

Oral fungal infections

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Aspergillosis

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Fungi : molds and yeasts

- Molds : exhibit filamentous type of growth
- Yeasts : pasty or mucoid form of fungal growth
- Spore : generally the reproductive body of a fungus; occasionally, a resistant body for adverse environment.
- Hypha (hyphae plural) - fundamental tube-like structural units of fungi.

The majority of oral fungal infections (oral mycosis) are resultant of opportunistic conditions.

- ❖ The prevalence of fungal infections of the oral mucosa is increasing globally. Fungal infections usually develop because of aberrations in the immune system.
- The frequency of oral mycosis has remarkably increased globally with the increased use of immunosuppressive drugs and immunodeficiency viral infections.
- Host resistance impairment allows for the initiation and progression of pathogenic conditions through local colonization in the oral cavity.

Oral mycological conditions range from superficial to deep fungal infections of the oral tissues.

1-The most frequent type of oral mycosis is candidiasis.

2- The most frequent type of deep fungal infections is Aspergillosis.

Superficial fungal infections are usually associated with oral discomfort, pain, burning sensation, parageusia, and aversion to food.

Deep fungal infections are characterized by the dissemination of pathogens to the deeper areas of the tissue and are usually associated with aggressive clinical presentation such as ulceration and perforation into bony areas.

Deep fungal infections which are observed in areas other than oral tissue are indicators of systemic or disseminated infections.

Aspergillosis is a mycotic disease caused by *Aspergillus* species.

Aspergillus is a common mold that lives indoors and outdoors. The organism is distributed world-wide and they can even grow in disinfectant.

Aspergillus is opportunistic pathogens similar to *Candida*, they rarely infect a normal host.

The most common etiologic agents of aspergillosis :

Aspergillus fumigatus

A. niger

A. Flavus

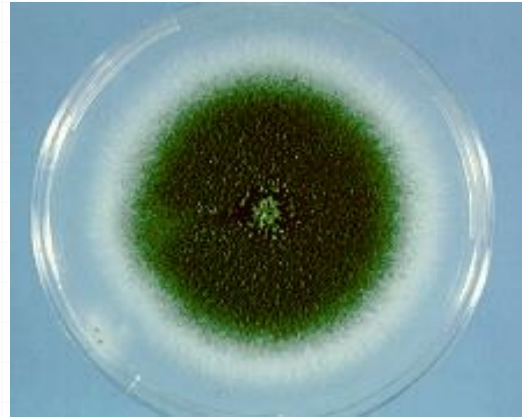
Aspergillosis is common in the environment and is found worldwide

□ Most people breathe *Aspergillus* spores everyday, It is impossible to completely avoid breathing in *Aspergillus* spores because they are ubiquitous.

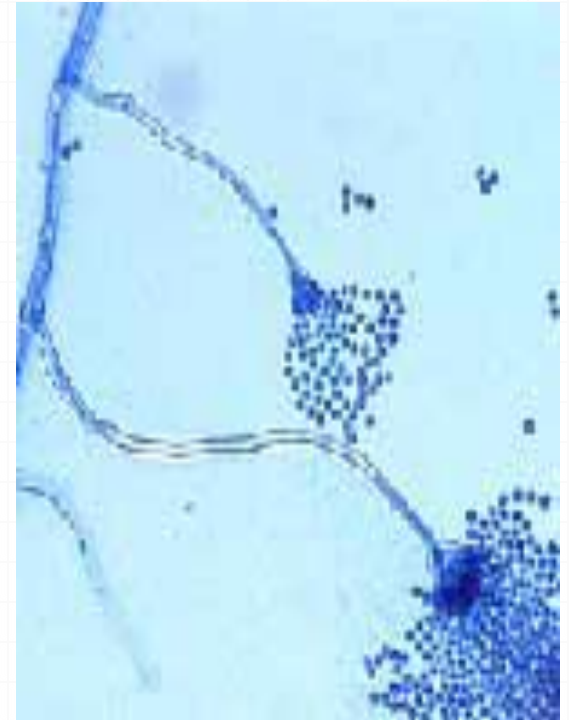
- -People with compromised immune systems who breathe in the spores acquire infections.

