

Toxocara canis

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Toxocara canis (also known as **dog roundworm**) is worldwide-distributed helminth parasite of dogs and other canids. *Toxocara canis* is gonochoristic, adult worms measure from 9 to 18 cm, are yellow-white in color, and occur in the intestine of the definitive host. In adult dogs, the infection is usually asymptomatic. By contrast, massive infection with *Toxocara canis* can be fatal in puppies.^{[1][2]}

As paratenic hosts, a number of various vertebrates, including humans, and some invertebrates can become infected. Humans are infected, like other paratenic hosts, by ingestion of embryonated *T. canis* eggs.^[3] The disease (called Toxocariasis) caused by migrating *T. canis* larvae (toxocariasis) results in two syndromes: visceralis larva migrans and ocularis larva migrans.^[4] Owing to transmission of the infection from the mother to her puppies, preventive anthelmintic treatment of newborn puppies is strongly recommended. Several anthelmintic drugs are effective against adult worms, for example pyrantel, fenbendazole, selamectine, etc.^[5]

Contents

- 1 Morphology
- 2 Life cycle
- 3 Transmission to humans
- 4 Treatment
- 5 Prevention
- 6 See also
- 7 References
- 8 External links

Morphology

The adult *canis* has a round body with spiky cranial and caudal parts, covered by yellow cuticula. The cranial part of the body contains two lateral alae (length 2–3.5 mm, width 0.1 mm). Male worms measure 9–13 by 0.2–0.25 cm and female worms 10–18 by 0.25–0.3 cm. *T. canis* eggs have oval or spherical shapes with granulated surfaces, are thick-walled, and measure from 72 to 85 μm.^[1]

Life cycle

Eggs are deposited in feces of dogs becoming infectious after 2–4 weeks.^[6] Dogs ingest infectious eggs allowing the eggs to hatch and the larval form of the parasite to penetrate through the gut wall. In young dogs,

Toxocara canis



Adult *Toxocara canis*

Scientific classification

Kingdom:	Animalia
Phylum:	Nematoda
Class:	Secernentea
Order:	Ascaridida
Family:	Toxocaridae
Genus:	Toxocara
Species:	<i>T. canis</i>

Binomial name

Toxocara canis

Werner 1782

the larvae move through the body via the bloodstream by penetrating a blood vessel in the gut wall. Once in the lungs, the larvae enter into the alveoli and crawl up the trachea. The larvae are then coughed up and swallowed leading back down to the small intestine. The larvae encyst in gut wall tissues within older dogs. The cysts can reactivate in pregnant females to infect puppies either through the placenta in utero or the mammary glands in colostrum and milk. Another possible route of infection is the ingesting of paratenic hosts that contain encysted larvae from egg consumption thus completing the life cycle for the parasite to re-infect its definite host, the dog.^[7]

Four modes of infection are associated with this species. These modes of infection include direct transmission, prenatal transmission, paratenic transmission, and transmammary transmission.^[8] The basic form is direct transmission and is typical to all ascaroides, with the egg containing the L₂(the second larval developmental stage) being infective, at optimal temperature and humidity, four weeks after secreted in the feces to the environment. After ingestion and hatching in the small intestine, the L₂ larvae travel through the portal blood stream into the liver and lungs. Such migratory route is known as enterohepatic pulmonar larval migration. The second molt takes place in the lungs, the now L₃ larvae return via the trachea and into the intestines, where the final two molts take place. This form of infection occurs regularly only in dogs up to three months of age.^[9]

In older dogs, this type of migration occurs less frequently, and at six months it is almost ceased. Instead, the L₂ travel to a wide range of organs, including the liver, lungs, brain, heart and skeletal muscles, as well as to the walls of the gastrointestinal tract. In pregnant female dogs, prenatal infection can occur, where larvae become mobilized (at about three weeks prior to parturition) and migrate through the umbilical vein to the lungs of the fetus, here molting into the L₃ stage just prior to birth.^[8] In the newborn pup, the cycle is completed when the larvae migrate through the trachea and into the intestinal lumen, where the final molts take place. Once infected, a female dog will usually harbor sufficient larvae to subsequently infect all of her litters, even if she never again encounters an infection. A certain amount of the female dog's dormant larvae penetrate into the intestinal lumen, where molting into adulthood takes place again, thus leading to a new release of eggs containing L₁ larvae.^[6]

Transmammary transmission occurs when the suckling pup becomes infected by the presence of L₃ larvae in the milk during the first three weeks of lactation.^[10] There is no migration in the pup via this route.

