

Alberta

Public Health  
Disease  
Management  
Guidelines

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Rabies

Ministry of Health, Government of Alberta

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Rabies Public Health Disease Management Guideline

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Health and Wellness Promotion Branch

Public Health and Compliance Branch

Alberta Health

# Case Definition

## Confirmed Case

Clinical illness<sup>(A)</sup> with laboratory confirmation of infection:

- Detection of rabies virus antigen in an appropriate clinical specimen, including conjunctival swabs, saliva, cerebrospinal fluid (CSF) and nuchal skin biopsy by immunofluorescence (i.e., direct fluorescent antibody);

OR

- Detection of rabies virus RNA in an appropriate clinical specimen by RT-PCR;

OR

- Isolation of rabies virus from saliva or cerebral spinal fluid (CSF) using cell culture or laboratory animal;

OR

- Findings at autopsy including detection of rabies virus in central nervous system (CNS) tissue by immunofluorescence or RT-PCR and visualization of Negri bodies by histopathology.

## Probable Case

Clinical illness<sup>(A)</sup> with laboratory evidence:

- Detection of rabies-neutralizing antibody in the serum or CSF of an unimmunized<sup>(B)</sup> person who did not receive rabies immunoglobulin.

## Suspect Case

- Clinical illness<sup>(A)</sup> without laboratory evidence.

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<sup>(A)</sup> Clinical Illness: Rabies is an acute encephalomyelitis dominated by forms of hyperactivity (furious rabies) or paralytic syndromes (dumb rabies) that almost always progresses to coma or death within 10 days after the first symptom.

<sup>(B)</sup> Serology is very insensitive for rabies diagnosis and is best used in immunized persons to confirm immunity post immunization.<sup>(19)</sup>

# Reporting Requirements

## 1. Physicians/Health Practitioners and others

Physicians, health practitioners and others shall notify the Medical Officer of Health (MOH) (or designate) of the zone, of all confirmed, probable and suspect cases in the prescribed form by the Fastest Means Possible (FMP).

## 2. Laboratories

All laboratories shall report all positive laboratory results:

- by FMP to the MOH (or designate) of the zone, and
- by mail, fax or electronic transfer within 48 hours (two business days) to the Chief Medical Officer of Health (CMOH) (or designate).

## 3. Alberta Health Services and First Nations and Inuit Health Branch

- The MOH (or designate) of the zone where the case currently resides shall notify the CMOH (or designate) by FMP of all confirmed, probable, and suspect cases.
- The MOH (or designate) of the zone where the case currently resides shall forward the initial Notifiable Disease Report (NDR) of all confirmed cases to the CMOH (or designate) within one week of notification and the final NDR (amendment) within two weeks of notification.
- For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by FMP:
  - name,
  - date of birth,
  - out-of-province health care number,
  - out-of-province address and phone number,
  - positive laboratory report, and
  - other relevant clinical / epidemiological information.

# Epidemiology

## Etiology

Rabies virus is a member of the *Rhabdoviridae* family, *Lyssavirus* genus.<sup>(1)</sup>

## Clinical Presentation

Rabies is almost invariably fatal. Initial symptoms, lasting 4 – 10 days, include headache, fever, malaise, flu-like illness, paresthesia at the site of the animal bite and a sense of apprehension.<sup>(2,3)</sup> Two forms of rabies are known to occur: furious and paralytic. Furious rabies accounts for approximately 80% of cases. Progressively worsening central nervous system (CNS) manifestations occur such as anxiety, hyperactivity, excited behaviour, dysesthesia (abnormal sense of touch) or pruritus (itching), radicular pain, intense thirst but fear of water (hydrophobia) and dysautonomia (autonomic nervous system does not work properly).<sup>(1,2)</sup> After a few days, death occurs by cardio-respiratory arrest.

