



National Public Health  
Service for Wales

Gwasanaeth Iechyd Cyhoeddus  
Cenedlaethol Cymru

## Hydatid Disease

### Overview

Hydatid disease in man is caused principally by infection with the larval stage of the dog tapeworm *Echinococcus granulosus*. It is an important pathogenic zoonotic parasitic infection (acquired from animals) of humans, following ingestion of tapeworm eggs excreted in the faeces of infected dogs.

Three species of tapeworm are of importance in human hydatid disease worldwide, *E. granulosus*, *E. multilocularis* and *E. vogeli*. However, *E. multilocularis* and *E. vogeli* have not been found in the UK. *Echinococcus granulosus*, which causes cystic echinococcosis (CE), is the only species of the tapeworm found in the UK. The natural definitive hosts of CE are the domestic dog (*Canis l. familiaris*) and foxes, chiefly the Arctic fox (*Alopex lagopus*) found in the Arctic Region of the Northern Hemisphere, and the red fox (*Vulpes vulpes*) found in urban and rural habitats of the UK, Europe and North America..

*E. granulosus* is a small tapeworm (about 2 to 7 mm in length) and usually has about 3 segments. Several strains have been identified (named G1 to G9), seven of the nine genotypes are infective to humans. A common feature of most of the strains is that members of the dog family are definitive hosts although the intermediate hosts (which carry the metacestode stage) may vary. Geographic distribution of the strains also varies.

### Epidemiology

*E. granulosus* is distributed throughout most of the world, especially in areas where sheep are raised, and is endemic in Asia, North Africa, South and Central America, North America, Canada and the Mediterranean region. It is common throughout Europe, and in the UK there are well-documented 'hotspots' of infection in Wales and the Western Isles of Scotland. Approximately 10-20 cases are reported in the UK each year and most have arisen following exposure abroad. In many countries, hydatid disease is more prevalent in rural areas where there is close contact between people and dogs and the various domestic animals which act as intermediate vectors.

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In the UK, the important intermediate hosts for *E. granulosus* are sheep which carry the sheep or G1 strain. Current evidence suggests that the main areas for Hydatid disease in Wales are Powys, Monmouthshire, especially the southern slopes of the Brecon Beacons and the Black Mountains. A pocket of disease is also present in the part of South Herefordshire adjacent to South Powys. Sheep are the most important intermediate host; infection rates may be high in these animals, over 90% of cysts may be fertile.

## The disease

Once the egg enters the gut, it then hatches in the intestine, penetrates the gut wall and travels through the body in the blood or lymphatic system. When humans become infected following ingestion of *E. granulosus* eggs, cysts can develop in a wide range of sites throughout the body, although as blood from the mesenteric vessels pass to the liver, it is the liver in which the majority of cysts are found. The cysts of *E. granulosus* may take many years to produce clinical symptoms. Cyst growth is slow and carriers may be asymptomatic throughout the infected individual's life and be found only at autopsy, during surgery or when X-rays or imaging studies are taken for other reasons. The occurrence of symptoms depends on the location of the cyst in the body and its size; the liver is the organ most commonly affected followed by the lungs. Confirmation is by detection of specific serum antibodies by immunodiagnostic tests. There is an inflammatory reaction in the surrounding tissue, with formation of a fibrous, encapsulating membrane. If the outer laminated wall of the cyst calcifies, the cyst then remains asymptomatic. In locations such as the abdomen, where growth of the cyst is not restricted by anatomical structures, it can grow very large and contain several litres of fluid. Rupture of the cyst presents the greatest danger for the patient and may be fatal.

## Transmission

Sheep and other intermediate hosts such as cattle acquire hydatid disease by grazing on pastures contaminated with dog faeces containing eggs. Each egg hatches in the small intestine of the sheep where it penetrates the gut wall. This larval stage of the parasite (called an oncosphere) is carried via the bloodstream to target organs in other parts of the body (liver, lungs, brain, muscles, etc.) where they develop by expansion into a hydatid cyst called a metacestode. This hydatid cyst is usually filled with a clear fluid. This cyst (called an endocyst) gradually expands and causes a granulomatous reaction, followed by a fibrous tissue reaction. After 10 months or more the cyst will, contain brood capsules in which are protoscolices, produced by asexual reproduction.

Dogs are in turn, infected by ingesting meat and viscera containing viable cysts, for example by eating an infected rodent, or being fed or through scavenging infected

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sheep meat and viscera. The walls of the fertile hydatid cysts (protoscolices) they ingest disintegrate, releasing protoscolices which migrate between the villi of the intestine where they develop into adult tapeworms after about 2 to 9 weeks, after which, they reproduce sexually. New reproductive segments of the worm called proglottids and which contain eggs are produced. After about a month, the animal host begins to excrete the gravid proglottids containing infective eggs in its faecal matter. *E. granulosus* lives in the dogs' intestine for about a year but ceases to produce eggs after 6 - 10 months. The adult tapeworm is usually non-pathogenic to its canine host. Segments of the worm eliminated in dog faeces have been reported to migrate some distance from faecal matter over grass or garden vegetables before expelling eggs that subsequently adhere to the vegetation. Eggs passed in the faeces are highly resistant, and are able to survive freezing and drying on the ground for up to a year. Humans are accidental intermediate hosts; they do not play a role in the biological cycle but may act as agents perpetuating the disease by feeding dogs infected meat and viscera.

