

Rabies

Prevention and Control Manual

Guidance for Public Health and Veterinary Professionals

Health, Government of Alberta

January 2019

Rabies Prevention and Control Manual, Guidance for Public Health and Veterinary Professionals

ISBN 978-1-4601-4263-9

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Acronyms

AEP: Alberta Environment and Parks

AF: Alberta Agriculture and Forestry

AHS: Alberta Health Services

CFIA: Canadian Food Inspection Agency

CRCC: Central Rabies Control Committee

FAT: fluorescent antibody test

FNIHB-AB: First Nations and Inuit Health Branch – Alberta Region

ISO: International Organization for Standardization

MOH: Medical Officer of Health

OCPV: Office of the Chief Provincial Veterinarian

OIE: World Organization for Animal Health

PHV: Public Health Veterinarian

PEP: post exposure prophylaxis

PREP: pre-exposure prophylaxis

RCMP: Royal Canadian Mounted Police

RIG: rabies immune globulin

WHO: World Health Organization

Introduction

Rabies is a nearly always fatal viral communicable disease that can infect all mammals including humans. Due to the success of rabies prevention and control activities over time, the risk of a human or domestic animal acquiring rabies infection in Alberta is very low; however, there remains a risk for the emergence of rabies through the movement of people, domestic animals and wildlife. Alberta rabies prevention and control activities help to ensure the protection of public health and to mitigate rabies exposure to companion and domestic animals from wild animal populations in Alberta.

Data collected in Alberta over time indicate that the virus is maintained in bat populations throughout the province. In the last five years, a range of 4 to 10 bats tested positive for rabies annually in Alberta out of the one to two hundred specimens submitted for testing each year.¹ Past studies estimating rabies prevalence in Alberta bats suggest a very low prevalence that varies by bat type and surveillance method.^{2,3} Currently, no other rabies reservoirs are identified in Alberta and on average two hundred samples are tested annually from other species (dog, cat, livestock and wildlife).

Across Canada, identified rabies reservoirs include skunk (skunk variant), raccoon (raccoon variant) and fox (fox variant) in addition to bats. Canada has been free of the dog variant of the rabies virus since the 1950s; however, dog variant rabies remains endemic in several countries around the world, and is implicated in the majority of human rabies infections globally. It is estimated that 59,000 people die annually from rabies, mostly in Asia and Africa, and 20 million receive rabies post-exposure prophylaxis annually.^{4,5}

This manual has been developed through a partnership between Alberta Health, Alberta Health Services, the First Nations and Inuit Health Branch – Alberta Region, Alberta Agriculture and Forestry, and Alberta Environment and Parks to provide guidance to public health and veterinary professionals in Alberta regarding:

- the roles and responsibilities of the various partners involved in rabies control in Alberta;
- rabies pre-exposure prophylaxis guidelines for humans and other animals;
- risk assessment following potential rabies exposures in humans and other animals; and
- post-exposure management in humans and other animals.

This document does not include information regarding the management of rabies infection in humans. For management of human suspect, probable, or confirmed cases of rabies, please refer to the Alberta Notifiable Disease Guidelines: <https://open.alberta.ca/publications/rabies>.

This manual will be updated as needed should new pertinent information become available.

Questions and comments about this manual can be directed by email to: albertarabiesprogram@gov.ab.ca

History of Rabies Control in Alberta

The Government of Alberta has a long history when it comes to rabies control in wildlife, and actions to date have helped prevent the establishment of rabies in terrestrial wildlife reservoirs in the province. Alberta's first documentation of rabies in terrestrial wildlife occurred in the early 1950's, the result of epizootic spread from northern Canada. Rabies outbreaks in fox populations in the Northwest Territories spilled over into Alberta wildlife and resulted in rabies cases as far south as Lethbridge within one year. The Government of Alberta responded by implementing several initiatives that included public education, promoting vaccination of dogs, and a program to cull wild carnivores. This program was in place from 1951 – 1956 and appeared to successfully prevent fox rabies from establishing in the province.

In the early 1960's, skunk rabies was detected in Saskatchewan and spread west reaching the Alberta border by the early 1970's. A buffer zone was established along the AB-SK border and skunks were targeted and removed. This resulted in the re-establishment of the **Central Rabies Control Committee (CRCC)** in 1970 that is still active today. The CRCC includes representation from Alberta Health, Alberta Agriculture and Forestry, Alberta Environment and Parks, key municipal governments along the Montana and Saskatchewan borders and the Canadian Food Inspection Agency. During the 1970's to 1990's there were small rabies outbreaks in skunk that prompted swift action from the CRCC. The last rabid skunk in Alberta was found in 1994. The CRCC continues to monitor rabies in skunk along the south and recently again along the eastern Alberta borders to prevent incursion of skunk variant rabies.

Roles and Responsibilities

The effectiveness of Alberta rabies prevention and control activities is dependent upon the coordinated efforts of several organizations and groups. The roles and responsibilities of the various partners are outlined in the remainder of this section including a short description of relevant provincial and federal legislation.

Relevant legislation in rabies control

Rabies infection in humans is a notifiable disease internationally, nationally, and provincially in Alberta under the Alberta [Public Health Act](#), and [Communicable Diseases Regulation](#). In Alberta, physicians and laboratories must report any suspect, probable and confirmed cases of human rabies infection by the fastest means possible to the local Medical Officer of Health (MOH). As well, when an animal suspected of having rabies exposes a person, the attending physician must immediately report the incident to the local MOH.

Rabies is a nationally reportable disease in animals as defined in the [Health of Animals Act](#) and the [Reportable Diseases Regulations](#). In Alberta, veterinarians must report any suspect, probable or confirmed cases of rabies in an animal within 24 hours to the Public Health Veterinarian (PHV) under the provincial [Animal Health Act](#). The PHV is a member of the Office of the Chief Provincial Veterinarian at Alberta Agriculture and Forestry.

Rabies is declared a “pest” under the Alberta [Pest and Nuisance Control Regulation](#) under the [Agricultural Pests Act](#). A pest is any animal, bird, insect, plant or disease that is destroying or harming or is likely to destroy or harm any land, livestock or property in Alberta. The [Agricultural Pests Act](#) and the [Pest and Nuisance Control Regulation](#) set out the authority of an inspector (e.g., agricultural fieldman) in identifying the occurrence of a pest and directing the appropriate control measures. Under the [Agricultural Pests Act](#), a local authority of a municipality must take active measures to prevent the establishment of, or to control or destroy pests in the municipality. Owners or occupants of land must also take measures to prevent, control or destroy pests on their property. Agricultural fieldmen play a vital role in the Government of Alberta’s skunk surveillance program directed by the CRCC.

The Alberta [Wildlife Act](#) and [Regulation](#) provide for the protection and conservation of wild animals in Alberta. It includes activities in relation to hunting, commercial operators, import and export of wildlife, protecting wildlife from disease outbreaks and wildlife damage to property. The Minister of Justice is responsible for the appointment of Wildlife Officers (called Fish and Wildlife Officers in Alberta). In addition, members of the Royal Canadian Mounted Police (RCMP), Conservation Officers (under the [Government Organization Act](#)) and Forest Officers (under the [Forests Act](#)) are also Wildlife Officers by virtue of their appointments in their respective roles. Wildlife Officers have the authority to order quarantines of suspected diseased animals and may also capture and destroy animals (wild and privately owned) that are posing a risk of disease to other wildlife, domestic animals, and people.

