

# Toxoplasmosis

## Charlie Stoltenow

D.V.M., D.A.C.V.P.M.,  
Extension Veterinarian  
Department of Animal Sciences

## Neil Dyer

D.V.M., M.S., D.A.C.V.P., Veterinary  
Diagnostic Laboratory Director  
Department of Animal Sciences

## Gerald Stokka

D.V.M., M.S., Extension Livestock  
Stewardship Specialist  
Department of Animal Sciences

Toxoplasmosis is a disease of humans and animals caused by the protozoan parasite *Toxoplasma gondii*. The biology of *T. gondii* is complicated, but the life cycle of the parasite begins with felids (cats, wild and domestic). **Only felids** can shed the infective form (oocyst) of the parasite in their fecal material.

Humans and other types of animals can become infected when inadvertently ingesting this infective oocyst through contact with cat fecal material. In the case of humans, this contact might be initiated by cleaning cat litter boxes, gardening where cats defecate or playing in a sandbox in which a cat has defecated. The oocysts are very small and environmentally resistant, and can be ingested simply by touching contaminated hands to the mouth.

Other species of animals, such as sheep, become infected by ingesting the oocyst when they graze where cats have defecated. Once the oocyst is inside the human or animal, it can cause sudden disease or become quiescent (tissue cyst) for months to years. Humans also can become infected by consuming meat containing these tissue cysts.

Finally, cats reinfect themselves by consuming an animal that contains the tissue cysts, typically some type of rodent or bird. Once the tissue cyst is back inside the cat, it goes through a reproductive cycle that ultimately results in the release of oocysts back into the environment.

While most infections in healthy humans and animals do not result in any disease, *Toxoplasma gondii* can cause a variety of disease syndromes in a small percentage of infected individuals, including flulike symptoms in immunocompetant

adults, severe disseminated disease in immunosuppressed individuals and birth defects in infants when women are exposed during pregnancy. Knowledge of the parasite and its life cycle is important to individuals with potential exposure to the many species affected by this organism.

## The Disease in Humans

- Humans can become infected by:
  - 1) ingesting the oocyst (inadvertent contact with cat fecal material)
  - or 2) ingesting the tissue cyst (eating contaminated or undercooked meat). This is the most common method of *Toxoplasma* infection in humans. Recent studies have indicated that pigs can be asymptomatic carriers of *Toxoplasma*; therefore, pork needs to be cooked completely.
- Other, less common, sources of human infection include:
  - 1) transplacental transmission (mother to offspring), 2) organ transplantation (tissue cyst present in organ), 3) blood transfusion (rare), 4) transmission during lactation (rare).
- The majority of infections in healthy humans do not result in clinical disease.
- **Acute** infections show “flulike” symptoms.
- **Chronic** infections occur when tissue cysts form and persist for years. No disease occurs.

**Congenital** infections occur when a woman is exposed for the first time **during pregnancy**. About 10 percent of these cases result in abortion, stillbirth or central nervous system damage. Reactivation of prior infections is very rare.

- Infections can cause significant disease in immunosuppressed individuals (individuals receiving chemotherapy or receiving immunosuppressive therapy during organ transplants, AIDS patients, elderly patients, patients with chronic disease, homeless individuals). These individuals may develop encephalitis (brain infection), pneumonia, myocarditis (heart infection) and chorioretinitis (ocular infection)

## The Disease in Cats

- Cats become infected when they consume an animal (rodent, bird, etc.) that contains the tissue cyst. Infection is more prevalent in predatory stray cats.
- The protozoa reside in the intestinal lining of members of the cat family.
- Cats passing *Toxoplasma* oocysts in their feces can infect other cats in the environment.
- Cats, particularly kittens or adults with a suppressed immune system, can die from a generalized *Toxoplasma* infection.
- Infected cats typically shed *Toxoplasma* oocysts for one to two weeks and then develop immunity to the organism. After that, the oocyst is not found in their feces.

- Oocysts need to be in the environment (outside the cat) for one to five days before they are infective. Therefore, cleaning litter boxes **daily** is important to avoid infection.
- Oocysts can remain infective in the environment for up to a year.
- Some cats remain carriers and will shed oocysts when **stressed**, such as during birthing or while on steroid therapy for other disease conditions.
- Testing of cats generally is not done. A serum test for *Toxoplasma* is available. Testing a cat only will determine if the animal **has been exposed to *Toxoplasma***, not if it is shedding the oocyst. A fecal exam can be done to look for the oocyst; however, results of this test are often negative because cats typically shed the oocyst for a short period of time.

## The Disease in Sheep

- Ewes show no clinical disease.
- This disease causes abortion in ewes and perinatal mortality in lambs.
- Depending on the stage of pregnancy at which the ewe is infected, the fetus may be aborted, retained, mummified or stillborn. If the fetus survives the infection, it may be born alive but weak.
- Ewes that abort due to *Toxoplasma* one year typically have a normal lamb the next (immunity develops).
- The organism can be suppressed in sheep by feeding a coccidiostat.

- Sheep become infected by ingesting infective oocysts (grazing) where cats have defecated.
- Humans can be exposed to *Toxoplasma*-infected sheep when assisting with lambing, handling placental tissues from infected ewes or caring for infected lambs.
- Diagnosis in sheep usually happens after death of the lamb through observation and testing of tissues and fluids from the fetus and the dam.

## Control Measures

- Properly clean and handle cat litter boxes (wash hands, wear protective gloves); clean litter boxes daily.
- Pregnant women should avoid cleaning litter boxes and helping with lambing.
- Do not feed raw meat to cats because it may contain infective tissue cysts.
- Cover children's sandboxes to deter cats from defecating in such locations.
- Wear gloves when working in a garden because cats may use gardens or landscaping areas for defecation.
- Take precautions in lambing operations (wash hands, wear protective gloves).
- If undercooked meat is desired, it should be hard frozen prior to cooking.
- The oocyst is destroyed by freezing (0 F, or minus 14 C), heating (150 F, or 65 C), boiling water, iodine and ammonia.

**For more information on this and other topics, see [www.ag.ndsu.edu](http://www.ag.ndsu.edu)**

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