

## Cryptococcus neoformans

*Cryptococcus neoformans* is an opportunistic fungal infection that causes cryptococcosis, a severe disease of the CNS. *C. neoformans* is monomorphic and only exists as yeast with narrow-based buds measuring 5-10  $\mu\text{m}$ . It is encapsulated with a polysaccharide capsule that helps evade phagocytosis. In addition, its virulence is increased by the ability to undergo phenotypic switching and change the structure of its capsule. It is commonly found in the soil or in pigeon droppings and can cause disease when inhaled. Healthy individuals can demonstrate a range of symptoms, from asymptomatic to pneumonia or meningoencephalitis. However, immunosuppressed patients, such as HIV/AIDS patients or patients on chronic corticosteroid therapy, are most commonly affected and more likely to have disseminated disease. Dissemination into the CSF can commonly cause meningitis that extends into the perivascular space with lesions that appear similar to soap bubbles. Diagnosis of cryptococcosis can be made in many different ways. A Gram stain of the organism collected from CSF stained with India ink reveals the oval yeast with a halo surrounding it, signifying the capsule. A mucicarmine stain or periodic acid-Schiff stain can also be used, which stains the polysaccharide capsule a bright red. In addition, a latex agglutination test can also be used, which uses antibody-coated latex beads that binds to cryptococcal antigen present in the assay. Treatment includes amphotericin B and flucytosine for meningitis and disseminated disease. Fluconazole can also be used as long-term prophylaxis in immunosuppressed patients.



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### Characteristics

#### Monomorphic

##### [Mono-morphic-man](#)

This fungus is monomorphic, which means that it only exists as one form at all temperatures.

#### Encapsulated

##### [Capsule](#)

This organism is encapsulated, which allows it to evade phagocytosis.

#### Polysaccharide Capsule

##### [Polly-sack Capsule](#)

*Cryptococcus neoformans* contains a polysaccharide capsule that is able to undergo phenotypic switching and change capsule structure to further increase virulence.

#### Narrow-Based Buds

##### [Narrow Based Bud wheels](#)

This organism has narrow-based buds off of the yeast, in contrast to blastomycosis which has broad-based buds.

#### Latex Agglutination

##### [Latex-feathers](#)

This disease can be detected using a latex agglutination test, which involves antibody-coated latex beads that will bind to antigen present in the assay.

## Pigeons

### [Pigeons](#)

This disease can be obtained by inhaling soil containing pigeon droppings, which contains the organism. There is no person-to-person transmission.

## India Ink

### [India ink](#)

Diagnosis can be made using an India ink stain of the organism in the CSF, which will appear as oval yeast with a surrounding clear halo.

## Mucicarmine stain

### [Mucous-car](#)

This organism can be stained with a mucicarmine stain, which stains the polysaccharide capsule a bright red.

## Signs and Symptoms

### AIDS/Immunocompromised

#### [Band-AIDS](#)

This disease most commonly affects immunocompromised patients, in particular, patients with poor cell-mediated immunity. Patients on chronic corticosteroid therapy or immunosuppressants, such as transplant patients, are more likely to have severe disseminated disease.

### Meningitis

#### [Men-in-tights](#)

This disease presents most often as meningitis that can progress to meningoencephalitis, with altered mental status in addition to the meningitis.

### Soap Bubble Lesions in Brain

#### [Soap Bubbles](#)

Neuroimaging may reveal a “soap bubble” appearance of cerebral lesions. These represent gelatinous pseudocysts created by the organism and its extension into the perivascular space.

### Pneumonia

#### [Nude-Mona](#)

Cryptococcus neoformans is spread through inhalation and can cause pneumonia in both healthy and immunosuppressed patients.

## Treatment

### Fluconazole

#### [Flute-a-hole](#)

This disease can be treated prophylactically with long-term administration of fluconazole to immunosuppressed patients or those at high-risk to prevent cryptococcal meningitis.

### Flucytosine

#### [Flute-side-toe](#)

Flucytosine is an anti-fungal that inhibits DNA synthesis. Combination of amphotericin B and flucytosine is the recommended treatment for disseminated cryptococcal disease.

### Amphotericin

#### [Amphibian-terminator](#)

Disseminated cryptococcal disease is treated with amphotericin B, an anti-fungal that binds ergosterol in the fungal membranes, and has severe systemic side effects like fever, nephrotoxicity, and arrhythmias.