Rabies

Manitoba Health
Public Health
Communicable Disease Control Unit

Case Definition

Confirmed Case: Clinically compatible neurologic illness with diagnosis confirmed by tissue antigen detection, observation of Negri bodies, viral culture, or serology.

Reporting Requirements

- All positive results from specimens tested using methods listed above are reportable by laboratory.
- All cases are reportable by attending health care professional.
- Notification of the local Regional Health Authority Public Health Unit or Nursing Station by attending health care professional is recommended for all bites, scratches or instances of contact of saliva or infected tissue with an open wound or mucous membrane. Two exceptions are:
  - the biting animal is extremely unlikely to be rabid;

    OR
  - a 10-day observation period is appropriate and the bite victim (or family) is confident that the owners will notify them or a veterinarian immediately, if a significant change in health or behaviour of the animal occurs during this period.

Clinical Presentation/Natural History

An almost invariably fatal, acute viral encephalomyelitis; onset is often heralded by a sense of apprehension, headache, fever, malaise and indefinite sensory changes often referred to the site of a preceding animal-bite wound. Excitability and aerophobia are frequent symptoms. The disease progresses to paresis or paralysis; spasm of swallowing muscles leads to fear of water (hydrophobia); delirium and convulsions follow. Without medical intervention, the usual duration is two to six days, sometimes longer. Death is often due to respiratory paralysis.

Etiology

Rabies virus, a rhabdovirus of the genus Lyssavirus. All members of the genus are antigenically related, but use of monoclonal antibodies and nucleotide sequencing of the virus demonstrates differences according to the animal species or the geographic location from which they originate. Rabies-related viruses that exist in Africa (Mokola and Duvenhage) have been associated rarely with fatal rabies-like human illness. Some of these illnesses may be diagnosed as rabies by the standard FA test.

Epidemiology

Reservoir and Source: Many wild Canidae, including dogs, foxes, coyotes, wolves and jackals; also skunks, raccoons, mongooses and other biting mammals. Infected populations of vampire, frugivorous and insectivorous bats are found in Mexico, Central and South America; infected insectivorous bats are found in the United States, Canada and now in Europe. In developing countries, dogs remain the principal reservoir. Rabbits, opossums, squirrels, chipmunks, rats and mice are rarely infected, and their bites rarely, if ever, call for rabies prophylaxis. Muskrats have, on rare occasion, been found to be rabid. In Manitoba, the principal reservoir is the striped skunk. Many exposures occur via domestic farm animals, dogs and cats that have acquired rabies from skunks.

Transmission: Virus-laden saliva of a rabid animal is introduced by a bite or scratch (or, very rarely, into a fresh break in the skin or through intact mucous membranes). Transmission from person-to-person is theoretically possible since the saliva of the infected person may contain virus, but this has never been documented. Organ (corneal) transplants taken from persons dying of undiagnosed Central Nervous System disease have resulted in rabies in the recipients. Airborne spread has been demonstrated in a cave where myriad of bats were roosting and in laboratory settings, but this occurs very rarely. In Latin America,

transmission from infected vampire bats to domestic animals is common. In the United States, rabid insectivorous bats rarely transmit rabies to terrestrial animals, wild or domestic. Skunk spray does not contain rabies virus.

Occurrence:

Worldwide, with an estimated 35,000 to 40,000 deaths per year, almost all in developing countries. From 1980 to 1994 in the United States, 24 deaths from rabies were diagnosed; nine of these were probably acquired outside the United States. Of those who were probably infected within the United States, 11 died of bat-associated rabies. In Canada, since 1925, there have been 22 recorded deaths due to rabies, with the most recent occurring in 2000.

