INFORMATION FOR VETERINARIANS AND CLINICS

Roundworms (ascarids) in dogs and cats

Key facts

- In dogs and cats, *Toxocara* and *Toxascaris spp*. are the most common roundworms, and are among the most common global parasites
- Major concern of 'failure to thrive' in puppies and kittens, generally subclinical in adult animals
- Preventive care (AAHA), companion animal parasite council (CAPC), Canadian Parasitology Expert Panel (CPEP) evidence and expert based fecal and deworming guidelines for puppies, kittens, adult dogs, and cats (See resource section below)
- Zoonotic (human) health concern (visceral and ocular larval migrans)
- *Toxocara canis* must be differentiated from *Baylisascaris procyonis* (raccoon roundworm), which has severe zoonotic (human) risk
- KeyScreen™ GI Parasite PCR for roundworm diagnosis, identification, and zoonotic risk, along with 20 other parasites, hookworm resistance marker and *Giardia* zoonosis marker
- One Health, potential drug stewardship considerations

What is it and who gets it?[1]

Toxocara and *Toxascaris spp*. are the most common roundworms in dogs and cats, and can be quite large, i.e., >10 cm.

- Dogs are typically infected with *T. canis*
- Cats are typically infected with *T. cati/(mystax), T. malayiensis*
- Dogs and cats can be infected with *Toxascaris leonina*

How common is it?

Prevalence in dogs and cats varies with deworming history, age, lifestyle (prey ingestion, shelter, kennel, feral), season (peak in winter), and region (geography).[1,2]

One US CAPC data study reported annual canine roundworm prevalence of just below 2% and 3% in peak winter season[2], and a Canadian study reported prevalence between 2-13% in dogs, and up to 17% in cats.[3] Study samples collected from the United States report puppies (<6m) may be shedding *T. canis* eggs at 30%, and that almost all puppies are born infected with *T. canis* (CAPC).

Roundworm infection is most common (and carries the largest risk of disease) in young puppies and kittens. Risk factors for infection are age (more common in young animals), dogs and cats with outdoor lifestyles (stray, working dog, feral cat, etc.), prey-hunting behaviour, and high-density housing (kennels, breeding facility, multi-cat household, etc.).[1]

Transmammary or *in utero* infection are the reason for high shedding prevalence in young animals.[1]

Where is it?

Roundworms are global pathogens; however, there are regional variations in prevalence, CAPC maps, as accessed September 2022.

USA: capcvet.org/maps/#/2022/all-year/roundworm/dog/united-states
Canada: capcvet.org/maps/#/2022/all-year/roundworm/dog/canada

How is it transmitted (spread)?[1]

Pathogenesis
Roundworm adults live and reproduce in their host's (e.g., dog) small intestine. Eggs from adult worms are shed in the host's feces to the environment and develop into 3rd stage larvae. Depending on species, they become infective within 1-4 weeks.

Dogs and cats become infected through direct ingestion of infected tissue or eggs in soil (environmental contamination).

After ingestion of eggs, *Toxocara spp*. pass from the small intestine to the liver and then into the lungs, where they are next coughed up, swallowed, and move to develop into maturity in the small intestine. However, some *Toxocara spp*. larvae may move to other body tissues and can become dormant (arrested development). This process does not occur with *Toxascaris leonina*, i.e., it remains in the small intestine.

In utero infection with *T.canis* can lead to disease in young puppies. Typically, this type of infection is related to reactivation of the larvae (arrested development phase) in the bitch during late pregnancy. Puppies may re-infect the bitch with ingestion of infected feces. Transmammary infection (nursing) occurs in kittens and puppies, in cats this only occurs if the queen is infected late in pregnancy.

What are the clinical signs in dogs and cats?[1]

infection can be a major concern of 'failure to thrive' in puppies and kittens, along with poor haircoat, potbelly and failure to gain weight. Disease is generally subclinical in healthy adult animals.

