Lecture 5: Histopathology of Fungal Infections
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Histological Stains for Fungi (cont.)

- Limitations:
  - Does not stain many fungi
  - Does not stain filamentous bacteria
  - Is not adequate for screening tissue with sparse number of fungal elements

Histological Stains for Fungi (cont.)

- Gomori’s methenamine silver (GMS) [often referred to as ‘silver stain’]
  - Color of fungi: black brown on a light green background
  - Applications:
    - Stains most fungi, viable or not
    - Can stain filamentous bacteria
  - Limitations:
    - May overstain fungi and obscure internal details
    - Cannot detect host response

Histological Stains for Fungi (cont.)

- Periodic acid-Shiff (PAS)
  - Color of fungi: red pink on a green background
  - Application: stains most fungi, viable or not
  - Limitations:
    - Masks innate color and internal details
    - Many tissue elements take up the stain
    - Cannot detect host response
    - Does not stain filamentous bacteria

Histological Stains for Fungi (cont.)

- Source: www.histopathology-india.net/ Sporotri.htm

Histological Stains for Fungi (cont.)

- Source: www.doctorfungus.com
Histological Stains for Fungi (cont.)

• Gridley fungus (GF)
  – Color of fungi: purplish red on a yellow background
  – Application: stains most fungi
  – Limitations:
    • Masks innate color
    • Non-viable cells do not stain
    • Cannot demonstrate host response
    • Does not stain filamentous bacteria

Histological Stains for Fungi (cont.)

• GMS with H&E counterstain
  – Stain of choice if only one slide available for histopathological examination
  – Color of fungi: black brown fungi on a red-pink background
  – Applications:
    • Permits study of host response
    • Excellent for detecting fungi and filamentous bacteria
  – Limitation: cannot determine innate fungal color

Histological Stains for Fungi (cont.)

• Mucin (mucicarmine) stains
  – Mayer’s or Southgate’s preparations
  – Application: stains of mucopolysaccharide capsular material of fungi, e.g., Cryptococcus
  – Limitation: Not specific for Cryptococcus
Histological Stains for Fungi (cont.)

- Modified Gram’s stains
  - Brown-Hopps’ and MacCallum-Goodpasture preparations
  - Application: stains Gram-positive filamentous bacteria
  - Limitation: does not selectively stain fungi

- Modified acid-fast stains
  - Ziehl-Neelsen’s and Kinyoun’s preparations
  - Application: stains Gram-positive filamentous bacteria
  - Limitation: does not stain fungi

Histological Stains for Fungi (cont.)

- Modified Fontana-Masson
  - Applications:
    - Stains cell walls of Cryptococcus and other melanin producing fungi
    - Accentuates weakly pigmented agents of phaeohyphomycosis
  - Limitation: may stain fungal elements that are immature or innately not pigmented

Histopathological Identification

- Tissue sections can be used to observe fungal elements and particular attributes that may be characteristic of certain species
- Fungi can appear as
  - Hyaline or pigmented (phaeoid)
  - One of four broad morphological categories
    - Yeast-like
    - Hyphae
    - Endosporulating spherules
    - Granules

Histopathological Identification (cont.)

- Other defining features of fungal forms in vivo include
  - Size and shape of cells
  - Cell wall thickness
  - Number and shape of blastoconidia (buds)
  - Presence or absence of septations
  - Capsules
  - Number of nuclei
  - Presence of pseudohyphae, hyphae, or arthroconidia

- Immunohistological staining is also used to detect and identify fungi in tissue
  - Can be direct or indirect staining, i.e., one step or multi-step process
  - Often fluorescent-tagged antibodies are used
  - Other ‘tags’ include
    - Gold-silver complexes
    - Enzyme complexes (e.g., peroxidases)