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Two Cases of Cystic Echinococcus Due to *Echinococcus granulosus* Acquired in New Hampshire, 2022

Key Points and Recommendations:

- There have been two human cases of *Echinococcus* (tapeworm) infection acquired in northern New Hampshire; both patients presented with cystic lesions (i.e., "cystic echinococcus") and report exposure to dogs (definitive host) that were allowed to feed on raw organs/meat harvested from moose.
- There is emerging evidence that moose in northern New England carry this parasitic tapeworm and transmit infection to dogs and other canids through ingestion of cysts from consumption of raw organ/meat of infected animals (see life cycle description below).
- Consider *Echinococcus* in patients with unexplained cystic lesions in lung, liver, and other organs; take care during surgical interventions to prevent cyst rupture because secondary seeding of daughter cysts and/or anaphylaxis can occur.
- Advise patients with exposure risk factors that their dogs should be routinely treated for tapeworms (de-wormed), avoid being fed raw offal or allowed to scavenge carcasses, and have fecal waste managed appropriately (e.g., do not use dog feces as fertilizer in gardens).
- Report all suspect or confirmed *Echinococcus* infections to the NH Division of Public Health Services (DPHS) by calling 603-271-4496 (after hours 603-271-5300 and ask for the public health professional on call).

Background

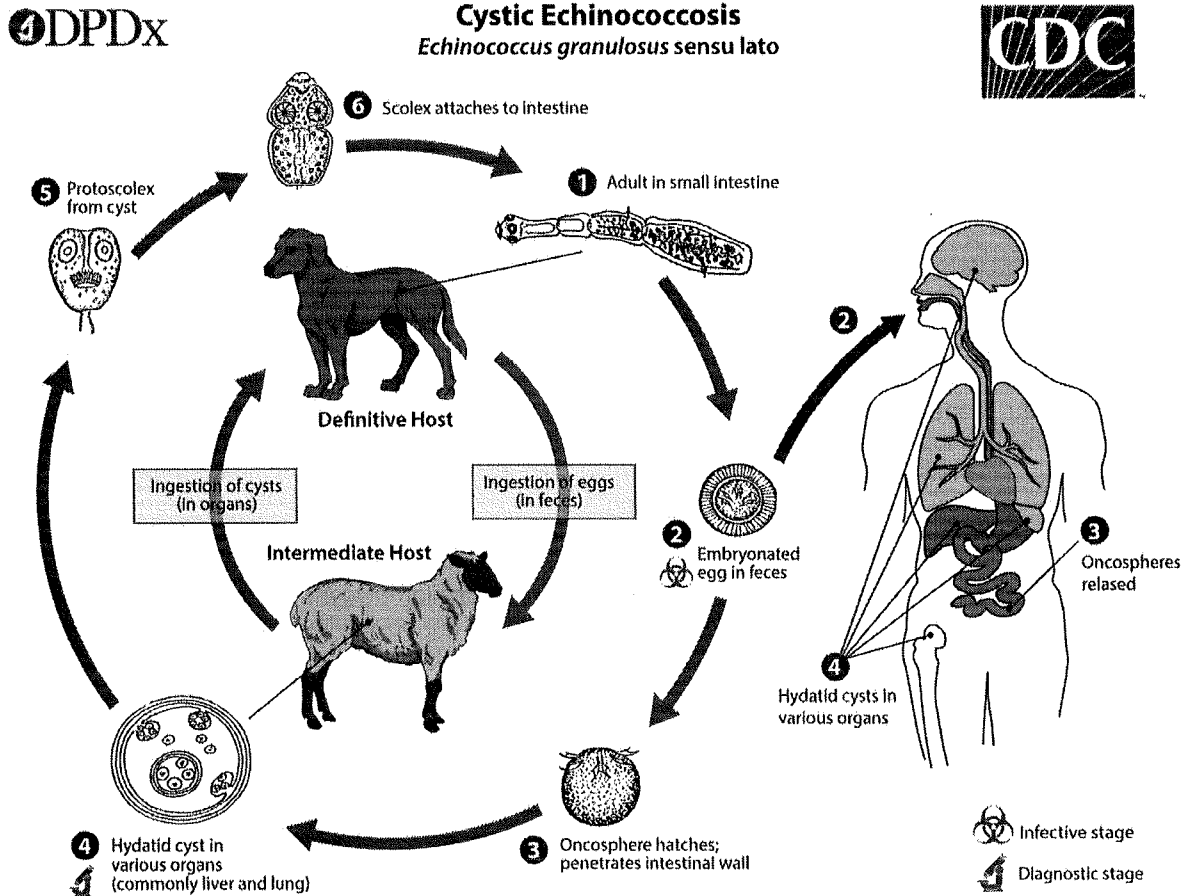
On April 11, 2022, DPHS was notified of a confirmed case of human pulmonary *Echinococcus granulosus* (EG) causing cystic echinococcus (CE). On December 1, 2022, a second case of CE in an unrelated patient was confirmed. Both patients likely acquired infection in northern New Hampshire and reported the epidemiologic risk of dressing locally hunted moose and exposure to dogs, which can serve as a definitive host. These are the first identified cases of locally-acquired *Echinococcus* in the state of New Hampshire.

