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Morbidity and  
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Report (MMWR)

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## Ocular Toxocariasis --- United States, 2009--2010

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### *Weekly*

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Ocular toxocariasis (OT) is caused by the zoonotic parasites *Toxocara canis* and *Toxocara cati*, roundworms of dogs and cats. Persons become infected with *Toxocara* when they unintentionally ingest embryonated eggs that have been shed in the feces of infected animals. Although OT is uncommon, it most often affects young children and can cause debilitating ophthalmologic disease, including blindness. Previous studies of OT in the United States have been conducted in single institutions (1--4). This report describes the results of a web-based survey distributed to uveitis, retinal, and pediatric ophthalmology specialists nationwide to collect epidemiologic, demographic, and clinical information on patients with OT. A total of 68 patients were newly diagnosed with OT from September 2009 through September 2010. Among the 44 patients for whom demographic information was available, the median patient age was 8.5 years (range: 1--60 years), and 25 patients (57%) lived in the South at the time of diagnosis. Among 30 patients with reported clinical data, the most common symptom was vision loss, reported by 25 (83%) patients; of these, 17 (68%) suffered permanent vision loss. The results of this first national level survey demonstrate that OT transmission continues to occur in the United States, frequently affecting children and causing permanent vision loss in the majority of reported patients. Good hygiene practices, timely disposal of pet feces, and routine deworming of pets are strategies necessary to reduce OT in humans.

In collaboration with the American Academy of Ophthalmology (AAO), a web-based survey was distributed to currently practicing ophthalmologists belonging to the American Uveitis Society (AUS), the American Society of Retina Specialists (ASRS), or the American Association for Pediatric Ophthalmology and Strabismus (AAPOS). Each ophthalmologist reported how many patients with OT were examined from September 2009 through September 2010. An OT patient was defined as a person who had a new clinical diagnosis of OT based on ophthalmologic signs and symptoms. Ophthalmologists were asked to provide epidemiologic, demographic, clinical, diagnostic, and treatment data for each OT patient.

Of the 3,020 ophthalmology specialists surveyed, 599 (19%) responded; of these, 67% were pediatric ophthalmologists, 18% were retinal specialists, and 15% were uveitis specialists. OT patients were classified as newly diagnosed if first diagnosed with OT from September 2009 through September 2010. A total of 68 newly diagnosed OT patients were reported. OT patients lived in 23 different states, the District of Columbia, and Puerto Rico (Table 1). Twenty-five of 44 (57%) OT patients lived in the South, and 21 of 33 (64%) owned a pet (Table 2). Clinical data were reported for 30 OT patients. Vision loss was observed in 25 (83%) of these 30 OT patients, 17 (68%) of whom had permanent vision loss (Table 3). Three of the top five most commonly reported ophthalmologic signs (subretinal granulomatous mass/scar, posterior pole granuloma, and peripheral granuloma with traction bands) are indicative of permanent injury to the eye (5). Fourteen of 20 (70%) OT patients who had serum enzyme-

linked immunosorbent assay (ELISA) testing for antibody to the *Toxocara* parasite completed had a positive test result. Corticosteroid treatment was prescribed for 11 of 12 (92%) OT patients, whereas seven of 28 (25%) OT patients underwent ophthalmologic procedures, including pars plana vitrectomy, scleral buckling, and cataract surgery, in an attempt to improve their vision.

## Reported by

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## Editorial Note

Dogs and cats are the respective definitive hosts for the zoonotic parasites *T. canis* and *T. cati*. Infected dogs or cats pass unembryonated eggs in their feces; after 2 to 4 weeks in the environment, the eggs embryonate and become infectious. If embryonated eggs are consumed unintentionally by humans, the *Toxocara* larvae emerge and are able to migrate throughout the body, causing severe systemic reactions. *Toxocara* infection in humans occurs most commonly through ingestion of contaminated soil. *Toxocara* is found in all regions of the United States; however, development of *Toxocara* larvae does not occur below 50°F (10°C), making soil in warmer climates more conducive to contamination with infectious *Toxocara* eggs (5).

Children are especially at risk for infection from exposure to playgrounds and sandboxes contaminated by dog or cat feces (6--7). Several case studies have documented a clinical ocular manifestation with severe vision impairment in children (1--4). Previous studies of OT in the United States have been conducted within single institutions, with only one multicenter survey performed in 1987 in Alabama, which indicated an estimated statewide prevalence of one per 1,000 persons (8). Testing data for a representative sample of the U.S. population aged ≥6 years from the Third National Health and Nutrition Examination Survey (NHANES III) demonstrated an overall prevalence of 13.9% positive for antibodies to *Toxocara*; however, serologic testing does not reliably indicate active infection, nor does a negative test result rule out *Toxocara* infection (9).

Treatment of OT is aimed at reducing inflammation through the use of corticosteroids and antihelminthics; various ophthalmologic surgical procedures may be used to minimize complications from severe disease. However, data are limited regarding optimal treatment strategies, and irreversible ocular damage has already occurred in most OT patients by the time they are examined by an ophthalmologist. The survey described in this report was conducted in an effort to better understand the impact of toxocariasis in the United States by collecting information on OT, which is readily diagnosed by clinical presentation.

