



SOLID ORGAN / KIDNEY  
TRANSPLANT RECIPIENT

# EVOLUTION OF POST-TRANSPLANT INVASIVE ASPERGILLOSIS & MUCORMYCOSIS



IMPROVED DIAGNOSIS,  
TARGETED THERAPY  
BETTER OUTCOMES,  
BUT CHALLENGES CONTINUE

## EARLY ERA (1960s-1980s)

- Rarely diagnosed (mostly at autopsy)
- High mortality (>80-90%)
- Limited antifungal options (Amphotericin B deoxycholate)
- Risk factors: high-dose steroids, heavy immunosuppression, CMV infection



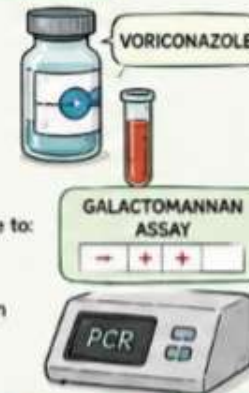
## INTERMEDIATE ERA (1990s-2005)

- Improved imaging (CT chest, MRI)
- Better microbiology
- Increasing recognition of
  - Invasive Aspergillosis (IA) as predominant mold
  - Emerging Mucormycosis in diabetics & heavily immunosuppressed
- Liposomal Amphotericin B reduced nephrotoxicity



## MODERN ERA (2005-PRESENT)

- Voriconazole revolutionized treatment of IA
- Galactomannan assay, PCR-based diagnostics, fungal biomarkers
- Earlier diagnosis
- Improved survival in IA
- Increasing Mucormycosis due to:
  - Diabetes mellitus
  - Prolonged steroids
  - Potent immunosuppression
  - COVID-19 associated immune dysregulation



## FUTURE & ONGOING (2020s & BEYOND)

- Precision diagnostics (next-gen sequencing, multiple biomarkers)
- Individualized antifungal therapy
- Better supportive care
- Mucormycosis remains a major challenge requiring early suspicion and aggressive management



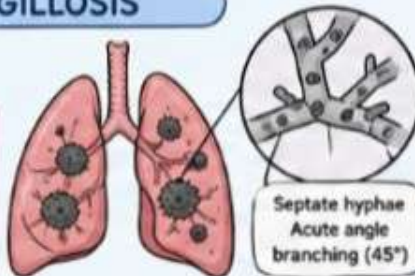
## INVASIVE ASPERGILLOSIS



*Aspergillus fumigatus*

### RISK FACTORS

- Neutropenia
- CMV infection
- Rejection therapy
- High-dose steroids
- Environmental exposure



Septate hyphae  
Acute angle  
branching (45°)

### CLINICAL FEATURES

- Fever
- Pleuritic chest pain
- Cough, hemoptysis
- Dyspnea



### DIAGNOSIS

- CT chest - nodules, halo sign, cavitation
- Galactomannan positive
- Culture / PCR



### TREATMENT

- Voriconazole (first line)
- Isavuconazole / Posaconazole (alternatives)



### OUTCOME

Mortality  
25-50%  
(Improved compared to earlier era)



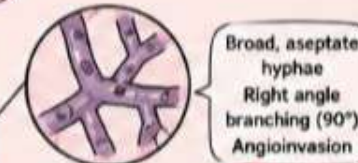
## MUCORMYCOSIS



Mucorales  
(Rhizopus,  
Mucor,  
Lichtheimia)

### RISK FACTORS

- Diabetes mellitus
- Iron overload
- Prolonged steroids
- Potent immunosuppression
- Acidosis



Broad, aseptate  
hyphae  
Right angle  
branching (90°)  
Angioinvasion

### CLINICAL FEATURES

- Fever
- Facial pain, swelling
- Nasal discharge
- Black eschar
- Orbital / CNS signs
- Pulmonary infiltrates



### DIAGNOSIS

- CT / MRI (sinuses, orbit, brain, lungs)
- Tissue biopsy - broad aseptate hyphae
- Culture (often non-specific)