Clinical signs are related to level of infection (worm burden). In puppies with heavy gastro-intestinal parasite burdens vomiting of worms can occur, which pet-owners may bring into clinics. Kittens and older animals with few worms typically display mild or no clinical signs. Less commonly, coughing up worms or respiratory signs can occur in dogs and in very young puppies death can occur with heavy worm burdens.

How is it diagnosed?

Diagnosis is made by a combination of history, clinical signs, fecal testing and identification of adult worms in vomit or feces. This can include fecal centrifugal flotation (multiple samples may be needed due to intermittent egg shedding), coproantigen ELISA and KeyScreen™ GI Parasite PCR.[4]

A combination of test methodologies may be needed for diagnosis, i.e.., a single fecal test is less likely to be reliable.

What is the treatment?[1]

Treatment is indicated in all patients to reduce spread and environmental contamination. All puppies and kittens should be considered infected, despite an apparent lack of clinical signs.

Established deworming protocols for puppies, kittens and adult dogs and cats consist of benzimidazoles (febantel and fenbendazole), macrocyclic lactones (moxidectin and milbemycin oxime), and tetrahydropyrimidine (pyrantel).

It is critical to be aware (and convey to pet-owners) that larvae in the arrested development phase will not be killed with a single deworming. As such, re-assessment fecal testing is needed to determine need for further therapy.

Monitoring?

Re-testing fecal samples
Fecal re-testing (either through direct fecal, fecal centrifugal flotation or the KeyScreen™ GI Parasite PCR) is important for roundworm positive cases to assess for continued infection or confirm resolution, determine if further therapy is indicated, identify zoonotic risk (and reassure or communicate risk to pet-owners), and identify environmental re-infection.

What to do in cases of re-infection or persistent infection?

At the clinic level, efforts to quickly identify persistent infection (due to re-activation of arrested development phase) or re-infection (e.g., KeyScreen™ GI Parasite PCR) assist in limiting environmental contamination, subsequent zoonotic risk, and aid in drug selection for treatment.

Please connect with the Antech consultation team in cases of re-infection or persistent infection.

What is the prognosis?[1]

Prognosis is excellent in most cases, although severely infected animals may require more intensive therapy and may die if severely compromised or owners cannot afford intensive therapy. Similarly, persistently infected animals can require repeated therapy and additional monitoring for parasite clearance.

What is the prevention?[1]
What can I do to stop this happening to dogs?

Following existing evidence- and expert-based guidelines (CAPC) for prevention testing, monitoring and therapy is indicated for puppies, kittens, and adult animals. Puppies and kittens should have 3-4 fecals in their first year of life, and adult dogs twice annually (as determined based on risk assessment), and routine deworming schedules followed as per CAPC and CPEP.

Therapy of the bitch from day 40 of gestation is indicated and the nursing bitch should be dewormed at the same time as the puppies. Deworming during pregnancy two to four times for a bitch with prior infected litters is advised. Note, care to use deworming medication safe for reproductive stage is advised.

Environmental cleaning (pick up poop) and decontamination (infection control) can reduce re-infection risk and limit the development and geographic spread of roundworms.

"An ounce of prevention is worth a pound of cure" – Ben Franklin

Is this a One Health concern (zoonotic (human), animal, drug stewardship and environment)?

Yes, this is a zoonotic (human) and animal (dog and cat) concern. Humans can develop visceral and ocular larval migrans. *Toxocara canis* must be differentiated from *Baylisascaris procyonis* (raccoon roundworm), which has severe zoonotic (human) risk.[1,5] This can be done through testing with the KeyScreen™ GI Parasite PCR test.

Maybe- At this time there are no reported concerns of resistance; however, due to the rising concern of benzimidazole resistance this concern cannot be dismissed.

Yes- this is environmental concern as we work to reduce the parasite burden by ensuring parasite clearance (re-testing and effective deworming) and 'pick up the poop' messaging.

Baylisascaris procyonis (raccoon roundworm) zoonotic risk?

Baylisascaris procyonis (raccoon roundworm) is present in raccoons (definitive host) and may be identified in fecal samples from dogs across North America. Prevalence is highest in midwestern, northeastern, and western states and Canada, with some studies reporting up to 90% of adult raccoons infected (capc.com).

