biopsy of a lesion or organ to find the fungus and identify other abnormalities that may require specific therapy. Additional diagnostics may include gastrointestinal biopsies if your dog has consistent signs and the fungus cannot be identified by other means.

In endemic regions, testing urine (urine antigen testing) is advised prior to invasive diagnostics. However, other types of fungi can interfere with the results of this test (e.g. provide a false positive result). Providing your veterinarian with a detailed travel history for your dog can help in interpreting test results and ensuring your dog receives appropriate treatment.

What is the treatment? Will my dog recover?

Histoplasmosis can be treated and dogs with lung infection often have a good prognosis with therapy, especially if treatment is started shortly after clinical signs appear. However, long-term treatment (often requiring six or more months) is required and can be expensive. Unfortunately, dogs with disseminated or gastrointestinal disease often have a guarded prognosis, particularly if disease is advanced and clinical signs are severe.

Typically, therapy consists of antifungal medications and pain relief. Supportive care, such as intensive care monitoring, oxygen and nutritional supplementation may be needed for dogs with difficulty breathing and those not eating.

Urine antigen testing can be used as a monitoring tool to assess the need for continued treatment, ensure disease resolution, and diagnose relapse.

Relapses can occur despite appropriate therapy.

How can I stop this from happening to my dog and other dogs?

Be informed and aware of endemic regions in your area and when travelling with your dog(s). In known endemic regions, reducing exposure to soil or other locations (e.g. caves) contaminated with bird/bat droppings is warranted. Owners of dogs involved in hunting or field trials in endemic areas should be mindful of risks and relay them to veterinarians should consistent illness develop.

Owners of infected dogs are encouraged to report suspected locations where infection occurred to local canine event coordinators or similar groups to allow for event changes and risk communication messaging.

Outbreak management

It is uncommon for numerous dogs to be simultaneously diagnosed with histoplasmosis and linked to a common source (outbreak). However, within high-risk regions, if an outbreak occurs it will be helpful to identify suspected sources of infection and caution people and dogs to stay away from such areas. Such cases should be reported to local public and animal health officials.

Zoonotic (Human Infection) Alert

Histoplasmosis has not been reported to spread to people from dogs through the air, such as breathing or coughing. However, blood transmission (e.g. from dog bites, used needles) could occur. Care should also be taken to regularly change any bandaged dog skin lesions and dispose of these used bandage materials safely, due to risk of inhalation of the fungus forming on bandages.

Given their increased susceptibility and exposure to the fungus, dogs can act as sentinels of human disease. Any increase in the number of canine disease cases should result in notification to local

human public health organizations. Additionally, information on human cases (e.g. location, annual counts) can be useful in determining the risk for canine cases in the same area (see *Additional Resources* for human disease risk maps).

Additional Resources

Baddley JW, et al. (2011). Geographic distribution of endemic fungal infections among older persons, United States. *Emerg Infect Dis.* 17(9):1664-9. Available at: wwwnc.cdc.gov/eid/article/17/9/10-1987_article

Cunningham L, et al. (2015). Sensitivity and specificity of *Histoplasma* antigen detection by enzyme immunoassay. *J Am Anim Hosp Assoc* 51: 306-310. Available at: jaaha.org/doi/10.5326/JAAHA-MS-6202

Schumaker LL, et al. (2013). Canine intestinal histoplasmosis containing hyphal forms. *J Vet Diag Invest* 25: 304-307. Available at: journals.sagepub.com/doi/full/10.1177/1040638713479604

The Centers for Disease Control and Prevention. Fungal Diseases: Histoplasmosis. (Contains information on human disease, including human disease risk maps) Available at: cdc.gov/fungal/diseases/Histoplasmosis/index.html

Current research being funded by the AKC Canine Health Foundation to study a urine test for canine histoplasmosis (02633: Validation and diagnostic performance of a novel monoclonal antibody based histoplasma urine immunoassay in dogs with histoplasmosis). Principal Investigator: Andrew S. Hanzlicek DVM, MS; Oklahoma State University. Available at: akcchf.org/research/research-portfolio/2633.html

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