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Animal Testing for Potential Rabies Exposures Update—Connecticut, 2011–2013

The Connecticut Department of Public Health (DPH) Public Health Laboratory tests all animals submitted for rabies examination free of charge. The high number of animals submitted creates a significant burden on laboratory resources. In 2010, DPH staff reviewed rabies testing data to determine if submissions were consistent with state and national prevention guidelines for people and domestic animals. These data included testing on animal species and types of contact that would not indicate a rabies exposure had occurred (*1,2*).

Based on these findings, the Request for Rabies Examination Form OL-97A was revised to include clarification of the guidelines for submitting specimens including acceptable animal species, and the type of rabies exposures. Human exposures were categorized as "bite", "saliva contact of mucus membrane or open wound", or "bat", with additional instructions on bat submissions (*3*). Domestic animal exposures were categorized as "direct contact or bite" and "exposure by proximity (high probability of contact)". The revised form was published in the November 2010 edition of the Connecticut Epidemiologist newsletter. Presentations were given at a Connecticut Animal Control Officers (ACO) Training Seminar and the Commissioner's semi-annual meeting of Local Directors of Health. This report summarizes surveillance data collected subsequent to the revised submission process.

During 2011–2013, 5,973 animals were submitted of which 5,968 viable specimens were tested. Of those tested, there were 1,822 (31%) bats, 1,468 (25%) cats, 1,016 (17%) dogs, 595 (10%) raccoons, 447 (7%) skunks, 172 (3%) groundhogs, 130 (2%) opossum, 101 (2%) squirrels, and 65 (1%) fox. A total of 69 other wild terrestrial animals, 40 domestic animals, 42 animals that could have been either wild or domestic (mice, rabbits, and rats) and 1 unidentified animal were also tested (Table 1). The average annual number of animals submitted for rabies testing was 1,991 (range 1,930-2,085).

Of all specimens received, 3,072 (51%) indicated a human exposure, and 1,099 (18%) indicated domestic animal exposure. There were 1,449 (24%) others that indicated both a human and domestic animal exposure, and 353 (6%) with no exposure indicated. Specimens received indicating human exposures included 1,336 (43%) bite, 550

In this issue...

Table. Animals tested for rabies, by test result and percentage positive, Connecticut, 2011-2013.

Animal Type	Total*	Positive	Negative	% Positive
Bats	1825	74	1748	4%
Domestic Cats	1468	13	1455	1%
Domestic Dogs	1017	1	1015	0%
Raccoons	595	278	317	47%
Skunks	447	126	321	28%
Rodents[1]	158	0	158	0%
Other[2]	159	1	157	1%
Groundhogs[3]	172	5	167	3%
Domestic Hoofstock[4]	35	4	31	11%
Wild Canids[5]	81	14	67	17%
Mustelids[6]	9	0	9	0%
Wild Hoofstock[7]	6	0	6	0%
Unknown	1	0	1	0%
Total	**5968**	**516**	**5452**	9%

1. beaver, chipmunk, mole, mouse, muskrat, rat, squirrel, vole (excludes groundhogs)
2. bear, mountain lion, opossum, rabbit, shrew
3. aka woodchuck
4. alpaca, cow, donkey, goat, horse, sheep
5. bobcat, coyote, fox
6. ferrets, fisher cats, otters, weasels (excludes skunks)
7. deer, moose

(18%) bat, and 225 (7%) saliva contact of mucus membrane or open wound. Domestic animal exposures included 549 (50%) direct contact or bite, and 185 (17%) exposure by proximity. All other exposures did not match established exposure types.

Of the viable specimens tested, a total of 516 (9%) tested positive, and included 278 (54%) raccoons, 126 (24%) skunks, and 74 (14%) bats. An additional 19 (4%) wild terrestrial animals and 19 (4%) domestic animals tested positive for rabies virus, including 13 cats and 1 dog. The average annual number of animals that tested positive for rabies was 172 (range 148-195).

A total of 147 chipmunks, moles, mice, squirrels, and other small rodents were submitted for testing. The average annual number of small rodents submitted for testing was 49 (range 27-81). No small rodent tested positive.

The average annual number of animals submitted for rabies testing during 2011-2013 was reduced by 22%, when compared to those submitted during 2005-2009 (1,991 vs. 2,543 respectively). Overall, the average annual number of domestic animals was reduced by 22% (841 vs 1,073 respectively) and includes a reduction in cats of 24% and dogs of 11%. The average annual number of small rodents submitted for testing was reduced by 54% (49 vs 106 respectively). On average, bat submissions were down 19%.

