

## LECTURE #3: MUCOFLAGELLATES: TRICHOMONADS, *GIARDIA*

### General Morphology of Mucoflagellates

#### A. Cell body

- Shape – Pear-shaped (*Giardia*), spindle-shaped (trichomonads)
- Special organelles
  - nucleus (single or double)
  - flagellum (multiple)
  - undulating membrane (present or absent)
  - axostyle = a stout median rod (present or absent)

### *Tritrichomonas foetus* bovine

#### **Bovine Genital Trichomoniasis**

##### A. Morphology

- Trophozoites only
- Spindle-shaped (some-what pointed at both ends)
- 3 anterior flagella, one posterior flagellum with undulating membrane
- Axostyle present

##### B. Life Cycle

4. Bovine Reproductive systems (prepuce, penis, vagina, uterus, fetus)
  - Direct life cycle – venereal disease, transmitted from bulls to cows
  - No Cyst stage
  - Multiply by binary fission
5. Transmission
  - Sexually transmitted during copulation
  - Artificial insemination via contaminated semen

##### C. Pathogenesis (definitive mechanism has not be confirmed)

1. Cow's immune / inflammatory reaction may be destructive to fetal-maternal tissues
2. Trichomonad contact, excretions, or enzymes may be cytotoxic to fetal / maternal tissues

##### D. Clinical Disease

1. Complaint -- Abortions (early to mid-term), failed pregnancy, infertility suspect,
2. Pathological findings -- vaginitis, cervicitis, pyometra, endometritis, mummified fetus

##### E. Diagnosis

1. Bull -- Preputial wash or scrapings
2. Cow – History of abortions, cervical mucus, uterine fluid, fetal tissue
3. Lab -- Fresh wet-mounts for trophozoite, culture kits, PCR

##### F. Treatment – none available

##### G. Control

- Strict surveillance of bulls
- Cull infected bulls, replace with young bulls
- Use hygienic AI
- Vaccines (not-complete protection) [Trichguard, TrichGuard V5L]

##### H. Epidemiology

- Bulls -- permanently infected / infective.
- Cows -- Immune response can eliminate infection if left unbred for 3-4 months. (But immunity is only temporary against reinfection)

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## ***Tritrichomonas foetus feline (T. blagburni)***

### **Large Bowel Feline Trichomoniasis**

#### A. Morphology

- Trophozoites only
- Spindle-shaped (some-what pointed at both ends)
- 3 anterior flagella, one posterior flagellum with undulating membrane
- Axostyle present

#### B. Life Cycle

1. Feline large intestine
  - Direct life cycle – fecal-oral contact
  - No Cyst stage
  - Multiply by binary fission
2. Transmission
  - Ingestion of trophozoite in feces.

#### C. Pathogenesis (Suspect contributing factors)

1. Interactions with endogenous bacterial flora
2. Adherence to host mucus and epithelium
3. Elaborations of cytotoxins and enzymes
4. Activation of host immune / inflammatory response
5. Rarely – invasion of sub-epithelial tissue

#### D. Clinical Disease

1. Complaint – Intermittent, chronic diarrhea
2. Pathological findings -- large bowel diarrhea (frequent defecation, small volume of feces, tenesmus (straining), increased urgency, mucus may be present)

#### E. Diagnosis

1. Motile trophozoites on fresh wet-mounts
  - Don't confuse with *Giardia*
2. in vitro culture kit with PCR

#### F. Treatment

1. Ronidazole {*Tricho Plus*} (30 to 50 mg/kg every 12 hrs. for 14days) [be alert for neurotoxicity]
2. Unresponsive to metronidazole.

#### G. Control

- Strict hygiene in group housing and cat shows.

#### H. Epidemiology

1. Cats from High density populations, group housing
    - Catteries – Breeding and boarding
    - Pure-breed show cats
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## ***Giardia spp.***

### **Giardiasis**

#### A. Morphology

- Trophozoites
  - Tear-shaped (rounded anteriorly)
  - 2 bilateral nuclei
  - Ventral “adhesive disk”
  - 4 pairs of flagella (1 anterior pair, 1 posterior pair, 1 ventral pair, & 1 caudal pair)
  - Pair of median axonemes that give the appearance of an axostyle.
  - 2 crescent-shaped median bodies – dark staining organelles of undetermined function.
  - No undulating membrane
- Cyst
  - Ellipsoidal
  - Cyst “wall” containing 2 developed trophozoites
  - 4 nuclei
  - Axonemes
  - 4 median bodies

## B. Life Cycle

1. Small intestine on mucosal surface.
  - Direct life cycle – fecal-oral contact
  - Multiply by binary fission
2. Transmission
  - Ingestion of cyst from feces
    - Fecal-contaminated water, food, or fomites, or self-grooming
  - (Ingested trophozoites will not survive)

## C. Pathogenesis

1. Trophozoite attachment to surface of epithelial cells of small intestine
  - Damages epithelial cells, blunts intestinal villi
  - Causes dysfunction of epithelial cells
  - Maldigestion, malabsorption, diarrhea

## D. Clinical Disease

1. Complaint – Persistent Diarrhea: watery to loose, fatty, strongly malodorous
2. Pathological findings -- Fatty diarrhea, malabsorption syndrome

## E. Diagnosis

1. Direct fecal analysis (intermittent shedding makes this difficult)
  - Loose stool: Motile trophozoites on fresh wet-mounts
    - In cats: don't confuse with *Trichostrongylus axei*
  - Solid stool: Cyst stage – don't confuse with yeast
    - Fecal float centrifugation with zinc sulfate solution
2. Antigen detection kits, ELISA (SNAP Tests)

## F. Treatment

1. Dog: Metronidazole [Flagyl], Fenbendazole [Panacur], Febantel-pyrantel-praziquantel [Drontal plus]
2. Cat: Metronidazole [Flagyl], Fenbendazole [Panacur], Febantel-pyrantel-praziquantel [Drontal plus]
3. Calves: Fenbendazole [Panacur], Albendazole [Valbazen]
4. Companion Animal Parasite Council (CAPC) recommends treating only symptomatic dogs & cats to decrease development of antiprotozoal resistance.

## G. Control

1. Prevent fecal contamination
2. Sanitation and disinfection of environment with a chlorine bleach product

## H. Epidemiology

1. Pets from high density situations
  - Catteries, kennels, shelters, dog parks

## I. Zoonosis

1. Giardia molecular assemblages seem to be rather host specific.
  - Cat and dog strains do not cross-infect
  - Human to human infection primarily
  - Rarely is there transmission from dog to human.
  - Subtypes within assemblages may vary in host specificity
    - Assemblage A-I – Humans, dogs, cats, other animals (rare zoonosis b/w dog & human)
    - Assemblage A-II – Humans
    - Assemblage A-III & A-IV – exclusively animals (unspecified)
    - Assemblage B -- Humans & various animals
    - Assemblage C & D – Canines
    - Assemblage E – Alpacas, cattle, goats, pigs, sheep.
    - Assemblage F -- Felines

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