

ECHINOCOCCOSIS

Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
Mammals	Intermediate (IH)/accidental (AH) hosts: Fecal-oral Definitive (DH) host: predation or ingestion of infected IH/AH	IH/AH: Abdominal distention and pain, lethargy, inappetence, cough, dyspnea	IH/AH: Initially subclinical but cyst growth can lead to hepatic and respiratory disease which may be fatal	IH/AH Benzimidazoles or percutaneous drainage of hepatic cysts DH: Praziquantel	Eggs susceptible to desiccation and extreme temperatures; avoid feeding potentially-infected carcasses; anthelmintic bait (praziquantel) for DH; dog population management; education; EG95 vaccine	Yes

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Susceptible animal groups: Mammals: primates (Old World monkeys and great apes) – including significant number of primate cases in the literature; ungulates; marsupials; rodents; canids

Causative organism: Primary transmission cycles include:

E. granulosus complex (EG; wolf-cervid; canid-livestock) molecular species include:

- *E. granulosus sensu stricto* [sheep, Tasmanian sheep and buffalo strains]
- *E. equinus* [EE; horse strain]
- *E. ortleppi* [EOr; cattle strain]
- *E. canadensis* [EC; camel, pig, and cervid strains]
- *E. felidis* [EF; lion strain]

E. multilocularis (EM; fox/canid/felid/rodent)

E. oligarthrus (EOI; felid-agouti/paca)

E. vogeli (EV; bush dog-paca)

E. shiquicus (ES; Tibetan fox-pika)

Zoonotic potential: Yes. Humans are susceptible by ingesting shed *Echinococcus* eggs (EG, EC, EM, EOI, EV, EOr).

Distribution:

EG: Worldwide; EM: Northern Hemisphere

EOI and EV: Central and South America; ES: Qinghai-Tibet plateau of China

Incubation period:

IH/AH incubation period: Months (e.g., rodents) to years (e.g., primates) depending on hydatid cyst location and growth rate; DH prepatent period: EG (32-80 days); EM (28-35 days)

Clinical signs: Larval metacestode infections of IH/AH are initially subclinical and signs may not develop during the host's life span. Clinical signs are related to cyst location, which is most often the liver and lungs.

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As cysts develop, signs may include lethargy, abdominal pain, abdominal enlargement (due to hepatomegaly), inappetance, and respiratory signs. Cyst rupture may lead to anaphylaxis. EM is most likely to eventually cause clinical disease after a 5-15 year asymptomatic period. No clinical signs in DH are noted.

Post mortem, gross, or histologic findings: Adult cestodes (body length: 1.2 - 11 mm) are found in the small intestine of DH with EG primarily in the upper third and EM in the middle third. The formation of fluid-filled cysts is primarily in hepatic and pulmonary tissues, but can occur in any organ of IH/AH. EG and EOI are usually associated with a single cyst. Similar to a metastasizing neoplasm, EM and EV form masses of small cysts. Viable protoscolices may be present within cysts.

Diagnosis:

Antemortem: Imaging may be used to identify and classify fluid-filled cysts in IH/AH (see Table 2.5, Eckert et al. 2001) along with a cytologic exam of FNA. Fecal diagnosis in DH is difficult due to the small size of gravid proglottids (1-2mm) and inability to differentiate from eggs of *Taenia* species. Fecal coproantigen ELISA and confirmatory *Echinococcus* PCRs have been developed for DH. Serum antibody ELISAs have been developed but *Taenia* false positives may occur and species validation is limited. Percutaneous drainage of cysts may reveal the presence of protoscolices.

Postmortem: Fluid-filled cysts may be seen at necropsy (primarily hepatic and pulmonary). In IH/AH, histopathology may reveal the presence of protoscolices within brood-capsules or in hydatid sand. In DH, the scraping, filtration and counting technique can be used to extract cestodes from the intestines.

Material required for laboratory analysis: cyst fluid, serum (IH/AH); feces, small intestine (DH)

Treatment: In humans, treatment options include surgical removal of cysts and ultrasound-guided partial removal of cyst fluid and injection of anthelmintic (PAIR – puncture, aspiration, injection, reaspiration). Alternatively, anthelmintics (benzimidazoles) can be used for IH/AHs. Degenerating cysts may not require treatment and monitoring would be an option.

Prevention and control: Infective material can be decontaminated by extreme temperatures (70°C for 12 hrs; -80°C for 48 hrs). When handling infective material, personal protective equipment should be worn to reduce the risk of human exposure. Ensure the DH's diet does not include potentially infected organs and carcasses. Prevent scavenging and predation by susceptible mammals. Decontaminate foliage or branches used for environmental enrichment. Pet and feral dog population management and deworming. Education of animal care workers, dog owners and other at-risk human populations. Anthelmintic baiting of foxes (50mg praziquantel/bait). EG95 vaccine has been shown to be protective against EG in sheep, goats, cattle and tammar wallabies.

Suggested disinfectant for housing facilities: Chemical disinfection is unreliable but ≥ 3.75% bleach (NaOCl) solution for 1 hr (metal surface) or 2-3 hrs (concrete) may be effective for EM. Facilities can be decontaminated by 40% relative humidity and 30°C for at least 48 hrs.

Notification: Echinococcosis is an OIE reportable disease and USDA should be notified.

Experts who may be consulted:

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