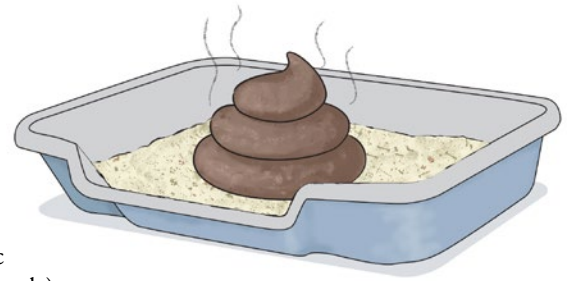


Stay Away From the Cat Poop and No One Gets Hurt

Toxoplasmosis in Cats

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At some point, you may have heard that pregnant women should not clean litter boxes. Is this an urban legend, something made up by the person trying to get out cleaning the litter box, or is it actually based on fact?

Fact: there are several diseases that can be transmitted from cats to humans. These are referred to as zoonotic diseases. The one that may affect pregnant women is called toxoplasmosis, pronounced “tok-so-plaz-MOE-sis.” It is an infection with a parasite called *Toxoplasma gondii*¹ and is often referred to as simply “T. gondii.” A microscopic single-cell organism related to coccidia,² *T. gondii* is one of the most common parasitic diseases and infects nearly all warm-blooded animals, including pets and humans.³ It is an extremely well-adapted parasite yet rarely causes significant disease to the individuals it infects.² “Out of all the zoonotic diseases which humans can get from cats, toxoplasmosis is the most well known and publicised one. However, there is a huge amount of misunderstanding about this disease, and also about the role the cat plays in human transmission.⁴”

How Common is Toxoplasmosis?

T. gondii occurs worldwide, and infection in cats is widespread.² So why is there not more mention of it? Probably because many more cats are infected than show symptoms. Very few infected cats show significant clinical signs.² The disease is also more prevalent in outdoor or stray cats than indoor-only cats. It is seen most often in cats that are active hunters or those that are fed undercooked or raw meat.⁴ In contrast, infection is uncommon in pet cats that do little or no hunting and are fed primarily or exclusively commercial cat foods.²

In general, depending on their lifestyle, between 20-60% of cats will be infected with *T. gondii*, but very few of these will ever show clinical signs. However, even without clinical signs of infection, once an animal has been infected with *T. gondii*, it will probably remain infected for life. The

parasite may be present in microscopic cysts within tissues (typically in the muscle) where it will remain dormant, but “hidden” from immune response.⁴

Similarly, in humans, it is estimated that more than 500 million people are infected worldwide, but again, the vast majority of these have no significant clinical signs. Human infection is more common in some countries than others. For example, in the U.S. and United Kingdom, around 20-30% of people are infected at some point in their lives, whereas approximately 80% of people in France and Germany are infected. People who have been infected with *T. gondii* develop antibodies against the organism that may be detected by a blood test.⁴

Understanding Transmission and Hosts

So, what role does the cat actually play in the life cycle of this disease? Is it as bad as what we may have been led to believe?

The life cycle of *T. gondii* is complex and involves two types of hosts: “definitive” hosts and “intermediate” hosts.³ Cats (wild cat species and domestic cats) are the definitive hosts, meaning they are the only animals in which replication of *T. gondii* will result in the production of oocysts (eggs), which are then shed in the feces.⁴

Cats become infected by eating infected rodents, birds or other small animals, or anything contaminated with feces from another cat that is shedding the microscopic parasite in its feces. The parasite becomes infective one to five days after it is passed in the feces of the cat. After a cat has been infected, it may shed the parasite for up to two weeks. It is possible for the parasite to live in the environment for many months and contaminate soil, water, fruits, vegetables, sandboxes, grass where animals graze for food, litter boxes, or any place where an infected cat may have defecated. After a cat is infected, it will take more than one day to become to become infectious with the disease and have the ability to transmit *T. gondii* to other cats.⁵

Signs of Infection May Be Hard to Find

It is important to remember that *T. gondii* is an infrequent cause of disease in cats.² If your cat is healthy, you may not see any symptoms. However, if the cat is not able to fight off/stop the infection, issues will start to develop. For example, if the cat is immunocompromised and its immune system is not working properly, *T. gondii* may continue to replicate, spread, and cause damage to its tissues.² When this happens, various clinical problems may develop, including, but not limited to, fever, loss of appetite, weight loss, or lethargy. When the parasite load becomes heavy, it is possible for pneumonia, causing breathing difficulties, to occur, along with inflammatory eye problems (uveitis and retinitis), liver disease (hepatitis), or neurological (nervous) signs (e.g., tremors or seizures)⁴ depending on which parts of the body have been affected.

