CESTODE INFECTIONS

DISEASE: Diphyllobothriasis

AGENT

Diphyllobothrium spp. In humans, primarily ***D. latum***

RECOGNITION

Syndrome: Human: Often asymptomatic with occasional segments **in** feces as only sign of infection. Approximately ***50%*** of infections are associated with diarrhea, anorexia, nausea, vomiting, and weight loss. A craving for salt is common. Occasionally a macrocytic, hyperchromic anemia develops as a result of the parasite competing with the host for vitamin B12.

Animal: Usually subclinical.

Incubation period. 3-6 weeks.

Case fatality rate: Low, unless pernicious anemia develops and reduces ability to cope with subsequent stressors.

Conflrmatory tests: Microscopic examination of fresh feces for ova or segments of ***D. latum,*** or related species.

Occurrence: Worldwide. Most prevalent where social customs include ingestion of raw fish. Adult worms may be found in dogs and cats as well as fish-eating wild mammals such as foxes, wolves, and bears.

Transmission: Consumption of raw or undercooked fish that have ingested infected copepods and have plerocercoid larvae in their musculature or organs. Pike, salmon, trout, and perch are the major source for humans. The copepods become infected with the procercoid stage when infected mammals defecate **in** water.

CONTROL AND PREVENTION

Individual/herd: Treat with niclosamide, quinacrine, or praziquantel. In endemic areas, heat fish ***to*** 56"C/132"F for ***5*** minutes, or freeze at - 10°C/14"F for 48 hours.

Local/community: Educate public regarding method of transmission. Institute proper fecal waste disposal.

National/international None.

DISEASE: Sparganosis

AGENT

Spirometra spp. ***(S. erinacei-europaei,* S. *mansoni,* S. *mansonoides,* S. *proliferun, S. theleri)***