Paralytic (dumb) rabies does not have the same CNS manifestations that furious rabies has.<sup>(2)</sup> Rather, paralysis insidiously ascends and the person becomes increasingly confused until coma occurs, then death. The paralytic forms are often misdiagnosed, which is believed to contribute to underreporting of the disease.<sup>(4)</sup>

## Reservoir

Rabies virus is maintained in nature within various types of wild and domestic carnivores (e.g., foxes, dogs, coyotes, wolves, ferrets, skunks, raccoons, cats) and bats.<sup>(3)</sup> In developing countries, dogs remain the principal reservoir. Rabbits, hamsters, guinea pigs, gerbils, squirrels, chipmunks, rats, birds and mice are rarely infected. Although rodents and other small mammals are very susceptible to the virus, these small animals rarely survive the encounter with a larger rabid animal.<sup>(5)</sup> In Alberta, rabies is mainly found in bats.<sup>(6)</sup>

## Transmission

Rabies is transmitted via a bite, scratch or lick that introduces saliva of an infected animal (refer to Reservoir for highest risk animals) into a fresh break in the skin or contact with intact mucous membranes including the eyes, nose and mouth.<sup>(1-3)</sup> Aerosol transmission, although rare, has been reported in caves and laboratory settings.<sup>(2,3)</sup>

Although the virus has been isolated from the saliva of infected cases, making person-to-person transmission from a human bite theoretically possible, such transmission has not been confirmed.<sup>(3,7)</sup> Activities that could potentially pose a risk to others include bites, kisses, direct contact between saliva and mucous membranes or broken skin, sexual activity, sharing utensils or cigarettes.<sup>(8)</sup>

Transmission has been reported following corneal transplants and other organs taken from persons who have died of undiagnosed rabies.<sup>(9,10)</sup> Mother-to-child transmission is possible, although rare.<sup>(11)</sup>

Ingestion of raw meats or other tissues from animals infected with rabies is not a source of human infection but is not advised.<sup>(7)</sup> However, there have been documented cases in which people have contracted rabies from cuts or sprays while handling rabid animal carcasses.<sup>(12,13)</sup>

The virus is inactivated rapidly in sunlight (1.5h at 30°C) and does not survive for long periods outside of the host (minutes to hours depending on environmental conditions).<sup>(14)</sup> Ultraviolet, detergent, ethyl alcohol, or a 1:10 dilution of bleach can destroy the virus.<sup>(2)</sup>

## Incubation Period

The incubation period varies from a few days to more than 19 years however, the majority of cases become ill within 90 days of exposure.<sup>(2,3,7,15)</sup> The incubation period is dependent on a number of factors including the severity of the wound, site of the wound in relation to the richness of the nerve supply, distance from the brain, the amount and strain of virus introduced, and if protective clothing was worn.<sup>(3)</sup>

## Period of Communicability

Generally, a person is considered infectious beginning 14 days prior to the onset of symptoms.<sup>(3)</sup> Refer to the Rabies Prevention and Control Manual for further information on suspected animal rabies.

## Host Susceptibility

Persons most at risk are those occupations or activities that result in exposure to animals such as veterinarians, animal control staff, cave spelunkers, laboratory personnel and long-term travellers to endemic areas.<sup>(3,16)</sup> Host-specific risk factors include younger age and immune status of the host (e.g., no history of pre-exposure immunization). Refer to the [Canadian Immunization Guide](#) for efficacy of rabies pre-exposure immunization.

## Incidence

Rabies has been notifiable in Alberta since 1985<sup>(17)</sup> and nationally since 1927 (PHAC NND).<sup>(18)</sup> In Alberta, the most recent case of rabies occurred in 2007.<sup>(17)</sup> The individual became infected following a bat exposure, did not seek medical intervention and subsequently died within 6 – 7 months of the exposure. This was the first case of rabies in Alberta since 1985.

Africa and Asia account for the highest number of human rabies deaths (WHO).<sup>(7)</sup> Of the people bitten by suspect rabid animals worldwide, 40% are under the age of 15.

# Public Health Management

## Diagnosis

The diagnosis of rabies in humans typically requires more than one test ante-mortem and is typically made via detection of viral antigen by direct immunofluorescence from clinical specimens or detection of rabies virus RNA in an appropriate clinical specimen.

