

## Fungi

Did you know that fungi causes the following threats to public health?

- **Aspergillosis (*Aspergillus fumigatus*)**
- **Meningoencephalitis (*Cryptococcus neoformans*)**
- **Oral Thrush (*Candida albicans*)**
- **Mold (*Stachybotrys*)**

## Objectives of This Lesson

After completing this lesson, you will be able to:

- Describe the general characteristics of a basic fungus
- Gain familiarity with pathogenic fungi
- State at least one pathogenic disease associated with fungi
- State at least one pathogenic disease associated with yeast

## Fungi: The Basics

Fungi are eukaryotic cells that are widespread in the environment and critically affect human health and welfare.

### Basic Characteristics:

- Eukaryotic
- Non-vascular organisms
- Reproduce by means of spores, usually wind-spread
- Both sexual (meiotic) and asexual (mitotic) spores may be produced, depending on the species and conditions
- Typically not capable of movement
- Like plants, fungi have an alternation of generations

### Other Characteristics

- Vegetative body may be unicellular (yeasts) or composed of microscopic threads called hyphae
- Cell walls similar in structure to plants but differ in chemical composition; fungi cell walls are composed mostly of chitin; plant cell walls are composed mostly of cellulose (plus lignin in secondary walls)
- Cytoplasmic ultra-structure is broadly similar to plants cells, but differs significantly in kinds of organelles and structures

## Fungal Forms

Some fungi can grow into two major fungal forms:

- **Yeasts** – primarily unicellular growth form of fungi; reproduce asexually through budding
- **Molds or Mycelia** – characterized by having long, filamentous structures known as **hyphae** (long threadlike structures that entwine together into a mass known as a mycelium)

Other fungal forms are:

- **Spores** – reproducing bodies of molds
- **Dimorphic Fungi** – fungi that can grow as either yeast or mold depending on environmental conditions and temperatures; *Blastomyces dermatitidis* is an example of a dimorphic fungi (mycelial forms at 25°C, and grow into yeast form at 37°C).

## Classifying Fungi

The formal classification scheme for fungi is not essential for the scope of this course. Briefly, fungi are formally classified according to their growth and reproduction process. The three groups or divisions are:

- **Zygomycota**
  - mostly terrestrial and live in soil or on decaying plant and animal material. Rhizopus ("bread mold") is an example of a zygomycete and is known for its rapid growth.
- **Ascomycetes**
  - known for sexual reproduction by means of an ascus. Some yeasts and molds belong to this group.
- **Basidiomycetes**
  - important decomposers of wood and other plant material

## Pathogenic Fungi

Fungal pathogens adversely affect human health. Fungal infections develop slowly but recur more frequently than bacterial infections and do not produce a lasting immunity in the body. Infections can be generalized in one of two groups, depending on the part of the body that is infected.

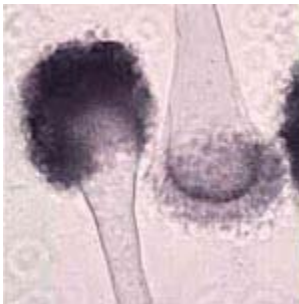
- **Dermatomycosis** - infecting the skin, hair, or nails  
(E.g., ringworm or athlete's foot)
- **Systemic mycosis** - infecting the entire body
  - Typically more serious and can be fatal for individuals whose immune system has been weakened

Fungal infections are typically spread by spores that enter the body through breathing or through an opening in the skin. Some infections are passed from animals to humans or between humans.

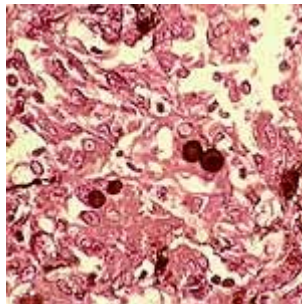
## Pathogenic Fungi: Examples of Pathogenic Fungi

### Examples of Pathogenic Fungi

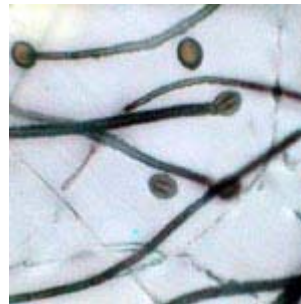
- ***Aspergillus fumigatus***
  - Causes aspergillosis. Aspergillosis is a clinical infection that can lead to allergic, superficial, or invasive disease. It can also cause allergic bronchopulmonary and sinus infections.
- ***Blastomyces dermatitidis***
  - Found in soil, causes blastomycosis – an uncommon infection to humans, dogs, cats and other animals. Blastomycosis affects the lungs and skin sometimes resulting in pneumonia or crusted, ulcerated pimples. The symptoms often do not appear until weeks or months after exposure. Blastomyces are dimorphic fungi, meaning they are mycelial forms at 25°C and grow into yeast forms at 37°C.
- ***Stachybotrys atra***
  - Commonly called “stachy,” is a greenish-black, slimy mold found only on cellulose products. *Stachybotrys* may produce several toxic chemicals called mycotoxins present in spores and small mold fragments released into the air. Symptoms include coughing, wheezing, runny nose, irritated eyes or throat, skin rash and diarrhea.



*Aspergillus fumigatus*



*Blastomyces dermatitidis*

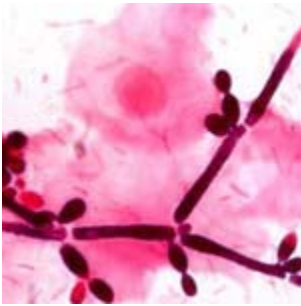


*Stachybotrys atra*

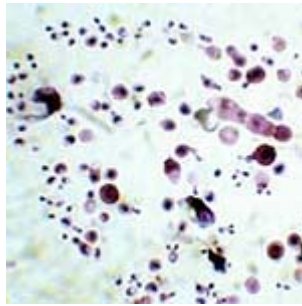
## Pathogenic Fungi: Examples of Pathogenic Yeasts

### Examples of Pathogenic Yeasts

- ***Candida albicans***
  - Causes skin level fungal infections of the mouth (oral thrush), groin (diaper rash), and the vagina (candida vaginitis) or 'yeast infection'
- ***Cryptococcus neoformans***
  - Causes **cryptococcosis**, one of the most serious fungal diseases worldwide. The major manifestation is meningoencephalitis. The morbidity and mortality associated with this disease has become increasingly important with the AIDS epidemic. It can also cause pneumonia, skin ulcers, and bone lesions.



*Candida albicans*



*Cryptococcus neoformans*

## Question 1 of 5

**Fungi and bacteria share the same cell wall structure.**

- A. True
- B. False

Submit Answer

## Question 2 of 5

Which of the following are "forms" of fungi?

- A. yeasts
- B. mycelia
- C. flagella
- D. spores
- E. all of the above
- F. A, B, & D

Submit Answer

### Question 3 of 5

**Yeast and/or fungi do not infect the body systemically.**

- A. True
- B. False

Submit Answer

## Question 4 of 5

**Fungi are classified according to their size and shape only.**

- A. True
- B. False

Submit Answer

## Question 5 of 5

**Yeast reproduce by which of the following ways?**

- A. Budding
- B. Fission
- C. Spores
- D. Sexual reproduction

[Submit Answer](#)