

COCCIDIOIDOMYCOSIS

(Coccidioidal Granuloma, Desert Fever, Desert Rheumatism, Posada's Disease, San Joaquin Fever, Valley Fever)

REPORTING INFORMATION

- **Class B:** Report by the end of the next business day after the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
 - The Ohio Disease Reporting System (ODRS) should be used to report lab findings to the Ohio Department of Health (ODH). For healthcare providers without access to ODRS, you may use the [Ohio Confidential Reportable Disease Form](#) (HEA 3334, rev. 1/09).
 - The Centers for Disease Control and Prevention (CDC) [Coccidioidomycosis Case Report form](#) (CDC 0920-1087, rev. 11/15) is available for use to assist in local health department disease investigation. Information collected from the form should be entered into ODRS and the form should be uploaded into ODRS. The form should not be sent to the Ohio Department of Health (ODH), unless otherwise requested. If requested, the mailing address for this form is: Ohio Department of Health, ORBIT, 35 E. Chestnut Street, Columbus, OH 43215.
- Key fields for ODRS reporting include: clinical case definition (check all clinical findings that are relevant to the case).

AGENT

Two different types of fungi cause Coccidioidomycosis, *Coccidioides immitis* and *Coccidioides posadasii*. In the soil, *these* species grow as saprophytic mold. Under special conditions, the parasitic forms grow as spherical cells (spherules) in animal and human hosts and reproduce by endospore formation.

CASE DEFINITION

Clinical Description

Infection may be asymptomatic or may produce an acute or chronic disease. Although the disease initially resembles an influenza-like febrile illness primarily involving the bronchopulmonary system, dissemination can occur to multiple organ systems.

Clinical Case Definition

An illness characterized by *one or more* of the following:

- Influenza-like signs and symptoms (e.g. fever, chest pain, cough, myalgia, arthralgia and headache);
- Pneumonia or other pulmonary lesion, diagnosed by chest radiograph;
- Erythema nodosum or erythema multiforme rash;
- Involvement of bones, joints or skin by dissemination;
- Meningitis;
- Involvement of viscera and lymph nodes.

Laboratory Criteria for Diagnosis

A confirmed case must meet at least one of the following laboratory criteria for diagnosis:

- Cultural, histopathologic, or molecular evidence of presence of *Coccidioides* species *or*
- Positive serologic test for coccidioidal antibodies in serum or cerebrospinal fluid *or*

other body fluids by:

- Detection of coccidioidal immunoglobulin M (IgM) by immunodiffusion, enzyme immunoassay (EIA), latex agglutination or tube precipitin, *or*
- Detection of coccidioidal immunoglobulin G (IgG) by immunodiffusion, EIA, or complement fixation, *or*
- Coccidioidal skin-test conversion from negative to positive after onset of clinical signs and symptoms

Case Classification

Suspect*: A clinically compatible case with presumptive laboratory testing or a case with positive laboratory findings waiting on information concerning clinical presentation of illness.

Confirmed: A case that meets the clinical case definition and is laboratory confirmed.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

*This case classification can be used for initial reporting purposes to ODH as CDC has not developed a classification.

SIGNS AND SYMPTOMS

Forty percent of infected persons present with symptomatic infections, primarily respiratory with flu-like illness (e.g. fever, cough, headaches, rash, myalgias). Approximately 5% of primary infections develop erythema multiforme or erythema nodosum and/or arthralgia. Most common is a light erythrodermal or maculopapular eruption. In less than 1 percent of people who get coccidioidomycosis, the infection can spread from the lungs to the rest of the body, causing meningitis or infection in the bones and joints. Radiologic pictures vary, but hilar adenopathy with alveolar infiltrates and infiltrates that change areas are indicative of coccidioidal pneumonia. Sequelae may include: chronic pulmonary infection with formation of fibrotic or cavernous lesions in the lungs or widespread disseminated infection (affecting meninges, soft tissues, joints and bone). Severe pulmonary disease may develop in HIV-infected persons. If there is underlying immunosuppression, the severity of symptoms will vary with the degree of immunosuppression. Sixty percent of infected immunocompetent persons may be asymptomatic.