### TREATMENT

- Liposomal Amphotericin B (first line)
- Posaconazole / Isavuconazole (step-down)
- Surgical debridement (often needed)



### OUTCOME

Mortality  
40-80%  
(Still high despite therapy)



## COMPARISON AT A GLANCE

|                        | FREQUENCY   | USUAL ONSET                         | MAJOR RISK FACTORS                  | COMMON SITE                                | BIOMARKERS            | FIRST-LINE THERAPY       | SURGERY             | MORTALITY |
|------------------------|-------------|-------------------------------------|-------------------------------------|--------------------------------------------|-----------------------|--------------------------|---------------------|-----------|
| INVASIVE ASPERGILLOSIS | More common | 3-12 months post-transplant         | Neutropenia, CMV, rejection therapy | Lung (most common)                         | Galactomannan (+)     | Voriconazole             | Occasionally        | 25-50%    |
| MUCORMYCOSIS           | Less common | Variable; often early with diabetes | Diabetes, iron overload, steroids   | Rhino-orbital-cerebral, Lung, Disseminated | No reliable biomarker | Liposomal Amphotericin B | Frequently required | 40-80%    |

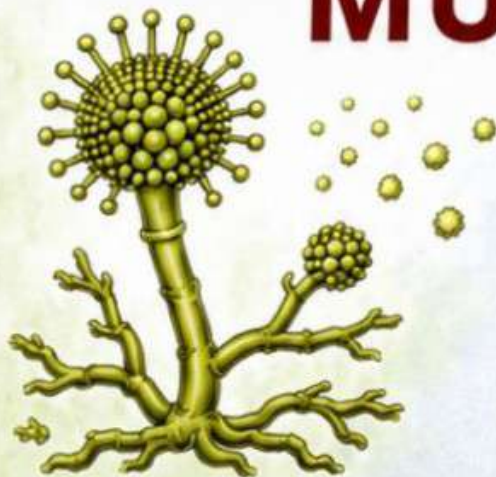


# ECNG

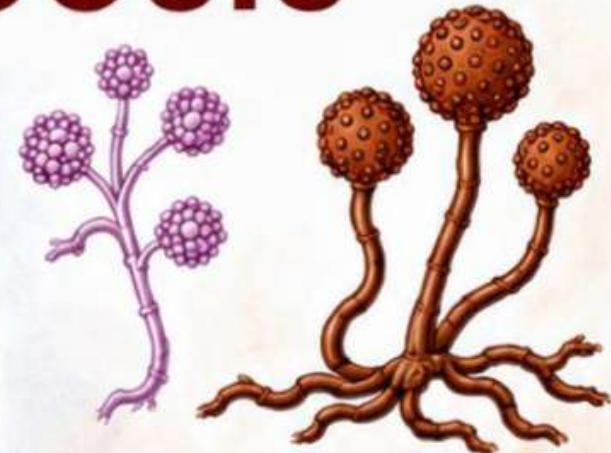
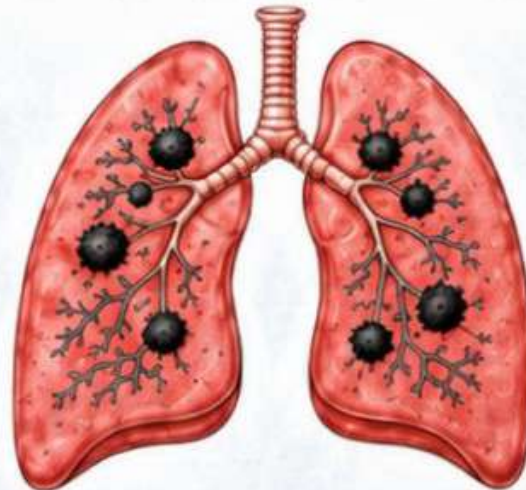
## Extracorporeal Nephrology Group

*An Academic Forum for Nephrologists, DM Trainees,  
Physicians, and Healthcare Professionals*

# — EVOLUTION OF POST-TRANSPLANT — INVASIVE ASPERGILLOSIS & MUCORMYCOSIS



ASPERGILLOSIS



MUCORMYCOSIS