

First Case of Canine Alveolar Echinococcosis Detected in Virginia—A Potential Zoonosis?

Anne Zajac, DVM, MS, PhD
Professor, Parasitology
Virginia Maryland College of Veterinary Medicine

In early November, 2018 an adult neutered male mixed breed dog was presented to a small animal practice near Winchester VA with a recent history of lethargy and mild anorexia. Radiographs and ultrasound performed at that time demonstrated the presence of several abdominal masses. Histologic features of biopsied material were consistent with *Echinococcus* infection and PCR testing performed at the University of Guelph in Ontario, Canada confirmed the presence of the larval stage of *Echinococcus multilocularis*.

This case is significant for three reasons: firstly, it establishes the presence of the zoonotic tapeworm, *Echinococcus multilocularis* in the mid Atlantic region, where it has not been described previously. Adult *Echinococcus multilocularis* is typically found in the small intestine of wild canids (foxes, coyotes). It is known to occur in southern Canada and in north central U.S. states extending from Montana to western Ohio. Dogs, and more rarely cats, can also serve as hosts for the adult worm if the larval stage is ingested. The normal intermediate host is a small rodent (often voles or mice). Following ingestion of eggs, the larval (metacestode) stage develops by exogenous budding, usually in the liver.

Infrequently, dogs that ingest large numbers of eggs can become infected with the metacestode leading to the disease alveolar echinococcosis (AE). Canine AE in North America was first reported in British Columbia, Canada in 2009. Since 2012 an additional 14 cases have been described in Canada, a number of them in Ontario, where the parasite had not been previously described. The increase in number and distribution of AE cases suggest possible changes in parasite transmission. The dog in Virginia is not known to have traveled to any area where the parasite is considered endemic and the infection here appears to substantially increase the known range for *E. multilocularis* in the U.S.

The second significant feature of this case is that it appears to be the first report of alveolar echinococcosis in a dog in the U.S. AE is a serious condition in dogs with a poor prognosis because of the tumor-like growth of the parasite. Because of the vesicular structure of the metacestode it is difficult to remove surgically and the current recommended treatment is daily albendazole for the remainder of the dog's life.

Thirdly, and perhaps most importantly, the metacestode is also able to develop in humans; AE is a serious public health problem in parts of Europe where the parasite is common in foxes. Human infection is acquired through ingestion of eggs produced by adult worms in infected canids. Contact with a pet that has AE is not a public health risk. However, work in Europe has shown that some dogs with AE also have adult tapeworms in the intestine. Thus, any dogs with possible AE should be treated with praziquantel to eliminate the intestinal infection (a single

dose of 5 mg/kg is effective, but repeat treatment in 24 hours is recommended to ensure that an adequate dose has been given). Praziquantel has no impact on the metacestode.

Detecting adult *E. multilocularis* infection is difficult. Infection with adults is asymptomatic and the tapeworm is very small (about 5 mm in length). Consequently, segments shed by the tapeworm are not seen by owners or practitioners. At best, fecal flotation tests are very insensitive for detection of tapeworm eggs. As a further complication, *E. multilocularis* is a member of the Family Taeniidae, as are *Taenia pisiformis* and *T. hydatigena* in dogs and *T. taeniaeformis* in cats. Eggs of all taeniid tapeworms are identical. In the unlikely event that taeniid eggs are detected in a fecal exam they are not diagnostic for *Echinococcus*. Currently, there is no serologic test for infection available in the U.S. Fecal PCR testing for infection may soon become available though at least one of the large reference labs.

In known endemic areas, dogs are considered at risk of AE if they have access to fox or coyote feces that may contain eggs. More seriously, dogs with access to wild rodents are at risk of developing an adult tapeworm infection, potentially contaminating the environment with eggs that can cause AE in dog and human family members and others. In these areas, monthly praziquantel treatments are used in dogs for prevention of adult tapeworm infection.