Federal organizations

Canadian Food Inspection Agency

The role of the Canadian Food Inspection Agency (CFIA) in rabies control is to provide laboratory services for the testing of submitted specimens, and to report results back to the submitting province. In Alberta, the CFIA Laboratory in Lethbridge is responsible for rabies testing and as part of a reciprocal agreement, reporting all rabies results to the Alberta Public Health Veterinarian (PHV) and local public health.

The CFIA gathers diagnostic statistics in order to provide national rabies occurrence reports as well as to meet international reporting responsibilities. There are currently two CFIA laboratories that conduct rabies testing in Canada: the Ottawa Laboratory (Fallowfield), and the Lethbridge Laboratory. All CFIA Laboratories have quality assurance programs and are ISO/IEC 17025 accredited. The Ottawa Laboratory is a World Health Organization (WHO) Collaborating Centre for Control and Epidemiology of Rabies in Carnivores, and a World Organisation for Animal Health (OIE) Reference Laboratory for rabies.

Provincial organizations

Alberta Health

Alberta Health's role in rabies prevention and control is to work collaboratively with partners in the development and maintenance of relevant provincial policies, regulations and guidelines including the Communicable Diseases Regulation, the Notifiable Disease Guidelines and rabies pre-exposure and post-exposure prophylaxis guidelines for humans. Alberta Health is also responsible for:

- ensuring the availability and adequate supply of human rabies vaccine and rabies immune globulin; and
- developing and maintaining a human rabies surveillance system.

Alberta Health Services

Alberta Health Services (AHS) Public Health's role (includes Medical Officers of Health (MOHs), Public Health Nursing, and Environmental Health Officers or Public Health Inspectors) is to provide risk assessment and management of potential human rabies exposures as defined under the [Alberta Communicable Diseases Regulation](#).

Under the regulation, AHS Public Health must be notified of all potential human rabies exposures that present for health care services. Local Medical Officers of Health (MOH) (or designates) direct the risk assessment and management of each human exposure case, working with the PHV, local veterinarians, animal owners and the exposed person and/or their caregiver/family. AHS Vaccine Depots also distribute rabies immunoglobulin and rabies vaccine for post-exposure prophylaxis administration within AHS zones, and to the First Nations Inuit Health Branch, Alberta Region as directed by the MOH.

First Nations Inuit Health Branch Regional Office

The First Nations Inuit Health Branch (FNIHB-AB) MOH is responsible for ensuring that the follow-up and reporting of notifiable diseases and other related activities are carried out in accordance with the *Public Health Act* and the Communicable Diseases Regulation for people living on reserves in Alberta.

FNIHB-AB investigates all reported human exposures to potentially rabid animals for people living on-reserve in Alberta. Investigations are conducted by the Community Health Nurse/Representative in consultation with the FNIHB-AB MOH (or designate) and include follow-up with the exposed person(s) and animal involved. A joint effort with AHS and the Public Health Veterinarian (PHV) may be required if either the animal or the exposed person resides off-reserve.

Alberta Agriculture and Forestry

Alberta Agriculture and Forestry's role in rabies prevention and control is to provide leadership and policy direction to veterinary medicine professionals through the Office of the Chief Provincial Veterinarian (OCPV). The Chief Veterinarian through the PHV coordinates the response to potentially rabid animals, performs risk assessments for animal-to-animal exposures within the province and supports the public health risk assessment process for potential human exposures to a rabid animal. Any animal in Alberta suspected of having rabies should be reported to the [PHV](#). The PHV is responsible for:

- coordinating the testing of wild and domestic animal specimens for rabies at the CFIA lab;
- providing veterinary expertise in risk assessments and management of potential rabies exposures;
- providing on-call support for public health and veterinary medicine professionals for risk assessments of potential rabies exposures;
- ongoing rabies education to veterinarians, veterinary technologists, and public health professionals;
- providing information and assistance if necessary to the public and to wildlife staff;
- instituting and supervising OCPV placed quarantines on animals potentially exposed to a rabid animal; and
- developing and maintaining an animal rabies surveillance system.

Alberta Environment and Parks

Alberta Environment and Parks (AEP) plays a key role in the management of healthy wild animal populations in Alberta including rabies control. AEP is the lead in the Central Rabies Control Committee (CRCC) skunk surveillance program. AEP develops and maintains guidelines for responding to reports of rabies suspect wildlife on public lands. These guidelines are provided in the [appendices of this manual](#).

Local organizations

Private veterinarians

Private veterinarians may perform assessments on animals in their practice suspected of having rabies that may or may not be involved in a potential human exposure. If the veterinarian is concerned that the clinical picture suggests rabies, they must contact the PHV to report the rabies suspect case as required by the provincial [Animal Health Act](#) and [Regulations](#) and to discuss further steps. If the animal has been involved in a potential human exposure, the veterinarian should inform local AHS Public Health or FNIHB-AB if on reserve, and advise the client that any exposed person should seek medical attention. If the PHV determines through the assessment that the animal is a rabies suspect case, the PHV will direct the private veterinarian on how to collect, package and submit brain samples to the CFIA-Rabies Laboratory in Lethbridge for rabies testing. The PHV is responsible for completing the rabies form that is to be included with the sample. The PHV will also work with AHS Public Health and FNIHB-AB to assist in the risk assessment of potential human exposures.

Municipalities

Under the [Municipal Government Act](#), a council may pass bylaws for municipal purposes in respect of wild and domestic animals and activities in relation to them. Also under the [Agricultural Pests Act](#), a local authority of a municipality must take active measures to prevent the establishment of, or to control or destroy pests in the municipality. Municipal bylaws, policies and programs differ across the province depending on the location, size, capacity, needs and interests of the municipality. Some municipalities have pest/animal control staff that can assist in response to reports of potentially rabid animals. Some municipalities rely on support from local RCMP, Fish and Wildlife Officers, or agricultural fieldmen.

Local RCMP

Local RCMP may be called to respond to aggressive or nuisance animals in their local areas, particularly in non-urban areas. If the responding RCMP Officer determines there could be a risk of rabies in the animal, the local RCMP office should contact the Public Health Veterinarian (PHV) to assist in the risk assessment and determine if the animal should be euthanized and tested for rabies. The PHV can arrange for the testing of the animal or will assist with coordinating the observation of the animal if appropriate. The PHV will also direct the risk assessment and management of any animals exposed to the aggressor/nuisance animal. If the animal has been involved in an exposure to a person, the PHV will contact local AHS Public Health, or FNIHB-AB (on reserves) to conduct a risk assessment and to manage any human exposures.

Local Pest Control Companies

Local pest control companies may be able to provide advice or services to capture and/or remove nuisance animals such as skunks and bats from private property for a fee.

Rabies

Etiology and pathogenesis

The disease of rabies is caused by a single-stranded RNA virus in the family *Rhabdoviridae*, of the genus *Lyssavirus*. All warm-blooded animals are susceptible to the rabies virus.

