Mycology III: Systemic Mycoses

Systemic Mycoses

- Cryptococcus (Monomorphic) + Thermal Dimorphics
- Can cause disease in healthy animals (dogs and cats, humans)
- Saprozoanoses (direct zoonosis rare)
- Inhaled (ingested) from environment source
- Upper Resp. or Lungs initially – most subclinical, resolve, immunity
- Secondary hematogenous dissemination patterns unique
  - Cryptococcosis (Risk group 2) – only encapsulated systemic fungi
  - Blastomycosis (Risk Group 3: mold phase highly infectious, virulent)
  - Histoplasmosis (Risk Group 3: same)
  - Coccidioidomycosis (Risk Group 3: same)
Cryptococcosis: Yeast

- *Cryptococcus neoformans* (C. gattii emerging)
  - worldwide in soil *(pigeon feces)*
  - *C. gattii* – tropical subtropical, decaying wood
  - CATs (most common systemic fungal), dogs
  - horse, cattle, porpoise, humans
  - Saprozoonoses, immune status is factor

- Inhalation of unencapsulated environ. yeast
  - Rostral nasal mucosal colonization: rhinitis
  - Caudal nasal – olfactory nerve - meningitis
  - **Capsule** (antiphagocytic/ immunosuppressive)
  - hematogenous dissemination
  - skin, eyes (uveitis), lungs (kidney, joints), CNS
  - Clinical signs relevant to location

Cryptococcosis: Dx/TxT

- Hx: outdoor cat, no vaccination (FeLV)
- Clinical signs: upper /lower resp.
- Direct Examination
  - exudates (Skin), aspirates (TTA), CSF
  - India ink (capsule) can be presumptive
- Histology: H& E, PAS

- Serology - agglutination and ELISA

- Culture - SAB (no cycloheximide)
  - 20 and 37 oC *(r/o dimorph)* – 1 week
  - Confirmatory id: Bird Seed agar *(melanin)*
  - API 20C strips

- Treatment: Cats/Dogs
  - FCZ / ITZ (early): AMB + FCZ
  - Find environment source – lime, mask
Blastomycosis: Thermal Dimorph

- *Blastomyces dermatitidis*: DOGs (cats)
- Slightly acidic soils, water sources, beaver dams
- Endemic U.S. East/Canada (SK/MN/ON, St. Lawrence River
  - Miss., Ohio, Tennessee R., Great lakes
- Pathogenesis: signs
  - Severe resp. + skin disease of dogs
  - Typically one (several) animals
  - Cats, humans (rarely other species)
  - Aerosol inhalation → pyogranulomatous lesions in lungs, regional lymph nodes
  - Hematogenous - skin, eyes, bone, brain, prostate

Blastomycosis: Dx/TxT

- Hx: Dog (cat), endemic area, signs
- Direct Examination – Yeast form
  - Exudates: skin, respiratory (TTA), aspirate
  - Thick-walled, 5-20 μm
- Histological – PAS/Methenamine Ag
- Culture: Mycology Reference Lab
- SAB: 20 oC (2-8 wks)
  - septate, “Lollypop” chlamydospires
- BHI (37°C) - budding yeast
- Serology – Mycology reference lab, DNA
- Txt
  - ITZ (p.o.)
  - AMB (i.v.) + FCZ (p.o): CNS involvement
- Direct Zoonoses rare .. But
  - post bite, post necropsy (vets)
Histoplasmosis: Thermal Dimorph

- *Histoplasma capsulatum* (fac. intracellular)
- Soil, decaying vegetation, feces (bats, pigeons, starlings)
  - Endemic hotspots (as per *B. dermatitidis*)
  - Moving up St. Lawrence River
  - Humans, dogs (< 4 yrs), rare in cats

Pathogenesis/Signs:

- Exogenous infection (inhalation)
  - Subclinical; pneumonia +/- disseminated
  - Necrotic granulomatous pneumonia
  - Reticuloendothelial system (Liver, spleen, L.N.),
  - GIT colon/rectal mucosal ulceration, skin, CNS, bone
  - anorexia, wt. loss, resp. signs, lymphadenopathy, anemia, chronic diarrhea

Histoplasmosis: Dx/Txt

- Hx: Endemic area, signs
- Direct examination: Intracellular
  - Aspirates (TTA, LN, bone marrow)
  - rectal mucosal scraping
  - Blood smear (buffy coat)
  - H & E, Wright’s, Giemsa
- Histological
  - monocytes/macrophages (intracellular)
- Culture : SAB (20oC) + BHI (37oC)
  - septate + **tuberculate** chlamydospores
  - BHI (37°C) - yeast like cells
- Serology – ELISA, DNA
- Treatment:
  - ITZ drug of choice
  - AMB + FCZ if life threatening - CNS
Coccidioidomycosis: Thermal Dimorph

- *Coccidioides immitis* (California)
- San Joaquin Valley Fever - humans
- *C. posadasii* – non-CA strains
- Alkaline soil (arthrospores)
- primarily dogs, humans, horses

Pathogenesis/Signs: Resp. /CNS/lameness

- Summer/fall - release “barrel” arthrospores
- Inhalation – lung (self-limiting) or…..
- Inflammatory granulomatous pneumonia
- Hematogenous dissemination
- Bone, skin, L.N., CNS
- Dermal ulcerations at bone infections

Coccidioidomycosis: Dx/TxT

- Hx: travel to endemic area, signs
- Direct Examination: Spherules (10 - 100 um)
  - KOH of aspirates (TTA/L.N.), exudates, CSF
- Histological : Biopsy (PAS)
  - L.N., Bone, skin, brain
- Culture : Mycology Reference Lab
  - Tubed media: 1-2 wks
  - SAB - 20 oC (septate, barrel-shaped arthrospores)
  - 37oC + CO2, supplements to get Spherules
- Serology - Mycology Reference Lab, DNA
- Skin Test: Coccidioidin DTH available

- TxT: ITZ *early can prevent dissemination*
- AMB (IV) + KTZ (p.o.) 8-12 months