DIAGNOSIS

Diagnosis is made through demonstration of fungus on microscopic examination or through culture of sputum, skin, bone, joint fluid, nodes, pus, urine, CSF or biopsies of skin lesions or organs. Success in culturing usually depends on proximity between collection and plating on appropriate media, particularly from non-sterile sites. Sabhi Agar or Brain Heart Infusion (BHI) agar, augmented with antibacterial agents (chloramphenicol and gentamicin) and 5-10% sheep blood cells are the most common media for the primary isolation of fastidious, thermally dimorphic fungi. Handling cultures of the mold form is extremely hazardous and must be carried out in a BSL-2 or BSL-3 facility.

Type of Test	Earliest Positive Test	Latest Positive Test
Skin test – spherulin	2-3 days after exposure	3 weeks after exposure
Precipitin – IGM antibody	1-2 weeks after symptoms appear	Persists 3-4 months
Complement fixation tests (CF test) – IgG antibodies	1-2 months after symptoms appear	Persists 6-8 months

Serial skin and serological tests may be necessary to confirm a recent infection or indicate dissemination; skin tests are often negative in disseminated disease and serological tests may be negative in immunocompromised individuals.

EPIDEMIOLOGY

Source

Coccidioidomycosis is an illness caused by a fungus found in the soil and dirt of some areas of southwestern United States, and parts of Mexico and Central and South America. This fungus is endemic in the southwest U.S., including California, and it is especially prevalent in the soil of San Joaquin Valley. In 2013, soil samples from Washington state tested by the Centers for Disease Control and Prevention, Mycotic Disease Laboratory, detected *Coccidioides* DNA.

Coccidioides species are found in soil in areas of low rainfall, high summer temperatures, and moderate winter temperatures of North and South America. *Coccidioides immitis* is geographically limited to California's San Joaquin valley region, whereas *Coccidioides posadasii* is endemic in the deserts of the Southwest United States (including, California, Arizona, New Mexico, Texas and northwest Utah), northern Mexico, Argentina, Colombia, Guatemala, Honduras, Paraguay, Venezuela and probably Bolivia. The endemic area in Latin America is estimated to cover 1.5 million km², more than 1.0 million km² of which are in Mexico.

Scientists continue to study how weather and climate patterns affect the habitat of the fungus that causes valley fever. *Coccidioides* is thought to grow best in soil after heavy rainfall and then disperse into the air most effectively during hot, dry conditions. For example, hot and dry weather conditions have been shown to correlate with an increase in the number of valley fever cases in Arizona and in California. The ways in which climate change may be affecting the number of coccidioidomycosis infections, as well as the geographic range of *Coccidioides*, isn't known yet, but is a subject for further research.

Occurrence

In the United States, over 65 percent of all coccidioidomycosis cases occur in Arizona, and 30 percent occur in California. Most other cases occur in Nevada, Utah and New Mexico. Estimates indicate that each year the fungus infects thousands more people, many of whom are sick without knowing the cause or have mild cases that are not detected. Cases of coccidioidomycosis have increased by 15 percent each year from 1998 to 2011 in the United States. The increase could be because of

- More people exposed to the fungus because of increased travel or relocation to the southwestern United States,
- Changes in the way cases of coccidioidomycosis are being detected and reported to public health officials, or
- Changes in factors such as temperature and rainfall, which can affect the growth of the fungus in the environment and how much of it is circulating in the air.

Although blowing dust may carry fungal spores throughout the year, peak season in Arizona is the early summer and late fall, from June through August and October through November. In California, the risk of infection is highest from June through November, without the late summer break.

Mode of Transmission

Transmission occurs when airborne arthroconidia are inhaled after disturbance of contaminated soil by humans or natural disasters (e.g. dust storms and earthquakes). The fungal spores of *Coccidioides* are often found in abundance in the soil around

rodent burrows, Indian ruins and burial grounds. In these settings, infections are more likely to be severe because of intensive exposure to a large number of spores. Many infections, however, occur in persons without occupational risks.

Transmission has also occurred in laboratory accidents from inhalation of airborne arthroconidia from cultures. There is no known human-to-human, animal-to-human or animal-to-animal transmission.

Incubation Period

The incubation period in primary infections is 1-3 weeks. Dissemination may develop insidiously years after the primary infection, sometimes without recognized symptoms of primary pulmonary infection.

PUBLIC HEALTH MANAGEMENT

Case

Investigation

Obtain residence, work exposure and travel history of cases.

