BHARATHIDASAN UNIVERSITY

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Programme: M.Sc., Biomedical Science

Course Title : Clinical Microbiology

Course Code : 18BMS48C15

Unit-V

TOPIC: Cryptococcus

Dr. P. JEGANATHAN
Guest Lecturer
Department of Biomedical Science

CRYPTOCOCCUS

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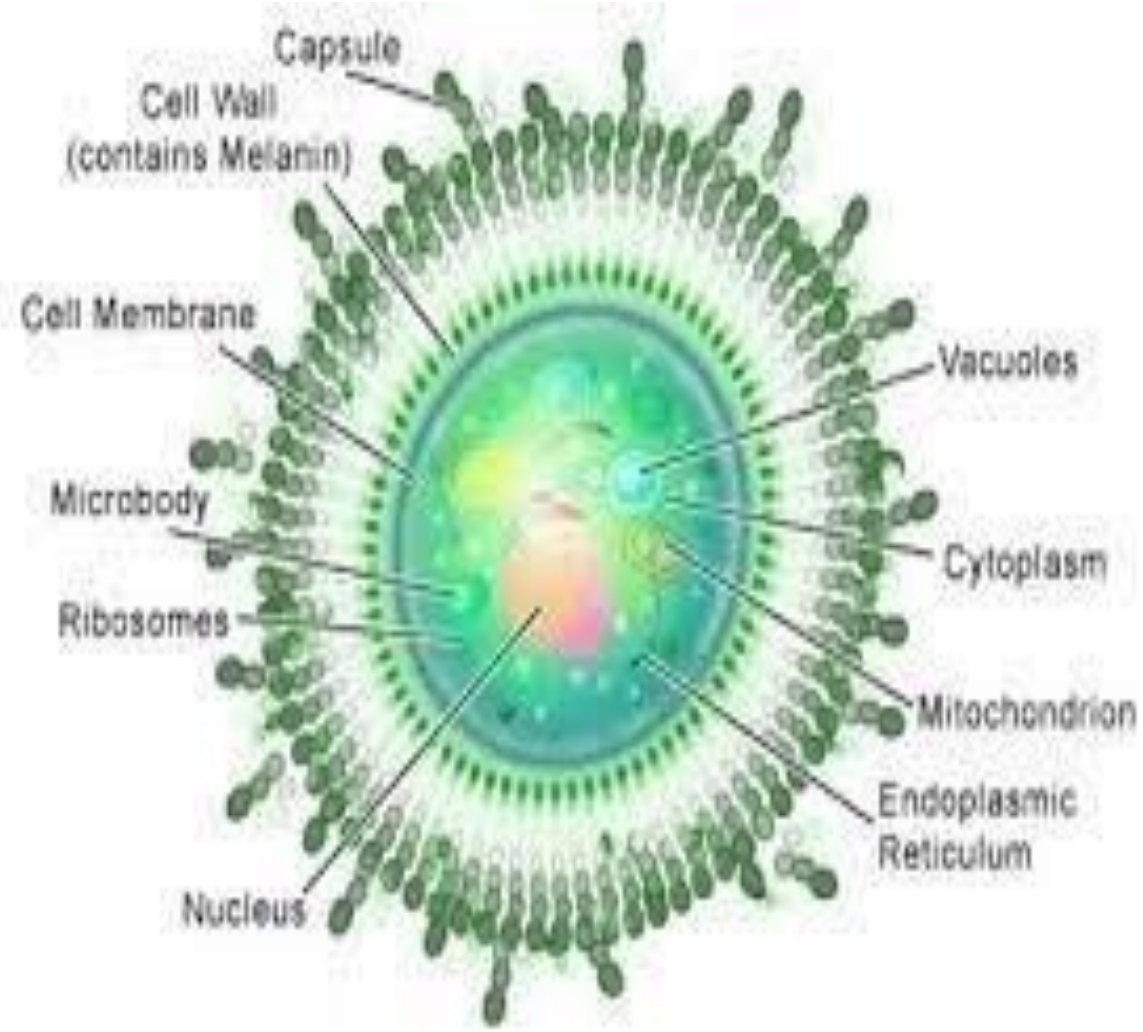
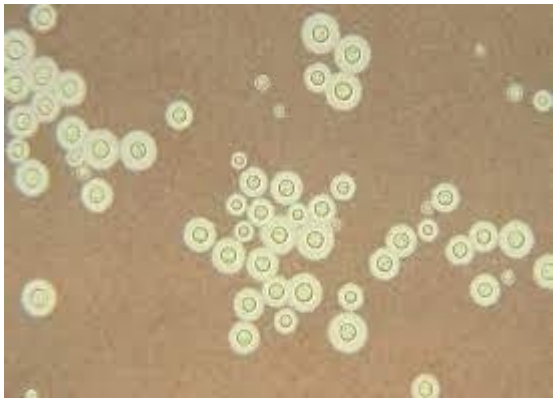
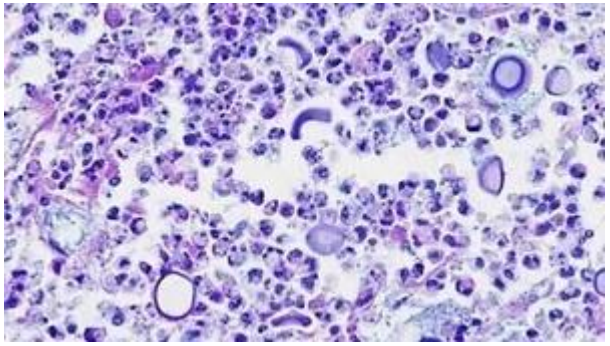
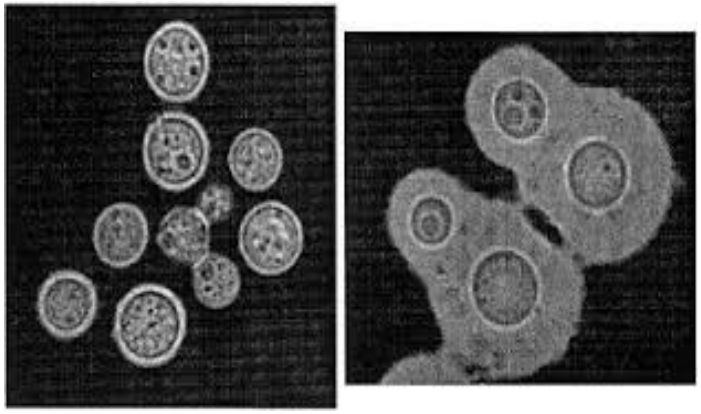
- Cryptococcus is an invasive fungus, transmitted through the inhalation of spores and causes cryptococcosis , an infection commonly associated with immunosuppressive individuals.
- Cryptococcus neoformans and Cryptococcus gattii are commonly associated with humans .
- Both types of fungi are found in 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
Microbody
Ribosomes
Nucleus
Vacuoles
Cytoplasm
Mitochondrion
Endoplasmic
Reticulum