General: Rabies is a disease primarily of animals. The only areas free of rabies in the animal population in 1994 were Australia, New Zealand, New Guinea, Japan, Hawaii, Taiwan, Oceania, the United Kingdom, Ireland, Iceland, mainland Norway, Sweden, Finland, Portugal, Greece and some of the West Indies and Atlantic islands. Urban (or canine) rabies is transmitted by dogs, whereas sylvatic rabies is a disease of wild carnivores and bats, with sporadic spillover to dogs, cats and livestock. In Europe, fox rabies was widespread, but has decreased since 1978 when oral rabies immunization was begun; in western Europe the number of cases has decreased drastically since 1992, except for bat rabies. Since 1986, bat-rabies cases have been reported in Denmark, Holland and West Germany. In the United States and Canada, wildlife rabies most commonly involves raccoons, skunks, foxes, coyotes and bats. There has been a progressive epizootic among raccoons in the eastern United States for more than a decade, now reaching New England, and currently among coyotes and dogs in South Texas; spread of the virus to domestic animals most frequently involves cats.

Manitoba: In 1999 there were 223 rabid animals identified. There were 183 skunks, two woodchucks, three raccoons, two fox, two cats, three horses, six dogs, 19 cows, one bison and two bats. Rabies is considered an enzootic disease throughout Manitoba.

Incubation Period: Usually three to eight weeks, rarely as short as nine days or as long as seven years; depends on the severity of the wound, site of the wound in relation to the richness of the nerve supply and its distance from the brain, amount and strain of virus introduced, protection provided by clothing and other factors. Prolonged incubation periods have occurred in pre-pubertal persons.

Susceptibility and Resistance: All mammals are susceptible to varying degrees, which may be influenced by the virus strain. Humans are more resistant to infection than several animal species; only approximately 40% of untreated Iranians bitten by proven rabid animals developed the disease.

Period of Communicability: In dogs and cats, usually for three to seven days before onset of clinical signs (rarely over four days) and throughout the course of the disease. Longer periods of excretion before onset of clinical signs (14 days) have been observed with Ethiopian dog-rabies strains. In one study, bats shed virus for 12 days before evidence of illness; in another study, skunks shed virus for at least eight days before onset of clinical signs. Skunks may shed virus for up to 18 days before death. Rabid ferrets do not shed virus in saliva more than 10 days prior to the onset of signs. Horses do not shed virus earlier than 10 days before the onset of symptoms and cows do not shed virus before developing symptoms.

Diagnosis

Diagnosis is made by specific FA staining of brain tissue or by virus isolation in mouse or cell culture systems. FA is very sensitive and specific. In unusual circumstances FA results may be negative and mouse culture tests, which are initiated at the same time but which take longer to return, may be positive. In humans, presumptive diagnosis may be made by specific FA staining of frozen skin sections taken from the back of the neck at the hairline. Serologic diagnosis is based on neutralization tests

in mice or cell culture. The rabies-neutralizing antibody titre should be greater or equal to five (complete neutralization) in the serum or cerebrospinal fluid of an unvaccinated person.

Key Investigations

(see also Phone Report of Possible Rabies Exposure form).

- Type of animal involved.
- Type of exposure (bite, scratch, other and provoked vs. unprovoked).
- Geographic location.
- Immunization status of animal.
- List of persons exposed with their weights and previous rabies and tetanus immunization histories.
- Availability of animal for diagnostic testing or observation.

Control

Management of Human Cases:

Treatment:

- For clinical rabies, intensive supportive medical care.

Public Health Measures:

- Contact isolation for respiratory secretions for duration of the illness. Disinfect articles soiled with saliva.

Management of Contacts of Human Cases:

- Although transmission from a patient to attending personnel has not been documented, immediate attendants should be warned of the potential hazard of infection from saliva, and should wear rubber gloves, protective gowns, and protection to avoid exposure from a patient coughing saliva in the attendant's face.
- Contacts who have an open wound or mucous membrane exposure to the patient's saliva should receive antirabies-specific treatment as per attached protocol "*Management of Animal Exposures to Prevent Human Rabies: Information for Physicians*."