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Editorial

A rabies exposure is defined as contact among susceptible animals that has the potential to result in virus transmission. Transmission requires the presence of infectious material (saliva and brain/ nervous system tissue) and a portal of entry into the body. Only mammals are capable of being infected and transmitting rabies virus. Susceptibility varies among species with some more likely to be infected than others. In Connecticut, wild animals that must be assumed to be infected include raccoons, skunks, wild carnivores (e.g., fox, coyote, bobcat), groundhogs/woodchucks, and bats.

The Centers for Disease Control and Prevention (CDC) outlines two major categories of human rabies exposures, bite and non-bite (*4*). Non-bite exposures include contamination of open wounds and/or mucous membranes (eyes or mouth) with potentially contaminated infectious material. These types of exposures must be evaluated; however, they rarely result in rabies transmission. Petting or handling an animal, or contact with other bodily fluids including blood and urine or feces, is not considered an exposure. Domestic animal exposures include direct contact or bite, and exposure by proximity (high probability of contact with a potentially rabid wild animal).

Bat bites cause relatively small wounds with mild pain. Persons bitten may not recognize that a rabies exposure occurred and not seek medical attention. A bat that has direct contact with a human or domestic animal, or is found in a room with a person who cannot communicate seeing it or knowing they may have been bitten (e.g., sleeping person, young child, person with dementia or inebriated) should be submitted for testing.

Other animals should be submitted for testing only after consultation with the DPH or local health department. These animals include those that have not bitten a person or domestic animal, and small rodents (e.g., chipmunks, mice, moles, squirrels) and rabbits that have bitten a person or domestic animal.

Rabies in small rodents has not been detected in Connecticut and is rarely reported in the United States. No known human rabies cases have been linked to small rodents. Also, bats found in a home but not in a room with a person need testing approval. Domestic animals, including cats and dogs, should be submitted only if instructed to do so by an ACO. These animals should generally be observed in quarantine for 14 days after a person is bitten.

Adherence to established guidelines is important to assure that rabies in people and domestic animals is prevented, and reduce the burden of unnecessary testing on public health laboratories.

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Potential Human Rabies Exposures – Connecticut, 2003-2008. Vol.30, No. 7; 25-27. November 2010.
3. Connecticut Department of Public Health Request for Rabies Examination Form. http://www.ct.gov/dph/lib/dph/infectious_diseases/rabies/rabiestestform_ol97a.pdf. Viewed on 8/15/2014.
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Babesiosis Surveillance — Connecticut, 2011–2013

Babesiosis was first identified in Connecticut in 1988, and is most commonly caused by *Babesia microti*, a red blood cell parasite. *B. microti* is primarily transmitted by the nymphal stage of *Ixodes scapularis* ticks; however it is rarely transmitted through blood transfusions or organ and tissue transplantation. The Connecticut Department of Public Health (DPH) has conducted surveillance for babesiosis through physician reporting since 1989 and through laboratory reporting since 1990. In 2011, with the establishment of a national surveillance case definition, babesiosis became a nationally notifiable disease (*1*).

Before the national surveillance case definition was established, case classification was based only on laboratory test results. The national surveillance case definition also requires clinical information. Provider follow-up for clinical information is conducted by DPH staff on all positive test results consistent with the national surveillance laboratory criteria for diagnosis. Follow-up involves mailing letters requesting completion and return of a supplemental report form. The information collected is necessary to determine case status.

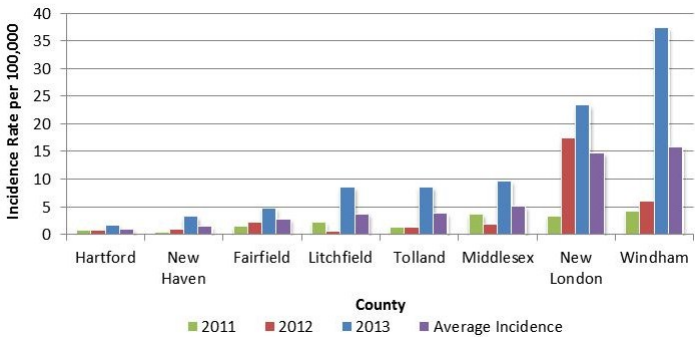
Laboratory confirmation is defined as identification of the parasite on a peripheral blood smear, detection of genomic sequences from whole blood specimens by nucleic acid amplification such as polymerase chain reaction (PCR), or isolation by animal inoculation. Test results that are supportive but not confirmatory include indirect fluorescent antibody IgG (≥ 1:256 for *B. microti* and *B. divergens*, ≥ 1:512 for *B. duncani*) or positive *B. microti* immunoblot IgG. A confirmed case is defined as, a patient with confirmatory laboratory result and at least one objective (i.e. fever, anemia, thrombocytopenia) or one subjective (i.e. chills, sweats, headache, myalgia, arthralgia) clinical manifestation. A probable case has a supportive laboratory result and at least one objective clinical characteristic or is a blood donor or recipient epidemiologically linked to a confirmed or probable case. A suspect case has confirmatory or supportive laboratory results but insufficient clinical information for further classification (e.g., laboratory report only, no clinical information provided). Only confirmed cases are reported to the Centers for Disease Control and Prevention for inclusion in the national statistics.

