IDEXX Reference Laboratories introduces new *Echinococcus* RealPCR Panel

Echinococcus multilocularis has recently been identified as an emerging disease of concern in Canada and the northern United States.[1-5] This tapeworm, carried by wild canids, poses a significant zoonotic threat if appropriate preventive steps are not taken. A recent prevalence study showed that an alarming 23% of wild canid feces in Ontario were positive for *Echinococcus multilocularis*.[1] An earlier study of coyote carcasses from the Calgary and Edmonton, Alberta region showed a similar prevalence of 25.3%.[2] To address concerns about the spread of *Echinococcus* in North America, IDEXX Reference Laboratories has responded quickly to develop and validate a test for *Echinococcus*. **IDEXX Reference Laboratories is pleased to announce that the *Echinococcus* RealPCR™ Panel** is now available, allowing for rapid, reliable and specific testing for this serious pathogen.

Disease transmission

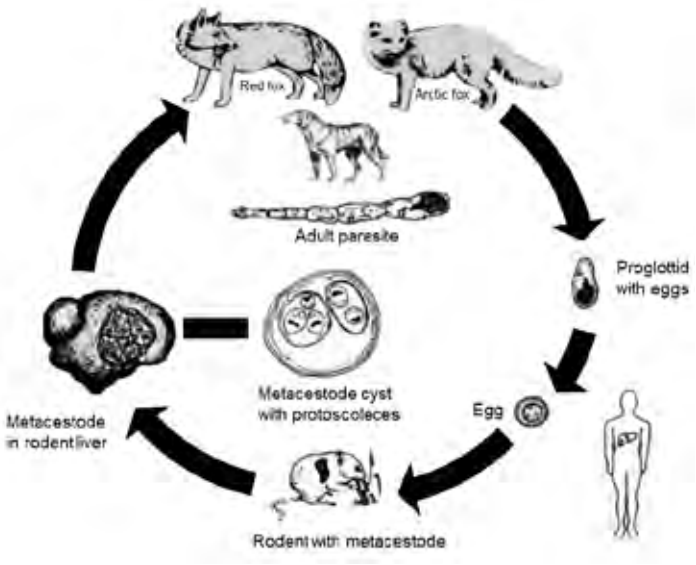

Figure. Lifecycle of *Echinococcus multilocularis*[6]

The adult *E. multilocularis* tapeworm is carried in the intestinal tract of infected foxes, coyotes and other canids (and rarely, cats). These host species are generally infected by eating infected intermediate hosts (small mammals). Canids may carry the adult tapeworms and shed tapeworm eggs in their feces for years.

Rodents and other small mammals serve as intermediate hosts following ingestion of the eggs. The tapeworm eggs hatch in the intestines and the larvae then migrate to the liver and other organs. Once in the organs, the larvae can form budding cysts that behave like a malignant tumour (alveolar echinococcosis). As intermediate hosts, rodents do not shed eggs. Transmission to definitive hosts occurs when the infected organs are eaten.

Humans may become accidental hosts when they ingest the tapeworm eggs from infected feces. This may occur when handling contaminated soil (e.g. gardening), eating unwashed vegetables grown in infected soil, or from fecal-oral transmission following handling of infected feces. Alveolar echinococcosis (also known as hydatid disease) is a serious, and often fatal, complication of *Echinococcus* infection. Due to the slow growth of these multilocular hydatid cysts, clinical signs may not occur until 5-15 years after initial infection.[7,8]

Other important *Echinococcus* species

Other zoonotic *Echinococcus* species of importance in North America include *Echinococcus granulosus* and *Echinococcus canadensis*. The eggs and adult tapeworms of these species are morphologically identical and very closely related genetically. They are distinguished by differences in their intermediate hosts, geographic distribution and by which organs most commonly develop hydatid cysts. *E. canadensis* is found mainly in northern North America. The most common definitive hosts are coyotes and wolves, and the intermediate hosts are primarily moose and elk.

E. granulosus is primarily found in South and Central America, Africa, the Middle East, China, Italy, Spain, Greece, Russia and the southwestern United States (especially Arizona, New Mexico and California). Dogs, wild canids and cats serve as definitive hosts, while sheep, goats, swine and cattle serve as intermediate hosts. Due to the differences in intermediate hosts, pet dogs may be more likely to be infected with and transmit *E. granulosus* than *E. canadensis*.

Clinical signs in dogs

The majority of *Echinococcus* infections in dogs result in long-term shedding of eggs with minimal to no clinical signs. Rarely, however, dogs may also develop alveolar echinococcosis when *E. multilocularis* infection is left untreated. Clinical signs in alveolar *echinococcosis* vary depending on the organ in which the cysts develop. The most common site is the liver.

Clinical signs (vomiting, lethargy, inappetence, abdominal pain, and jaundice) and ultrasound findings (cystic masses) are similar to those seen with liver cancer.

