# Toxoplasmosis (Toxoplasma gondii)

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*Toxoplasma gondii* is found throughout North America and can infect almost any warm-blooded animal or bird, and humans. Infection with *T. gondii*, a condition called toxoplasmosis, can be very serious in humans. *T. gondii* can be passed from a pregnant woman to her fetus and cause abortions and congenital defects. In children and adults, it can cause other signs, and is sometimes fatal. It can cause severe disease in persons with poor immune systems such as those undergoing chemotherapy or infected with human immunodeficiency virus (the virus that causes AIDS). The cases of toxoplasmosis in the United States had been declining to 350 cases annually in the early 1990's. With the AIDS epidemic, the number of cases has increased. Surveys in the United States suggest 30% of cats and 25-50% of people have been infected (most clear the infection with no or few symptoms).

How is *T. gondii* transmitted?

Cats are the only primary hosts of *T. gondii*; they are the only mammals in which Toxoplasma is passed through the feces. In the cat, the reproductive form of *T. gondii* lives in the intestine and the oocysts (egg-like immature forms) exit the body in the feces. The oocysts must be in the environment 1-5 days before they are infective. This is important to remember when we discuss preventing infection. Cats only pass *T. gondii* in their feces for a few weeks after becoming infected. The oocysts can survive several years in the environment and are resistant to most disinfectants.

The oocysts are ingested by intermediate hosts such as rodents and birds, or other animals such as dogs and humans, and migrate to the muscle and brain. When a cat eats an infected intermediate prey (or part of a larger animal, e.g., a pig), the parasite is released in the cat's intestine and the life cycle can be repeated.

In any warm-blooded host, *T. gondii* can also be transmitted in utero (across the placenta) and through the milk.

In summary, the main sources of infection for a cat are uncooked meat (usually pork), infected prey, or as kittens *in utero* or through the milk. Humans, dogs, and other mammals usually become infected through meat, raw milk from infected goats, and accidental ingestion of cat's fecal material from hands or on food.

Does *T. gondii* cause disease in pets?

*T. gondii* can cause disease in dogs and cats; it is more frequently recognized in cats. The signs of toxoplasmosis in pets are nonspecific: fever, loss of appetite, depression. Further signs may occur depending on whether the infection is acute or chronic, and where *T. gondii* is found in the body. In the eyes, it can cause inflammation; in the lungs, pneumonia; in the heart, arrhythmias; in the digestive tract, vomiting, diarrhea, abdominal pain, and jaundice; in the nervous system, seizures, paralysis and loss of nerve function; in muscle, a stiff gait and loss of muscle. Kittens may be born stillborn or ill.

In animals, like people, disease is more common in those with suppressed immune systems. Cats with toxoplasmosis should be checked for infections with such viruses as feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), and feline infectious peritonitis (FIP). In dogs, distemper may cause immunodeficiency and allow *T. gondii* to take hold.

Toxoplasmosis can be a significant cause of abortion in sheep.

How is toxoplasmosis diagnosed in pet animals?

Measurement of antibodies to *T. gondii* in the blood is the best method to diagnose toxoplasmosis. Sometimes the oocysts can be found in the feces but they look so similar to some other parasites that this is not a reliable method of diagnosis. Also, cats shed the oocysts for only a short period of time (about 2-3 weeks) and often are not shedding the oocysts when they are showing signs of disease.

How are infected pets treated?

An antibiotic called clindamycin is the treatment of choice for toxoplasmosis. Other drugs that have been used include pyrimethamine and trimethoprim/sulfadiazine (Tribrissen).

About 60% of pets that have toxoplasmosis can recover with treatment. Recovery is less likely in animals that are young or have severe suppression of their immune systems.

How can I prevent my pet from becoming infected?

Animals should not be fed raw meat or bones and should not be allowed to scavenge through the garbage. Since *T. gondii* can be found in unpasteurized goat's milk, pets should not be allowed to drink it. Cats that can roam free outside can become infected through hunting prey such as mice and birds, so it is best to keep cats indoors.

Feces should be removed from the litter box daily and disposed of properly (incinerate or flush). Clean the litter boxes regularly with boiling or scalding water. Dogs should not be allowed access to litter boxes.

What are the signs and symptoms of toxoplasmosis in humans?

Cockroaches and flies may serve as transport hosts for *T. gondii*, carrying cat's fecal material on their bodies. Controlling



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Humans can become infected either in utero, or by accidental ingestion of the oocysts. If *T. gondii* passes through the uterus of an infected pregnant woman to her fetus early in the pregnancy, spontaneous abortion is common. If the infection occurs later in pregnancy (10-24 weeks of gestation) the infant may have serious or fatal congenital defects including hydrocephalus, blindness, and mental retardation. Most infected pregnant women do not have symptoms. Approximately 60% of infected pregnant women will pass the infection to their fetus.

these pests may help in preventing the spread of *T. gondii*.

People infected through ingestion of oocysts may be listless and have fever, enlarged lymph nodes and less commonly, inflammation of the heart.

Diagnosis is generally made through serologic (blood) testing.

I have heard all kinds of stories about how people can get toxoplasmosis. What is the truth?

In the United States, people are much more likely to become infected through eating raw meat than from handling cat feces. People also become infected by eating unwashed fruits and vegetables. Do not just focus on cats.

Neither people who own cats nor veterinarians have a significantly higher risk of being infected with *T. gondii* than the rest of the population.

It is unlikely you will become infected by petting an infected cat. The oocysts do not tend to stick to the fur like roundworm eggs might. The cat, while grooming, would generally remove any oocysts on the fur, before they become infective.

It is unlikely that you can become infected through cat bites or scratches.

What are my health risks if my cat tests positive for toxoplasmosis?

As odd as it may seem, a healthy cat that tests positive is probably safer than a cat that tests negative. Let us explain that. Cats that test positive have been exposed to toxoplasmosis. They have developed strong immunity to *T. gondii*, which means they are very unlikely to become infected again and pass oocysts if they are re-exposed to *T. gondii* within a year of their first infection. Over half of the cats that have become infected have immunity for up to 6 years. Negative cats, however, have no immunity or protection against becoming infected with *T. gondii*. If they become infected, they will pass oocysts that can infect humans and other animals.

What should pregnant women know about toxoplasmosis?

Pregnant women should remember that in the United States, exposures to *T. gondii* through food are much more common than exposures from cat feces, however, both do occur. Pregnant women, and those planning to conceive, should check with their physicians to determine if they should be tested for exposure to *T. gondii*.

Do's and Don'ts for the prevention of toxoplasmosis

Do not eat raw or undercooked meat. Meat should be cooked to a temperature of at least 160°F for 20 minutes.

Do not drink unpasteurized milk.

- Do not eat unwashed fruits and vegetables.
- Wash hands and food preparation surfaces with warm soapy water after handling raw meat.
- Wear gloves when gardening. Wash hands after gardening.
- Wash hands before eating (especially children).
- Keep children's sandboxes and playpens covered.
- Do not drink water from the environment unless it is boiled.
- Do not feed raw meat or undercooked meat to cats. Also, do not give them unpasteurized milk.
- Do not allow cats to hunt or roam.
- Do not allow cats to use a garden or children’s play area as their litter box.
- Remove feces from the litter box daily and clean with boiling or scalding water.
- Control rodent populations and other potential intermediate hosts.
- Pregnant women, and persons with suppressed immune systems, should not clean the litter box.



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