Respiratory Fungal Infections

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Respiratory fungal ifections

- Respiratory System
- Rout of infection?
- Oral Cavity, any role?
- Respiratory fungal infections are less common than viral and bacterial infections.
- Are opportunistic infections
  - Diseases in immunocompromised mainly , rarely in healthy hosts
- Have significant difficulties in diagnosis and treatment.

Inducing Immunosuppression

AIDS
Bone marrow/ organ transplantation
Cancer: Leukemia, lymphoma etc
Drugs: Cytotoxic drugs, steroids etc
Endocrine related: Diabetes
Failure of organs: multi-organ

Other factors

Increased survival of premature neonates
.More elderly pts
Long Stay in hospital/ ICU

Surgery

Devices

Respiratory fungal infection - Etiology

- YEAST
  - Candidiasis (*Candida* and other yeast)
  - Cryptococcosis (*Cryptococcus neoformans, C. gattii*)
- Pneumocystosis (*Pneumocystis jiroveci*)

Opportunistic

- Mould fungi
  - Aspergillosis (*Aspergillus* species)
  - Zygomycosis (*Zygomycetes,* e.g. *Rhizopus, Mucor*)
  - Other mould

- Dimorphic fungi
  - Histoplasma capsulatum
  - Blastomyces dermatitidis
  - Paracoccidioides brasiliensis
  - Coccidioides immitis

Primary infections

Primary Systemic Mycoses

Infections of the respiratory system

Dissemination seen in immunocompromised hosts

Common in North America and to a lesser extent South America. Not .common in other parts of the World

Etiologies are dimorphic fungi. In nature found in soil of restricted .habitats

:They include

,Blastomycosis

,Histoplasmosis

,Coccidioidomycosis

Paracoccidioidomycosis

Aspergillosis

Aspergillosis is a spectrum of diseases of humans and animals caused by .members of the genus *Aspergillus*

These include

mycotoxicosis (1)

Allergy (2)

invasion and extension) in preformed cavities Colonization (without (3)

Invasive, inflammatory, granulomatous, necrotizing disease of lungs (4)

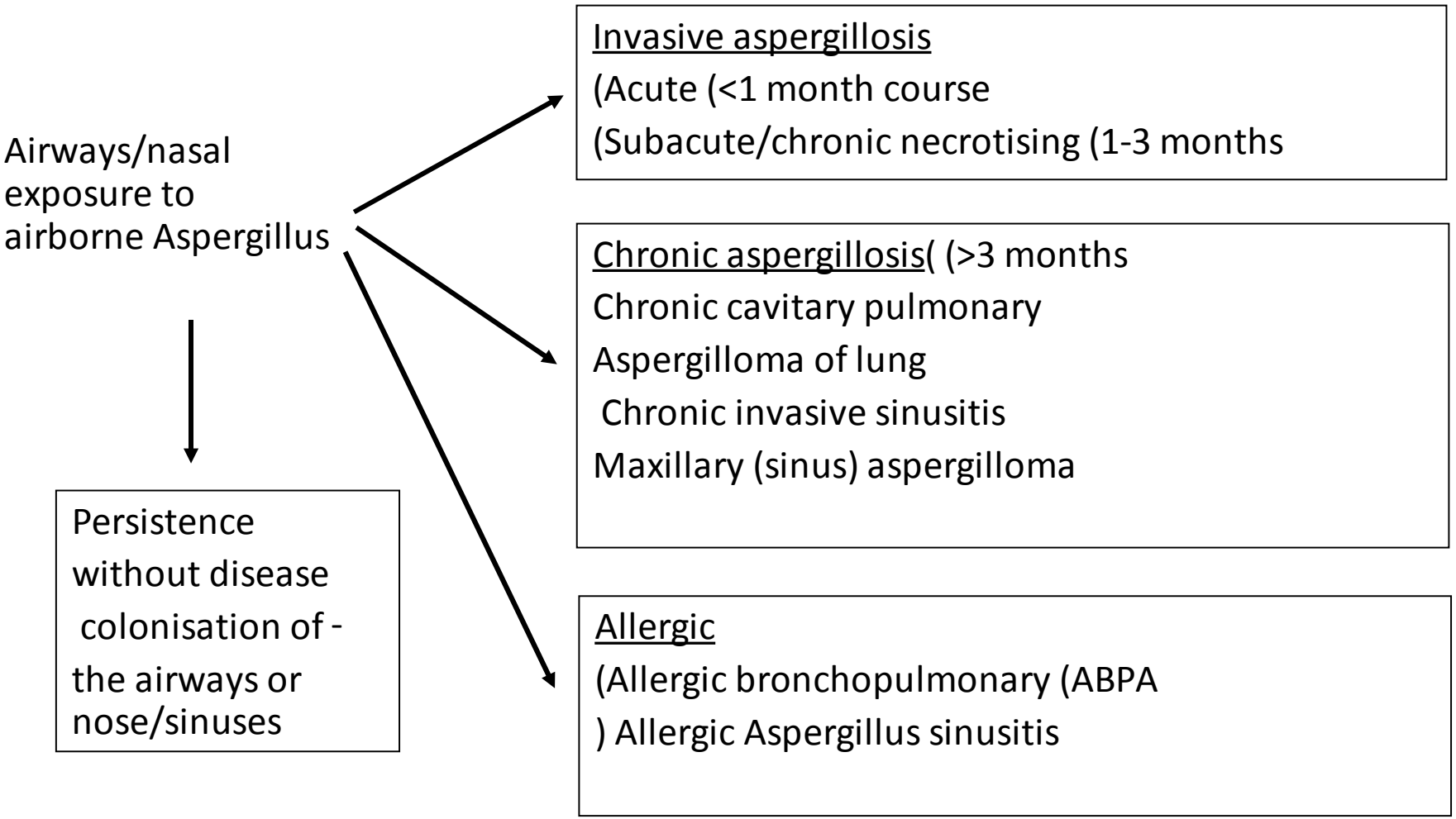
.systemic and disseminated disease (5)

