Roundworms in Dogs: They are Pretty Common, Even in California
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If one looks at the CAPC (Companion Animal Parasite Council) maps on its website, www.capcvet.org, one will see that California is one of the darker states. In 2014 of about 1.5 million fecal examinations run on client owned dogs, some 1 in 59 dogs are positive for roundworm eggs. In California, out of 150,000 dogs that have been tested this year to date, 1 out of every 49 dogs having a fecal submitted by a veterinarian is positive. Basically 13% of the total 1.5 million samples that are positive for Toxocara canis are found in samples submitted within the state of California. In Los Angeles County, the rate is the same as the state – 1/49 dogs. In San Diego County it is 1 out of 70 dogs, IN two counties where 500 dogs have been tested, Merced and Fresno Counties, 1/13 and 1/17 dogs respectively, have been found positive. In San Bernardino County this year, some 8,700 dogs have been tested, and 1 out of 26 dogs were positive. Thus, California can consider itself one of the top states in the nation for dogs appearing in clinics shedding Toxocara canis eggs in their feces. It is there with Michigan, and just behind Washington, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia. Yet California often seems to consider itself Toxocara free. Dr. Blagburn’s survey of shelter dogs (Blagburn 2010), showed that 5.6% of dogs from shelters in the western United States had Toxocara canis eggs in their feces, not as high as the rest of the nation, but still 1/20 dogs were positive. The number in cared for dogs, 1 in 49, is really not all that much different from stray dogs.

Toxocara canis is one of the most common parasites of dogs around the world. The ability of this parasite to be found everywhere is due to the resistance of the egg in the environment, the ability of the parasite to infect puppies via transplacental infection, and the ability of the parasite to utilize invertebrate and vertebrate paratenic hosts to increase the opportunities of transmission to the dog. In the United States, Dr. Blagburn has reported a national prevalence of eggs in the feces of shelter dogs of 14.5% (Blagburn et al., 1996). Amongst well cared for dogs, the levels of T. canis are much less; a review of the results of examination via zinc sulfate centrifugal flotation of 1,199,293 canine fecal samples submitted to Antech Diagnostics in 2006 revealed ascarid eggs in only 2.2% of the samples (Little et al., 2009). Thus, proper care of pets along with broad-spectrum continuous parasite control will markedly reduce the prevalence of these parasites in the canine population.

If a Toxocara canis egg hatches in a dog’s stomach or small intestine, the larva invades the bowel wall and after passage through the liver arrives in a pulmonary capillary. From the lungs larvae can either break into the alveolus and enter the respiratory system to be coughed-up, swallowed and returned to the intestine where it will develop to an adult, or it will be returned to the heart by the pulmonary veins and carried away by the systemic circulation, perhaps to lodge in a kidney or some other somatic tissue, where it will encyst as an arrested infective larva. The probability of tracheal migration is high in a newborn puppy. However, by the time the pup is 1 or 2 months old, the probability that a newly hatched Toxocara canis larva is lowered. If a mouse with arrested infective larvae in its tissues is eaten by a dog, somatic migration is not observed, and in some instances at least, development proceeds to maturity in the alimentary tract (Sprent, 1958).

It was once thought that adult dogs could not be infected with Toxocara canis with any regularity, but this has been shown several times not to be the case. Blagburn, 1996 found 5% of dogs greater than 7 years old to be positive in his survey of shelter animals. It has also been shown that adult dogs can be infected with Toxocara canis routinely, as well as repeatedly after anthelmintic clearance, if they are given only a relatively few infective eggs, 100 to 200, at once (Dubey, 1978; Fahrion et al, 2008; Maizels and Meghji, 1984). Also, dogs infected transplacentally as puppies are no less susceptible to re-infection compared to naïve dogs (Fahrion et al., 2008).

Personal observation by the author of a number of random-source dogs that have been housed in raised runs that are cleaned twice a day for months have revealed that dogs will often have either mixed age infections with a few very young worms mixed among matures adults or will develop a new infection after having been clear of an infection for months. This seems to suggest that it may be that worms occasionally migrate back into the small intestine from the tissues, i.e., larval leak, much like the canine hookworm, Ancylostoma caninum.

