



# Disease Caused by *Coccidioides*, a Type of Fungus (Coccidioidomycosis)

## Basics

### OVERVIEW

- Coccidioidomycosis is a generalized (systemic) disease caused by inhalation of infective spores of the soil-borne fungus *Coccidioides immitis*
- “Mycosis” is the medical term for any disease caused by a fungus

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs
- Cats (rare)

#### Mean Age and Range

- Most affected pets are young (less than 4 years of age); may be seen in pets of all ages

### SIGNS/OBSERVED CHANGES IN THE PET

- Lack of appetite (known as “anorexia”)
- Coughing
- Fever, unresponsive to antibiotics
- Lameness
- Weakness, partial paralysis, back and neck pain
- Seizures
- Change in vision
- Weight loss

#### Dogs

##### *Signs with Lung Involvement*

- Coughing
- Difficulty breathing (known as “dyspnea”)
- Fever

##### *Signs with Generalized (Systemic) Involvement*

- Bone swelling, joint enlargement, and lameness
- Extreme weight loss with muscle wasting (known as “cachexia”)
- Sluggishness (lethargy)

- Enlarged lymph nodes (known as “lymphadenomegaly”)
- Skin ulcers and draining tracts
- Inflammation of the iris (the colored part of the eye) and other areas in the front part of the eye (known as “uveitis”); inflammation of the cornea (known as “keratitis”); inflammation of the iris (known as “iritis”)

### Cats

- Extreme weight loss with muscle wasting (cachexia)
- Draining skin lesions
- Difficulty breathing (dyspnea)
- Lameness caused by bone involvement
- Inflammation of the iris (the colored part of the eye) and other areas in the front part of the eye (uveitis)

## CAUSES

- Infection by the soil-borne fungus *Coccidioides immitis*
- *Coccidioides immitis* grows several inches deep in the soil, where it survives high environmental temperatures and low moisture; after a period of rainfall, the fungus returns to the soil surface where it forms spores, which are released and spread by wind and dust storms

## RISK FACTORS

- *Coccidioides immitis* is found in the southwestern United States in the geographic Lower Sonoran life zone—it is more common in Southern California, Arizona, and southwest Texas, and less common in New Mexico, Nevada, and Utah
- Aggressive nosing about in soil and underbrush may expose susceptible pets to large doses of the fungus in contaminated soil
- Dust storms after the rainy season; increased number of cases are noted after earthquakes
- Land development (where much earth disruption occurs) may lead to increased exposure

## Treatment

### HEALTH CARE

- Generally treated as outpatients
- Clinical signs (such as seizures, pain, coughing) should be treated appropriately

### ACTIVITY

- Restrict activity until clinical signs begin to subside

### DIET

- Feed a high-quality palatable (tasty) diet to maintain body weight

### SURGERY

- Surgical removal of an affected organ may be indicated for cases with localized, nodular involvement in various organs (such as a consolidated lung lobe or involvement of the eye or kidney)

## Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Treatment of widespread (disseminated) disease often requires at least 1 year of aggressive antifungal therapy
- Low-dose, short-term treatment with steroids (prednisone administered by mouth) and cough suppressants may be required to alleviate the respiratory signs

### DOGS

- Several antifungal medications that may be given by mouth (oral treatment) currently are available for the treatment of coccidioidomycoses; they include (1) fluconazole—noted to greatly increase the success of treatment; has been used in treating infections involving the nervous system; cost of the drug has decreased

significantly with the availability of a medical grade generic compound; (2) ketoconazole—may be given with food; some believe that administration of high doses of vitamin C at the time that ketoconazole is administered may improve the absorption of the drug; treatment should be continued for 1 year; (3) itraconazole—administered similarly as ketoconazole; it has been reported to have a higher penetration rate than ketoconazole, but a better clinical response has not been observed

- Amphotericin B is an antifungal medication that must be administered by intravenous (IV) injection; it is recommended rarely because of the high risk of kidney damage and the availability of effective oral medications

## CATS

- Any of the following antifungal medications may be used in cats: ketoconazole, fluconazole, itraconazole

## Follow-Up Care

### PATIENT MONITORING

- Serologic tests (blood tests that detect the presence of antibodies to a certain disease-causing agent or antigen; an “antibody” is a protein that is produced by the immune system in response to a specific antigen)—should be monitored every 3–4 months; pets should be treated until their antibody titers fall to less than 1:4
- Pets displaying poor response to therapy should have a 2- to 4-hour post-pill drug level measured to ensure adequate absorption of the drug
- Blood urea nitrogen (BUN; a blood test used in assessing the kidneys) and urinalysis should be monitored in all pets treated with amphotericin B; treatment should be discontinued temporarily if the BUN rises above 50 mg/dL or if granular casts are noted in the urine

### PREVENTIONS AND AVOIDANCE

- No vaccine is available for dogs or cats
- Contaminated soil in areas where *Coccidioides immitis* are found (known as “endemic areas”) should be avoided, particularly during dust storms after the rainy season

### POSSIBLE COMPLICATIONS

- Lung disease resulting in severe coughing may worsen temporarily after treatment is started, owing to inflammation in the lungs
- Liver toxicity may result from ketoconazole treatment
- Kidney toxicity may result from amphotericin B treatment

### EXPECTED COURSE AND PROGNOSIS

- Coccidioidomycosis is considered one of the most severe and life threatening of the generalized (systemic) fungal diseases (mycoses)
- The prognosis is guarded to grave
- Many dogs will improve following oral antifungal medication therapy; however, relapses may be seen, especially if therapy is shortened
- The overall recovery rate has been estimated at 60%, but some report a 90% response to fluconazole therapy
- The prognosis for cats is not well documented, but rapid spread of the disease throughout the body (dissemination) requiring long-term therapy should be anticipated
- Serologic tests (blood tests that detect the presence of antibodies to a certain disease-causing agent or antigen; an “antibody” is a protein that is produced by the immune system in response to a specific antigen) every 3–4 months after completion of treatment is recommended to monitor the possibility of relapse
- Spontaneous recovery from widespread (disseminated) coccidioidomycosis without treatment is extremely rare

## Key Points

- Coccidioidomycosis is a generalized (systemic) disease caused by inhalation of infective spores of the soil-borne fungus *Coccidioides immitis*
- The necessity and expense of long-term treatment of this serious illness, with the possibility of treatment failure, should be discussed with your pet's veterinarian

- The antifungal medications used in treatment have potential side effects

## Notes

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