The type of disease and severity depends upon the physiologic state of the host and the species of *Aspergillus*. causing the disease

<u>Aetiological Agents:</u> *,Aspergillus species*

.common species are A. fumigatus, A. flavus, A. niger, A. terreus and *A. nidulans*

CLASSIFICATION OF ASPERGILLOSIS



Aspergillosis

(Chronic Aspergillosis (Colonizing aspergillosis

(Aspergilloma OR Aspergillus fungus ball)
signs include: Cough, hemoptysis, variable fever

- Radiology will show mass in the lung , radiolucent crescent

Invasive pulmonary Aspergillosis

Signs: Cough , hemoptysis, Fever, Pneumonia, Leukocytosis

Aspergillosis

:Aspergillus sinusitis

The most common cause is *Aspergillus flavus*

in addition Aspergillus, there are other fungi that can cause fungal) sinusitis

:Clinical

Nasal polyps – sinusitis

(Could disseminate to – eye ⟹ craneum (Rhinocerebral

Other diseases caused by :*Aspergillus*

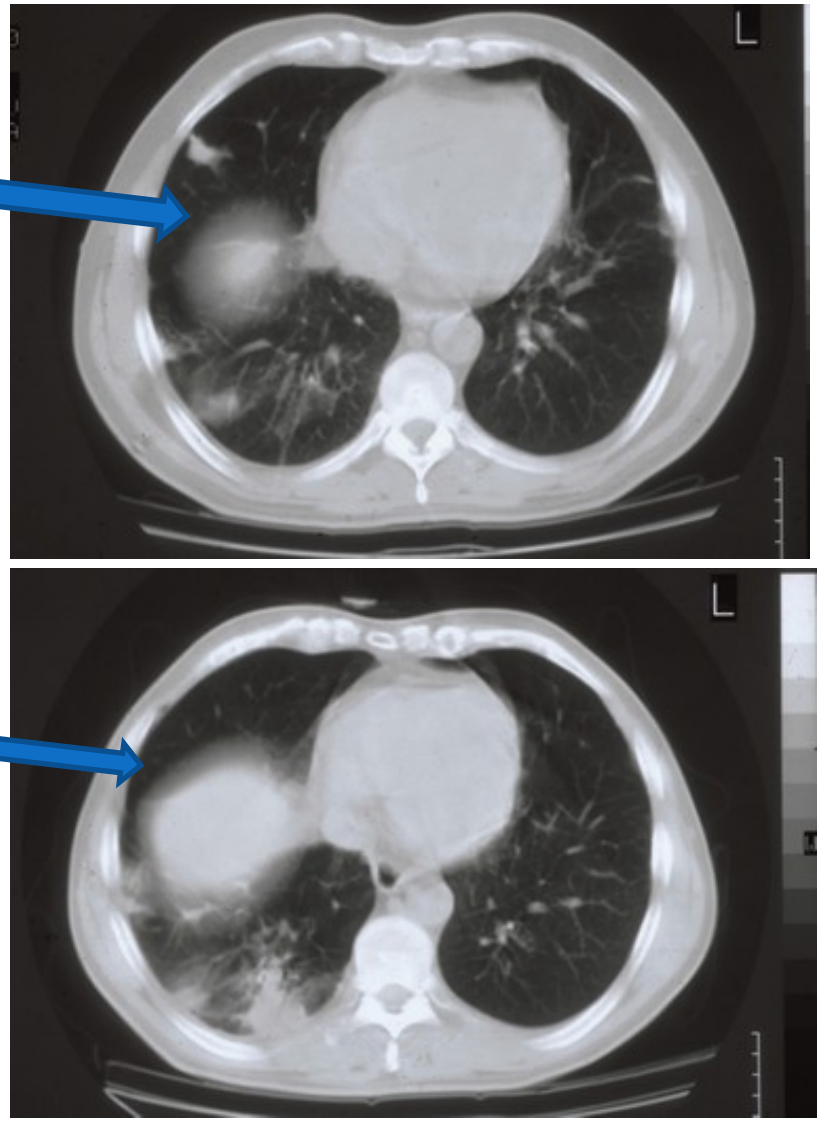
Corneal ulcer – endophthalmitis

(Otitis externa – otitis media (*A. niger*

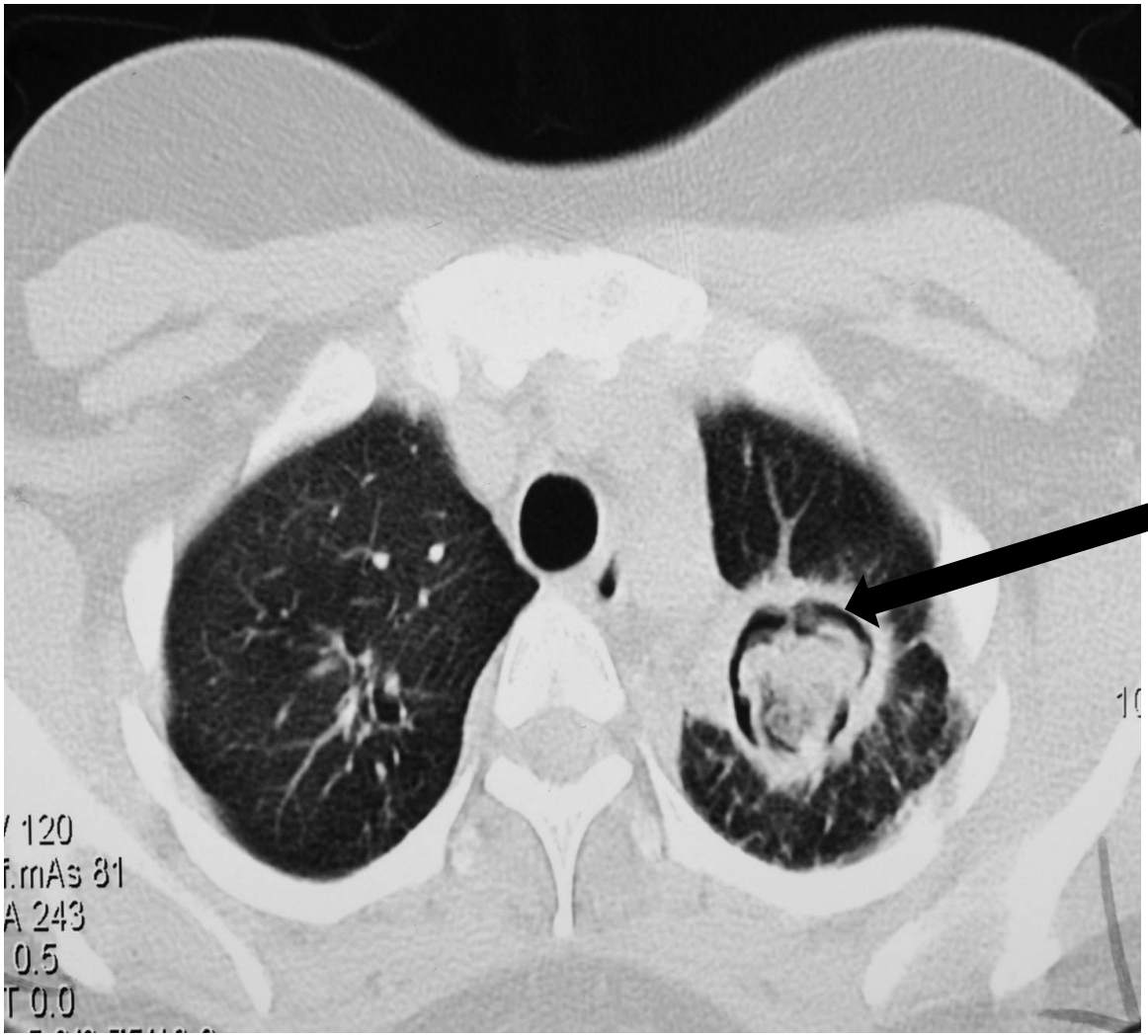
(Nail & skin infection (*A. niger*

Invasive pulmonary aspergillosis in AIDS

Note the Halo sign



Simple (single) aspergilloma



Note the Air crescent

ABPA

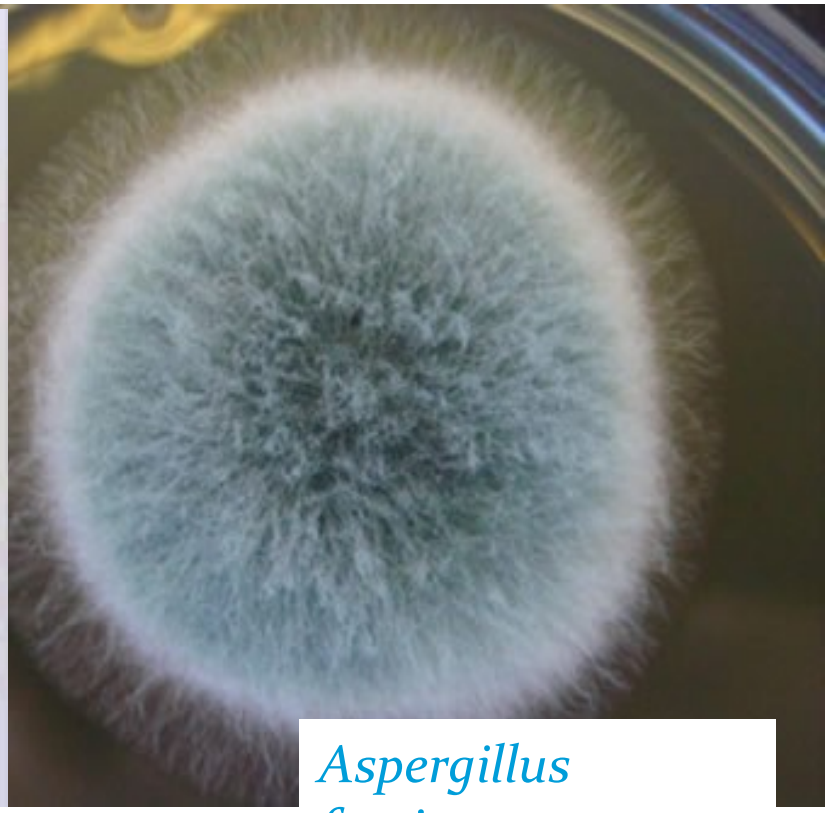
Hx Asthma
Bronchial obstruction
Fever, malaise
Eosinophilia
Wheezing +/-

