BHARATHIDASAN UNIVERSITY

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Programme: M.Sc., Biomedical Science

Course Title : Clinical Microbiology

Course Code: BM36C9

Unit-V

Cryptococcus

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CRYPTOCOCCUS

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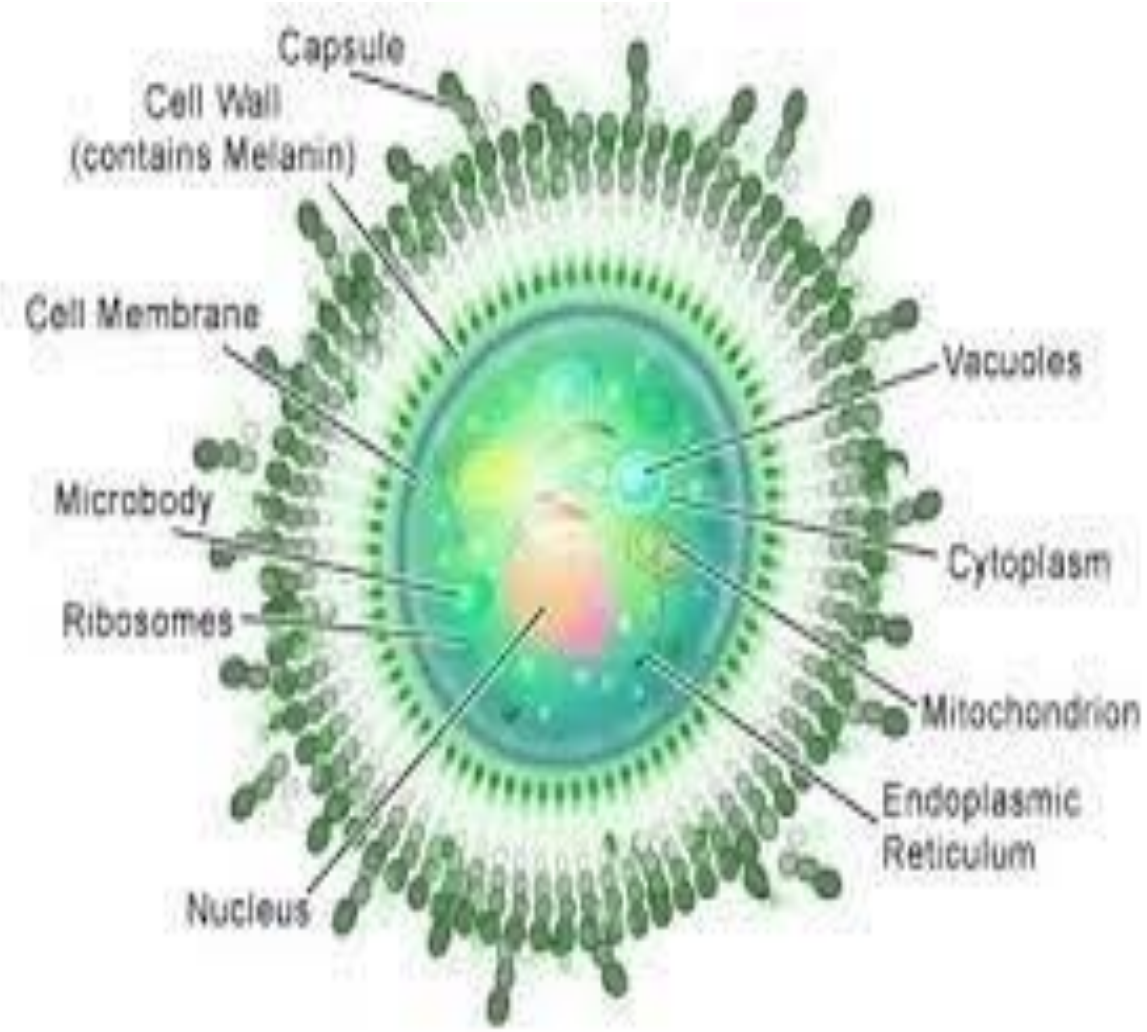
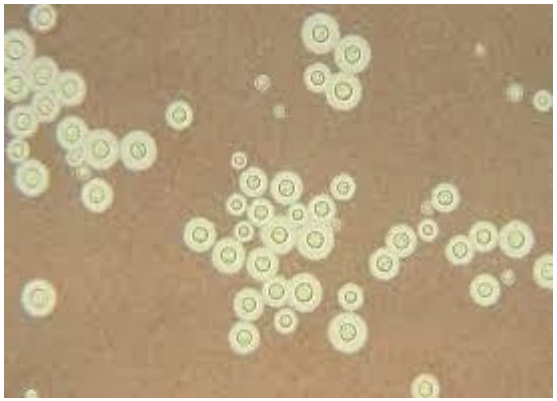
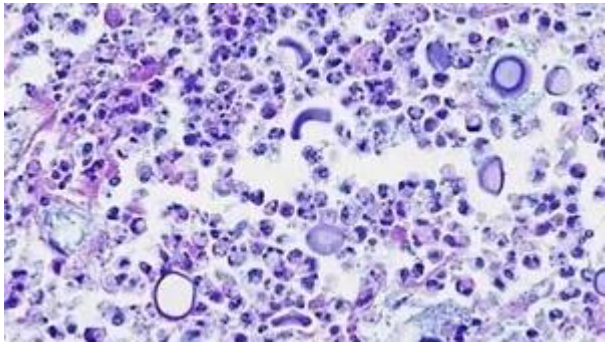
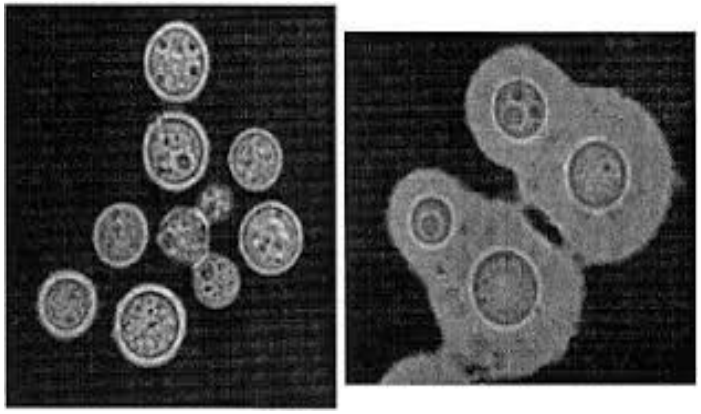
- Cryptococcus is an invasive fungus, transmitted through the inhalation of spores and causes cryptococcosis , an infection commonly associated with immunosuppressive individuals.
- Cryptococcus neoformans and Cryptococcus gattii are commonly associated with humans .
- Both types of fungi are found in soil. If you breathe the fungus in, it infects your lungs.
- The infection may go away on its own, remain in the lungs only, or spread throughout the body .
- The most common forms of exposure include a history of exposure to soil, bird droppings.