The findings in this report are subject to at least three limitations. First, the response rate (19%) of survey respondents was low, which likely is attributable to the significant amount of time required to access and abstract the patients' medical records for the requested data and to complete the survey. Ophthalmologists who did not have OT patients likely elected not to participate in the survey, which also might have contributed to the low response rate. Second,



the results might be subject to responder bias because the surveyed ophthalmologic subspecialists might be more likely to report more severe disease, which might contribute to the underrepresentation of patients with mild OT clinical manifestations. Finally, the findings might be subject to selection bias because persons with limited access to health care might not have access to subspecialty ophthalmologic care. All three limitations likely would contribute to underreporting of OT patients.

Prevention of toxocariasis requires a One Health approach,\* incorporating the collaboration of groups invested in protecting the health of humans, animals, and the environment. Good hygiene practices, such as hand washing, should be encouraged especially after contact with pets or areas at high risk for soil contamination, such as playgrounds and sandboxes. Health-care providers should be aware of clinical manifestations of toxocariasis and educate their patients at risk, especially children, about avoiding exposure to potentially contaminated soil and preventing infection in their pets. Veterinarians should encourage pet owners to immediately dispose of dog and cat feces and to have their pets regularly tested for parasitic infections and dewormed. Controlling *Toxocara* infection in dogs and cats and preventing exposure of persons to possible sources of infection will prevent infection and decrease morbidity associated with *Toxocara*. Additional information about toxocariasis is available at <http://www.cdc.gov/parasites/toxocariasis>.

## Acknowledgment

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\* The One Health initiative seeks to improve the health of all humans and animals through the integration of human medicine, veterinary medicine, and environmental science. Additional information available at <http://www.onehealthinitiative.com>.

**TABLE 1. Number of patients with newly diagnosed ocular toxocariasis (N = 68), by state/area --- United States, 2009--2010**

State/Area	No. of patients
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Georgia	9
Florida	8
California	6
Texas	6
Alabama	5
District of Columbia	3
Illinois	3
New York	3
South Carolina	3
Arkansas	2
Connecticut	2
Indiana	2
Maryland	2
Nevada	2
Virginia	2
Iowa	1
Louisiana	1
North Carolina	1
Ohio	1
Oklahoma	1
Oregon	1
Pennsylvania	1
Puerto Rico	1
Tennessee	1
West Virginia	1



**TABLE 2. Number and percentage of patients with newly diagnosed ocular toxocariasis (N = 68), by selected characteristics --- United States, 2009--2010**

Characteristic	No. of patients*	(%) <sup>†</sup>
<b>Age (yrs) (n = 44)</b>		
Mean	15.5	
Median	8.5	
Range	1--60	
<b>Sex (n = 43)</b>		
Male	24	(56)
Female	19	(44)
<b>Race (n = 43)</b>		
White	30	(70)
Black	8	(19)
Asian/Pacific Islander	4	(9)
American Indian/Alaska Native	1	(2)
<b>Ethnicity (n = 41)</b>		
Hispanic	7	(17)
Non-Hispanic	34	(83)
<b>Region<sup>§</sup> (n = 44)</b>		
Northeast	6	(14)
Midwest	5	(11)
South	25	(57)
West	8	(18)
<b>Environment (n = 40)</b>		
Urban	12	(30)
Rural	7	(18)
Suburban	16	(40)

Mixed	5	(12)
<b>Pet ownership (n = 33)</b>	<b>21</b>	<b>(64)</b>
<b>Type of pet (n = 21)</b>		
Dog	9	(43)
Cat	6	(29)
Dog and cat	5	(24)
Unknown	1	(5)
<b>Health insurance coverage (n = 43)</b>		
Private	18	(42)
Medicare	16	(37)
Medicaid	0	---
Uninsured	3	(8)
Unknown	6	(14)

\* Because of missing data, the number of respondents for selected characteristics varies.

† Percentages might not sum to 100% because of rounding.

§ U.S. Census regions. Additional information available at [http://www.census.gov/geo/www/us\\_regdiv.pdf](http://www.census.gov/geo/www/us_regdiv.pdf)  .

**TABLE 3. Number and percentage of patients with newly diagnosed ocular toxocariasis (N = 68), by signs and symptoms present at examination --- United States, 2009--2010**

<b>Signs/Symptoms</b>	<b>No. of patients*</b>	<b>(%)<sup>†</sup></b>
<b>Signs (n = 32)</b>		
Subretinal granulomatous mass/scar	20	(65)
Vitritis	16	(55)
Scotoma	10	(50)
Posterior pole granuloma	13	(42)
Peripheral granuloma with traction bands	12	(39)
Active chorioretinitis	11	(34)

Retinal detachment	9	(28)
Strabismus	8	(27)
Anterior uveitis	8	(25)
Leukocoria	4	(15)
Diffuse nematode endophthalmitis	2	(6)

### Symptoms (n = 37)

Vision loss	25	(83)
Permanent	17	(68)
Temporary	7	(28)
Unknown	1	(<1)
Floaters	13	(38)
Eye redness	12	(32)
Photophobia	10	(27)
Eye pain	7	(19)

\* Because of missing data, the number of respondents for selected characteristics varies.

† Percentages might not sum to 100% because of rounding.

### What is already known on this topic?

Ocular toxocariasis (OT) is a zoonotic parasitic infection of cats and dogs that can lead to debilitating ophthalmologic disease in humans.

### What is added by this report?

Transmission of *Toxocara* continues to occur in the United States. OT is a cause of preventable vision loss primarily affecting children.

### What are the implications for public health practice?

Preventing transmission of *Toxocara* by good hygiene practices, prompt disposal of pet feces, and routine deworming of pets can reduce the number of children with vision loss caused by OT.

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