Rabies is a disease of the central nervous system that is almost invariably fatal. In both humans and other animals, the virus enters the body and replicates locally in the tissue before moving into the nearest peripheral nerve. The virus then spreads along the peripheral nerves to the central nervous system. Once the virus is in the brain, it replicates further, and then spreads from the cranial nerves into the salivary glands and other peripheral tissues. The virus can then be secreted into the saliva and transmitted to another susceptible host.

Transmission

Rabies is transmitted when saliva of an infected animal is introduced into the next host through a bite, scratch or contact with mucous membranes including eyes, mouth, and nose. Infected animals can have saliva with virus present on their claws and fur from animal grooming activities; however the risk of transmission from exposure to claws and fur is very low. Transmission most commonly occurs through bites from a rabid animal.⁶

The rabies virus is inactivated rapidly in sunlight, sensitive to desiccation and does not survive for long periods (minutes to hours) outside of the host. In general, if the contaminated surface/material is dry, then it is no longer infectious.

Rabies has been transmitted through aerosols in bat caves and laboratory settings, though such occurrences are very rare.⁷

There are no clear timeframes on how long the virus is viable in a dead animal, thus it should be assumed that an infected dead animal may still harbour the virus. For transmission to occur, infected animal tissues/secretions/aerosols would need to come in contact with mucous membranes or breaks in the skin. There have been documented cases in which people have contracted rabies from cuts or sprays while handling rabid animal carcasses.^{8,9}

Transmission of rabies through consumption of raw meat, milk or animal-derived tissue has never been confirmed in humans.^{5,6,10} Milk that has been pasteurized presents no risk of rabies transmission.⁵ However, consuming meat or other animal derived products from a rabid animal is not advised.⁵

Although the occurrence of vertical transmission of the rabies virus during gestation has been theorized in bats and other species such as dogs and cats, it has not been well documented thus the actual occurrence is unknown.

Human-to-human transmission only occurs in extremely rare circumstances. The only reported cases of human-to-human transmission have been through organ donation and a single case of probable perinatal transmission.^{5,11} It has been reported following corneal transplants and other solid organs taken from

persons who have died of undiagnosed rabies.¹² Although the virus has been isolated from the saliva of infected human cases, person-to-person transmission from a human bite has not been documented.

Incubation period

The time between the introduction of the virus into the body and the appearance of the first clinical signs of rabies infection (prodrome) is known as the incubation period. During this time, the animal will appear clinically healthy.

The incubation period in both humans and other animals is dependent on the severity of the wound (bite or scratch), site of the wound in relation to the richness of the nerve supply, distance from the brain, the amount of virus introduced, and the immune status of the host (i.e., history of pre-exposure immunization).

In humans, the incubation period from exposure to the virus to occurrence of symptoms is usually 3 to 8 weeks, but can be highly variable. For example, incubation periods as short as 5 to 6 days, and as long as greater than 6 months have been documented.¹³ There have been reports of unusually long incubation periods (e.g., 4 – 6 years) in the literature.^{14, 15}

In cats and dogs, the incubation period is experimentally documented to be 3–12 weeks.¹⁶ The incubation period in other animals is not well documented; however, for many mammals it has been observed to fall within a similar incubation period as cats and dogs. Incubation periods in bats are highly variable from weeks to months.¹⁷

Period of communicability

Dogs, cats and domestic ferrets have experimentally been found to have the rabies virus present in their saliva for 3 to 4 days prior to onset of clinical signs,⁵ and some studies have shown that it could be up to 10 days prior.^{18, 19} Once the virus reaches the saliva in the infected animal, it is present until the animal's death.⁵

It is prudent to extrapolate that all warm-blooded animals (wild and domestic) can have the rabies virus in their saliva prior to specific clinical signs of rabies. The period of communicability is not well documented in most animals and may vary across species. Bats can be extremely variable in their period of communicability and their subsequent time to death.¹⁷

Clinical presentation and diagnosis:

For the clinical description and diagnosis of human cases of rabies, please refer to the Alberta Notifiable Disease Guidelines: <https://open.alberta.ca/publications/rabies>

Clinical signs of rabies in animals can be very subtle and nonspecific at first, and can include lethargy, fever, vomiting, anorexia, colic and lameness. The animal may show very subtle changes in behavior at the onset of the disease. The disease then progresses steadily to more severe signs such as self-mutilation, excessive salivation, abnormal vocalization, aggression, and/or seizures. Animals may display the *furious form* in which they are extremely aggressive, or the *paralytic* or “dumb form” in which the animal is lethargic, immobile and becomes comatose. It is not possible to make a definitive diagnosis of

rabies ante-mortem because the clinical signs are too variable and non-specific, and can differ across species.

In animals, rabies virus is identified by detecting viral antigens or RNA in a brain and/or spinal cord sample taken at necropsy. The main test used at the CFIA laboratories is the fluorescent antibody test (FAT). The sensitivity and specificity of the FAT approaches 100% in a sample that is in good condition.⁴ If a brain sample is damaged (e.g. euthanasia via gunshot or decomposition) then a piece of spinal cord can alternatively be used for testing. In livestock species, a piece of spinal cord is requested in addition to the brain sample. It is not unusual for livestock specimens to be submitted to the CFIA early in the incubation period, and due to the vast size of cows and horses, the rabies virus antigen may only be present in the spinal cord. Immunohistochemistry (IHC) is also available should the brain sample be fixed in formalin; however IHC is not as sensitive or specific as the FAT so samples should preferably not be fixed. Gross post-mortem exam is non-diagnostic, and histopathology of the brain may be non-specific. Although Negri bodies in the brain and spinal cord are pathognomonic, they are not always present.

Epidemiology of Rabies in Animals

The veterinary epidemiology of rabies is based upon species that act as reservoirs for the virus. Rabies virus is maintained within two reservoir mammal groups: various species of carnivores and bats.¹⁷ Other types of species can be infected with the rabies virus; however, the virus does not continue to circulate within those species.

Alberta

The Canadian Food Inspection Agency (CFIA) provides the results of animal rabies testing across Canada on their [public website](#). All positive rabies diagnoses are typed to determine the source species variant of rabies.

From 2014 – November 2018, there were 35 laboratory-confirmed cases of rabies in animals in Alberta, out of 1808 animals tested (1.9%).¹ All of the rabies positive animals from 2014 – October 2018 were bats. A cat tested positive with bat variant rabies in November 2018. A rabies positive cat was also found in 2010, 2006 and 2001; a dog tested positive in 2013 and 1998; and a single fox tested positive in 1998. The last positive skunk was tested in 1994. It is important to note that animals are submitted to the CFIA for testing under the suspicion of rabies, so the percentage of positive cases is not representative of the healthy population of animals in the province.

In Alberta, bats are considered the only reservoir of the rabies virus. There are several different species of bat that roost in our forests, buildings and in urban areas. We also have species of bats that migrate to the southern United States. There are no active bat surveillance programs in Alberta (or Canada) and bats are only tested when captured and sent to the CFIA in response to an animal or human exposure. Rabies prevalence in bats in Alberta is thought to be very low and is distributed across the province.³ Bats that have physical contact with humans or other animals may have a higher rate of infection because healthy bats will avoid such interaction. Any physical contact between a bat and a person or pet should result in a risk assessment and appropriate management actions.