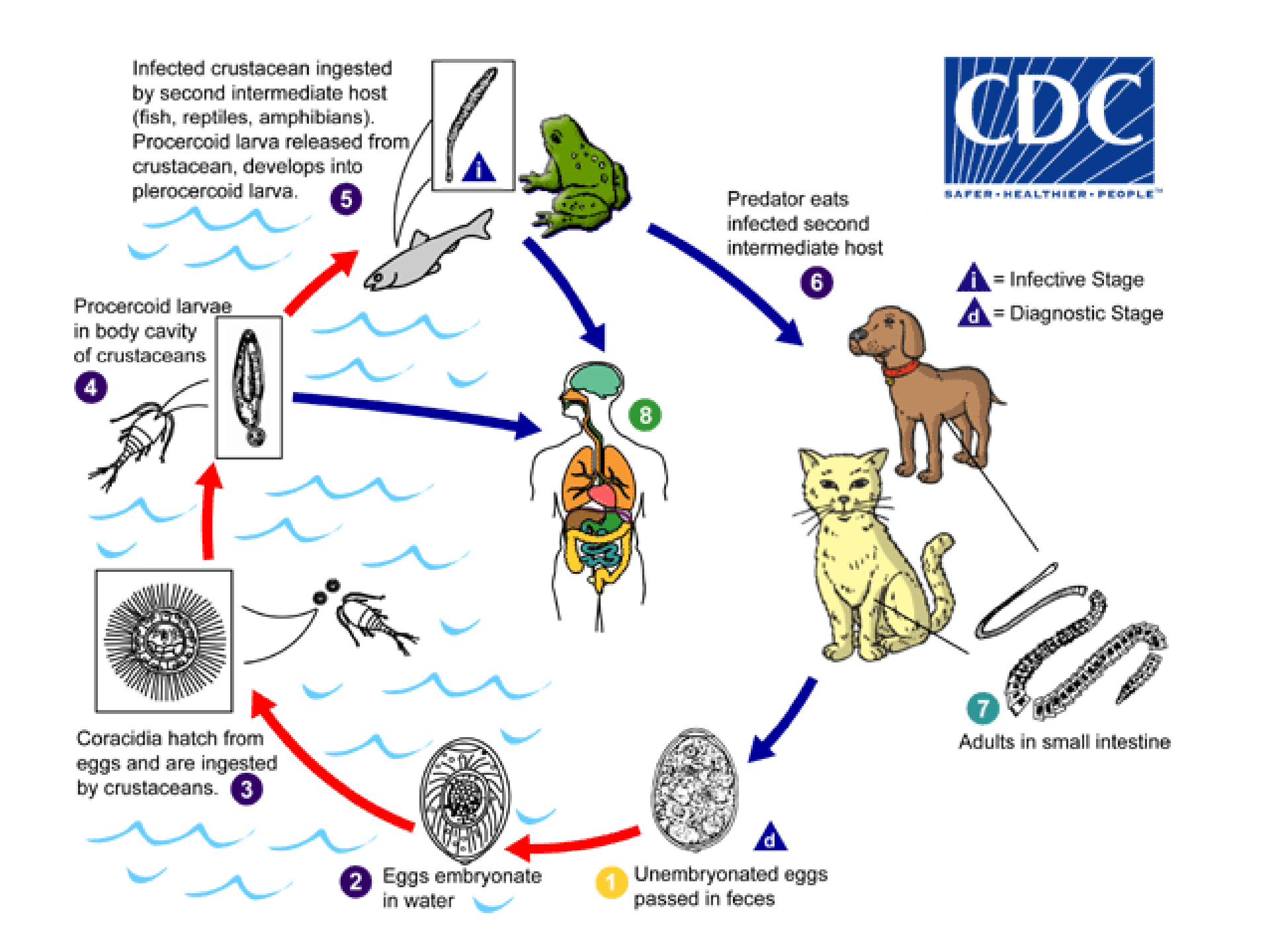
RECOGNITION

Syndrome: Human: Pruritic tender nodule around parasite in subcutis. Severe inflammation if parasite dies in situ. Ocular sparganosis produces intense pain, lacrymation, lagophthalmus, and corneal ulceration.

Animal: Dogs, usually subclinical. Cats may have weight loss and be irritable.

Incubation period: 3 weeks to 1 year.

Case fatality rate: Low.


Infected crustacean ingested by second intermediate host (fish, reptiles, amphibians). Procercoid larva released from crustacean, develops into plerocercoid larva.
5
Predator eats infected second intermediate host
6
i = Infective Stage
d = Diagnostic Stage
Procercoid larvae in body cavity of crustaceans
4
8
7
Adults in small intestine
Coracidia hatch from eggs and are ingested by crustaceans.
3
d
2
Eggs embryonate in water
1
Unembryonated eggs passed in feces

Confirmatory tests: Identification of parasite in subcutaneous tissues after surgical removal.

Occurrence: Worldwide. Common parasite of canids and cats.

Transmission: Requires **two** intermediate hosts-a copepod and then a vertebrate. Infection of humans can occur in three ways: ingestion of an infected copepod in water contaminated with dog or cat feces, ingestion of raw or undercooked meat containing the **plerocercoid** stage, or direct contact with the **plerocercoid** in meat being used as a poultice.

CONTROL AND PREVENTION

Individual/herd: Treat by surgical removal.

Local/community: Education regarding method of transmission, with particular emphasis on hazard of meat poultices. Cook meat from possibly infected secondary intermediate hosts. Treat drinking water to kill copepods.

Natlonal/international: None.

DISEASE: Dipylidiasis

AGENT

Dipylidium caninum

RECOGNITION

Syndrome: Human: Varies from asymptomatic discharge of proglottids to anal pruritis, colic, diarrhea, and ascites.

Animal: Usually subclinical. Anal pruritis, proglottids on hair of rear legs and tail.

Incubation period: Up to **1** month.

Case fatality rate: Normally, not fatal. Rarely, a severe sensitization will occur in children resulting in urticaria, fever, and convulsions.

Confirmatory tests: Examination of fresh feces on transparent adhesive tape applied to perianal area for segments of ***D. caninum.***

Occurrence: Worldwide. Primarily in young children at crawling age having close contact with dogs or cats.