Transmission of infection from bitch to pups occurs almost exclusively by way of transplacental transmission. During the last trimester of pregnancy, arrested larvae are reactivated and migrate from the tissues of the bitch to the pups in utero (Fülleborn, 1921). After parturition, small numbers of reactivated larvae also may be shed in the milk, but this is a minor form of transmission for this parasite. Treatment of adult toxocariasis can be performed with a number of labeled products; some of which (pyrantel pamoate) are labeled to be administered as early as two weeks after birth. Treatment can either be targeted based on the results of a fecal examination or can be part of a broad-spectrum control program that targets heartworm and other internal parasites. It now appears that the prenatal application of moxidectin to the pregnant female dog around 5 days and 2 weeks prior to parturition will prevent the prenatal infection.
of puppies with this worm, which is the form of infection that has the most devastating sequelae for the host (Kramer et al., 2006). Thus, we may have the first simple and easy to administer method for treating prenatal infections in puppies and minimizing the number of dogs born with this infection.

Human infections with Toxocara canis are common throughout the world (see Table in Rubionsky-Elefant et al., 2010). After infection, serologic titers remain elevated apparently for life, and biopsies from experimentally infected primates revealed the recovery of living worms yearly for nine years after infection. It appears that the infection in people is more commonly associated with people living in poverty, and human toxocariasis is now considered one of the neglected diseases of people living in poverty in both the United States and Latin America (Hotez et al., 2008; Paludo et al., 2007; Delgado et al., 2009). Fortunately the majority of these infections are asymptomatic.

The most widely recognized source of human infection is ingestion of contaminated soil, and this occurs most frequently in toddlers (Lee et al., 2010). Clinical toxocariasis has also been documented following ingestion of partial or whole paratenic hosts, such as earthworms and raw livers of domestic animals (chickens, ducks, cows, and pigs). Uncooked vegetables have been reported as a probable source of infection, and an Irish study showed garden soil contamination with eggs, but it was not associated with the presence of well-cared-for pets in the household. Keegan and Holland (2010) report on the potential of Toxocara canis eggs being transferred from soil to people with the dog’s hair serving as a fomite, but suggest that the low prevalence and lack embryonated eggs in the haircoat suggested that direct contact with well cared for dogs posed only a low risk of infection.

The mean anti-Toxocara antibodies titer among the U.S. population has been determined to be 13.9% using sera from the Third National Health and Nutrition Examination Survey (Won, 2008). Having a positive titer was associated with a low-level of education, being born in a foreign country, living in overcrowded conditions and in conditions of poverty. Pet ownership was not associated with increased seroprevalence.

Unfortunately, the occasional child still acquires massive doses of eggs inducing the syndrome of visceral larva migrans. The typical clinical manifestations of visceral toxocariasis are enlarged liver and spleen, perhaps pneumonitis, associated with very high eosinophilia. These children may or may not also be afflicted with neurologic disease or sometimes ocular manifestations that may include both eyes. These visceral cases typically occur in toddler-age children.

Ocular toxocariasis typically occurs in older children, and sometimes adults. These patients usually have no other signs of the infection, may have no antibody titer to Toxocara canis, and typically simply have a loss of visual acuity. The lesions are most typically associated in only one eye being affected, and the lesions usually occur within the retina. It has been reported in Ireland that somewhere around 1 in 10,000 school-age children is afflicted with this presentation of the disease (Good et al., 2004). In a survey of ophthalmologists in the United States looking at samples from 2009 to 2010, 68 cases were identified with the four highest states being Georgia, Florida, California, and Texas with 9, 8, 6, and 6, cases respectively. In these cases the mean age of onset was 15.5 years, with the median age of onset being 8.5 years. However, ocular infections occurred in a range of people from 1 to 60 years of age.

Everything would seem to suggest that relative to Toxocara canis that California is not much different from the rest of the United States or the world, and actually, the CAPC maps would indicate that the prevalence in pets is actually amongst the 10 highest states in the nation. This is just one more argument why these dogs should be on year-round heartworm prevention with internal parasite control.

References

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