Alberta has not had terrestrial rabies in other wildlife since the 1980's when there were localized outbreaks of skunk variant rabies in southern Alberta, leading to ongoing surveillance directed by the [CRCC](#).²⁰ Skunk are randomly trapped along the Montana and Saskatchewan borders and submitted to the CFIA for rabies testing. Approximately 200 skunk per year are humanely trapped, euthanized and tested. A positive skunk has not been diagnosed via this program since 1994. If a positive skunk were to be found, then trapping, euthanizing and testing of skunk within a 5km zone around where the positive animal was found would be implemented. Other wild carnivores such as foxes, coyotes, wolves, lynx and badgers can serve as vectors for the rabies virus, and human exposures to such animals is always a concern for the potential of rabies infection.

Domesticated animals such as dogs, cats, ferrets, and livestock may be at risk of contracting rabies if exposed to infected wild animals and then pose a further risk to their owners and the public. Animal exposures to bats commonly occur in Alberta, and result in domestic animal quarantines. For example, dogs are curious and may pick up a dead or dying bat potentially exposing them to the rabies virus. It is also common for cats to catch bats, and even if the cat is an indoor one, bats still make their way into homes and cats can be potentially exposed. Cats are less likely to be immunized against rabies than dogs, and are more likely to be free roaming, potentially increasing their risk of exposure to bats. In

November 2018, a cat in southern Alberta tested positive for bat variant rabies after becoming aggressive and biting its owners. The exposed were given post-exposure prophylaxis.

Alberta has been free of the canine variant of rabies since the 1950s; however, there is always the risk of introduction through the importation and movement of companion animals. Canada does not require proof of rabies vaccination for companion animals that travel between provinces and territories. In 2013, a puppy that was adopted to Alberta from Nunavut later expressed rabies (arctic fox variant) and 9 people were given post-exposure prophylaxis as a result.²¹

Alberta has not had a rabies positive livestock species in several decades as the usual route of infection to cattle, horse, sheep, goats or other livestock on range is from a rabid skunk or fox.

Small mainly herbivorous mammals (wild and domestic) such as rabbits, hares, hamsters, guinea pigs, gerbils, squirrels, chipmunks, rats, and mice are rarely infected with the rabies virus, but quite commonly are involved in bites to humans. These small mammals do not serve as a rabies reservoir anywhere in the world. In the rare event that they are exposed to a rabid animal, they most likely would succumb to the attack sooner than the development of rabies. Because these small mammals are not carnivores, an interaction between them and Alberta's rabies reservoir, the bat, would be rare and unlikely.

Experimentally, birds can be infected with rabies; however there has been only one documented case in the literature of an avian developing rabies in a real world scenario - a report from India in which a chicken developed symptoms of rabies after surviving an attack from a rabid dog.²² There has never been a reported rabies infection in a bird in Canada. A serological survey of wild raptors in California U.S. concluded they are of little importance in the epidemiology of rabies, despite their predatory behaviour.²³

Canada

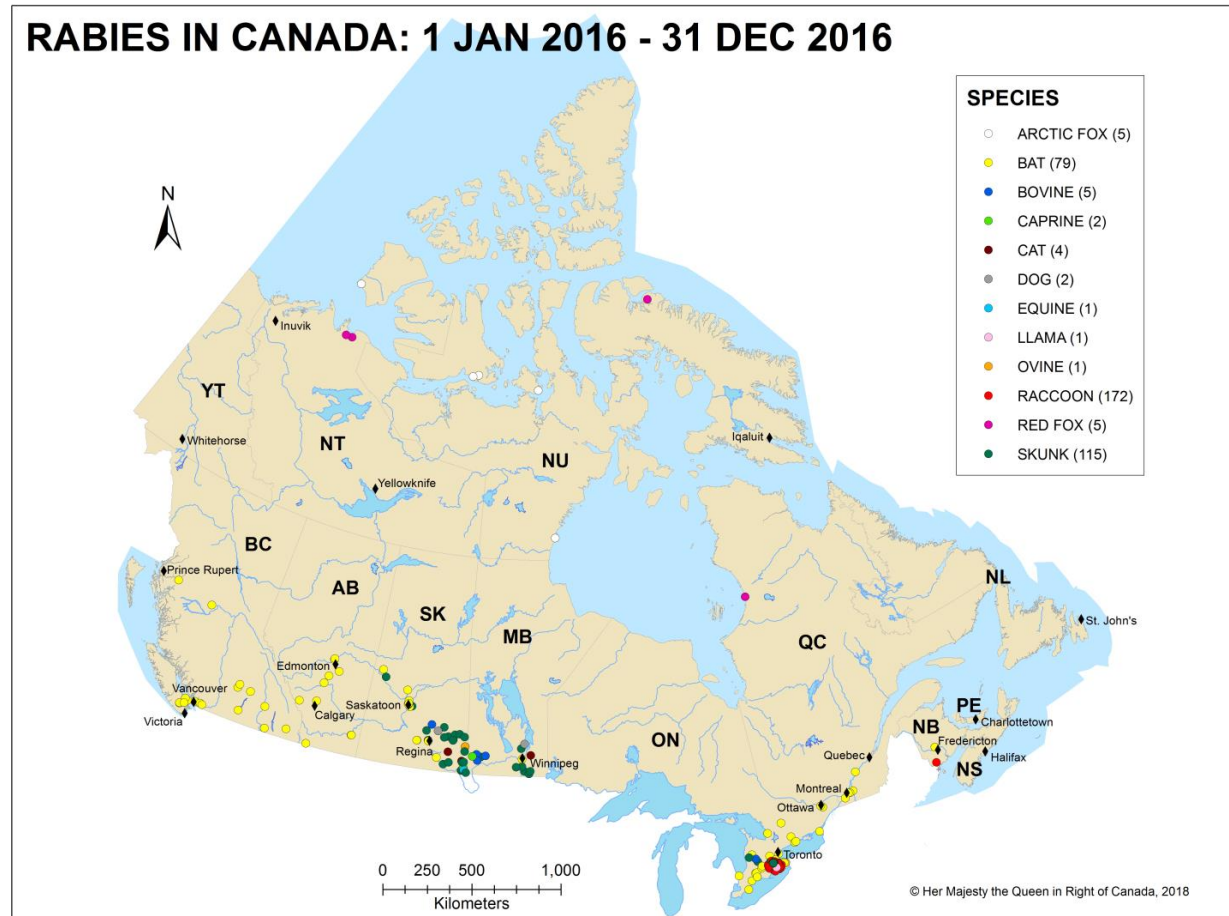
Across Canada, approximately 160 animals are found to have rabies each year.¹ Most of these are wild animals, mainly bats, skunks, raccoons, and foxes. Some are farm animals and some are pets, such as cats and dogs. In Canada, the rabies virus is maintained in wild mammalian reservoir populations such as bats, skunks, raccoons, red and arctic foxes.¹ Although canine rabies is considered eradicated in Canada, in developing countries, dogs remain the principal reservoir. Thus, there is always a risk of reintroducing this virus variant to Canada with imported dogs from other countries. For example, canine rabies remains in certain areas in Latin America and the Caribbean, and it is not uncommon for dogs to be imported from these locations into Canada.