The prospect for detecting infectious rabies virus, rabies virus antigen and/or specific immune response increases as clinical symptoms progress. Serology cannot distinguish between antibodies resulting from current infection or previous immunization. Negative serological results do not rule out a rabies infection because antibodies may not develop during infection and seroconversion usually occurs very late or not at all. The majority of patients with rabies infection die without having seroconverted.<sup>(19)</sup>

## Key Investigation

- A single case (confirmed, probable or suspect) of rabies should be managed as an urgent issue requiring immediate public health action.<sup>(20)</sup> Because of the near 100% case fatality rate of rabies disease, public health investigation of source and identification of all persons exposed to the same source or that came into contact with infected body fluids of the case should begin immediately if rabies infection is suspected.
- Confirm that the client meets the case definition (confirmed, probable or suspect).
- Obtain a history of illness including the date of onset, and signs and symptoms.
- Determine the possible source of infection for all confirmed, probable and suspect cases taking into consideration the incubation period, reservoir and mode of transmission. Assessment may include determining, obtaining or identifying:
  - travel/immigration history,
  - animal involved,
  - type of exposure (bite, scratch, other and provoked vs. unprovoked),
  - geographic location of exposure, and
  - immunization status of animal, if possible.
- Determine the immunization status of the case.
- Identify other persons and animals that may have been exposed to the source animal.
- Determine contacts:
  - Those potentially exposed to the infected body fluids of the case, and/or
  - Those exposed to the same source (e.g., animal).

## Management of a Case

- Individuals should avoid contact with the saliva and tears of a rabies case.<sup>(3)</sup>
- Routine precautions are recommended at all times during patient care and the number of healthcare staff involved in care should be limited.
  - Personal protective equipment (e.g., gowns, goggles, face shield and gloves) are recommended, especially during intubation, suctioning and autopsy because of potential aerosolization of the virus.<sup>(3,21,22)</sup>
  - Concurrent disinfection of articles soiled with saliva or tears by detergent and/or 1:10 diluted bleach should be done as soon as possible or may also be discarded as biohazard waste.
  - The use of needles or other sharp objects around the case should be limited so as not to risk accidental percutaneous exposure.<sup>(2)</sup>

## Treatment

- Once symptoms have developed there is no specific treatment. Intensive supportive medical care is usually undertaken but in most situations rabies is fatal.

## Management of Contacts

- Individuals who have been bitten by or who have open wound/mucous membrane exposure to a rabies case or the same animal source should receive post-exposure prophylaxis (PEP) urgently.<sup>(3)</sup>
- For post-exposure prophylaxis recommendations refer to the [Alberta Immunization Policy \(AIP\)](#).

## Bite Exposure

- Refer to the [Rabies Prevention and Control Manual: Guidance for Public Health and Veterinary Professionals](#).

### **Immediate care for bite or direct contact with suspected rabies-infected fluids (animal or human)**

- When a bite and/or direct contact with saliva exposure occurs, in addition to the following, individuals should be immediately reported to public health for assessment and reporting:<sup>(3)</sup>
  - Wash the wound immediately with soap or detergent and water.
  - Then wash the wound with 70% ethanol, an iodine-containing solution or Dakins solution (3 tablespoons of bleach plus ½ teaspoon baking soda in 1 litre of boiled water).
  - Do not suture the wound (or suture loosely) to allow free bleeding and drainage.
  - Infiltration of the wound with rabies immune globulin (RIG) should be considered.



## Preventive Measures

- Educate the public and those individuals with the greatest risk of animal exposure to avoid close contact with unfamiliar animals on the following:<sup>(3,21,23–26)</sup>
  - Provincially funded pre-exposure rabies immunization may be considered for certain risk groups (e.g., veterinarians, wildlife and park personnel). Refer to the [AIP](#).
  - Travelers should receive a pre-travel immunization assessment for rabies vaccine (and other vaccines) depending on their travelling destination, the purpose of and duration of their trip.<sup>(27)</sup>
  - Have all domestic pets immunized by a licensed veterinarian.
  - When travelling with pets:
    - ensure rabies immunizations are up to date, and
    - keep pets under control to avoid contact with other animals (wild and domestic).
  - Cover up potential entrances, such as uncapped chimneys and openings in attics, roofs, and decks to discourage wild animals, such as bats, from taking up residence in or around homes.
  - Report any animal(s) behaving strangely to local public health or animal control departments.
  - Do not keep wild animals as pets. Avoid handling, feeding or unintentionally attracting wild animals.
  - Do not attempt to nurse a wild animal back to health. Seek assistance from animal control.
  - Instruct children to avoid unfamiliar wild or domestic animals even if they appear friendly.

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