Less common signs of illness reported include lymph node enlargement; vomiting, diarrhoea and muscle pain. Infection in a pregnant cat may cause severe signs of illness in the offspring such as foetal death, abortion, stillbirths and death of young kittens. While this is possible, though, it is unusual.⁴ These symptoms may also mimic other diseases, but keep them in mind when trying to determine the cause of failing kittens.

Diagnosis and Treatment in Cats

As noted previously, the symptoms just cited may also be caused by many other organisms or conditions. So how do we narrow the culprit down to *T. gondii*?

Blood tests will determine whether a cat has been exposed to the organism. These tests do not necessarily mean that *Toxoplasma* is the cause of any disease since most exposed cats do not develop disease; however, high levels of certain antibodies may suggest current infection.²

Treatment usually involves a course of an antibiotic called clindamycin, either alone or in combination with corticosteroids if there is significant inflammation of the eyes or central nervous system. Ideally, treatment should be started immediately after diagnosis and continued for several days after the signs have disappeared. In acute illness, treatment is often started on the basis of high initial IgM (immunoglobulin M) antibody levels. If clinical improvement is not seen within two to three days, the diagnosis of Toxoplasmosis may be questioned.³

Unfortunately, cats that are showing signs of the disease most likely already have compromised systems and/or autoimmune issues.

“The prognosis for cats diagnosed with toxoplasmosis depends upon the organs or systems affected, the time between infection and treatment, and initial responses to therapy. Generally, cats with central nervous system and eye symptoms respond to therapy more slowly, but they still have more favorable prognoses if their clinical signs improve within two to three days of starting therapy. The prognosis for cats with toxoplasmosis affecting the liver or lungs is usually poor.”³

Toxoplasma and Humans

Now that we understand the role that cats play in toxoplasmosis, where do humans fit into the equation?

“Although cats are essential to complete the life cycle of *T. gondii*, numerous surveys have shown that people who own cats have no higher risk of infection than those who don't own cats. There are several reasons for this: Many pet cats will never be exposed to *Toxoplasma* and cannot pass the infection on to humans. Even if a cat does become infected with *Toxoplasma*, it will only shed the oocysts or eggs in its feces for approximately ten days after initial exposure. Following this, there is no further significant oocyst shedding and no additional risk to humans. Although humans may become infected through exposure to oocysts in the environment, a more common source of infection appears to be infected meat.”²

Humans may become infected via one of two ways. The first route is by the ingestion of oocysts from the environment (e.g., through contact with soil containing sporulated oocysts, or through eating contaminated fruit or vegetables). The second route is by the ingestion of meat containing tissue cysts. Fresh meat is most risky since freezing meat for several days will kill most tissue cysts.⁴ Less common routes of infection can include ingestion of sporulated oocysts through contact with contaminated water, ingestion of raw (unpasteurized) goats' milk, or the inhalation of sporulated oocysts on dust particles (extremely rare). The good news for cat owners, vets and judges is “it is generally believed that infection cannot be transmitted by a bite or scratch from an infected cat.”⁴

Surprisingly, there appears to be a greater risk of contracting *T. gondii* by consuming meat than through contact with cats. Sheep, cattle, and pigs grazing on contaminated pastures, or fed oocyst-contaminated food, may develop the encysted form of the organism in their body tissues. If meat from these animals is not adequately cooked, or if proper hygiene precautions are not followed while handling uncooked meat, humans may become infected. Ingestion of oocysts from infected cats, such as gardening in contaminated soil, is a much less common source of human infection.²

How Are People Affected?

Like our feline friends, most people infected with *T. gondii* do not have symptoms. They often don't know they're infected. In humans with a normally functioning immune system, clinical signs of toxoplasmosis are usually mild and may pass either undetected or just cause mild ‘flu’-like symptoms such as fever, swollen lymph nodes, headache, muscle aches, and skin rash.^{1,4} These days, some people may mistake their symptoms for COVID-19.

As with cats, there are groups of higher-risk people who are more susceptible to complications from an infection. Unborn babies, newborn babies and young children, very elderly people, pregnant women (because

of the risk to their baby), and immunosuppressed people may be more severely affected. Infection has been known to be associated with severe illness including encephalitis (inflammation of the brain), abortion, stillbirth, birth defects (including mental retardation) and other problems affecting the nervous system and eyes.⁴

Now we begin to see why there is so much concern about this parasite. If an infection reaches the human eye, symptoms may include eye pain, poor vision, and floaters. If not properly treated, the infected eye could lose its sight. In addition to affecting the eye, in severe cases, *T. gondii* may also infect the lung or brain disease for immunocompromised individuals. What's even more alarming is that the disease may lay dormant, but with illnesses or system stressors, it could re-emerge to become active again later in life.¹

Nevertheless, do remember that the majority of people don't require treatment. Drug treatment is used for people with more serious cases, pregnant women, newborns, and people with weakened immune systems.

