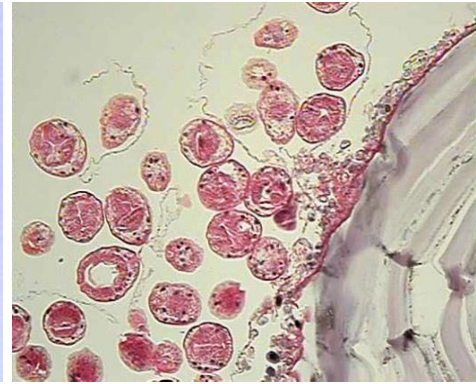


## *Echinococcus granulosus*



**Adult worm**

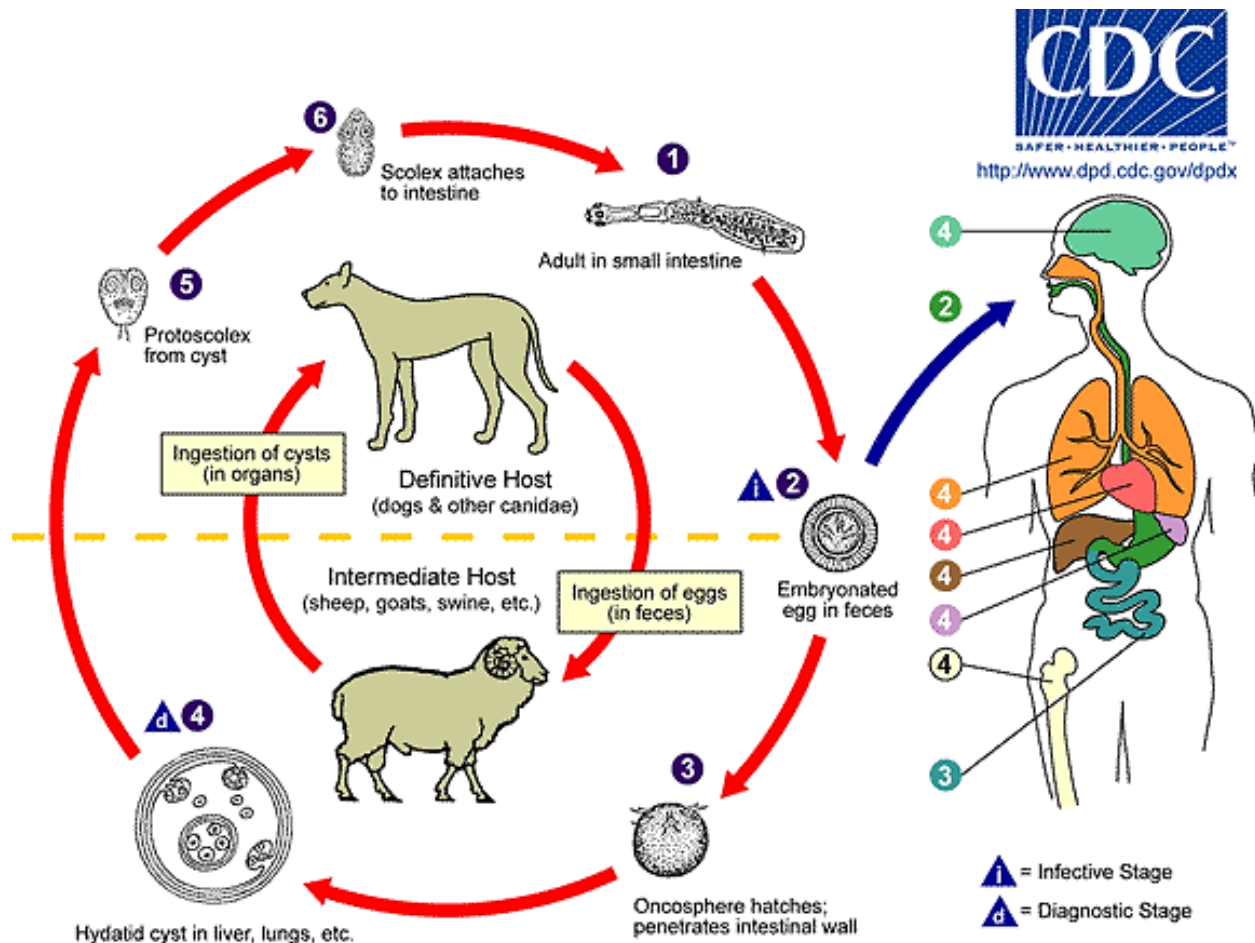


**protoscolices**

### **Morphology, Biology and Life Cycle**

The adult of *E.granulosus* lives in the small intestine of the canine host, with its “head” embeded between the villi. The worm measures 3 to 6 mm long.

When ripe eggs are swallowed by man, they hatch in the intestine and the freed embryos migrate through blood and lymphatic channels to the liver and less frequently to other viscera. Here they develop rather slowly into vaculated **unilocular hydatids**, characterized by an external, milky white laminated membrane and an internal germinative layer typically producing multiple scolices, each capable of developing into daughter hydatids within the parent cyst. Usually the cyst has a host-tissue capsule.