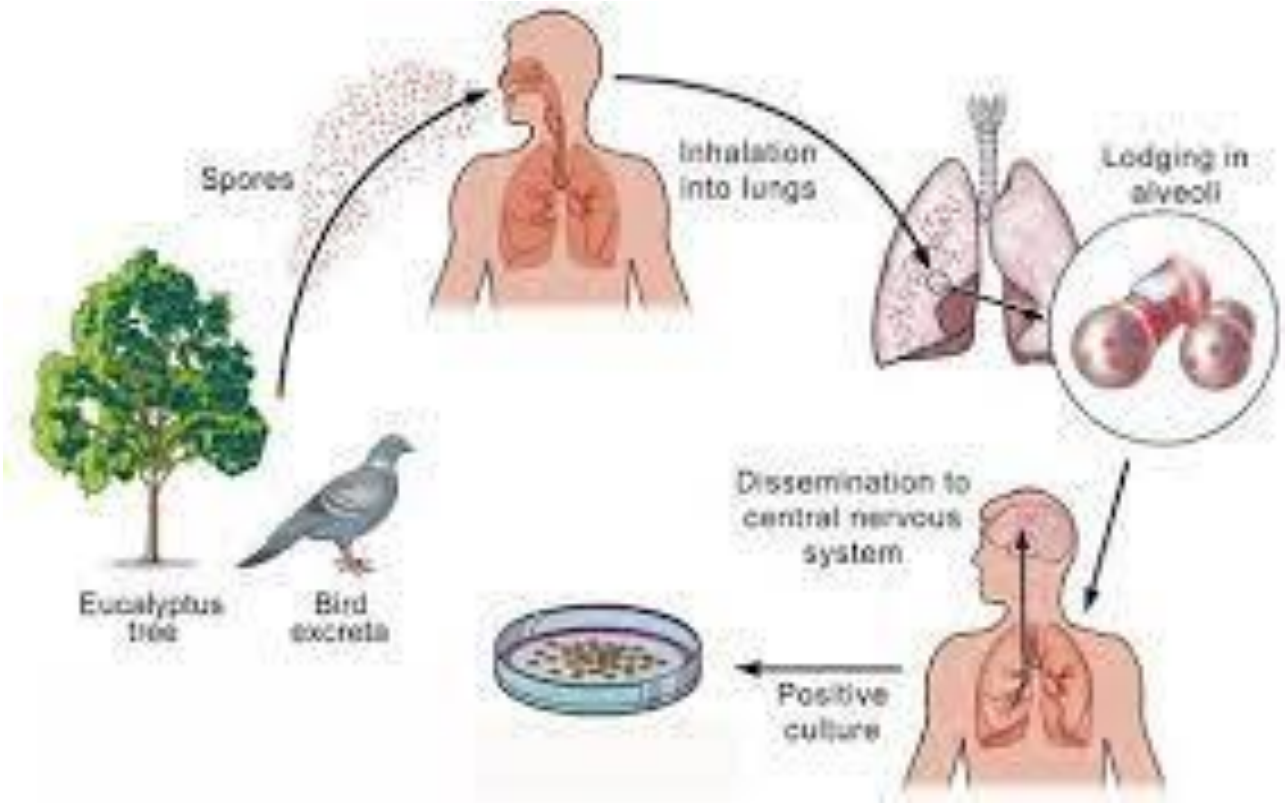


PATHOPHYSIOLOGY

- 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:

1. Pelczar,A Jr M.J. Chan and Kreig, N.R. (2021). Microbiology, Mc Graw Hill, Inc, NewYork.
2. Ananthanarayan R. and C.K. Jeyaram Panikar. (1994). Textbook of Microbiology. Orient Longman
3. Frazier, W.C. and Westhoff, D.C. (1988). Food Microbiology. 4th Edition.McGraw Hill, NY.

THANK YOU