Pennsylvania Game Commission Wildlife Disease Reference Library

Toxoplasmosis

Cause

Toxoplasmosis is a disease of wild and domestic animals and humans caused by the single-celled protozoan parasite known as *Toxoplasma gondii*. *T. gondii* infection uncommonly causes clinical disease, but can occasionally result in severe clinical illness, especially when infected at the same time with another parasite or disease organism.

Significance

Toxoplasmosis is a common infection in humans, and an estimated 60 million people in the United States are infected with this protozoan. In most people, this infection is asymptomatic. However, people with a weakened immune system can suffer severe illness, and when women become infected for the first time during pregnancy, serious birth defects can result. People become infected when they consume food or water contaminated with eggs from cat feces, or when they consume undercooked meat (from domestic livestock or wild game) containing tissue cysts.

Species Affected

Cats are the definitive hosts for *T. gondii*. Feral cats are probably the main source of environmental contamination with infective eggs, but many species of wild cats can also act as definitive hosts. All warm-blooded animals including mammals, birds, and humans are susceptible to infection and can act as intermediate hosts. Toxoplasmosis is known to occur in white-tailed deer, mule deer, elk, moose, pronghorn antelope, bison, bobcats, caribou, black bears, polar bears, mink, red foxes, raccoons, skunks, and many bird and rodent species. Marine mammals such as sea lions, seals, sea otters, and dolphins are also susceptible. Domestic livestock such as sheep, goats, and pigs can become infected.

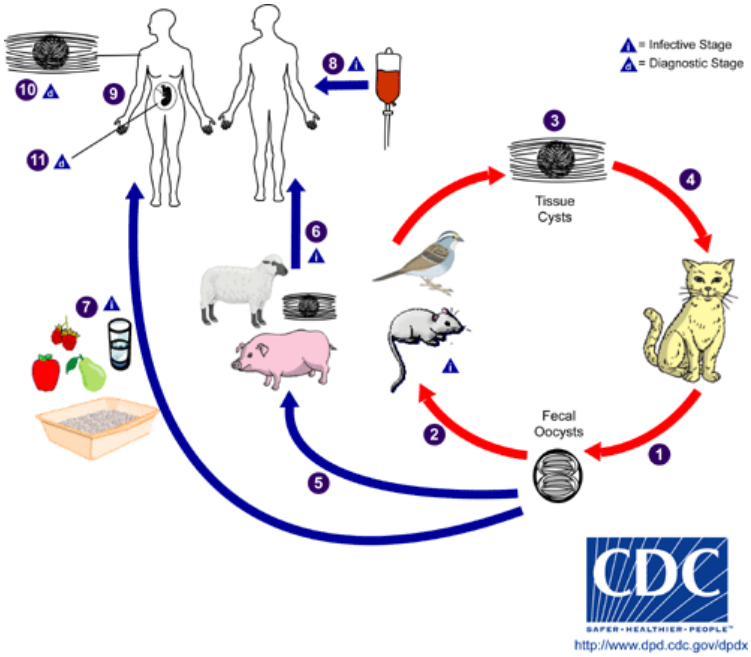
Distribution

T. gondii has a worldwide distribution.

Transmission/Life Cycle

Domestic and wild cats are the only known definitive host for *T. gondii*, which means the protozoa only reproduce and create new eggs within infected cats. Eggs are released in the feces of infected cats for 1 to 2 weeks. The eggs develop and become

capable of infecting a new host within 1 to 5 days. Intermediate hosts become infected when they ingest soil or vegetation contaminated with infective *T. gondii* eggs. Following ingestion, the eggs develop into a rapidly multiplying life stage known as a tachyzoite. The tachyzoites enter neural and muscle tissue where they become bradyzoites (slowly multiplying life stage) which are encased within tissue cysts. Cats become infected by feeding on animals containing tissue cysts or by directly ingesting infective eggs. Other carnivorous species and humans can become infected by consuming infective eggs or by eating meat of animals containing tissue cysts.



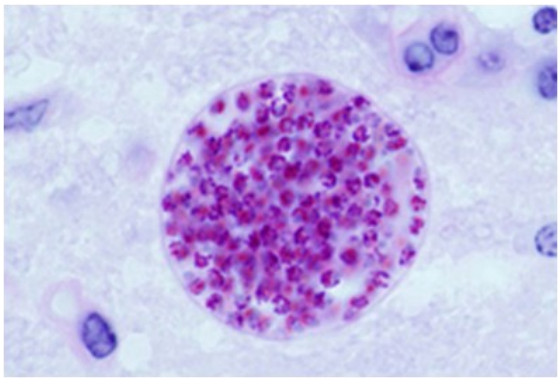
Life cycle of *Toxoplasma gondii*; image courtesy of cdc.gov

Clinical Signs

Most infected animals (definitive and intermediate hosts) do not show clinical signs of toxoplasmosis. The host's immune system usually keeps the protozoa in check and prevents serious illness. Many animals that do show signs of clinical illness have a weakened immune system due to a concurrent disease, sea otters are a current example. Young animals are also more susceptible to clinical illness because their immune systems are not fully developed. In the young orf immune compromised toxoplasmosis may cause pneumonia or other problems involving the heart, liver, central nervous system, eyes, or muscles. Clinical signs may include fever, diarrhea, cough, difficulty breathing, jaundice, seizures, and death. Toxoplasmosis can also result in abortion and stillbirth when pregnant animals become infected.

Diagnosis

Toxoplasmosis can be diagnosed at necropsy by microscopic identification of tissue cysts and identification of *T. gondii* organisms. Other laboratory tests are also available for diagnosis.


Toxoplasma gondii tissue cyst in a mouse brain; image courtesy of ars.usda.gov

Treatment

Medications are available to treat toxoplasmosis in humans, but they cannot completely eliminate the infection and are probably not useful or necessary in wildlife.

Management/Prevention

People can avoid becoming infected with *T. gondii* by taking certain precautions such as washing hands and materials (cutting boards, knives, etc.) thoroughly after working with raw meat, and cooking all meat thoroughly (a meat thermometer should read at least 135° F). Vegetables and fruit should also be washed prior to consumption. Pregnant women and anyone who is immune compromised should avoid contact with

cat feces, soil, raw meat, and aborted animals. Litter boxes should be cleaned daily and should not be cleaned by pregnant women. Pet cats should not be fed raw meat. Cats should also be kept indoors to prevent them from hunting and consuming infected prey.

Suggested Reading

Centers for Disease Control and Prevention (CDC). 2011. Parasites- Toxoplasmosis (*Toxoplasma* infection). <http://www.cdc.gov/parasites/toxoplasmosis/>.

Dubey, J. P. 2008. *Toxoplasma*. Pages 204-222 *in* C. T. Atkinson, N. J. Thomas, and D. B. Hunter, editors. Parasitic Diseases of Wild Birds. Wiley-Blackwell, Ames, Iowa, USA.

Dubey, J. P., and K. Odening. 2001. Toxoplasmosis and Related Infections. Pages 478-519 *in* W. M. Samuel, M. J. Pybus, and A. A. Kocan, editors. Parasitic Diseases of Wild Mammals. Iowa State University Press, Ames, Iowa, USA.

Toxoplasmosis: Introduction. 2011. The Merck Veterinary Manual. <http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/52200.htm&word=toxoplasmosis>.