During 2011-2013, follow-up that included mailing supplemental reporting forms to the ordering physician, was conducted on 1,581 patients with confirmatory or supportive laboratory results. Of the supplemental reports mailed, 801 (51%) were returned and included 392 (49%) confirmed cases, 75 (9%) probable cases, and 334 (42%) were not a case. The remaining 780 (49%) were classified as suspect. Further analysis was conducted on confirmed cases only.

Of the 392 confirmed cases, 50 (13%) were reported in 2011, 103 (26%) in 2012, and 239 (61%) in 2013. The incidence of babesiosis increased statewide from 1.4 cases per 100,000 population in 2011 to 6.7 cases per 100,000 population in 2013 ($p<0.00001$) and included increases in all eight counties (Figure). The highest average annual rates were found in New London County (13.9 cases per 100,000 population, $p<0.00001$) and Windham County (14.4 cases per 100,000 population, $p<0.00001$). These counties also accounted for 44% of overall cases. Of the 188 confirmed cases with known onset date, 87% were during June-August.

The median age was 60 years (range: <1–103 years); 277 (71%) were male. Among the 320 (82%)

Figure. Babesiosis incidence rate by county, Connecticut, 2011-2013



cases for which race was available, 298 (93%) were white, 13 (4%) Asian, 6 (2%) were Black, 1 (<1%) Native Hawaiian and Pacific Islander, and 2 (1%) were classified as Other with no race specified identified. Among the 249 cases for which ethnicity was reported, 28 (11%) were identified as Hispanic/ Latino. Illness was characterized by fever (290, 74%), thrombocytopenia (247, 63%), anemia (242, 62%), muscle aches (199, 51%), chills (197, 50%), headaches (178, 45%), sweats (136, 35%), and arthralgia (126, 32%). Of the 388 patients for whom data were available, 180 (46%) were hospitalized. The median length of hospital stay was 5 days (range: 1–88 days); 2 (1%) deaths were reported.

The laboratory method most used for diagnosis was the blood smear test; 242 (62%) cases. PCR testing was used to diagnose the remaining confirmed cases. The number of cases diagnosed using PCR testing increased from 17 (33%) in 2011, to 109 (47%) in 2013 ($p<0.00003$). Of the 173 (44%) cases for which information was available, 5 (3%) received a blood transfusion, tissue product, or an organ transplant within one year before onset. Of the 106 (27%) cases for which information was available, 2 (2%) recently donated blood.

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Editorial

During 2011-2013, the number of confirmed cases reported to the DPH increased by 378%, and the reported incidence of babesiosis increased statewide and in all eight counties. This increase may be due in part to improved laboratory diagnostics. The use of PCR testing among confirmed case-patients increased by 14%. PCR testing is considered more sensitive than microscopic examination of blood smears.

Eastern Connecticut had the highest annual mean incidence of confirmed babesiosis. This may be due in part to the high rate of infection in the wildlife reservoir, the white footed mouse (*Peromyscus leucopus*), and land use. During 2001-2006, the Connecticut Agricultural Experiment Station conducted a serosurvey of mice in New London County. Data revealed the highest seroprevelance of white footed mice infected with *B. microti*, when compared to four other counties (*2*).

The rising number of reported cases, geographic spread, and severity of illness, frequently resulting in hospitalization, indicates this emerging tickborne disease is of increasing public health importance. Transmission by the same tick species that transmits the agents of Lyme disease and anaplasmosis underscores the need for environmental tick control and adoption of personal measures to avoid tick bites. To understand the changing trends of this emerging disease, it is crucial that providers complete and return the supplemental babesiosis follow-up form. Data collected will help the DPH better determine the epidemiology of this disease in Connecticut. When evaluating patients with fever and other symptoms suggestive of tick-borne illness, clinicians should consider babesiosis in their diagnosis, especially in those with potential tick exposures during the months of June–August.

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