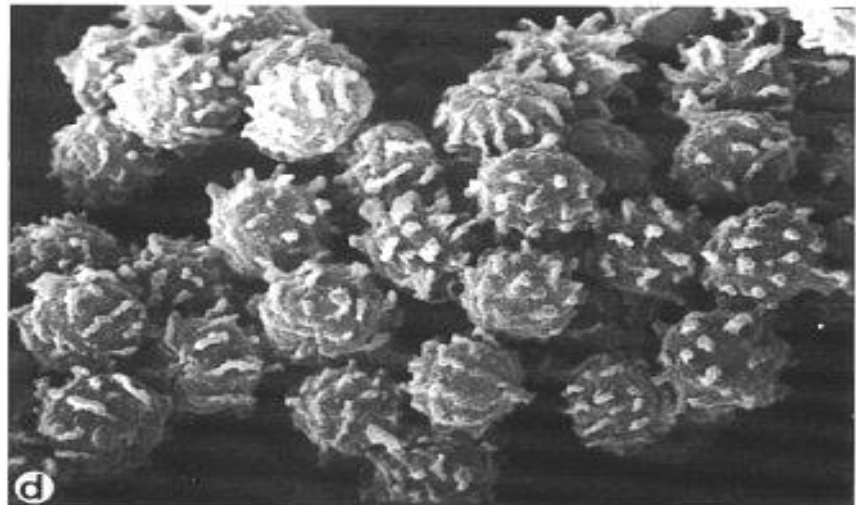
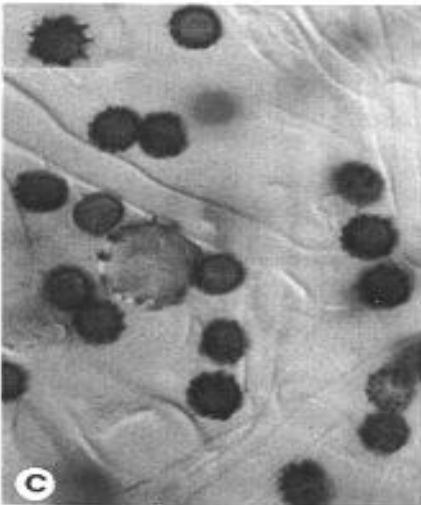
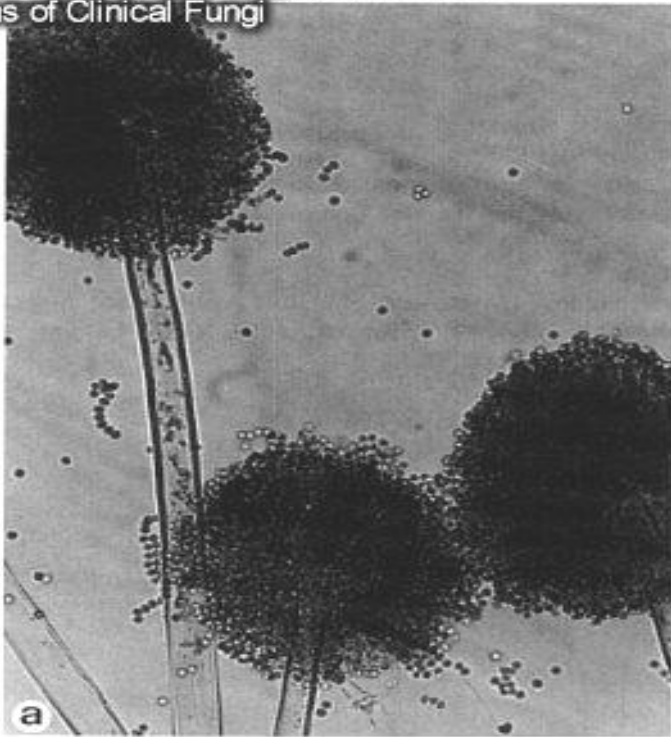
Aspergillus spp.:

- Kingdom: Fungi
- Genus: *Aspergillus*



Culture has a blue-green surface
Pigmentation with a suedelike
Surface consisting of a dense
felt of conidiophores





Etiology

Genus Aspergillus includes over 200 species, ~20 species reported to cause infections :

- ❖ **Aspergillus fumigatus most commonly isolated species**
- ❖ **Found in 90% of infections**
- ❖ **Widespread in nature**
- ❖ **Thermophilic species (Growth at 40° C and above)**

Aspergillus occurs in:

- Soil
- Air, spores are inhaled
- Food-spices and ground pepper
- Compost and decaying vegetation
- Grains and crops
- Bedding, pillows, carpeting
- Ventilation and air conditioning systems
- Dust

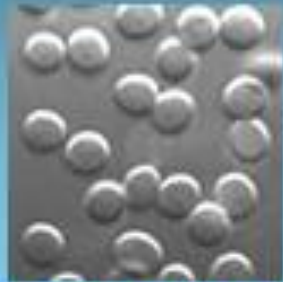
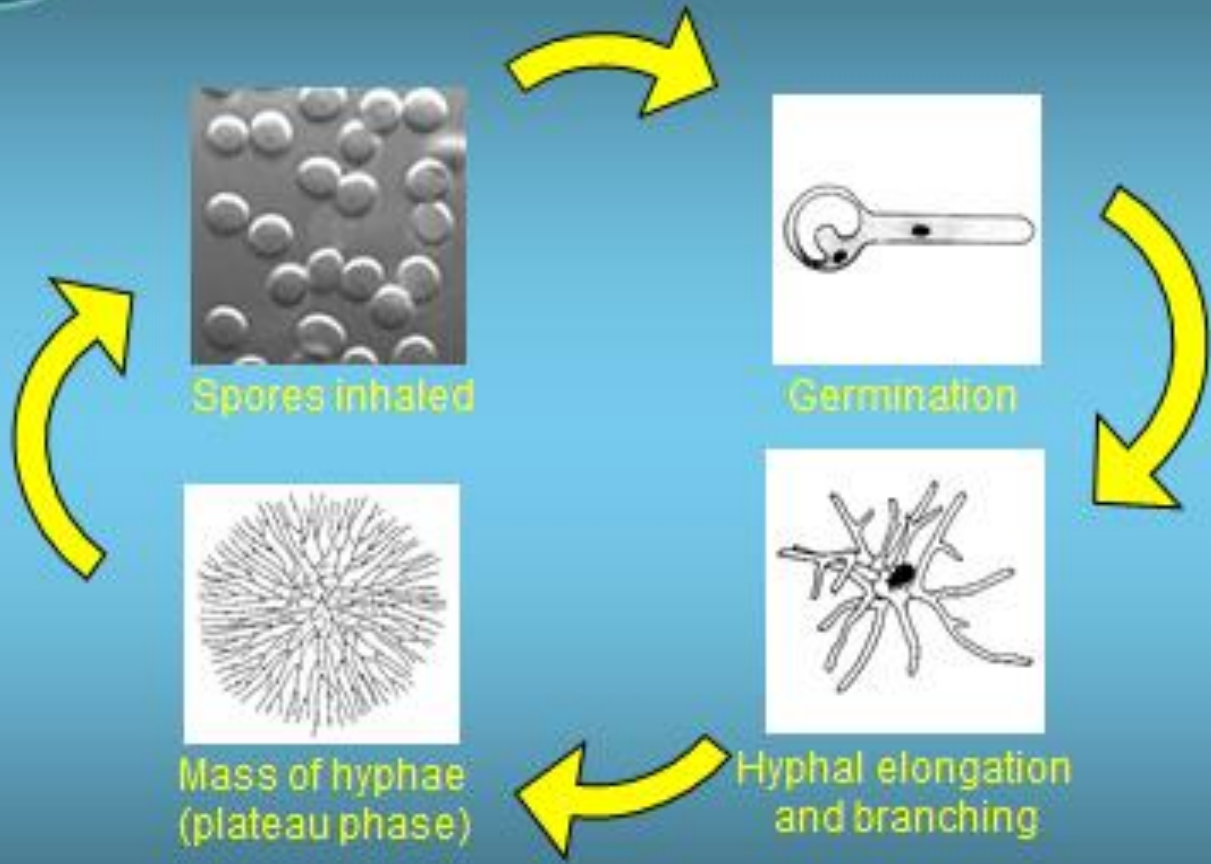
Epidemiology

Aspergillosis affects people with the following:

- Weakened immune system
- Low white blood cell levels
- Lung cavities
- Long-term corticosteroid therapy
- A hospital stay
- Asthma and cystic fibrosis



The life cycle of Aspergillus



Spores inhaled



Germination



Hyphal elongation and branching



Mass of hyphae (plateau phase)

Pathogenicity

The clinical manifestations of aspergillosis are determined by the host immune response to *Aspergillus* spp with the spectrum ranging from a local inappropriate inflammatory response, causing allergy, to local saprophytic lung disease with mycelial balls.