In British Columbia, the only wildlife reservoir for rabies is the bat. The southeast corner of Saskatchewan and south-central Manitoba both have skunk rabies reservoirs in addition to rabies in bats. Saskatchewan and Manitoba do not have skunk surveillance at this time, so positive skunk are documented only when there is interaction between a rabid skunk and a domestic animal or human.

Ontario has both red and arctic fox, raccoons and skunk as rabies reservoirs in addition to the bat. Ontario expended considerable effort over many years and successfully reduced rabies in terrestrial wildlife. However, in 2015-16, raccoon rabies virus variant recurred in the area of Hamilton resulting in 171 raccoons and 84 skunks positive for rabies in the 2016 calendar year.¹ Ontario, Quebec and New Brunswick continue to vaccinate raccoons along their provincial borders with the United States. Despite oral rabies vaccine, raccoon rabies re-emerged in Ontario likely due to accidental human translocation of a rabid raccoon from the United States.

The Yukon, Nunavut and the Northwest Territories all have the arctic and red fox as their main reservoirs of rabies.

Map - Rabies positive cases in Canada, 2016



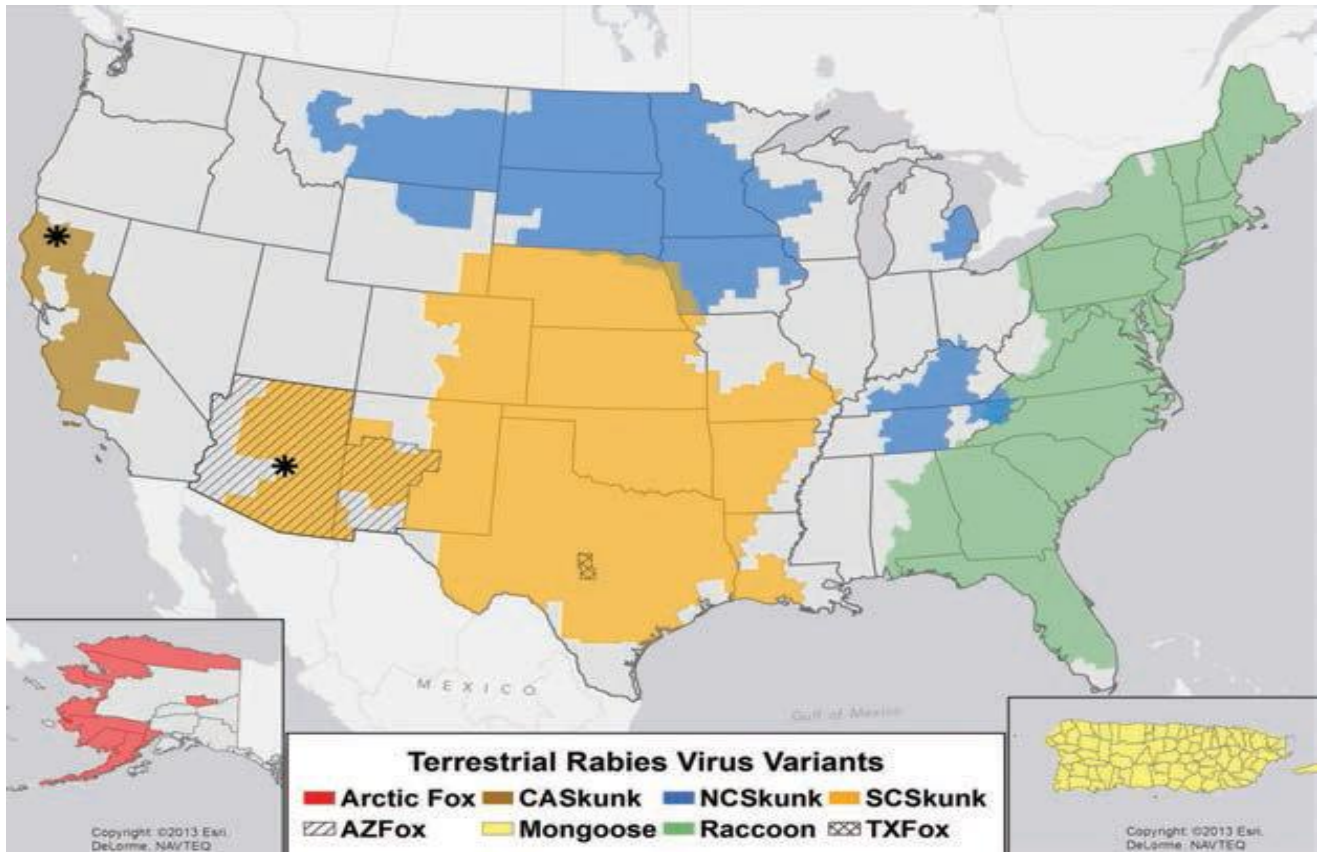
Picture courtesy of CFIA.

United States

In the United States, the predominant reservoirs for rabies are skunks in the western and central states, raccoons in the eastern states, fox in local areas in the south-west and Alaska, and bats throughout.

As the nearest state to Alberta, Montana has the bat and skunk as their rabies wildlife reservoir. In the 1980's and 90's during an Alberta outbreak of skunk rabies, Montana also went through a similar struggle with skunk rabies.²⁰ Montana has maintained skunk rabies surveillance as a result. A map of identified rabies virus reservoirs in the United States is below.

Map - Rabies reservoirs in the United States 2013



Picture courtesy of USDA.

International

Internationally, the domestic dog is the most important vector for the transmission of rabies to humans in rabies-endemic areas.^{5,6} Rabies in domestic dogs remains in Asia, Africa, Russia, the Middle East, and parts of Latin America and the Caribbean.⁵ Other wildlife such as fox, wolf, jackal, raccoon dog, skunk, mongoose, and bats are responsible for a small percentage of rabies transmission to people and domestic animals. Mass vaccination of dogs remains the principal strategy for rabies prevention in people. Where mass vaccination of dogs has been successful, other sources of rabies transmission (mainly wild carnivores and bats) become more prominent, although rare.⁶ The only continent where rabies has not been found is Antarctica.

Latin America and the Caribbean are working to eradicate the dog variant of the rabies virus. Although there has been a significant decrease in the occurrence, pockets still exist.²⁴ Rabies is widespread in stray dogs and cats in Asia and Africa and countries in these areas have the highest numbers of human rabies deaths reported, mostly from dog exposures. Some countries have implemented efforts to increase vaccination of dogs with varying degrees of success.