Transmission: Ingestion of an intermediate host ***(Ctenocephalides cati,*** the dog flea, or ***Ctenocephalides felis,*** the cat flea) containing the infective cysticercoid stage of the tapeworm.

CONTROL AND PREVENTION

Individual/herd: Treat affected children with niclosamide. Periodic treatment of pet dogs or cats with a taenicide to eliminate **tapeworms,** combined with the elimination of fleas and their eggs and larvae from pets and households.

Local/community: Education of pet owners regarding the method of transmission and the need for periodic treatment of pets to eliminate internal and external parasites.

National/international: None.

DISEASE: Echinococcosis/Hydatidosis

AGENT

Echinococcus spp. ***(E. granulosus, E. multilocularis, E. oligarthus, E. vogeli)***

RECOGNITION

Syndrome: Human: Varies with organ infected; most commonly the liver. Many infections asymptomatic and only discovered during surgery or necropsy. Clinical signs may include hepatomegaly, ascites, swollen abdomen, or dull abdominal pain. Rupture of cyst formed in liver may produce anaphylaxis. Animal: Usually subclinical in definitive and nonhuman intermediate hosts.

Incubation period: Months to years before illness ensues.

Case fatality rate: Very high; **50%-75%.** Even with successful surgical removal of cyst, recovery takes several months.

Confirmatory tests: Radiographic or ultrasonographic observation of space occupying lesion. Hemmagglutination, immunofluorescence, immunoelectrophoresis, or ELISA testing of serum. (Serologic tests may be negative, if cyst has never leaked, contains no scolices, or is dead.) Confirm by microscopic examination of tissues (obtained during surgery) for free scolices or daughter cells.

Occurrence: ***E. multilocularis*** (alveolar form), rural areas of the northern hemisphere. ***E.*** **granulosus** (unilocular or cystic form), the Mediterranean coast, Middle East, southern South America, southern Russia, northern Africa, Australia, and New Zealand. ***E. vogeli*** (polycystic form), South America. No confirmed human cases from E. ***oligarthrus*****.**

Transmission: Dogs and wild canids are the primary definitive hosts for ***E. granulosus.*** The natural definitive hosts of ***E. multilocularis*** are foxes, but dogs and cats, feeding on rodents (intermediate hosts), can also be infected. E. ***oligarthrus*** is normally a parasite of wild felids and ***E. vogeli*** of wild canids and rodents. Humans or other intermediate hosts (domestic and wild ungulates, rodents) are infected by ingestion of dog feces or by eating food contaminated with dog feces. Children are most often infected because of poor personal hygiene.

CONTROL AND PREVENTION

Individual/herd: Treatment **is** surgical extirpation of the cyst or cysts. Mebendazole may produce some regression of cysts, if surgery is not feasible. Educate public regarding method of transmission, and institute good personal hygiene. Wash food potentially contaminated with dog feces.

Local/community: Prevent dogs from eating the viscera of ungulates or rodents. Treat dogs with praziquantel or niclosamide. Eliminate stray dogs.

National/international Dogs entering a country in which hydatidosis has been eradicated should be quarantined and treated before entry.

DISEASE: Hymenolepiasis

AGENT

Hymenolepis spp. ***(H. nana, H. diminuta)***

RECOGNITION

Syndrome: Human: Primarily in children. Frequently asymptomatic.

With heavy infestation-nausea, anorexia, vomiting, and diarrhea. ***H. nana*** may produce allergic signs and central nervous system disturbances ranging from restlessness to convulsions.

Animal: Usually benign.

Incubation period Prepatent period, **2-4** weeks.

Case fatality rate: None.

Confirmatory tests: Fecal examination for presence of ova. False negative results are common, therefore repeat testing may be required.

Occurrence: Worldwide.

Transmission: ***H. nana:*** Usually direct human fecal-oral route, but ova may be ingested in rodent feces. Autoinfection may occur. ***H. diminuta:*** Ingestion of arthropod (e.g., beetles in **flour)** intermediate host that has been infected by ingestion of rodent feces.