Also:
Skin test reactivity to *Aspergillus*
Serum antibodies to *Aspergillus*
Serum IgE > 1000 ng/ml
Pulmonary infiltrates

A link between airborne fungi and severe ?asthma

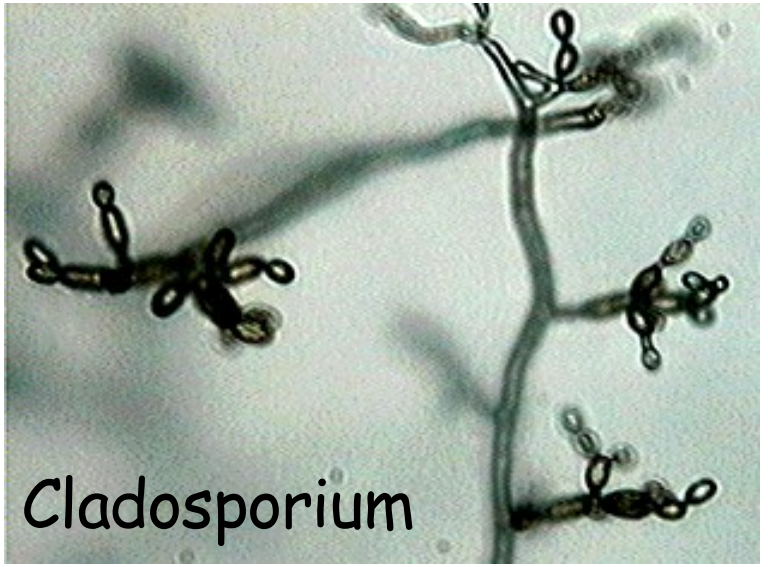
Common airborne Aspergilli

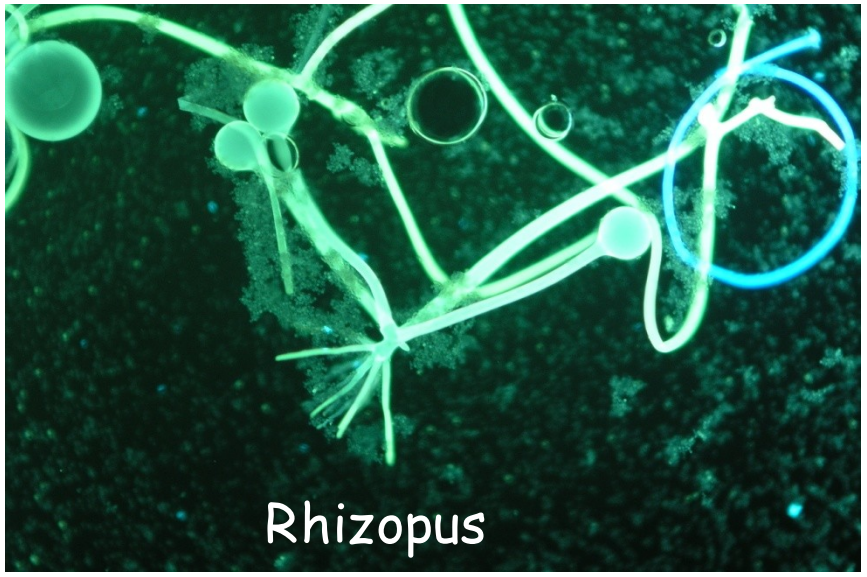
Aspergillus niger

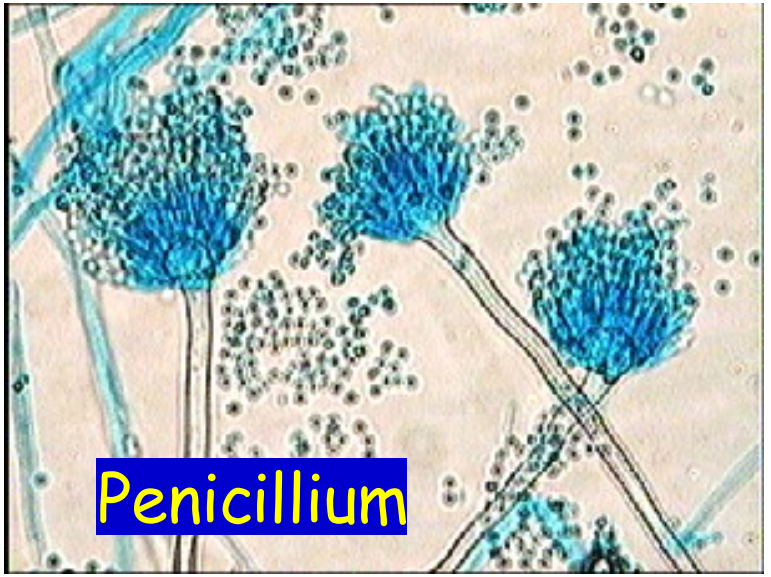


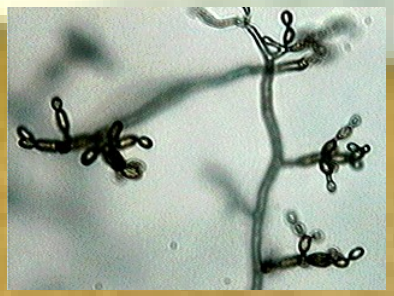
Aspergillus fumigatus

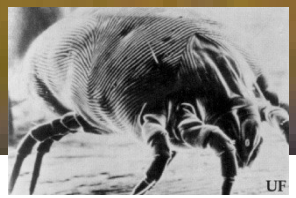
Other important airborne fungi

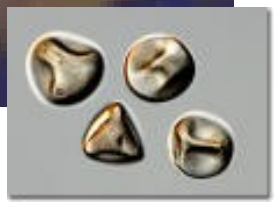












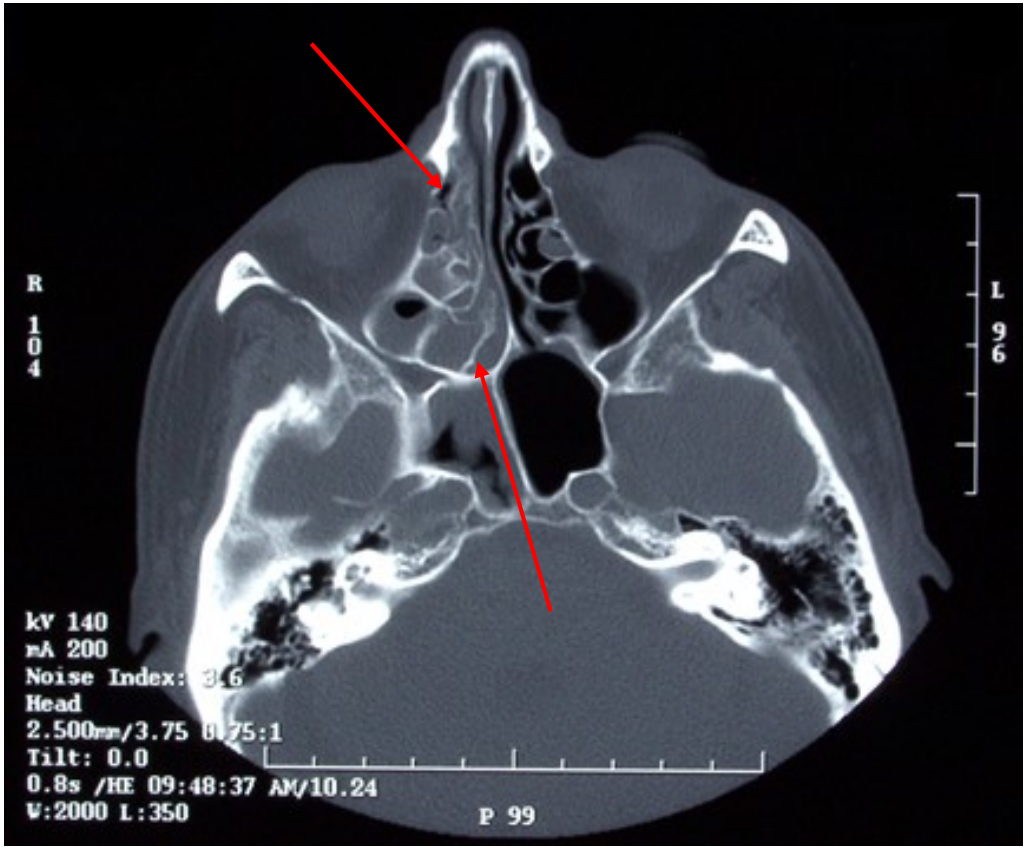
AIR QUALITY IN HOSPITALS

- Nosocomial pulmonary Aspergillosis

- > 500 cases of POST-OPARATIVE ASPERGILLOSIS

Fungal sinusitis

sinusitis after chemotherapy biopsy showed hyphal invasion



Management of acute invasive Aspergillus sinusitis

diagnosisRequires both biopsy and preferably culture for mucormycosis, *Scedopsporium*– differential diagnosis = infection/*Fusarium*

tissueRequires systemic antifungal therapy to minimize eye, mouth anddestruction, including spread to face, brain and cure

? Requires surgical removal

Allergic Aspergillus sinusitis

Clinical features = nasal obstruction, recurrent sinus infections, loss of smell and nasal polyps

Aspergillus precipitins +ve in 85%

Surgical handling of specimen very important – mucus versus tissue: allergic or chronic invasive