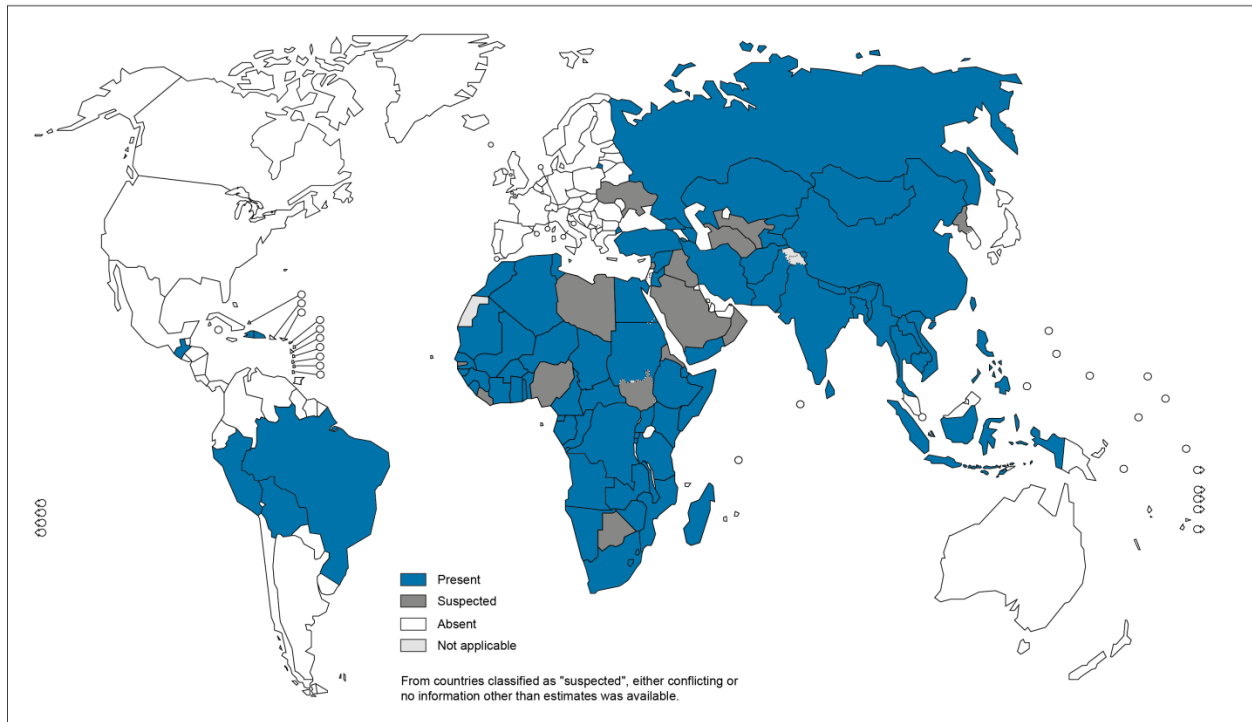
Mexico has an ongoing battle with rabies in their livestock as the vampire bat, being a rabies reservoir, prefers to feed on cattle. The vampire bat is present in much of Latin America and is responsible for rabies transmission to livestock, other species and humans.²⁵ There is evidence that the range of vampire

bats is increasing and may spread to southern United States.²⁵ Mexico also has the skunk as a rabies reservoir.

In Europe, the red fox and raccoon dog (a wild canid species) serve as reservoirs of the rabies virus in addition to bats.²⁶

The map below has been developed by the WHO and illustrates the countries with domestic dog rabies.²⁷

Presence of dog-transmitted human rabies based on most recent data points from different sources, 2010-2014



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. © WHO 2015. All rights reserved

Data Source: World Health Organization
Map Production: Control of Neglected
Tropical Diseases (NTD)
World Health Organization



WHO, 2015²⁷

Epidemiology of Rabies in Humans

Alberta

Human cases of rabies in Alberta are extremely rare. The latest case occurred in 2007. The individual became infected through a bat exposure, did not seek medical intervention, and subsequently died within 6–7 months after the exposure. The only other case of human rabies reported in Alberta occurred in 1985.

Canada

Since 1924 there have been a total of 25 cases of rabies reported in Canada, five of which occurred since 1985.²⁸ Two cases were acquired abroad in the Caribbean, the result of dog bites, the most recent (at the time of writing) occurred in 2012.¹ All of the locally acquired human cases since 1967 were due to bat exposures. All human cases of rabies reported in Canada have been fatal. Cases reported are from six provinces: Quebec (12), Ontario (7), Saskatchewan (2), Alberta (2), Nova Scotia (1), and British Columbia (1).

United States

Similar to Canada, human rabies cases in the United States are rare, with only 1 to 3 cases reported annually. From 2008 to 2017, 23 cases of human rabies were reported, with 8 being contracted outside of the country.¹² Human rabies deaths in the United States have predominantly been attributed to the bat over the last several years.¹²

International

Human rabies infection is present on all continents with the exception of Antarctica. Each year an estimated 59,000 people die of rabies and 20 million may take post-exposure prophylaxis.⁴⁻⁶ It is estimated that the great majority of human deaths caused by rabies each year occur in rural Asia and Africa.⁵ Asia continues to have the highest incidence of human rabies deaths reported, the majority of which occur in India.

Half of the global population still lives in canine-rabies endemic areas.⁴ Dogs are the principal vectors for the majority (99%) of rabies transmissions to humans in developing regions.^{4,6} A large proportion of people who are exposed to a suspect rabid animal are children under 15 years of age.⁶

Preventive Measures

Pre-exposure prophylaxis guidelines for humans

[The Alberta Immunization Policy \(AIP\) – Biological Products Rabies vaccine](#) can be referenced for more detailed information on the vaccines used in Alberta and their administration. Two vaccines are currently approved for use in Canada: Imovax® Rabies, made by Sanofi Pasteur Ltd and RabAvert®, made by Novartis and distributed by Merck Frosst.²⁸ The vaccines are safe, effective and cause few adverse reactions.

Alberta Health provides publically funded rabies vaccine for Albertans at occupational risk for infection with the rabies virus. High-risk occupations include:

- Workers routinely caring for animals including veterinarians, veterinary technologists and Humane Society/SPCA workers. (Please note that volunteers such as Humane Society/SPCA volunteers are not eligible to receive provincially funded rabies vaccine);
- Animal research workers including rabies laboratory workers and those working with rabies-prone species;
- Animal control workers including bylaw officers, animal control (dog pound workers) and zoo workers;
- Wildlife workers including fish and wildlife workers and foresters; and
- Spelunkers (cavers): Albertans involved in work-related spelunking - this includes occupations involved in activities related to mining and geological research where exposures could occur. (Recreational spelunkers are not eligible to receive provincially funded rabies vaccine.)

People in high-risk occupations should have their antibody titers monitored as per the AIP.

Anyone not eligible to receive provincially funded vaccine who is at risk of potential exposure to rabies can purchase the vaccine through some pharmacies and travel clinics in the province. Travelers are encouraged to consult a healthcare provider to obtain advice on receiving rabies pre-exposure immunization.²⁹ People who engage in recreational spelunking, hunters and trappers who may come into close contact with potentially rabid animals such as bats, skunks and foxes are also encouraged to consult a healthcare provider regarding rabies pre-exposure immunization.²⁹

Rabies immunization does not eliminate the need for post-exposure prophylaxis should an exposure occur, but fewer vaccine doses may be needed. Pre-exposure vaccine may also offer protection in the event that an exposure goes unnoticed. Refer to the AIP for current recommendations.