L₂ larvae may also be ingested by a variety of animals like mice or rabbits, where they stay in a dormant stage inside the animals' tissue until the intermediate host has been eaten by a dog, where subsequent development is confined to the gastrointestinal tract.^{[7][11]}

Transmission to humans

Consumption of eggs from feces-contaminated items is the most common method of infection for humans especially children and young adults under the age of 20 years.^[12] Although rare, being in contact with soil that contains infectious eggs can also cause human infection, especially handling soil with an open wound or accidentally swallowing contaminated soil, as well as eating under cooked or raw meat of an intermediate host of the parasite such as lamb or rabbit.^[7]

Humans can be infected by this roundworm, a condition called toxocariasis, just by stroking an infected dog's fur and accidentally ingesting infective eggs that may be present on the dog's fur. When humans ingest infective eggs, diseases like hepatomegaly, myocarditis, respiratory failure and vision problems can result depending on where the larva are deposited in the body.^[12] In humans, this parasite usually grows in the back

of the eye, which can result in blindness, or in the liver or lungs.^[13] However, a 2004 study showed, of 15 infected dogs, only seven had eggs in their coats, and no more than one egg was found on each dog. Furthermore, only 4% of those eggs were infectious.^[14] Given the low concentration of fertile eggs on infected dogs' coats (less than 0.00186% per gram), it is plausible that such eggs were transferred to the dog's coat by contact with fecal deposits in the environment, making dog coats the passive transport host vehicle.^[14] However, although the risk of being infected by petting a dog is extremely limited, a single infected puppy can produce more than 100,000 roundworm eggs per gram of feces.^[15]

Treatment

Humans suffering from visceral infection of *T. canis*, the drugs albendazole and mebendazole are highly effective. For other treatments, see a physician or reference the disease pages: visceralis larva migrans and ocularis larva migrans. Anthelminthic drugs are used to treat infections in dogs and puppies for adult worms. The best treatment for puppies is pyrantel pamoate to prevent the larvae from reproducing and causing disease.^[6]

Prevention

There are several ways to prevent a *T. canis* infection in both dogs and humans. Regular deworming by a veterinarian is important to stop canine re-infections, especially if the dog is frequently outdoors.^[6] Good practices to prevent human infections include: washing hands before eating and after disposing of animal feces in a timely manner as many disinfectants do not kill eggs, teaching children not to eat soil, and cooking meat to a safe temperature in order to kill potentially infectious eggs.^{[7][12]}

See also

- List of parasites (human)
- *Toxocara cati*
- *Toxascaris leonina*

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External links

- The Merck Veterinary Manual (<http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/23505.htm>)
- CDC - Guidelines for Veterinarians: Prevention of Zoonotic Transmission of Ascarids and Hookworms of Dogs and Cats (<http://www.cdc.gov/ncidod/dpd/parasites/ascaris/prevention.htm>)
- Emedicine - Toxocariasis (<http://www.emedicine.com/med/topic2293.htm>)
- CDC Parasitic Diseases Division - Toxocariasis (http://www.cdc.gov/NCIDOD/DPD/PARASITES/toxocara/factsht_toxocara.htm)
- <http://www.cvm.okstate.edu/~users/jcfox/htdocs/clinpara/Toxocara.htm>
- Roundworms: Dogs and Puppies from The Pet Health Library (<http://www.veterinarypartner.com/Content.plx?P=A&S=0&C=0&A=476>)
- http://www.cdc.gov/ncidod/dpd/parasites/toxocara/factsht_toxocara.htm

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Categories: Ascaridida | Veterinary helminthology | Parasites of dogs | Dog diseases

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