



- • opportunistic Pathogens
- – **Cryptococcus neoformans**
- – Candida albicans
- – Aspergillus species
- – Pneumocystis carinii

# Cryptococcus neoformans

- Cryptococcus neoformans is a fungus that lives in the environment throughout the world. People can become infected with C. neoformans after breathing in the microscopic fungus, although most people who are exposed to the fungus never get sick from it. C. neoformans infections are extremely rare in people who are otherwise healthy; most cases occur in people who have weakened immune systems, particularly those who have advanced HIV/AIDS

- It has been isolated from various sources in nature especially with pigeon excreta. The fungus has also been isolated from the dung of caged birds including canarie sand parrots and Other environmental isolations of *C. neoformans* have been from rotting vegetables, fruits and fruit juices, wood, dairy products and soil.

- Infection with the fungus *Cryptococcus* (either *C. neoformans* or *C. gattii*) is called cryptococcosis. Cryptococcosis usually affects the lungs or the central nervous system (the brain and spinal cord), but it can also affect other parts of the body. Brain infections due to the fungus *Cryptococcus* are called cryptococcal meningitis.

C. neoformans usually infects the lungs or the central nervous system (the brain and spinal cord), but it can also affect other parts of the body. The symptoms of the infection depend on the parts of the body that are affected.1-4

### In the lungs

A C. neoformans infection in the lungs can cause a pneumonia-like illness. The symptoms are often similar to those of many other illnesses, and can include:

- Cough
- Shortness of breath
- Chest pain
- Fever

### In the brain (cryptococcal meningitis)

Headache, fever, and neck pain are common symptoms of cryptococcal meningitis.

Cryptococcal meningitis is an infection caused by the fungus Cryptococcus after it spreads from the lungs to the brain. The symptoms of cryptococcal meningitis include:

- Headache
- Fever
- Neck pain
- Nausea and vomiting
- Sensitivity to light
- Confusion or changes in behavior



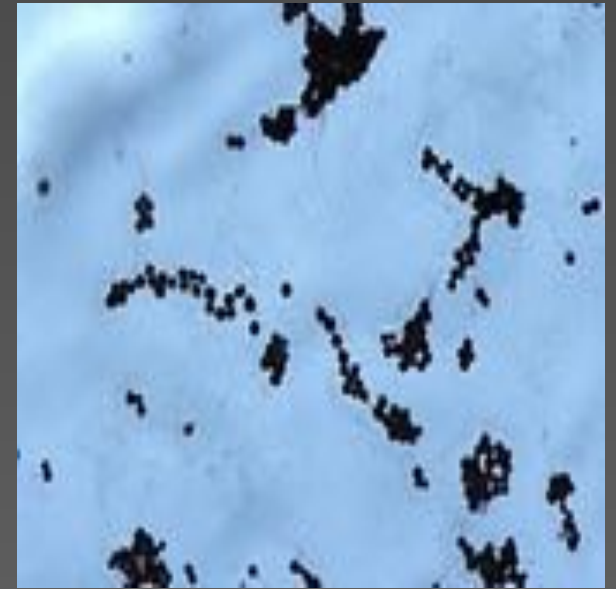
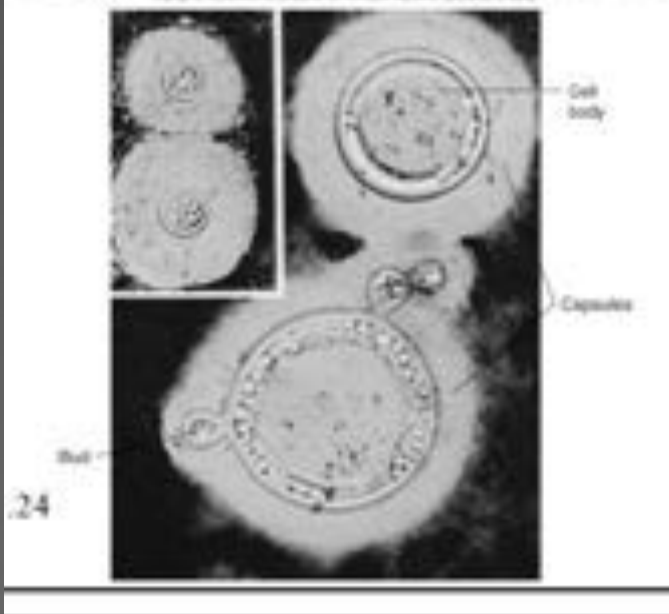
Headache, fever, and neck pain are common symptoms of cryptococcal meningitis.



