Echinococcus multilocularis Fact Sheet for veterinary and medical professionals

What is it?

Echinococcus multilocularis (E. multilocularis) is a tapeworm that can infect many animal species as well as humans. The adult stage of the parasite lives in the intestine of a canid definitive host (e.g. fox, coyote, dog) and these adult tapeworms produce eggs which are excreted with the host feces. The tapeworm eggs in the feces are able to contaminate vegetation, soil, and potentially water. When these eggs are ingested by an intermediate host (mostly rodents), they hatch and the larvae migrate to the liver of the host and multiply causing severe lesions that are fatal to the host. When a canid ingests an infectious rodent, it becomes infected and the cycle continues.

When eggs in the environment are accidentally ingested by humans, they may cause a disease called Alveolar Echinococcosis (AE), a potentially life-threatening condition in which cyst-like lesions develop in organs (most common being the liver).

How do pets get this infection?

1. By eating a rodent with liver lesions caused by the larvae of this parasite. This leads to intestinal infections with adult worms in dogs excreting eggs in their feces.
2. Very rarely, when ingesting parasite eggs to whose infection they are normally immune, dogs can develop cyst-like disease (canine AE) in organs such as the liver, acting as aberrant intermediate hosts. However, when a dog develops this form of disease, it is not dangerous to people unless the dog is also concurrently acting as a definitive host and passing eggs in its feces. Canine AE in dogs is very rare because usually definitive hosts are resistant to infections from the tapeworm eggs, and are only infected by larvae from the liver of infectious rodents.

How can humans get infected?

1. Eating fruits and vegetables contaminated with eggs is believed to be the most common mode of infection.
2. By handling contaminated soil (e.g. children playing outside and not washing hands before eating).
3. By ingesting the eggs from an infected pet's fur or other areas in the home that could have been contaminated with fecal matter. The eggs are microscopic in size and so not visible to the human eye.
4. By handling animals or animals' fur or feces for professional purposes.

Humans are accidental hosts and are not able to transmit the disease to other humans or animals (they are sometimes called dead end hosts).

Is it a threat in Alberta?

Echinococcus multilocularis has been identified in wildlife for many years in northern climates, and in Canada and US. More recently, this parasite has been frequently detected in Edmonton and Calgary. Recently, a research group at the Faculty of Veterinary Medicine of the University of Calgary has identified a Calgary city park with a high rate of infections in coyotes. This same research group has found that most of the parasite specimens in both Edmonton and Calgary are genetically more similar to

the European strain than the previously described North American strain, suggesting this strain might have been recently imported from Europe.

It is unclear whether the European strain is more virulent for humans, but it has been speculated as the parasite causes more than 150 new human AE cases every year in Europe, and more than 18,000 worldwide. In the US and Canada diagnosed human infections are typically in patients who have travelled to other parts of the world. Until recently, only two cases were ever reported in continental North America, but since 2013, 14 cases have been reported in Alberta that are very likely to be locally acquired. A recent joint research effort by University of Calgary, University of Alberta, and Alberta Health Services conducted on 7 of those cases found out that some of these cases were caused by an European-like strain of the parasite that differentiated from the original European strain and it is now common in Alberta wildlife. These findings suggest that the overall risk of infection by AE has changed, and needs assessment.

The risk of humans becoming infected is very low; however, the incubation of the disease and growth of the liver lesions in humans can take five to 15 years to cause symptoms.

Immunocompromised individuals such as those with HIV/AIDS, organ transplant recipients, patients receiving chemotherapy, as well as pediatric and geriatric individuals are most susceptible and develop lesions more quickly. Nonetheless, the risk is still considered low. Other individuals with a potential risk of exposure would include those working in close contact with animals that hunt and eat rodents, and people who eat locally grown fruits and vegetables that are accessible by infected canids.

What are the clinical signs of disease?

Definitive hosts (e.g. foxes, coyotes, dogs) show no symptoms when infected by the adult worms so surveillance is difficult. The methods routinely used in veterinary clinics for fecal flotations may not detect *E. multilocularis* eggs and specific modifications are needed to increase the diagnostic sensitivity of this test. *Echinococcus multilocularis* eggs cannot be distinguished from some other tapeworm eggs when examined under the microscope and a molecular diagnostic test is needed to confirm the infection is from *E. multilocularis*.

The aberrant liver infection in dogs (canine AE), although very rare, is very severe and most of the time starts in the liver, but quickly spreads as metastatic tumours involving other organs.

In humans, AE clinical signs include weight loss, abdominal pain, general malaise and signs of hepatic failure. Development of cystic-like lesions is most common in the liver, but can occur in other organs as well. Although it is very rare, it is a serious disease if it occurs and is fatal if not treated. It is also costly, complicated to treat, requires prolonged drug therapy, and patients may require extensive surgery.

Liver lesions caused by AE in humans or dogs are diagnosed via ultrasound, CT and/or MRI. Blood tests and biopsy follow to confirm the diagnosis.

Can this tapeworm infection be prevented in the pet population?

Prevention steps to discuss with pet owners:

- Educate clients about how all parasites are acquired.
- Recommend to pet owners that they shouldn't allow pets to wander freely and unobserved to capture and eat small rodents or other animals' fecal matter.
- Educate clients about the importance of cleaning up animal waste.
- The lifestyle of individual pets should be discussed with clients as this will influence preventive health protocols.
- The dewormer, praziquantel, is licensed for use in dogs and cats against *Echinococcus multilocularis.*
  Some examples, at this time, of dewormers in Canada that contain praziquantel are: Dolpac, Droncit, Drontal, Interceptor Plus, Milbemax and Profender.

Prevention steps for humans:

- Wash hands thoroughly with soap and warm water after handling pets/animals/potentially contaminated materials, and before handling food.
- Teach children the importance of washing hands to prevent infection.
- Thoroughly wash fruits and vegetables prior to eating them.
- Wash hands after handling soil.
- Pick up pet feces promptly and wash your hands thoroughly afterwards.
- Laboratory or veterinary clinic employees handling fecal samples should wear gloves.

References

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