Pre-exposure prophylaxis guidelines for animals:

Rabies vaccination in animals remains the only way to protect against the virus, and even though rabies prevalence is very low, exposure can occur at any time. The rabies vaccine is safe and efficacious in protecting pets and, therefore, their owners and the public from the rabies virus. Vaccines are available that provide three years of protection for pets. An adjuvanted product is typically used; however a non-adjuvanted vaccine is available for cats as evidence shows that some cats may develop osteosarcomas in response to the adjuvant.³⁰

Commercially available rabies vaccines are licensed for use in Canada for the following species: dogs, cats, ferrets, horses, cattle, and sheep. If any other animal is vaccinated for rabies, it would be considered off label use and the efficacy of the vaccine would be theoretically plausible but unproven.

A study done in the U.S. looking at the vaccination status of rabid dogs (n=264) and cats (n=840) between 1997-2001 found that 4.9% of rabid dogs and 2.6% of rabid cats had a history of rabies vaccination. A very small number had a history of receiving two doses, and were classified as up to date.³¹ The study concluded that rabies is uncommon in vaccinated dogs and cats, but can occur, thus veterinarians should include rabies on their differential diagnoses for dogs and cats with clinical symptoms regardless of vaccination status.³¹

Rabies vaccination of domestic animals in Alberta is not mandated however, many pet owners of dogs, cats and ferrets vaccinate their pets through private veterinarians. Livestock are not commonly vaccinated for rabies in Alberta; however, if a horse is being taken to other countries or provinces where rabies is present in small predators (e.g., skunk in Saskatchewan or Manitoba) then vaccinating for rabies is recommended.

Within Canada, there are no interprovincial vaccination requirements for rabies. The areas in Canada that have a higher prevalence of rabies in small carnivores such as the red and arctic foxes in the north have a greater risk of transmission of the virus to domestic pets such as dogs. This is important for veterinarians and public health professionals to recognize when faced with potential exposure events that involve animals from other parts of Canada.

Domestic pets may be required to be vaccinated for rabies when they travel to other countries, and at least 30 days prior to entering the USA. The Canadian Food Inspection Agency (CFIA) posts international vaccination requirements for animals on their [public website](#). All imported animals aged 12 weeks and over are also required to have proof of rabies vaccination before entering or returning to Canada. Owners of animals imported at under 12 weeks of age are required to present proof of vaccination to their local CFIA district office once their animal is vaccinated at 12 weeks.

Veterinarians are required to maintain client records of vaccinations according to the Alberta Veterinary Medical Association (ABVMA). The ABVMA is responsible for the certification and inspection of veterinary practice entities in Alberta. Alberta Health Services may request those records as part of a rabies risk assessment under the authority of the [Public Health Act](#).

Education

Educating the public is an important component of rabies prevention. Information about rabies prevention is provided by federal, provincial, and local partners in various formats including online, paper-based, and face-to-face interactions with veterinarians, wildlife biologists and officers, agricultural fieldmen, travel health and public health professionals. Education is a part of the risk assessment process following a potential exposure in humans and domestic animals. Education may include:

- Promoting public awareness of the risk of rabies exposure through contact with wild or unknown animals, in particular bats, skunk, raccoon, fox, etc.;
- Informing the public on what to do should an exposure occur to a person and/or pet; the importance of having pets vaccinated for rabies by a licensed veterinarian; and how to deter wild animals from taking up residence in and around homes;

- Educating the public on the importance (and legalities) of not keeping wild animals as pets, not attempting to nurse a wild animal back to health, and avoiding handling, feeding or intentionally attracting wild animals;
- Instructing children to avoid unfamiliar wild or domestic animals even if they appear friendly;
- Providing advice on how to keep pets and other domestic animals safe and healthy;
- Providing information on what to do if bats are [roosting in a home](#) or are found on the ground; and
- Educating travelers about avoiding exposures to animals and other preventive measures when travelling, especially to areas with endemic dog variant rabies.

Risk Assessment and Management for Human Exposures

Overall, in Alberta, the risk is very low for exposures to rabies-infected animals but the potential is present. Additionally, inter-provincial and international travel and transport of goods and products via rail, air, and motor vehicle can potentially introduce animals with rabies into the province.

For exposures that occur outside of Alberta, risk assessment should be conducted including consideration of rabies risk in the animal and the geographic region. The Public Health Veterinarian (PHV) can be consulted for current information related to the risk from the animal species where the exposure occurred to aid in the risk assessment and the decision to recommend rabies post-exposure prophylaxis (PEP).

Because the epidemiology and pathogenesis of rabies are very complex, these guidelines cannot be specific for every possible circumstance. The decision to provide rabies PEP should be made after careful examination of all the risk factors in a particular exposure situation.

Rabies in humans can be prevented by providing exposed persons with prompt local treatment of wounds combined with appropriate passive and active immunization. Rabies PEP must be considered in every incident in which a potential exposure has occurred. The decision to initiate PEP is made by the Medical Officer of Health (or designate) who may consult with the PHV. Contact information for the PHV, AHS-Public Health and FNIHB-AB is provided in the [appendices](#).

Treatment of wounds

Immediate and thorough cleaning of all wounds is one of the most important aspects of rabies prevention following a potential exposure. This includes:

- immediate and thorough flushing, and washing of the wound with soap and water and an appropriate antiseptic;³²
- consultation with [AHS-public health or FNIHB-AB](#) if the wound is caused by a known or suspected rabid animal;
- consideration of local rabies immune globulin (RIG) infiltration for wounds potentially infected with the rabies virus - refer to the Alberta Immunization Policy ([AIP](#)) for details on the administration of RIG and vaccine;
- tetanus prophylaxis given as indicated in the AIP on tetanus post-exposure prophylaxis in injury/wound management;³³ and
- an assessment by a health professional regarding recommended measures to control bacterial infection (i.e., antibiotic therapy) should also be done.

Considerations for post-exposure prophylaxis

Type of Exposure

Rabies is transmitted by introduction of the virus into the body through open wounds or via mucous membranes. A potential rabies exposure occurs with any bite, scratch, or other situation in which saliva, cerebral spinal fluid or nervous tissue from a potentially rabid animal enters into a fresh break of the skin, or comes in contact with mucous membranes of a person. The likelihood of rabies infection varies with the nature and extent of exposure.

The exposure risk is increased when any of the following are present:

- the animal involved in the exposure is a known rabies reservoir or vector species;
- the exposure occurs in a geographical area where rabies is present;
- the animal looks sick or displays abnormal behaviour;
- the bite/altercation was unprovoked; and/or
- the biting animal is not up to date with their rabies immunizations or has never been immunized for rabies. *Note: The immunization status of the animal should not by itself influence the decision to offer rabies PEP. Rabies can still occur in a small percentage of fully immunized dogs and cats. Rabies vaccine efficacy in other animals is not well documented.*

Bite Exposures

- Rabies is most commonly transmitted through bites (any penetration of the skin by teeth).
- Bites are usually apparent except for bat bites. Bat's sharp needle-like teeth may leave no visible mark.
- A bite with prominent salivary contamination (e.g., through exposed skin) is more likely to produce rabies than one through thick clothing that removes saliva from the animal's teeth.
- Multiple bites are more likely to transmit the virus than a single bite.
- The severity of the wound, the site of the wound in relation to the richness of the nerve supply, and its distance from the brain may, in theory, influence the incubation period.

