

Key Findings and Public Health Messages

- The California Department of Public Health (CDPH) received reports of 1,747 animal rabies cases from 2001 through 2008. Reported animal cases decreased in California by 44.5 percent from 2001 (321) to 2008 (178).
- Among animal rabies cases, the most frequently reported species were bats (1,276, 73.0 percent), skunks (410, 23.5 percent), foxes (39, 2.3 percent), and cats (11, 0.6 percent).
- The annual number of rabid bats reported to CDPH decreased by 17.5 percent from 2001 (166) to 2008 (137). Rabid bats were most frequently reported from the Far North (17.7 percent of 1,276), Bay Area (21.3 percent), Sacramento Metro (13.7 percent), and South Coast (13.7 percent) regions.
- The annual number of rabid skunks reported to CDPH decreased by 79.5 percent from 2001 (151) to 2008 (31). Rabid skunks were most frequently reported from the Central Coast (32.4 percent of 410), Far North (25.1 percent), and Sacramento Metro (17.8 percent) regions.
- During the surveillance period, 6 human cases of rabies were reported to CDPH. Four of 6 human rabies cases resulted from exposures that occurred outside of the US and 2 resulted from bat exposures in California.
- Appropriate domestic and wild animal management, animal vaccination programs, public health and medical management of persons exposed to potentially rabid animals, public education about animal risk reduction strategies, and avoiding wild animal contact may provide the best opportunities for reducing rabies in humans and animals.

Background

Human rabies is an uncommon but important viral zoonotic disease in the United States (US); between 1 and 8 cases are reported annually¹. In the US, rabies is common in some wild animal species but is rare in domestic animals. The primary animal reservoirs for rabies in California are bats and skunks; each has its own species-specific rabies virus variants. Contact with the saliva of a rabid animal by direct bite is the leading source of rabies virus exposure in humans. Although rare, rabies can be transmitted by contact through open wounds or mucous membranes with infected animal saliva. Transmission of virus has been documented through human organ and corneal transplant (from undiagnosed donor to recipient).

Human rabies has a variable and sometimes prolonged incubation period (7 days to 6 years). After an initial non-specific febrile prodromal phase (headache, fever, malaise, a sense of apprehension, and indefinite sensory changes), patients rapidly progress to an almost invariably fatal acute encephalomyelitis. Although uncommon, human rabies retains its public health significance because of the lethality of human infections. Guidance on public health investigation and management of potentially exposed humans, and surveillance and management of animals subject to rabies in California are described elsewhere^{1,2}.

We describe here the epidemiology of animal and human rabies in California from 2001 through 2008. Data for 2008 are provisional and may differ from data in future publications. For a complete discussion of the definitions, methods, and limitations associated with this report, please refer to Technical Notes³.

California reporting requirements and surveillance case definition

California Code of Regulations, Title 17, requires health care providers to report cases of suspected human or animal rabies to the local health officer (LHO) immediately by telephone. Laboratories must also notify the LHO when laboratory testing yields evidence suggestive of rabies; written notification must occur within one working day after the health care provider has been notified. Additionally, regulations require that all persons must notify the LHO if they have knowledge of persons or animals bitten by a potentially rabid animal, persons bitten by a mammal, or the

whereabouts of an animal suspected to have rabies. In areas declared by CDPH to be rabies areas, persons must also report to the LHO information regarding persons bitten by an animal of a species subject to rabies, whether or not the animal is suspected of having rabies². During the surveillance period, all counties in California were declared rabies areas.

California regulations require LHOs to report to CDPH cases of human and animal rabies. CDPH officially counted cases that satisfied the Centers for Disease Control and Prevention (CDC) surveillance case definition. CDC defined a case of animal rabies as one with a positive direct fluorescent antibody test (preferably performed on central nervous system tissue) or isolation of rabies virus in cell culture or in a laboratory animal. A human rabies case was defined as one with detection by direct fluorescent antibody of viral antigens in a clinical specimen (preferably the brain or the nerves surrounding hair follicles in the nape of the neck), or isolation in cell culture or in a laboratory animal of rabies virus from saliva, cerebrospinal fluid (CSF), or central nervous system tissue, or identification of a rabies-neutralizing antibody titer greater than or equal to 5 (complete neutralization) in the serum or CSF of an unvaccinated person.