Infection in dogs can occur through ingestion of larvated eggs from a contaminated environment (raccoon latrines) or predation (larvae in host tissues). Typically, disease in dogs is subclinical, but *B. procyonis* larvae may invade the central nervous system of dogs resulting in neurological disease.[5] Once infected, dogs can harbor adults in their intestinal tracts and pass eggs in their feces. Eggs require 10-14 days in the environment to become infective (CAPC).[5]

Shedding of *Baylisascaris procyonis* eggs from dogs poses a severe zoonotic risk to humans, as disease, while rare, can be devastating. In humans, ingestion of eggs from a contaminated environment (i.e., dog shedding eggs to home, etc.) typically results in fatal (meningoencephalitis) or severe neurological disease (unilateral subacute neuroretinitis) and treatment options are limited to none in some cases.[5]

The focus of veterinary preventative strategies are identification of risk to humans and dogs through fecal diagnostics (KeyScreen™ GI Parasite PCR), limiting exposure to contaminated environments, and prevention of egg shedding through effective therapy of dogs.[1,5,6] People and dogs should avoid areas frequented by raccoons, and ideally raccoons should not be kept as pets. In dogs, year-round use of a monthly preventative effective against roundworms is recommended, along with prompt removal of feces to avoid contamination of the environment.

Your preventive care contribution in the clinic assists:

- The individual pet (puppy, kitten, adult dog or cat)
- Pet-owner
- One Health
- Education of self, staff, and pet-owner to follow appropriate fecal and deworm plan supported by CAPC, CPEP and AAHA evidence- and expert-based guidelines

How does Antech provide veterinary and clinic support?

Provision of diagnostic options that:
Follow existing evidence - and expert-based guidelines (resources, CPEP, AAHA-AAFP, Infectious disease in dogs in group setting (Stull, 2016).

KeyScreen™ GI Parasite PCR[4] is a stable, single sample test with a fast turnaround time (TAT), provides reliable and accurate results, and is backed by scientific support (publications, internal data, peer-review publications, internal data).

- Quickly identifies roundworms and differentiates *Baylisascaris procyonis* (raccoon roundworm)
- Aids drug selection for therapy (if needed)
- Reduces zoonotic risk to humans
- Limits environmental contamination and subsequent worsening of re-infection concern
- Allows for infectious disease surveillance, identification of 'hot spots' and risk mapping
- Environmental stewardship-reduce burden due to parasite clearance re-assessment, supports pick up poop messaging

Provision of medical support

Internal Medicine Consultant team access, clinical pathologist, radiologist, others.

Vet team and pet-owner resources (visual aids graphs of labs, lifestage, breed, parasite and protocol, tidbits that are fun and individualized), technician training (Preventive care modules).

Webinar (RACE approved), case studies, FAQ on disease, pathogen, etc. (IM consultants), visual aids for prevention (trends of labs, parasite checks, body weight based on species-breed and lifestage).

Resources

Companion Animal Parasite Council (CAPC),
As accessed August 2022.

Canadian Parasitology Expert Panel (CPEP),
As accessed August 2022.

Canine (2019) and Feline (2021) Life stage Guidelines, AAHA, AAHA/AAFP,
As accessed August 2022.

American Animal Hospital Association (AAHA) Infectious disease in dogs in group setting (Stull, 2016, As accessed August 2022.

References

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2. Drake J, et al. 2019. Seasonality and changing prevalence of common canine gastrointestinal nematodes in the USA. Parasites Vectors 12, 430.
3. Villeneuve A, et al. 2015. Parasite prevalence in fecal samples from shelter dogs and cats across the Canadian provinces. Parasites Vectors 8, 281.
4. Leutenegger CM, 2022. How molecular testing is reshaping the way parasites can be detected. Vet Pract News. March.
5. Gavin PJ, et al. 2005. Baylisascariasis Clin Micr Rev. Oct:703-718.
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