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: Ohio Confidential Reportable Disease form (HEA 3334, rev. 1/09), Positive Laboratory Findings for Reportable Disease form (HEA 3333, rev. 8/05), the local health department via the Ohio Disease Reporting System (ODRS), or the telephone.
- 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 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. 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

In general, ODH Laboratory (ODHL) does not perform initial isolations from clinical materials for fungi. However, ODHL can provide identification and confirmation of suspected clinical isolates. Dimorphic fungi recovered on media containing blood should be subcultured to blood free media prior to performing a DNA probe. Suspect isolates may be submitted on any of the following media: Sabouraud's (Emmons modification), Inhibitory Mold Agar (IMA), Mycosel Agar or Brain Heart Infusion agar with or without antibiotics, or equivalent. For safety reasons, isolates should be submitted on screw capped tube slants and packaged to avoid breakage. Plastic petri dishes are not appropriate for submission of suspected isolates. Identity is confirmed at ODHL by demonstration of colony and microscopic morphology, growth at 37°C and in the presence of cycloheximide, and reaction with the

specific DNA Probe for *C. immitis* (Gen-Probe Inc., San Diego, California).

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

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 km^2, more than 1.0 million km^2 of which are in Mexico.

Occurrence

Estimates indicate that in the United States more than 4 million people live in areas where the Valley Fever fungus is prevalent (or "endemic") in the soils. About 80% of these people live in southern Arizona, which includes the Phoenix and Tucson metropolitan areas. Residents of Phoenix, Arizona and Bakersfield, California have shown positive skin-test reaction rates of 30-60%, meaning that about one-third of residents tested have had Valley Fever sometime in the past. Among those who have never had Valley Fever, the chance of infection is about three percent per year, but the longer one resides in an endemic area, the greater the risk. In the southwestern U.S., there are approximately 150,000 new infections each year.

Valley Fever infections are more likely to occur during certain seasons. In Arizona, the highest prevalence of infections occurs June through July and from 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.

Period of Communicability

Incubation Period

The incubation period in primary infections is 1-4 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.

Concurrent disinfection
Discharges and soiled articles must be disinfected. Terminal cleaning.

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, Mexico, Central and South America.

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?
Some people are at increased risk for developing more serious disease: people of African-American, Asian or Filipino descent appear to be at increased risk, as do pregnant women during the third trimester 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.