What About Human Pregnancy?

Since many of us may carry this parasite without realizing it, it makes sense for any woman contemplating pregnancy to talk to her doctor about running tests—whether or not she has ever had a cat! A diagnosis of toxoplasmosis is typically made by serologic testing. A test that measures immunoglobulin G (IgG) is used to determine if a person has been infected. If it is necessary to try to estimate the time of infection, which is of particular importance for pregnant women, a test which measures immunoglobulin M (IgM) is also used, along with other tests such as an avidity test, which measures the binding strength of the antibodies.⁶

If a woman gets infected, while pregnant, it may cause issues with her unborn child. If a pregnant woman is infected with *T. gondii* during her pregnancy, there is a risk that the infection may spread to the fetus. Note that this is only possible if the woman is infected during pregnancy. Prior infections

carry no such risk. In around 20 to 50% of women infected during pregnancy, infection will be passed on; however, even then, there is a good chance the fetus may remain asymptomatic. What most concerns us is the minority of cases where this does not happen, because the infection has resulted in spontaneous abortion, birth defects, neurological problems, or ocular problems. However, these problems appear to only occur if a woman contracts toxoplasmosis for the first time during her pregnancy.⁴

An asymptomatic baby may still be infected, however, and could develop symptoms later in life. These include vision loss, mental disability, and seizures. A woman who becomes infected during pregnancy, if treated with medications may protect her unborn baby from toxoplasmosis. Mother and baby should be monitored closely during the pregnancy and after the baby is born.⁵

Does My Cat Have to Go?

Just because you have a cat does not mean you will be infected with the parasite. It is unlikely that you would be exposed to the parasite by touching an infected cat because cats usually do not carry the parasite on their fur. In addition, cats kept indoors (that do not hunt prey or are not fed raw meat) are not likely to be infected. So, you do not need to worry about placing/rehoming your cat. But, if you are pregnant, planning on becoming pregnant, or have a weakened immune system, it is important to protect yourself from infection.⁷

You can help reduce the risk of infection for both your cat and yourself by following these steps:

- 1) Cook all meat thoroughly. Microwaving is not a safe way to kill tissue cysts as the heating is uneven.
- 2) Wash hands, utensils, and surfaces thoroughly after handling raw meat.
- 3) Wash all fruit and vegetables carefully.
- 4) If there are stray cats in your neighborhood, always wear gloves when gardening. The soil may be contaminated by cat feces.
- 5) Empty cat litterboxes daily, dispose of litter carefully, and disinfect boxes daily with boiling water. It takes more than 24 hours for oocysts passed in the feces to develop into the infective stage. If the litterbox is sanitized daily, then even if a cat is excreting oocysts, they will not have become infectious by the time the litter is changed.
- 6) Try to discourage pet cats from hunting and eating rodents or undercooked meat.
- 7) Cover children's sandboxes to prevent cats from using them as litter boxes.
- 8) Freeze fresh meat at 10°F to -4°F for three days to kill tissue cysts.⁴

Most importantly:

- 9) People in 'high-risk' groups (e.g., pregnant women, immunosuppressed individu-

als, young children) should not have contact with or handle the cat's litter box. If no one else is available to take over this job, wear gloves and a mask and wash hands thoroughly after cleaning the box. Periodically clean the litter tray with detergent and scalding water (which kills oocysts).

Going Forward

The good news for you and your cat going forward is that research indicates that contact with cats or owning a cat does not increase the risk of *T. gondii* infection in humans. Because cats only shed the organism for a short time, the chance of human exposure via cats they live with is relatively small. One study of over 206 cats showed that nearly 25% had been infected with *T. gondii*, yet NONE were shedding oocysts in their feces!⁴

Most infected humans probably picked up the parasite by eating undercooked meat, especially goat, mutton, and pork, rather than through contact with felines. In addition, newer strains of *T. gondii* have been identified that are highly contagious, with infection being efficiently passed between intermediate hosts (species other than cats). Consequently, some scientists think that cats are becoming less important in the spread of this infection.⁴

So, go ahead and enjoy your cat. Even during pregnancy, when your hormones are out of whack or you are stressed, it is completely safe to curl up on the sofa with your four-legged purr machine.

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