Capsule
Cell Wall
(contains Melanin)
Cell Membrane
Vacuoles
Microbody
Cytoplasm
Ribosomes
Mitochondrion
Endoplasmic
Reticulum
Nucleus





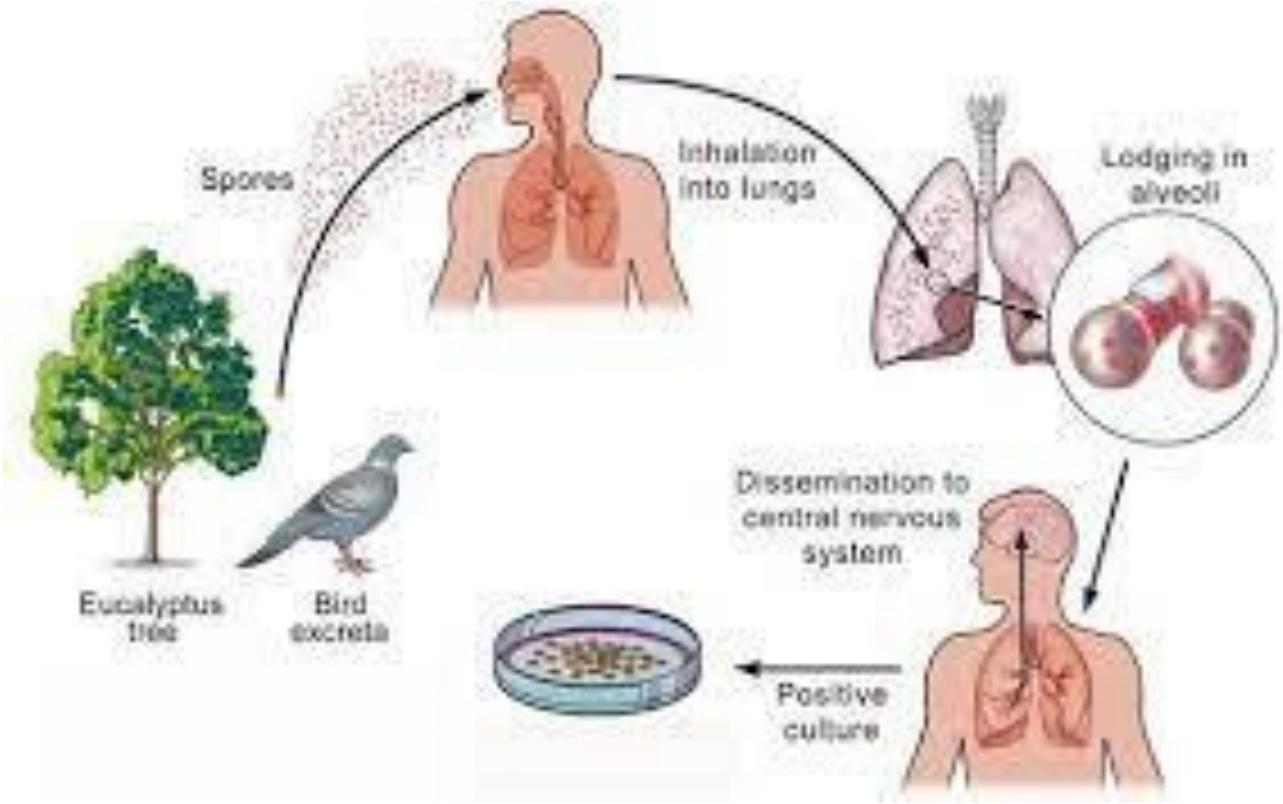


PATHOPHYSIOLOGY

- Cryptococcus fungi are commonly found in soil contaminated by bird droppings and in decaying wood and in tree hollows.
- The capsule of the fungus comprises polysaccharides glucurono xylomannan and glucuron oxylomannogalactan which are the major factors contributing to the virulence of pathogen.
- Infection usually occurs through inhalation of spores from the environment.
- The initial infection is mostly asymptomatic and is contained in healthy individuals.

- Spread of the disease from initial site of infection occurs through hematogenous dissemination in patients who are immune suppressed.
- Another mechanism through which the infection can develop is reactivation of the organism at the initial site of infection after several years when the patient becomes immunocompromised.

TRANSMISSION



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 rare in people who are otherwise healthy; most cases occur in people who have weakened immune systems, particularly those who have advanced HIV/AIDS.

- *C neoformans* infection is most often seen in people with a weak immune system, such as those who have ,
- Take high doses of corticosteroid medicines
- Cancer
- Are on chemotherapy medicines for cancer
- Have Hodgkin disease
- Have had an organ transplant.