Aspergillosis organisms tend to invade vascular tissue, leading to thrombosis and infarction. In maxillary sinus aspergillosis, organisms can invade the oral tissue through the soft tissue lining of the maxillary sinus that progress down to the bone and cause palatal infarction and manifest in the oral mucosal tissue or disseminate into systemic organs.

Primary aspergillosis:

may be identified in the paranasal sinuses, larynx, eyes, ears, or oral cavity.

Oral aspergillosis :

is typically characterized by black or yellow necrotic tissue on an ulcer base over the palate or in the posterior tongue. Toxins of aspergillosis hyphae help in penetrating the blood vessel wall and produce thrombosis that leads to infarction and necrosis. Aspergillosis organisms exhibit centrifugal linear growth and eventually develop into ball-shaped masses.

Inhalation of *Aspergillus* spores can lead to both upper and/or lower respiratory infection resulting in pulmonary aspergillosis.

Pulmonary aspergillosis may disseminate in the brain, bone, or endocardium. Invasion of the orbit and adjacent craniofacial areas can be seen in cases of chronic and/or aggressive invasive sino-nasal aspergillosis.

In humans, the major forms of disease are:

- 1- Otomycosis = ear infection
- 2- Brain abscess = brain infection
- 3- Mycetoma = subcutaneous tissue infection
- 4- Endocarditis & myocarditis= heart infection
- 5- Sinuses aspergillosis = nasal sinuses infection
- 6- Aspergillus flavus produces the carcinogenic mycotoxin, aflatoxin which often contaminates foods such as nuts.
- 7- Pulmonary aspergillosis

There are three clinical types of pulmonary aspergillosis:

- **Allergic - hypersensitivity to the organism:**

Symptoms may vary from mild respiratory distress to alveolar fibrosis.

- **Aggressive tissue invasion:**

the aspergilli may disseminate to any organ. They may cause endocarditis, osteomyelitis, otomycosis and cutaneous lesions.

- **Fungus ball or Pulmonary Aspergilloma:**

which is characteristically seen in the old cavities of TB patients. This is easily recognized by **x-ray**, because the lesion (actually a colony of mold growing in the cavity) is shaped like a half-moon (semi-lunar growth). The patients may cough up the fungus elements because the organism frequently invades the bronchus. Chains of conidia can sometimes be seen in the sputum.

Invasive Aspergillosis affects people who are immunosuppressed such as:

- People who have had bone marrow transplants or solid organ transplants
- People who are taking high doses of corticosteroids
- People who undergo chemotherapy for cancer
- People with advanced AIDS
- Leukemia patients
- Tuberculosis patients

for invasive aspergillosis / Blood vessel invasion, thrombosis, infarction, and dissemination are common. The mortality rate is 50-100% and diagnosis by culture which may take as long as 4 weeks.

Clinical Presentations:

- Fever
- Cough
- Dyspnea
- Difficulty breathing
- Hemoptysis
- Coughing up blood
- Chest Pain

DIAGNOSIS

- Radiographic picture
- CT Scan
- Histopathology
- Serological testing
- Sputum culture
- Transthoracic needle aspiration

Laboratory diagnosis

Specimens :

according to the site of the infection in which fungi are possible to be the etiological agents. The moistened swab method is best suited for the oral fungal lesions that occur on the mucous membrane, lip, circumoral skin, and tongue.

- **Direct microscopy:**

a wet mount preparation of 10% potassium hydroxide, which aids in the visualization of hyphal elements

- **Fluorescent techniques**

- **Tissue sections should be stained with H&E**

- **Direct immunofluorescence technique: by specific antisera**

Culture:

Aspergillus molds have a powdery texture. However the color of the mold's surface differs from species to another and can be used to identify the type of Aspergillus,

Aspergilli require 1-3 weeks for growth. The colony begins as a dense white mycelium which later assumes a variety of colors, according to species, based on the color of the conidia.

Species differentiation is

based on the formation of spores as well as their color, shape and texture.



Plate 21 *Aspergillus*, the Green Mold, growing on malt agar media.



THANK
YOU