## Pathogenesis and Symptomatology

A majority of human hydatids develop in liver, after the hexacanth embryos have burrowed into the intestinal wall and gotten into the mesenteric venules, infection of the lungs is next in prevalence; if they pass the pulmonary filter the embryos may settle down in any organ or tissue including bone, and proceed to develop into hydatids.

In heavily endemic areas in South America, the pulmonary location is more frequent than the hepatic. The primary hydatid cyst is usually single, but they may be multiple.

**Types of Hydatids produced by *E.granulosus*:** There are two morphological types in human tissues, viz., unilocular and osseous. The **unilocular cyst** has a central, fluid-filled cavity lined with a germinative layer, surrounded by an intact but a friable laminated membrane covered with a host-tissue capsule. A majority of human hydatids are unilocular, but if the embryo is filtered out of blood vessels in bony tissues, no limiting membranes are produced and the organism proceeds to

grow as a protoplasmic stream which erodes the cancellous structure, particularly of long bones and pelvic arch (**osseous hydatid**).

The size and contour of the unilocular hydatid are depended on the site of implantation and on its age. It may be 15 cm or more in diameter, containing a liter or more of clear, sterile hydatid fluid, typically with numerous scolices and daughter hydatids.

The amount of systemic intoxication or sensitization resulting from a unilocular hydatid depends on how well it is insulated from the surrounding host tissues. If a large abdominal cyst bursts, either spontaneously or following a blow on the abdomen, anaphylaxis may be precipitated by the sudden liberation of hydatid fluid into the peritoneal cavity. Moreover, scolices spilled out of the cystic cavity will become implanted on the peritoneum and produce multiple secondary growths. Rupture of a pulmonary cyst into a bronchus results in coughing up the contents, with a possible spontaneous clearance of the infection. Hydatid of the brain produces increasing symptomatic evidence of an intracranial tumor. Osseous hydatid is insidious, gradually eroding the bone to a stage where fracture or crumbling suddenly occurs.

### **Rupture of Hydatid Cyst**

Rupture of hydatid cyst may occur naturally, or in process of obtaining a biopsy for microscopic examination, due to coughing, muscle strain or surgical procedures. Such patients may suffer from anaphylactic shock, eosinophilia and allergic reactions or even death. The escape cyst fluid with protoscolices has the capacity of spreading to other sites and forming a new cyst (secondary hydatidosis). Rupture of the cyst is most important than the mass effect of the cyst, except in the brain where the mass effect has severe consequences.

### **Diagnosis**

In endemic areas, experienced clinicians may obtain strong suspicion of hydatid disease from the patient's history, presenting symptoms and X-ray picture. Noninvasive imaging techniques such as CT scans, MRI, and ultrasound imaging are all used for detecting and defining the extent and condition of avascular fluid-filled cysts in most organs. These techniques have proved valuable for diagnosis and preoperative evaluation by staging the condition of the lesion. A specific diagnosis can be obtained by intradermal test, employing a known amount of hydatid antigen.. Serologic tests, such as enzyme-linked immunosorbent assay (ELISA) and indirect hemagglutination test, are highly sensitive methods for detecting infection. Final diagnosis consists in demonstration of free scolices or

daughter cysts from aspirated hydatid fluid, or of the histologic structure of the cyst wall, with its laminated membrane.

### **Treatment**

Echinococcosis (hydatid disease) is often expensive and complicated to treat, sometimes requiring extensive surgery and/or prolonged drug therapy. There are 3 options for the treatment of cystic echinococcosis:

- 1- Percutaneous treatment of the hydatid cysts with the PAIR (Puncture, Aspiration, Injection of protoscolicidal chemicals, Re-aspiration) technique; This option is indicated for patients with relapse after surgery, failure of chemotherapy alone, or who refuse surgery.
- 2- Surgery
- 3- Anti-infective drug treatment

The choice must primarily be based on the ultrasound images of the cyst, following a stage-specific approach, and also on the medical infrastructure and human resources available.

For some patients, chemotherapy with benzimidazoles is the preferred treatment. Patients with small cysts or multiple cysts in several organs can be treated successfully with albendazole. Approximately one third of patients treated with chemotherapy with benzimidazole drugs have been cured of the disease and even higher proportions, between 30-50%, have responded with significant regression of the cyst size and alleviation of symptoms.

### **Epidemiology**

Human infection with the hydatid cyst of *E.granulosus* is apt to occur where dogs harbor the adult worms and sheep or hogs serve as common reservoirs of larval stage. Exposure most commonly takes place in childhood, particularly among boys who play with infected dogs.

### **Control**

Control must be directed against the dog, the carrier of the adult *Echinococcus granulosus*, and sheep and hogs, the common reservoirs of the viable hydatid, all infected carcasses should be deeply buried. Stray dogs should be destroyed. Domestic dogs should be periodically de-wormed. Personal hygiene in endemic areas includes care to avoid contamination of food and drink with the feces of dogs.