CONTROL AND PREVENTION

Individual/herd: Treat with praziquantel. Maintain good personal hygiene.

Local/community: Rodent control. Prevent contamination of human food with rodent feces.

National/lnternationak None.

DI SEASE: *Mesocestoides* Infection

AGENT

Mesocestoides spp. ***(M. lineatus, M. variabilis)***

RECOGNITION

Syndrome: Human: abdominal pain, anorexia, diarrhea.

Animal: Definitive host (dogs, cats)-subclinical. Intermediate host (amphibians, reptiles, **birds,** mammals)-peritonitis, ascites.

Incubation period: Prepatent period **2-3** weeks.

Case fatality rate: None.

Confirmatory tests: Microscopic examination of fresh feces for presence of ova or proglottids.

Occurrence: Rare. Worldwide.

Transmission: Ingestion of raw or undercooked meat from secondary intermediate host containing larval form.

CONTROL AND PREVENTION

Individual/herd: Treat with niclosamide.

Local/community: Prevent ingestion of raw or undercooked meat (frogs, snakes, birds, squirrels).

National/internationa): None.

DISEASE: Raillietiniasis

AGENT

Raillietina spp. (More than 200 species in birds and mammals)

RECOGNITION

Syndrome: Human: Usually asymptomatic. More severely affected individuals may have diarrhea, headache, anorexia, and suffer weight loss.

Animal: Usually subclinical. Intestinal nodules in poultry.

Incubation period: Unknown.

Case fatality rate: Low.

Confirmatory tests: Microscopic examination of fresh feces for presence of proglottids.

Occurrence: Worldwide. Actual disease most common in children. Rodents are primary reservoir.

Transmission: Ingestion of arthropod (ant, beetle, cockroach, fly) intermediate host containing infective cysticercoid.

CONTROL **AND** PREVENTION

Individual/herd: Treat with quinacrine or mebendazole.

Local/community: Arthropod and rodent control. Instruct population regarding method of transmission.

National/international: None.

DISEASE: Taeniasis

AGENT

Taenia spp. ***(T. saginata, T. solium.*** Occasionally ***T. ovis*** T. ***hydatigena, T. taeniaeformis)***

RECOGNITION

Syndrome: Human: Usually asymptomatic. May produce digestive disturbances, abdominal pain, anorexia. Infection with the larval stage of ***T. solium*** (cysticercosis) can produce severe response which will vary depending upon location of organisms (brain-neurologic signs, heart-may be fatal). Animal: Usually subclinical. Heavy infections can produce gastroenteritis and weight loss, particularly in young animals.

Incubation period 8-14 weeks.

Case fatality rate: Low except for cysticercosis, which is high without treatment .

Confirmatory tests: Microscopic identification of proglottids from feces or ova from tape applied to anal area. Species identification can be confirmed after scolex is retrieved following deworming ***(T. solium*** has hooklets; ***T. saginata*** does not). Cysticercosis can be diagnosed by radiography or microscopic examination of excised cyst.

Occurrence: Worldwide. Most common where beef or pork is eaten raw or undercooked. ***T. solium*** is most common **in** developing countries.

Transmission: Ingestion of cysticerci in raw or undercooked beef or pork. ***T. solium*** can be transmitted by ingestion of ova (cysticerco**sis).**

Cysticerci develop **in cows *(T. saginta)*** or pigs ***(T. solium)*** **2-3** months after ingesting embryophores from feces of infected humans. The cysticerci of ***T. ovis*** and ***T. hyhtigena*** are found in sheep and goats, and ***T. taeniaeformis*** in rodents.

CONTROL **AND** PREVENTION

Individual/herd Treat with niclosamide, praziquantel, or quinacrine hydrochloride. Mebendazole may be effective for cysticercosis. Cook meat thoroughly .

Local/community Prevent contamination of swine or cattle feed with human fecal waste.

National/international None.