## Prevention and treatment

There are no specific signs of Hydatid Disease in farm animals. Hydatid infection in food animals is in nearly all cases confined to the lungs and the liver; infected organs must be condemned and destroyed.

Humans acquire Hydatid disease through oral ingestion of *E. granulosus* eggs excreted by infected dogs. Infection can be acquired by handling infected dogs, egg-containing faeces or egg-contaminated plants or soil followed by direct hand-to-mouth transfer. Humans can also become infected when a dog licks the face after it has been cleaning itself, or through other contamination, followed by transfer to the mouth.

*Echinococcus* eggs stick to the coat of dogs, particularly to the hairs around the anus and on the thighs, muzzles and paws. Eggs can also be ingested with vegetables, salads, uncooked fruit and other plants which have become contaminated. Secondary transmission of foods or surfaces with *Echinococcus* eggs has been reported to occur *via* wind, birds, beetles and flies.

Dog owners should practice good hygiene when handling their animals. In endemic areas, it particularly important to wash the hands with soap and water after handling or patting dogs, avoid contact with dog faeces, and to prevent dogs from soiling the immediate environment. Dogs should not be allowed roam or to have access to raw sheep meat or viscera. All sheep carcasses should be disposed of properly and immediately. All dogs, especially those in rural endemic areas should be treated at 6 weekly intervals with a wormer containing Praziquantel. Vegetables, salads and fruit should be thoroughly washed before consumption. It is not carried in the meat you buy and eat.

Diagnosis of human disease is made by a combination of clinical, imaging, serological and molecular techniques. There are several options for treatment including surgical removal of the cyst with supplementary chemotherapy (Mebendazole or Albendazole), puncture-aspiration-injection-reaspiration (PAIR) and

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chemotherapy. Surgical removal may not prevent other cysts growing and causing further problems. Sometimes a “wait and see” approach may be considered.

There are currently no effective drugs or vaccines to protect humans against the disease.

## **Further information on hydatid disease:**

### **What you can do to prevent Hydatid disease – information for farmers and dog owners:**

[http://new.wales.gov.uk/topics/environmentcountryside/ahw/disease\\_surveillance\\_control/hydatiddisease/?lang=en](http://new.wales.gov.uk/topics/environmentcountryside/ahw/disease_surveillance_control/hydatiddisease/?lang=en)

### **Hydatid disease – Q & A’s prepared by the Welsh Assembly Government:**

[http://new.wales.gov.uk/topics/environmentcountryside/ahw/disease\\_surveillance\\_control/hydatiddisease/Hydatid\\_disease\\_QandA?lang=en](http://new.wales.gov.uk/topics/environmentcountryside/ahw/disease_surveillance_control/hydatiddisease/Hydatid_disease_QandA?lang=en)

### **The current Hydatid disease campaign in Wales:**

#### **Leaflet (available in both English and Welsh) (pdf 106kb):**

[http://new.wales.gov.uk/docrepos/40382/4038231121/403824/567199/4038292/hydatidleaflet\\_eng.pdf?lang=en](http://new.wales.gov.uk/docrepos/40382/4038231121/403824/567199/4038292/hydatidleaflet_eng.pdf?lang=en)

#### **Poster (239kb):**

<http://new.wales.gov.uk/docrepos/40382/4038231121/403824/567199/4038292/Hydatiddiseaseposter.pdf?lang=en>

#### **Question and Answer briefing (in English and Welsh) provided by the Welsh Assembly Government (277Kb):**

[http://new.wales.gov.uk/docrepos/40382/4038231121/403824/567199/4038292/Hydatidq\\_a.pdf?lang=en](http://new.wales.gov.uk/docrepos/40382/4038231121/403824/567199/4038292/Hydatidq_a.pdf?lang=en)

**Further reading:**

Buishi I, Walters T, Guildea Z, Craig P, Palmer S. Reemergence of canine *Echinococcus granulosus* infection, Wales. *Emerg Infect Dis* [serial on the Internet]. 2005 Apr [cited October 2006]. Available from <http://www.cdc.gov/ncidod/EID/vol11no04/04-0178.htm>

Eckert J, Deplazes P. Biological, Epidemiological and Clinical Aspects of *Echinococcus*, a Zoonosis of increasing concern. *Clinical Microbiology Reviews*, 2004; 17 (1); 107-135