Yeast: *Candida albicans*

- Normal flora of mucous membranes: respiratory, GI, GU
- Causes infections when normal flora balance is disrupted
  - Immunosuppression
  - Extended use of antibiotics
  - Diabetics (able to grow in more acidic pH as compared to bacteria)

*Candida albicans* Infections

- Oropharyngeal: thrush
- Esophagitis
- Vulvovaginal infection
- Skin and nail infections (areas kept in moist environment susceptible: dishwashers)
- UTI
- Pneumonia
- Septicemia

*Candida albicans* Detection

- Gram stain = gram positive, reported as budding yeast present
  - Must see a budding yeast to report as various cellular elements can look like a single yeast cell
- Pseudohyphae = yeast cell that continues to get longer, almost looking like hyphae
  - *Candida* sp. can all produce pseudohyphae
  - If see pseudohyphae, most likely a *Candida* sp.

*Candida albicans* Culture

- Recovered on routine bacterial culture media
- Grows within 24-48 hours
- Identification:
  - Ability to form ‘germ tubes’, which are hyphal structures formed in very specific circumstances
  - Yeast is incubated in serum for 3 hours, microscopically look for tube structures at end of yeast cell
  - If positive = *Candida albicans*
  - If negative = yeast other than *Candida albicans*, further identification to follow
Yeast: Cryptococcus neoformans
- Found in soil due to bird droppings (pigeons)
- Humans acquire via inhalation
- Disseminates from lungs to central nervous system causing meningitis
- Usually only causes disease in immunocompromised individuals

Cryptococcus neoformans
- Gram stain: gram-positive, budding yeast (larger and more round than Candida)
  - Produces large polysaccharide capsule around organism, protection from phagocytosis
  - Can inhibit Gram stain from staining organism
- Cryptococcal antigen
  - Rapid test (same day), detects capsular antigen in CSF and serum
  - Quantitative via performing test on various dilutions of serum/CSF (titer: highest dilution test is still positive)
  - If treatment working, titer will decrease

Cryptococcus neoformans Culture
- Will grow on routine bacterial culture media
- Growth within 24-48 hours
- Identification via various biochemical tests

Cutaneous Infections: Dermatophytosis
- Infect hair, skin and nails
- Organisms utilize keratin as carbon source
- Do not cause systemic disease
- Cause tinea or ringworm, areas/structures affected:
  - Tinea capitis: scalp, eyebrows, eyelashes
  - Tinea barbae: beard
  - Tinea corporis: body, arms, legs
  - Tinea cruris: groin (jock itch)
  - Tinea pedis: feet (athlete's foot)
  - Tinea unguium: nails (onychomycosis)

Dermatophytosis: Organisms
- Microsporum sp. – usually infects skin and hair
- Trichophyton sp. – infects hair, skin and nails
- Epidermophyton sp. – usually infects skin and nails
- Detection
  - KOH preparation looking for hyphal elements in affected area (hair, skin, nails)
  - Fungal culture

Dermatophytosis: Organisms
- Culture
  - Hair specimens: sometimes fluoresce under UV light (Woods lamp), select hairs that fluoresce to culture
  - Skin scrapings
  - Nails
- Organisms usually take 2 weeks for initial growth and 4-6 weeks for final identification
Overview

- *Candida albicans*: yeast, produce pseudohyphae and germ tubes, opportunistic infections, normal flora mucous membranes
- *Cryptococcus neoformans*: yeast, produces large capsule, organisms inhaled and spread to CNS (meningitis) in immunocompromised
- *Dermatophytes*: *Microsporum, Epidermophyton, Trichophyton*, cause ringworm, infect cells with keratin (hair, skin and nails)