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Tapeworm (Cestode parasites)

Family: *Hymenolepididae*

Prevalence

- Common in wild mice and mice from pet shops
- Tapeworm in modern laboratory mice colonies is vanishingly rare
- Mice are definitive host for three cestodes (rats and hamsters - also potential hosts)

Significance

- Effects on research are related to modulation of the immune system produced by parasitism:
    - *Rodentolepsis microstoma* infection – biliary inflammation and mucosal erosion
    - Experimental infection (*R. microstoma*) – associated with more severe changes such as intestinal mastocytosis and hepatitis
- *Hymenolepsis diminuta* and *Rodentolepsis nana* are zoonotic and human infection is possible through ingestion of the arthropod intermediate host – care should be taken, and good hygiene practices should be in place

Disease

- Cestodes share a general form with a scolex (head) that attaches to the host by suckers, and a strobila (body) attached to the scolex – scolex contains a rostellum which may be armed with hooks
- Light infections may not produce clinical signs
- Clinical signs (seen with heavy infections):
    - Catarrhal enteritis
    - Diarrhea
    - Growth retardation
    - Weight loss
    - Possibly intestinal blockage

Transmission

- Faecal-oral route
- *H. diminuta* and *R. microstoma* has an indirect life cycle - intermediate host required:
    - Cysticercoid larvae develop in an insect after consumption of eggs
    - Mouse infected by consuming the intermediate host
    - Infective proglottids that contain eggs break off the strobila and pass in the faeces
- *R. nana* has both direct and indirect life cycle in immunocompetent animals:
    - Indirect – must consume intermediate host containing cysticercoid larvae
    - Direct – mice ingest faeces containing eggs

Isolation and Diagnosis

- Preferred - direct gross examination for adult worms (flat and segmented) in their typical locations:
    - *H. diminuta* (20-60mm) and *R. nana* (25-40mm) - small intestine
    - *R. microstoma* (8-50mm, up to 120mm) – bile duct, duodenum, pancreatic ducts/MLN
    - Confirmation by microscopic viewing
- Microscopic examination of faecal floatation for eggs
- PCR assays are described as well

Tapeworm species

- Mice – *Rodentolepsis microstoma, Rodentolepsis nana* (dwarf tapeworm)
- Rat – *Hymenolepsis diminuta* (rat tapeworm) – can infect mice

Screening

- Maintain regular health monitoring of supplier sub-populations and strict protocols for barrier colonies

Duration

- Prepatent period of 2-4 weeks
- Eggs may persist in the environment (*R. nana* eggs remain infective in the environment for 11 days)
- If intermediate hosts are not excluded from animal areas, reinfection may occur

Durability

- Susceptible to chemotherapeutic treatment
- Sensitive to praziquantel

Prevention and Control

- Ensure animal feed is free from grain-eating insects and arthropods
- Maintain strict protocols for barrier colonies
- Oral dose of praziquantel in feed is reported to be effective for *R. nana* infections (*H. diminuta* and *R. microstoma* treatment probably similar, but little information is available)
- Rederivation via embryo transfer and relocation of dams to clean environment will eradicate all three cestodes

Reading

- Parkinson, C.M., O'Brien, A., Albers, T.M., Simon, M.A., Clifford, C.B., & Pritchett-Corning, K.R. Diagnosis of Ecto- and Endoparasites in Laboratory Rats and Mice. Journal of Visualised Experiments (55), e2767 (2011)
- Pritchett-Corning, K.R. & Clifford, C. Parasitic Infections of Laboratory Mice. The Laboratory Mouse, 503-518 (2012)