In the United States, EG is a rare parasitic infection that has historically been identified in the Western and Midwestern states; however, EG has recently emerged in wildlife in the Northeast. In 2012, surveillance of the hunter-harvested moose population documented the presence of the parasite in Maine, but no human infection cases had previously been documented in New England.

EG is a zoonotic parasite. Adult tapeworms live in the intestine of canids (e.g., dogs, coyotes, and foxes). Canid feces contain parasitic eggs that are infectious to humans and other intermediate animal hosts (e.g., ungulates such as moose, deer, and sheep). In the intermediate host, the eggs hatch in the small intestine to form oncospheres which penetrate the intestinal mucosa and enter the circulation and then infect organs, especially the liver and lungs, where cysts form. Canids can become infected when they ingest raw flesh and viscera of an infected intermediate host.

Humans become infected when they ingest eggs that are shed in canid feces, usually through ingestion of raw produce contaminated by canid feces or through direct contact with infected feces. Ingesting meat infected with *Echinococcus* cysts does not cause disease in humans.

Patients usually present when cysts are identified in a vital organ either incidentally or because the cysts are causing symptoms such as through mass effect. The incubation period is currently unknown, but may be years. Complications (such as anaphylactic reaction) can happen if the cyst ruptures either spontaneously or during surgical manipulation. Cyst rupture can also cause secondary seeding of daughter cysts in the infected person.



Prevention

Veterinarians and human healthcare providers should advise persons who hunt and dress moose and deer, or butcher sheep, of the following:

- Keep domestic dogs and wild canids away from raw ungulate viscera, including preventing dogs from scavenging carcasses
- Dispose of all viscera in accordance with recommendations from NH's Fish and Game Department
- Thoroughly cook all game meat that is fed to dogs

- In consultation with a veterinarian, de-worm dogs using an agent which is effective against tapeworms (e.g., praziquantel) at a minimum of twice a year, and monthly in areas of elevated *Echinococcus* risk.

Diagnosis and Treatment

In patients found to have unexplained cystic lesions, assess for risk factors of exposure and obtain dedicated imaging. Note eosinophilia is not a consistent finding, and serologic tests for *Echinococcus* have variable utility. Stool ova and parasite examinations are not helpful because the adult worm is only found in the intestines of the definitive canid host. Consult with an infectious diseases specialist who can help advise about diagnosis and management.

Contact us

If you have concern that you have a suspect case, please contact us at (603) 271-4496.

Additional Information:

General Resources:

- <https://www.cdc.gov/parasites/echinococcosis/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5782903/>
- <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0006712>
- <https://alcesjournal.org/index.php/alces/article/view/127>

Veterinary and Wildlife Resources:

- <https://capcvet.org/guidelines/echinococcus-spp/>
- <https://extension.umaine.edu/veterinarylab/topics/echinococcus-granulosus-canadensis-eg-in-maine-moose-suggestions-for-dog-owners/>
- <https://www.wildlife.state.nh.us/hunting/moose-game-care.html#disposal>