Treatment

Infection confers lifelong immunity. Most cases recover spontaneously, however 5% of cases benefit from treatment. Amphotericin B IV is beneficial in severe infections. Fluconazole is currently the agent of choice for meningeal infection. Ketoconazole and itraconazole have been useful in chronic non-meningeal coccidioidomycosis.

Isolation and Follow-up Specimens

Not applicable.

Public Health Significance

C. immitis anthrospores have potential use as a bioweapon.

Contacts

Quarantine of contacts is not applicable.

Prevention and Control

Outbreaks occur when groups of susceptible individuals are infected by airborne conidia.

- In endemic areas, institute dust control measures such as: planting grass, oiling unpaved airfields and other dust control measures (including facemasks, air conditioned cabs and wetted soil).
- Individuals from nonendemic areas should not be recruited to dusty occupations, such as road building. Skin testing could be used to screen out those susceptible.

What is coccidioidomycosis?

Coccidioidomycosis is a fungal disease caused by *Coccidioides* species that primarily causes respiratory symptoms and a fever but can spread to other organs.

What are some other names for coccidioidomycosis?

Coccidioidomycosis is sometimes also called coccidioidal granuloma, desert fever, desert rheumatism, Posada's disease, San Joaquin fever or valley fever.

What causes coccidioidomycosis?

Two different types of fungi cause coccidioidomycosis: *Coccidioides immitis* and *Coccidioides posadasii*.

Where are the fungi usually found?

The fungi that cause coccidioidomycosis live in the soil in the southwest United States (Arizona, California, Nevada, New Mexico, Texas, or Utah), Mexico, Central and South America. In 2013, the fungus was also found in south-central Washington state.

Who gets coccidioidomycosis?

Most of the people who get the disease are people who live in or visit places where the fungus is in the soil and who engage in activities that expose them to dust (such as construction, agricultural work, military field training and archeological exploration).

What are the symptoms?

Forty percent of infected people present with flu-like illness including fever, cough, headaches, rash and body aches. Some people develop chronic lung infection. One in 1,000 people with coccidioidomycosis develops a more widespread infection. The widespread infection may affect spinal nerves, soft tissues, joints and/or bone. If a person does not have a strong immune system, the severity of symptoms will increase. Sixty percent of infected people may not show any symptoms at all.

Who is at greatest risk of developing serious disease?

Groups of people who are at increased risk for developing more serious disease that spreads beyond the lungs include: people of African-American, Asian or Filipino descent, pregnant women, persons with diabetes, and immunocompromised persons.

How common is coccidioidomycosis?

Coccidioidomycosis is rare among Ohioans. It is found among travelers to the southwestern United States, Mexico, Central and South America.

How is coccidioidomycosis transmitted to humans and who is likely to become infected?

The fungi reproduce by airborne spores. A person who inhales the spores may become infected.

Is coccidioidomycosis contagious?

No, the infection is not spread from person-to-person or from animals to people. The infectious form of the fungus exists when the fungus grows in the environment. The fungus changes its form when it infects a person, and this form cannot be transmitted from one person to another.

It is important to note, however, that *Coccidioides* growing in culture as a mold in the laboratory may cause infection in laboratory personnel if the cultures are not handled properly and the appropriate precautions are not taken.

What should I do if I have been exposed to *Coccidioides* in the laboratory?

There are currently no guidelines about *Coccidioides* exposure in the laboratory. If you are concerned that you have had a laboratory-based exposure, you should immediately contact the occupational health and/or infection control departments for the laboratory where the exposure occurred. If you are not able to contact Occupational Health or Infection Control, or your laboratory does not have these services, then you should contact your local city, county or state health department. There are no data to say whether taking an antifungal drug to prevent infection after an exposure helps or not.

Is there a way to prevent infection?

Infection can be prevented by limiting exposure to dust in the Southwest United States, Mexico, Central and South America.

How is coccidioidomycosis diagnosed?

If your doctor believes that you are experiencing disease, he or she will order skin tests or blood tests.

Is there a treatment for it?

Most cases recover spontaneously, however 5% of cases benefit from treatment. Anti-fungal medications may be prescribed by your doctor.

I have been diagnosed with coccidioidomycosis. Should I be worried about spreading the disease to others?

No, the disease is spread by direct contact with dust containing spores. It is not spread person-to-person.