Dogs infected with *E.* canadensis or *E. granulosus* are most commonly silent carriers, shedding eggs without any clinical signs. Left untreated, these organisms can also rarely cause a milder form of disease, cystic echinococcosis, in which smaller, less aggressively invasive unilocular cysts are formed. These slow-growing cysts are most common in the liver with *E. granulosus* and in the lungs with *E. canadensis* but can also occur in other organs. Clinical signs may not be seen until the cysts have grown large enough to cause a mass-effect, which may take years from initial infection. Zoonotic fecal-oral transmission can lead to cystic echinococcosis in humans as well.

Diagnosis

Chronic shedding of potentially infective *Echinococcus* tapeworm eggs may be detected by fecal flotation done as part of regular preventive care. However, the sensitivity of fecal flotation is relatively low for identification of the eggs due to intermittent shedding, and *Echinococcus* spp. eggs are not morphologically distinguishable from *Taenia* tapeworm eggs. In dogs with alveolar or cystic echinococcosis, detection of cystic masses in the liver, lungs or other organs may be confused with neoplasia. Histopathology has historically been required to identify the presence of hydatid cysts in sick dogs suspected of having alveolar or cystic echinococcosis.

Introduction of the *Echinococcus* RealPCR Panel

In response to the concern regarding this emerging disease, IDEXX Reference Laboratories developed and validated an *Echinococcus* RealPCR™ Panel in collaboration with researchers at the University of Guelph.[9] The panel includes both a species-specific real-time PCR test for *E. multilocularis* and a genus-level *Echinococcus* spp. test. The *Echinococcus* spp. test detects not only *E. multilocularis* but also other clinically relevant *Echinococcus* species, such as *E. canadensis* and *E. granulosus*.

In dogs presenting with cystic masses suggestive of echinococcosis, the *Echinococcus* RealPCR™ Panel can be performed on a specimen collected by fine-needle aspiration of the suspect mass, eliminating the need for a biopsy.[10] Additionally, the *Echinococcus* RealPCR Panel performed on a fecal specimen may detect chronic nonclinical shedders of *Echinococcus* spp. or may be used to distinguish *Echinococcus* spp. eggs from *Taenia* eggs when tapeworm eggs are identified on fecal flotation.

Treatment of *Echinococcus* infections

Praziquantel is the treatment of choice to eliminate intestinal infection in dogs shedding *Echinococcus* tapeworm eggs. Dogs who have been infected with *Echinococcus* are at high-risk for reinfection, due either to continued exposure to the initial source of infection (e.g. infected wildlife) or to contamination of the environment with the eggs. Eggs are stable for up to a year in cooler 15°C (60°F) moist environments and are able to withstand freezing temperatures.[11] Monthly treatment with praziquantel is recommended for dogs who have a history of shedding *Echinococcus* eggs.

In dogs with hydatid cysts in the liver or lungs, albendazole therapy may slow the growth of the cystic masses, but generally does not effect a cure. Surgical excision, especially early in the course of the disease or when a solitary cyst is present, may be curative when combined with albendazole. When multiple cysts (as in alveolar echinococcosis) are present, surgery may not be possible and praziquantel may be a temporary palliative measure only. Percutaneous draining of cysts by ultrasound guidance has also been found to be useful in treatment of echinococcosis in humans. Dogs with alveolar or cystic echinococcosis may also have a patent intestinal infection. Therefore, these dogs should also be treated with praziquantel to prevent zoonotic infections.

Prevention of infection

Due to the serious nature of alveolar echinococcosis, preventing infection in endemic areas is highly recommended. The following is a summary of recommended preventive measures.[7,8,10]

- Administer monthly deworming with praziquantel for pet dogs at high risk:
  - Dogs living in endemic areas with access to wild rodents
  - Dogs in which shedding of tapeworm eggs has been identified
- Perform regular fecal examinations for dogs at high risk of exposure.
- Promptly remove animal feces to prevent contamination of the environment.
- Avoid feeding raw organ meat to pet dogs and cats.
- Wear gloves and wash hands following working with potentially contaminated soil (e.g. gardening) or feces.
- Wash home-grown vegetables thoroughly to remove soil.

Additional resources:

Ontario Animal Health Network. Emerging risk: *Echinococcus multilocularis* in Ontario [infographic]. www.oahn.ca/resources/emerging-risk-echinococcus-multilocularis-in-ontario-infographic.

Centers for Disease Control and Prevention. Parasites—Echinococcosis. www.cdc.gov/parasites/echinococcosis/gen_info/ae-faqs.html. Published December 12, 2012.

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Echinococcus for pet owners [information sheet]. Worms & Germs Blog website. www.wormsandgermsblog.com/files/2008/04/M2-Echinococcus.pdf. Updated July 2013.

Ordering Information

Test code	Test name and components
EMPP	***Echinococcus* RealPCR™ Panel** *Echinococcus multilocularis* and *Echinococcus* spp. RealPCR™ tests

Specimen requirements

The ideal specimen depends on the clinical manifestation:

- Patient with suspected alveolar or cystic echinococcosis: aspirate of suspect cystic lesion on a sterile swab, in a sterile tube (RTT or WTT)
- Exposed animal without clinical signs (to evaluate for intestinal *Echinococcus* infection): 5 g (1 g minimum) fresh feces in a sterile container

Turnaround time

1-3 working days

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1-800-667-3411

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Published May 2019.