Epidemiology of rabies in California

Animal cases

During the surveillance period, CDPH received reports of 1,747 animal rabies cases. Animal cases occurred in bats (1,276, 73.0 percent), skunks (410, 23.5 percent), foxes (39, 2.3 percent), cats (11, 0.6 percent), dogs (4, 0.2 percent), equine (2, 0.1 percent), raccoons (2, 0.1 percent), coyote (1, < 0.1 percent), opossum (1, < 0.1 percent), and rabbit (1, < 0.1 percent).

The annual number of animal cases reported to CDPH decreased by 44.5 percent from 2001 (321) to 2008 (178) [Figure 1]. The annual number of rabid bats decreased by 17.5 percent from 2001 (166) to 2008 (137) [Figure 2]. The annual number of rabid skunks decreased by 79.5 percent from 2001 (151) to 2008 (31).

Rabid bats were most frequently reported from the Far North (17.7 percent of 1,276), Bay Area (21.3 percent), Sacramento Metro (13.7 percent), and South Coast (13.7 percent) regions. The number of cases reported from most geographic regions remained level from the combined years of 2001 through 2004 to the combined years of 2005

Figure 1. Number of reported animal rabies cases in California

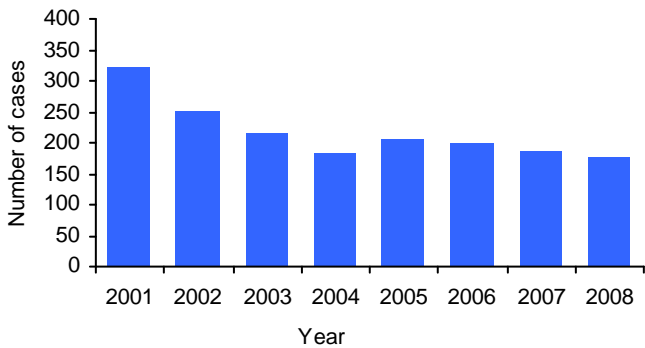


Figure 2. Reported animal cases of rabies in California by species and year

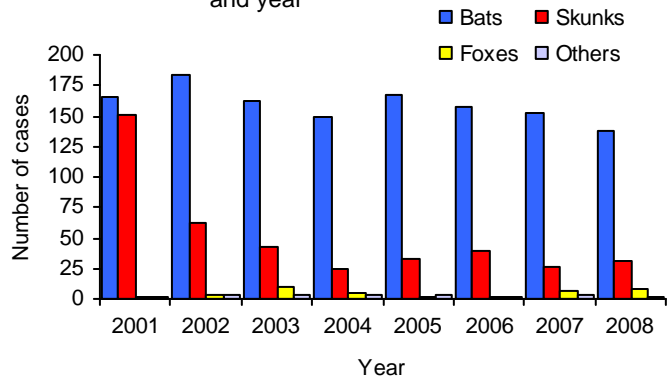
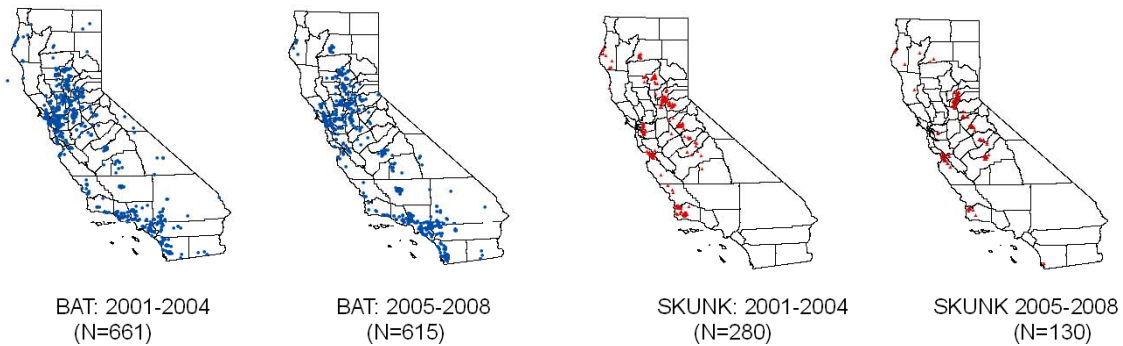