CRYPOCOCCUS GATTII

- Cryptococcus gattii is a fungus that lives in the environment in primarily tropical and sub-tropical areas of the world but also in some temperate regions such as British Columbia and some parts of the United States.
- C gattii may affect people with normal immune system.
- C. gattii is a rare infection that people can get after breathing in the microscopic fungus.
- The infection can affect the lungs, central nervous system, or other parts of the body.

SIGN AND SYMPTOMS

- The first sign that cryptococcosis is in an area is the increased diagnosis of the disease in animals, especially domestic pets.
- Although the animals do not pass the disease to humans, their disease indicates a likely chance of exposure of humans to *Cryptococcus*.
- People with lung or CNS (brain or central nervous system) problems who have visited or inhabited areas where animals have acquired the infection should be tested for the disease.

- The majority of symptoms of cryptococcosis occur in the lungs, the brain, or both. The following is a list of the major symptoms:
- Fever , cough, Headache.
- Pleuritic chest pain
- Vision changes (blurry or double vision, photophobia)
- Nausea and vomiting
- Mental status changes
- Meningitis , Coma
- Some people may develop skin changes (rash, pustules, nodules, ulcers).

TREATMENT

- The treatment and medications depend on the patient's overall condition.
- Example, HIV/AIDS, immunocompetent, having brain lesions or only pulmonary lesions and the extent of the cryptococcal infection (single organ or multiple organ involvement). It treated with long-term treatment with multiple antifungal medications.
- A few patients may require surgery to reduce or remove a fungal mass (cryptococcoma).
- The goal of treatment is to eliminate the fungi; however, for some patients, this is not possible, so these patients may require lifelong medication to suppress fungal growth or reactivation. Treatments for *C. neoformans* and *C. gattii* are similar.

- Immunocompromised - treated with amphotericin B alone (about six to 10 weeks) or combined with flucytosine (about two weeks).
- These treatments are then followed by fluconazole treatment for at least 10 additional weeks.
- This treatment is used for brain and severe lung infections.
- Regular medical checkups to determine if cryptococcosis is reactivated or lesions increase in size.

DIAGNOSIS

- Even if the patient has some visible findings such as skin lesions, or even pulmonary or bone lesions seen on X-rays, many other diseases.
- example, histoplasmosis, toxoplasmosis, tuber culosis may also have these findings.
- A CT scan or MRI of the brain may show focal areas of possible infection in the brain, but again many diseases may show similar findings

DIAGNOSIS

- Culture of cerebrospinal fluid (CSF), sputum, urine, and blood
- Fixed-tissue specimen staining
- Serum and CSF testing for cryptococcal antigen.
- Clinical diagnosis of cryptococcosis is suggested by symptoms of an indolent infection in immunocompetent patients and a more severe, progressive infection in immunocompromised patients.
- Chest x-ray, urine collection, and lumbar puncture are done first.

CONTIN…..

- Definitive diagnosis of cryptococcosis depends on isolating the fungus from an infected patient's tissue or bodily fluids or identifying the organisms in tissue biopsy samples.
- Further immunological testing such as a PCR test for the genetic material of the fungus can identify if the infection is caused by either *C. neoformans* or *C. gattii*.

PREVENTION

- The best way to prevent cryptococcosis is to not inhale the fungus.
- Use masks (ones that filter particles that are as small as 3 micrometers) may help prevent inhalation.
- One of the main sources of *C. neoformans* is dried pigeon feces, so avoiding areas that contain it may help prevent the disease.
- Avoiding dust that contains any type of bird feces may also help prevent infections.

- *C. gattii* is spread by plant debris and propagules, it is hard to avoid inhalation if a person is in an area that *C. gattii* inhabits.
- Higher concentrations occur in the air when trees like eucalyptus and gum trees release propagules, but they are also found in the dust around these trees.
- Avoiding dust inhalation, especially in dense forests and around logging operations may help reduce exposure to *C. gattii* in the Pacific Northwest.
- There is no commercially available vaccine to prevent cryptococcosis.

References:

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3. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology. 4th Edition.McGraw Hill, NY.

THANK YOU