Chronic invasive Aspergillus sinusitis

Complications in immunocompromised:

- orbital apex syndrome
- generalised proptosis and blindness
- cavernous sinus thrombosis
- osteomyelitis of the base of the skull
- cerebral aspergillosis

Diagnosis

:Specimen ▪

,Respiratory specimens: Sputum, BAL, Lung biopsy ▪

(Other samples (depend on the site ▪

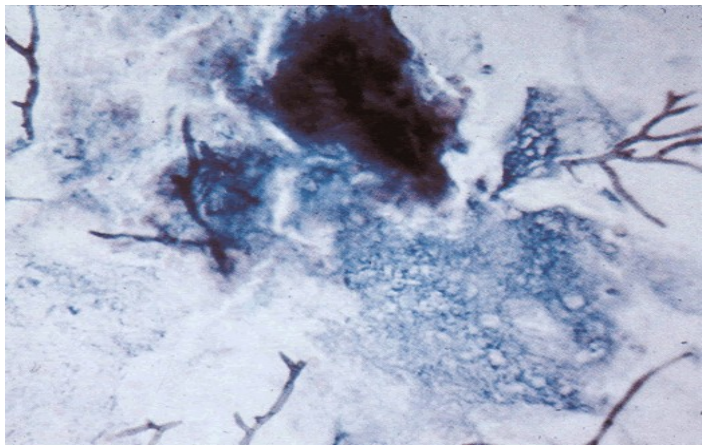
Blood ▪

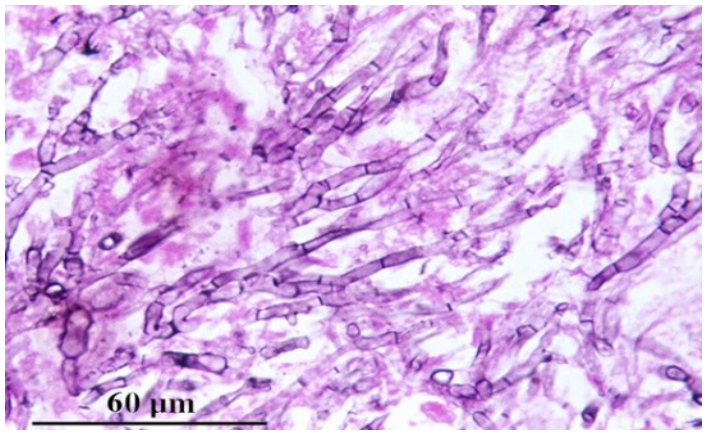
:Lab. Investigations

:Direct Microscopy ▪

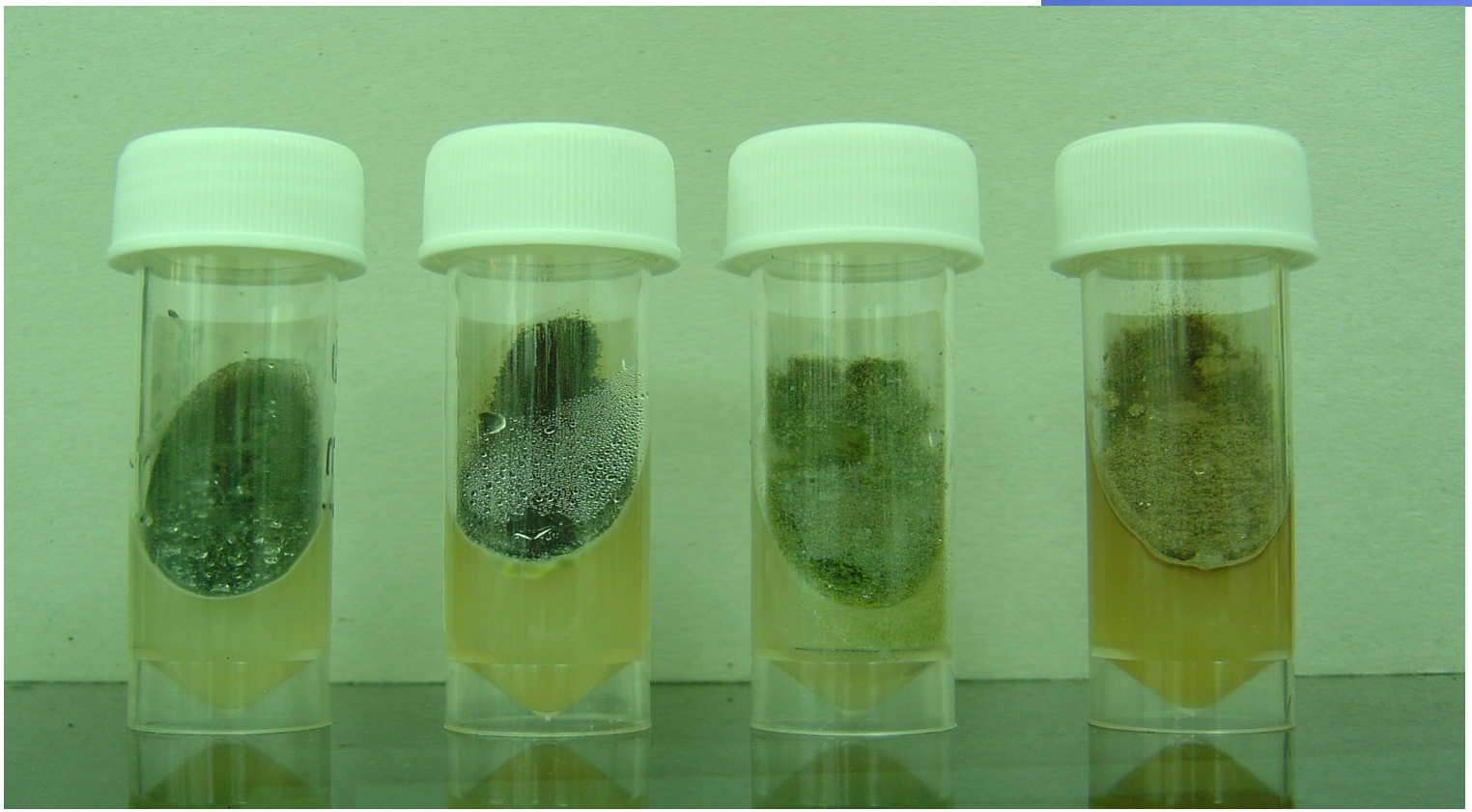
Stained smear : Periodic Acid Schiff (P.A.S); KOH, Giemsa, Grecott (methenamine silver stain (GMS