Table 1. Reported human rabies cases in California

Year	Age	Sex	County	Rabies virus variant
2001	72	Male	San Diego*	Dog, Philippines
2002	28	Male	Glenn	Bat, Mexican free-tailed
2003	66	Male	Trinity	Bat, Silver haired
2004	22	Male	Los Angeles*	Dog, El Salvador
2006	11	Male	San Joaquin*	Dog, Philippines
2008	16	Male	Santa Barbara*	Bat, Mexican free-tailed

* Imported cases; exposure occurred outside of the California

Figure 3. Reported rabid bats and skunks in California by location found, 2001 - 2008



through 2008 [Figure 3]. In contrast, rabid skunks were most frequently reported from the Central Coast (32.4 percent of 410), Far North (25.1 percent), and Sacramento Metro (17.8 percent) regions. From the combined years of 2001 through 2004 to the combined years of 2005 through 2008, the regions with the greatest percentage decreases in reported skunk rabies were the Bay Area (88.5 percent decrease from 26 to 3 cases), the Far North (78.8 percent decrease from 85 to 18 cases), and the Central Coast (53.9 percent decrease from 91 to 42 cases) [Figure 3].

Human cases

During the surveillance period, 6 human cases of rabies were reported in California; as expected all died [Table 1]. All were males with a median age of 25 years (range: 11 to 72 years). Race/ethnicities were White, non-Hispanic (2, 33.3 percent), Hispanic (2, 33.3 percent), and Asian-Pacific Islander (2, 33.3 percent). Cases resided in the regions of the Far North (2, 33.3 percent), San Joaquin Valley (1, 16.7 percent), Central Coast (1, 16.7 percent), South Coast (1, 16.7 percent), and San Diego (1, 16.7 percent). Four (66.7 percent) of 6 human rabies cases resulted from exposures that occurred outside of the US. The remaining 2 cases were associated with California bat variants.

California's most recent human case occurred in a 16-year-old male who entered the state illegally from Oaxaca, Mexico and became ill 1 day after his arrival⁴. The patient had a history of a dog and a fox bite. Patient specimens yielded virus closely related to bat rather than dog virus variant. At least 20 persons received postexposure prophylaxis because of exposure to the case.

Comment

Human rabies remained rare in California during the

surveillance period. California's 2008 case was the first imported human rabies case in the US that was not associated with a canine rabies virus variant. Although the number of rabid wild animals (especially skunks) reported to CDPH decreased during the surveillance period, it remains unclear whether these decreases represent changes in disease activity, detection, testing, or reporting. Because animal public health surveillance is largely passive, resource limitations may have influenced case detection and reporting.

Appropriate domestic and wild animal management, animal vaccination programs, public health and medical management of persons exposed to potentially rabid animals, public education about animal risk reduction strategies, and avoiding wild animal contact may provide the best opportunities for reducing rabies in humans and animals.

References and resources

- ¹Centers for Disease Control and Prevention. Human rabies prevention - United States, 2008. MMWR 2008;57:1-26,28. <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.htm>
- ²CDPH rabies information page: <http://www2.cdph.ca.gov/HealthInfo/discond/Pages/rabies.aspx>
- ³Epidemiologic Summaries of Selected General Communicable Diseases in California, 2001-2008: Technical Notes <http://www.cdph.ca.gov/data/statistics/Documents/technicalnotes-episummary-aug2409.pdf>
- ⁴Centers for Disease Control and Prevention. Imported human rabies - California, 2008. MMWR 2009;58:713-6. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5826a1.htm>

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