

CRYPTOCOCCOSIS

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Cryptococcosis is a fungal infection caused by an encapsulated yeast of the genus *Cryptococcus*. Most cases are caused by *Cryptococcus neoformans*, but a 2013 outbreak in the Northwestern part of the country prompted an increased focus on *Cryptococcus gattii*.

The incubation period is unknown, but studies have shown that symptoms develop between two and thirteen months following exposure with an average of six to seven months.

Epidemiology

Source: *Cryptococcus* has a worldwide distribution. It is most commonly found in the debris around pigeon roosts, decaying wood and soil contaminated with pigeon or chicken droppings. *C. neoformans* grows to high concentrations in pigeon feces, but the birds are not infected. Much less commonly, *C. neoformans* has also been isolated from fruits and a variety of other sources in nature. It causes most human infections, especially infections in immunocompromised hosts.

Cryptococcus gattii is a ubiquitous fungal pathogen that causes meningitis and pneumonia. This specific species is an emerging pathogen and is best known for the 2013 outbreak in the U.S. Pacific Northwest. In contrast to *Cryptococcus neoformans*, *Cryptococcus gattii* causes disease primarily in immunocompetent persons as well as in immunocompromised living in tropical and subtropical regions of the world.

Transmission is believed to result from inhalation of aerosolized organisms.

Person-to-person transmission has not been documented by the pulmonary route, but has occurred via transplanted tissues obtained from donors who had active cryptococcosis, including cases of systemic infection from a donor kidney and endophthalmitis from a corneal graft.

Because *C. neoformans* is ubiquitous, it is presumed that exposure is common. Skin test surveys of healthy subjects provide some support for this assumption. Nevertheless, natural resistance to infection must be high because new cases were relatively rare before the advent of acquired immunodeficiency syndrome (AIDS). Unlike other aerosol-borne mycoses, cases of cryptococcosis rarely occur in clusters.

No occupational predisposition is known. Laboratory workers are frequently exposed to aerosols of the organism, as indicated by a high incidence of positive cryptococcin skin tests. However, laboratory-acquired pulmonary or disseminated cryptococcosis has never been described.

Patients with immunologic defects in T-cell-mediated host defense mechanisms appear to be at increased risk for progressive cryptococcosis. Currently, AIDS is the predisposing factor in approximately 80% to 90% of cryptococcal infections. Patients with immunologic defects in T-cell-mediated host defense mechanisms appear to be at increased risk for progressive cryptococcosis. Among AIDS patients in the U.S., cryptococcosis is the defining illness in 5% of patients. The incidence of cryptococcosis is also increased in patients with lymphoreticular malignancies (especially Hodgkin's disease), as well as sarcoidosis (even in the absence of corticosteroid therapy). Other conditions such as diabetes mellitus have been cited as predisposing factor to cryptococcosis, but the association is less clear cut than for the aforementioned factors.

Clinical Manifestations

Primary infection is acquired by inhalation of aerosolized fungal elements and often is inapparent or mild.

Pulmonary disease is characterized by cough, hemoptysis, chest pain and constitutional symptoms. Chest radiographs may reveal a solitary nodule or focal or diffuse infiltrates.

Invasive disease: Hematogenous dissemination to the central nervous system, bones and joints, skin and mucous membranes can occur, but dissemination is rare in individuals without defects in cell-mediated immunity (e.g., transplantation, malignant neoplasm, collagen-vascular disease, long-term corticosteroid administration, or sarcoidosis). Usually, several sites are infected, but manifestations of involvement of one site predominate.

- Cryptococcal meningitis is the most common and serious form of cryptococcal disease. Symptoms are characteristic of meningitis, meningoencephalitis, or space-occupying lesions, but may manifest as only behavioral changes.
- Cryptococcal fungemia, without apparent organ involvement, occurs in patients with human immunodeficiency virus (HIV) infection but is uncommon in children. Cryptococcosis is one of the acquired immunodeficiency syndrome (AIDS)-defining diseases.

Laboratory Tests

- Encapsulated yeast cells can be demonstrated in wet mounts of sputum or pus. Bronchoalveolar lavage or open lung biopsy may be necessary to establish a diagnosis in children who are unable to produce sputum.
- Encapsulated yeast cells can be visualized by India ink or other stains of cerebrospinal fluid (CSF) containing 1,000 or more colony-forming units of yeast per milliliter.
- Precise diagnosis depends on the isolation and identification of the organism by culture. Sabouraud glucose agar is optimal for isolation of *Cryptococcus* from sputum, bronchopulmonary lavage, tissue, or CSF specimens. Few organisms may be present in the CSF and large quantities of CSF may be needed to recover the organism.
- The latex agglutination and enzyme immunoassay tests for detection of cryptococcal capsular polysaccharide antigen in serum or CSF are excellent rapid diagnostic tests. Antigen detection in CSF or serum is positive in 90% of patients with cryptococcal meningitis.
- Cryptococcal antibody testing is useful, but skin testing is of no value.

Surveillance

Cryptococcosis is a Class C reportable condition in Louisiana, and is to be reported within five (5) business days. Rare outbreaks or cases assumed to be related to an exposure to a highly contaminated area are reported with the intent of considering some preventive environmental measure.

Case Definition

A case of cryptococcosis is defined as a symptomatic illness that is laboratory confirmed as being caused by *C. neoformans* via:

- Cryptococcal antigen test – rapid test performed on blood or CSF.
- Detection of *Cryptococcus* via microscopic examination and/or culture of tissue or body fluids such as: blood, CSF, and sputum.
- Result of matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF), performed on a clinical specimen, specific for *Cryptococcus gattii*.

Culture must be performed to differentiate between species of *Cryptococcus*.

Investigation

Sporadic cases or cases associated from a severe immuno-depression do not need an investigation.

Some cases occurring in immunocompetent individuals get reported when an exposure to a highly contaminated area is suspected. The goal of the investigation is to:

- confirm the diagnosis of cryptococcosis
- attempt to verify exposure history and any contact the patient may have had with birds such as chickens or pigeons, or their habitats.

Case Management - Treatment

Amphotericin B in combination with oral flucytosine can be used for meningeal and other serious infections. However, the toxic effects of this combination limit its use. Fluconazole and itraconazole are possible alternative drugs for primary treatment of meningeal cryptococcosis in HIV-infected patients as well.

Hospital Precaution and Isolation: Standard precautions.