will show septate fungal hyphae with Dichotomous branching

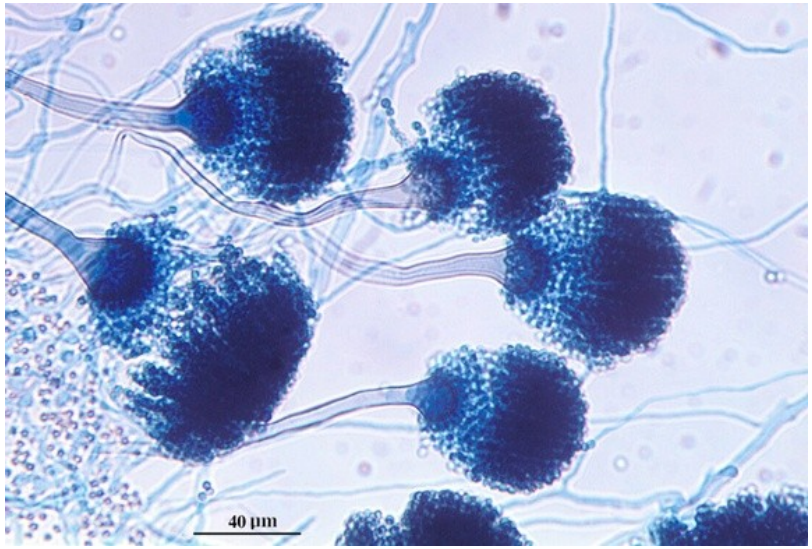


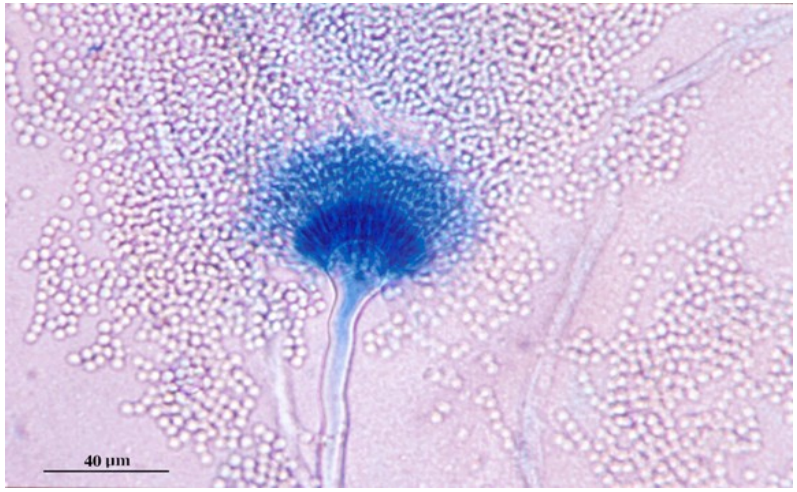


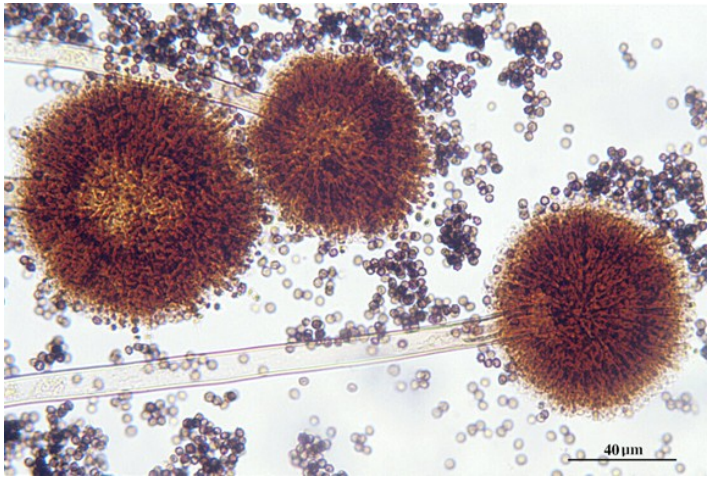
- **:Culture**
- (on SDA (no cycloheximide



