PATHOGENESIS OF FUNGAL DISEASES

I. Types of Fungal Diseases:
   
   A. Allergic \( \rightarrow \) respiratory
   
   B. Infection/Disease
      
      1. Cutaneous
      2. Subcutaneous
      3. Systemic \( \rightarrow \) organs

   C. Toxicoses
      
      * mushrooms
      * mycotoxins \( \rightarrow \) made in substrates

II. Exposure to Etiologic Agents:

   A. Ecology:
      Environmental factors influence where fungi can grow. Soil types, temperature, humidity, site on human or animal host

   B. Morphology:
      Morphological forms influence the infectivity of fungi. Spore size; spore shape.

   C. Physiology:
      Physiological factors determine if a fungus can survive in the environment or in the host: pH, substrate, etc.

III. Portal of Entry:

   Skin \( \rightarrow \) broken skin
   Hair
   Nails
   Respiratory tract
   Gastrointestinal tract
   Urinary tract
   Eye

IV. Pathogenicity:

   Pathogen = Any disease-producing microorganism or material

   A. Colonization: Multiplication of an organism at a given site without harm to the host.
B. Infection: Invasion and multiplication of microorganisms in body tissue resulting in local cellular injury. 

C. Disease: A definite morbid process having a characteristic train of symptoms.

D. Virulence: The degree of pathogenicity of a microorganism as indicated by case fatality rates and/or its ability to invade host tissue.

V. Virulence Factors:

A. Inoculum size → May affect allergy, etc. in immunocompromised;
B. Morphological structure: size, shape, capsule
C. Adherence
D. Enzymes → Break down tissue, lytic qualities & ability to cause granulomas
E. Toxins → Virulence factors.

VI. Host Factors:

A. Mechanical barriers:

- Skin → Epithelium, fatty acids, pH, normal flora → Low fungi virulence makes skin a good barrier
- Pulmonary mucosa → Epithelium, cilia, mucus
- Cilia
- Intestinal mucosa → Epithelium, mucus, peristalsis, normal flora
- Urogenital Mucosa → Epithelium, mucus, pH, normal flora

B. Phagocytosis:

- PMNs
- Macrophages (chronic inflam.)

( Note: Refer to Dr. Cohen's lecture) 

C. Cell-mediated response:

- Delayed hypersensitivity

( Note: Refer to Dr. Cohen’s lecture) 

D. Antibody-mediated response:

- IgM
- IgG
- IgE

( Note: Refer to Dr. Cohen’s lecture)
VII. Tissue Response:

A. Hyperplasia
B. Inflammation
C. Granuloma
D. Suppuration
E. None \( \rightarrow \) most severe dz.

VIII. Diagnosis of Fungal Diseases:

A. Clinical Manifestations
B. Epidemiological Factors--History \( \rightarrow \) skin test
C. Laboratory:

1. Serology:
   a. Agglutination
   b. Precipitation: Immunodiffusion (ID)
   c. Complement fixation (CF)
   d. Nucleic Acid Probes

2. Mycology:
   a. Proper collection of specimen
   b. Proper processing of specimen
   c. Direct microscopic examination of specimen
   d. Culture: Appropriate media and incubation
      Identification of etiological agent

3. Histopathology: Demonstrate etiological agent in tissue using the following stains
   a. Hematoxylin and Eosin (H&E)
   b. Periodic acid–Schiff (PAS)
   c. Gomori methenamine silver (GMS)