Management of Persons Who Have Been Bitten by an Animal:

- See attached protocol "*Management of Animal Exposures to Prevent Human Rabies: Information for Physicians*."
- Following notification by a physician, the public, Health Links (Misericordia Hospital, Winnipeg), or Agriculture Canada, Public Health will coordinate animal follow-up and/or provide rabies vaccine and immune globulin as necessary.
- Animal follow-up is coordinated by the local public health nurse/federal nursing station nurse and consists of one or more of:
  - euthanization, with subsequent examination by Agriculture Canada (see note L in "*Management of Animal Exposures to Prevent Human Rabies*");
  - observation and quarantine for 10 days from the time of the bite (dogs, cats, ferrets);
  - a 10-day search (from the time of the bite) by the person bitten and/or local Animal Control;
  - quarantine (for healthy animals bitten by rabid ones; Agriculture Canada is notified via the local federal veterinarian and determines appropriate action).
- The nurse follows up on results and the local Medical Officer of Health decides if rabies vaccine/rabies immune globulin should be given.

Management of Animal Outbreaks:

- Establish area control under authority of provincial laws, public health regulations and local ordinances, in cooperation with appropriate wildlife conservation and animal health authorities.
- Immunize dogs and cats through officially sponsored, intensified mass programs that provide immunizations at temporary and emergency stations.
- For protection of other domestic animals, approved vaccines appropriate for each animal species must be used.

- In urban areas, strict enforcement of regulations requiring collection, detention and euthanasia of ownerless and stray dogs, and of non-immunized dogs found off owners' premises, and control of the dog population by castration, spaying or drugs have been effective in breaking transmission cycles.
- Immunization of wildlife using vaccine-containing baits has successfully contained fox rabies in western Europe and Canada.

Preventive Measures:

General:

- Register, license and immunize all dogs in enzootic countries; collect and euthanize ownerless animals and strays.
- Immunize all cats and ferrets.
- Educate pet owners and the public about the importance of restrictions for dogs and cats (e.g., that pets be leashed in congested areas when not confined on owner's premises; that strange-acting or sick animals of any species, domestic or wild, may be dangerous and should not be picked up or handled; that it is necessary to report such animals and animals that have bitten a person or another animal to the Regional Health Authority; that confinement and observation of such animals is a preventive measure against rabies); and advise against keeping wild animals as pets.
- Where dog control is sociologically impractical, repetitive total dog population immunization has been effective.
- Maintain active surveillance for rabies in animals. Laboratory capacity should be developed to perform FA testing on all wild animals involved in human or domestic animal exposures and all domestic animals clinically suspected of having rabies.
- Educate physicians, veterinarians and animal-control officials to detain and observe or euthanize and test, animals involved in human and domestic animal exposures.
- Oral immunization of wildlife animal reservoirs using attenuated or recombinant vector vaccines has effectively eliminated fox rabies from parts of Europe and Canada. The technique is being evaluated in the United States, using air drop of bait containing recombinant vaccine.
- Cooperative programs with wildlife conservation authorities to reduce fox, skunk, raccoon and other terrestrial wildlife hosts of sylvatic rabies may be used in circumscribed enzootic areas near campsites and areas of human habitation. If such focal depopulation is undertaken, it must be maintained to prevent re-population from the periphery.
- Persons at high risk (e.g., veterinarians, veterinarian assistants, animal control staff, spelunkers, taxidermists, trappers, wildlife conservation personnel and park rangers in enzootic or epizootic areas, staff of quarantine kennels, laboratory and field personnel working with rabies, and long-term travellers to rabies endemic areas) should receive pre-exposure immunization. High-risk persons (except travellers) who live in Winnipeg or in close proximity, should contact Marg Rubin (204) 789-3364 to participate in the intradermal immunization program operated in conjunction with Dr. Aoki. High-risk persons living outside Winnipeg should contact their physician or public health nurse to be immunized via the intramuscular route. Travellers should contact a travel clinic, their physician or local public health nurse to be immunized.
- Euthanize immediately non-immunized dogs or cats bitten by known rabid animals. If detention is elected, consult local district federal veterinarian for details concerning type and length of confinement.

Additional Resources

For Health Care Professionals

- Management of Animal Exposures to Prevent Human Rabies: Information for Physicians (included)
- Phone Report of Possible Rabies Exposure (included)
- Collection and Shipping of Samples for Laboratory Testing for Rabies (included). This is available in video format from Agriculture Canada ph: 983-2200.
- Rabies Worksheet (included)