Microscopy



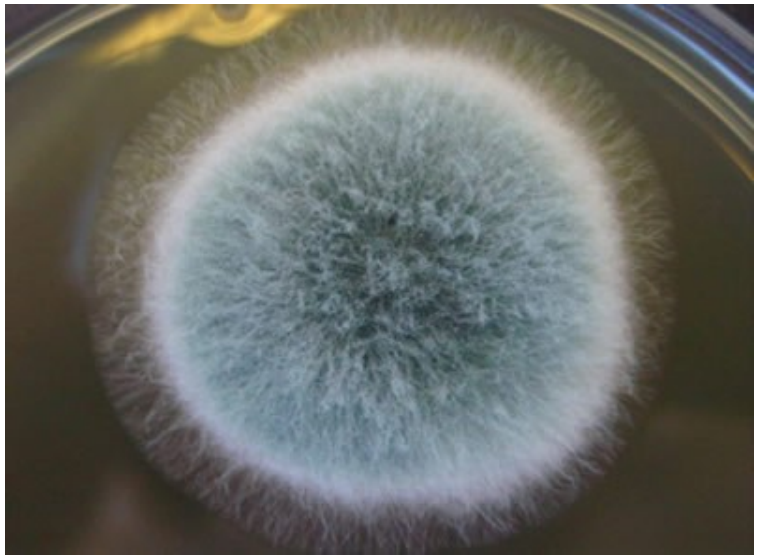




LPCB preparations

Cultures for Aspergillus from sputum and BAL

Yield in Invasive Aspergillosis from BAL and sputum ~40%



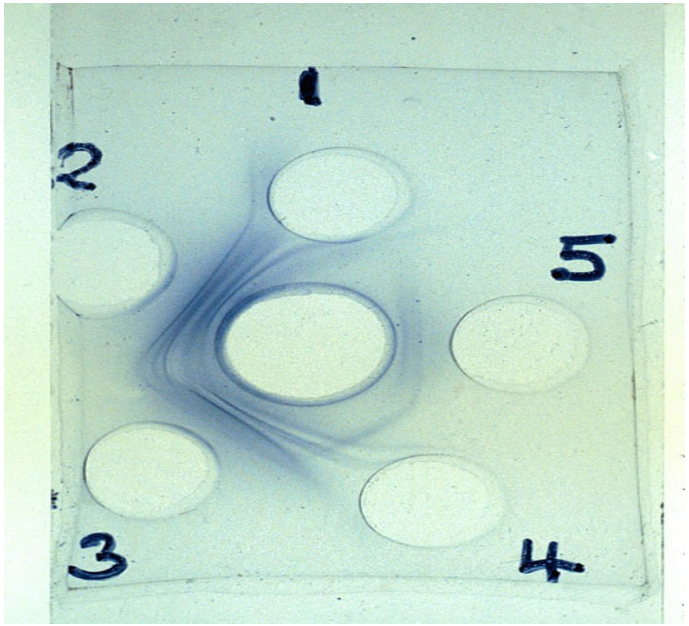
Bacteriological media inferior to fungal media – 32% higher yield on fungal media

Diagnosis

:Serology

Test for Antibody ▪

(Using I.D (Immunodiffusion



Immunodiffusion

Test for Antigen

ELISA test for galactomannan Antigen is available with a better sensitivity

Diagnosis- PCR

MycAssay™: Aspergillus

Real-time molecular based *in vitro* diagnostic tests for *Aspergillus* spp.

Choice of antifungal for aspergillosis

(Voriconazole (unless drug interaction

(Amphotericin B (AmBisome

OR

,Caspofungin

(Posaconazole (oral only

Zygomycosis

- Pulmonary zygomycosis
- Rhinocerebral zygomycosis

Risk factors

Diabetic ketoacidosis

Granulocytopenia
Corticosteroid therapy
Malignancy
HSCT
Many others

Zygomycosis

Etiology:
Zygomycetes
Non-septate hyphae
Mainly of the order Mucorales (Rarely Entomophthorales)
e.g. Rhizopus, Mucur, Absidia

- Angioinvasion, Thrombotic invasion of blood vessels
- Pulmonary infractions and hemorrhage
- Rapid evolving clinical course
- High mortality

Zygomycosis

Acute

Fever, pulmonary infiltrates refractory to antibacterial therapy.

Consolidation , nodules, cavitation, pleural effusion, hemoptysis

Infection may extend to chest wall, diaphragm, pericardium.

Early recognition and intervention are critical

Zygomycosis

Diagnosis

:Specimen ▪

,Respiratory specimens: Sputum, BAL, Lung biopsy ▪

:Other samples ▪

:Lab. Investigations

:Direct Microscopy ▪
Periodic Acid Schiff (P.A.S); KOH, Giemsa, Grecott methenamine silver (stain (GMS

will show broad non- septate fungal hyphae

Culture: (on SDA (no cycloheximide ▪

No Serology available ▪

Zygomycosis

Treatment:

Amphotericin B ,

Posaconazole (Other azoles are not effective)

?Surgery

Thank you