Cough is a common symptom of Cryptococcus infection in the lungs

# *Cryptococcus neoformans*

## Diagnosis



*C. neoformans* grows as a yeast (unicellular) and replicates by budding. It makes hyphae, and eventually creates basidiospores at the end of the hyphae before producing spores



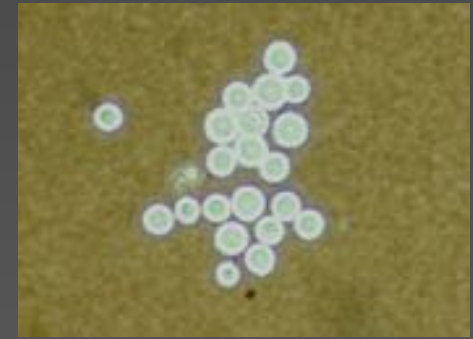
- ◉ Culture: Colonies (SDA) cream-coloured smooth, mucoid yeast-like colonies.
- ◉
- ◉ Microscopy: Globose to ovoid budding yeast-like cells.
- ◉
- ◉ India Ink Preparation: Positive - Distinct, wide gelatinous capsules are present.
- ◉
- ◉
- ◉ Bird Seed Agar: Colonies turn dark brown in colour as colonies selectively absorb a brown pigment from this media (Staib, 1987).
- ◉
- ◉ Creatinine dextrose bromothymol blue thymine (CDBT) agar: *Cryptococcus neoformans* grows as bright red colonies, turning the medium a bright orange after 5 days



Bird seed agar plate showing brown colonies of *C. neoformans* and white colonies of *Candida albicans*



Culture of *C. neoformans*



India ink preparation showing capsules of *C. neoformans*

# treatment

- Systemic cryptococcosis requires immediate treatment with amphotericin B and fluconazole over a period of weeks or months

# Candida albicans

- Secondary Pathogens
- –Cryptococcus neoformans
- –Candida albicans
- –Aspergillus species
- –Pneumocystis carinii

# Candida albicans

- Candida albicans is a dimorphic fungus, i.e. it can take two forms. Most of the time it exists as oval, single yeast cells, which reproduce by budding. Most yeasts do not produce mycelia (a mass of branching, threadlike hyphal filaments), **In normal room temperatures the organism found in yeast form,**
- **but under physiological conditions (body temperature, pH, and the presence of serum) it may develop into a hyphal form.**
- **Pseudohyphae( composed of chains of cells) are also common.**

# Candidiasis

- Candidiasis is a fungal infection caused by yeasts that belong to the genus *Candida*. There are over 20 species of *Candida* yeasts that can cause infection in humans, the most common of which is *Candida albicans*. *Candida* yeasts normally live on the skin and mucous membranes without causing infection; however, overgrowth of these organisms can cause symptoms to develop. Symptoms of candidiasis vary depending on the area of the body that is infected.
- Candidiasis that develops in the mouth or throat is called “thrush” or oropharyngeal candidiasis. Candidiasis in the vagina is commonly referred to as a “yeast infection.” Invasive candidiasis occurs when *Candida* species enter the bloodstream and spread throughout the body.

# Diagnosis of Candidiasis

- Direct Microscopy: (a) Skin and nails should be examined using 10% KOH and Parker ink or calcofluor white mounts; (b) Exudates and body fluids should be centrifuged and the sediment examined using either 10% KOH and Parker ink or calcofluor white mounts and/or gram stained smears; (c) Tissue sections should be stained using PAS digest, or Gram stain
- Examine specimens for the presence of small, round to oval, thin-walled, clusters of budding yeast cells (blastoconidia) and branching pseudohyphae

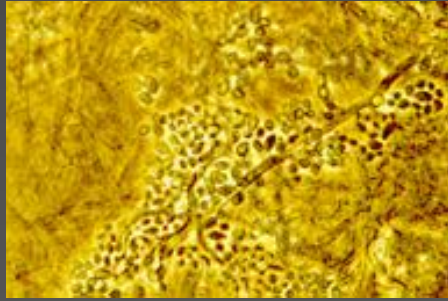


- On Sabouraud's dextrose agar colonies are white to cream colored, smooth, glabrous and yeast-like in appearance.

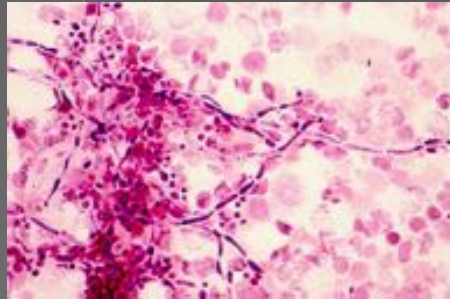


- Microscopic morphology shows spherical to subspherical budding yeast-like cells or blastoconidia





10% KOH mount showing the presence of budding yeast cells and pseudohyphae in a skin scraping



PAS stained smear showing the presence of budding yeast cells and pseudohyphae