Non-Bite Exposures

- Terrestrial animals rarely transmit rabies through non-bite exposures. However, "non-bite" contamination of scratches, abrasions and open wounds or mucous membranes by saliva or other potentially infectious material, such as the brain tissue of a rabid animal, could result in transfer of the virus.
- Rabies transmission has been shown to occur through aerosolization in laboratory settings and in rare natural cases.⁷ The risk of aerosol spread is very low, but could be present for individuals in confined spaces with infected bats, such as bat caves, or laboratory workers handling infected materials.
- Solid organ donation has been documented as a source of rabies transmission; however such occurrences are extremely rare.
- Contact with an animal's blood, urine or feces does not constitute an exposure.
- Being sprayed by a skunk is not considered an exposure.

- Ingestion of raw meats, milk or other tissues from animals infected with rabies has never been documented as a source of infection^{5,6}, though processing of carcasses through butchering or skinning could pose a risk.

Circumstances of the Exposure

The behavior of the animal in relation to the human behavior (**provoked** attack or **unprovoked** attack) at the time of the exposure should be considered. An unprovoked attack by an animal is more likely to indicate that the animal is rabid than a provoked attack.

An **unprovoked attack** is one where the person did **not** surprise or startle, antagonize or threaten the animal or enter its territory. A **provoked attack** is one where the human did something to “provoke” the animal (even if the action was unintentional) and the attack would be the animal’s normal response to such a human action. Examples could include any of the following:

- attempting to corner or trap an animal;
- entering an area that the animal considers its territory (e.g., dog in a yard) or approaching an animal’s offspring;
- coming too close to an injured animal;
- trying to break up a fight between two animals;
- picking up an animal and attempting to take it elsewhere;
- petting an unfamiliar animal;
- interfering with an animal’s food;
- interfering/wrestling with an animal’s owner;
- wrestling/playing with the animal; and/or
- exposing the animal to stress such as a new environment/people/other animals.

Signs of Rabies Displayed by the Animal

The signs of rabies in different animal species can vary and cannot be reliably interpreted in wild animals. However, a wild animal that is friendly to humans is not displaying normal behaviour and may have disease. Clinical signs may be subtle and non-specific at first and can include lethargy, fever, vomiting, anorexia, colic and lameness, and changes in behaviour. Almost always there is a change in temperament such that a normally friendly animal may become snappy and seek to avoid an owner’s company, while a timid shy animal may become less restrained and unnaturally approachable or aggressive.

The disease progresses to more severe signs such as self-mutilation, excessive salivation, abnormal vocalization, aggression and/or seizures. Animals may display either the furious form in which they become aggressive, or the paralytic or dumb form in which the animal becomes lethargic, immobile and comatose. Death usually ensues within a few days of the onset of clinical signs.

It’s important to note that clinical diagnosis in any animal (wild or domestic) is difficult, especially in areas where rabies is uncommon and should not be relied on when making public health decisions. In the early stages, rabies can easily be confused with other diseases or with normal aggressive tendencies. Therefore, when rabies is suspected and definitive diagnosis is required, laboratory confirmation is indicated. Suspect animals should be euthanized and tested at the CFIA.

Exposure to a dog, cat or ferret:

Dogs, cats and domestic ferrets within Alberta are handled in a similar way for human rabies exposure risk assessment and management. Dogs, cats and ferrets have similar rabies pathogenesis and viral shedding patterns, attain similar efficacy from the rabies vaccine, and are common household pets involved in the majority of bites to humans.

A pet dog/cat/ferret kept exclusively indoors (day and night) has virtually no risk of acquiring rabies, unless a bat or other potentially rabid animal entered the house and had physical contact with the pet within the previous six months. This would also apply to dogs/cats/ferrets that are walked exclusively on leash and/or are monitored at all times during outdoor activities.

An animal's history of up-to-date rabies immunization makes the chance of rabies much less, but does not completely eliminate risk. The immunization history by itself should not influence the need for PEP or the need for the 10-day observation, or the need to euthanize the animal for testing.

A clinically healthy pet dog/cat/ferret that bites a person should be confined and observed for 10 full days (Day 0 = date of the exposure incident). The companion animal's owner is typically the best person to observe the animal for the 10 days within the home, and then call the relevant agency for further health assessment or care of clients affected. If the animal is healthy and behaving normally at day 10, then it was not excreting rabies virus at the time of the exposure. PEP of the exposed is not needed, or can be discontinued if it was started. At the first sign of illness in the animal during the observation period, AHS Public Health or FNIHB-AB (for clients on-reserve) and the PHV must be notified. A veterinarian should examine the animal and if rabies is on the differential diagnosis, PEP should be initiated in the exposed if not already started, the animal should be euthanized and a specimen sent to the CFIA for rabies testing. The PHV will work with the private vet to facilitate rabies testing.

The 10-day observation period may not be necessary if:

- 1) The bite/exposure was provoked **AND**
- 2) The animal is kept exclusively indoors or is walked exclusively on leash and/or monitored at all times during outdoor activities **AND**
- 3) The exposure was from an apparently healthy domestic dog/cat/ferret **AND**
- 4) The animal is from Alberta and the exposure occurred in Alberta.

In this scenario, PEP would not be recommended in the exposed, and the observation period may be waived at the discretion of the MOH or Executive Officer.

In cases where an animal does not appear to be clinically healthy or cannot be held safely, AHS/FNIHB-AB should consult with the PHV to decide whether immediate euthanasia and testing is warranted. Generally an examination of the animal by a veterinarian should be completed to aid the assessment. PEP may be initiated if the veterinarian assessment does not rule out rabies and pending testing results.

If an owner refuses to hold the animal for observation, a MOH or Executive Officer can issue an Order for the animal to be secured alive and uninjured and confined in a secure place at the owner's expense for up to 10 full days. ([Refer to Schedule 4: 5 \(2\) of the Communicable Diseases Regulation: Rabies](#)). The 10-day observation period should only be enforced when there is a reasonable and significant assumption of a rabies risk in an animal. Otherwise the observation period should be done with general agreement/consent of the owner at the owner's premises.

If the animal is euthanized before it can be observed and the risk assessment is concerning for rabies, AHS/FNIHB-AB should attempt to have the brain tested. If testing is not possible (e.g., gunshot damaged specimen, decomposition), then PEP may be indicated depending on the circumstances.

If the live animal is unavailable for observation or testing (e.g., a stray animal bit a person and cannot be located, cannot locate animal's owner) and the risk assessment cannot rule out rabies, PEP may be indicated depending on the circumstances.

If a stray animal that is involved in an exposure is captured, it may be held for a 10-day observation period in a municipal animal control facility or other appropriate facility, or may be euthanized and tested if rabies is suspected. PEP of the exposed may be indicated if the animal is exhibiting signs and symptoms of rabies, or pending the results of testing or observation.

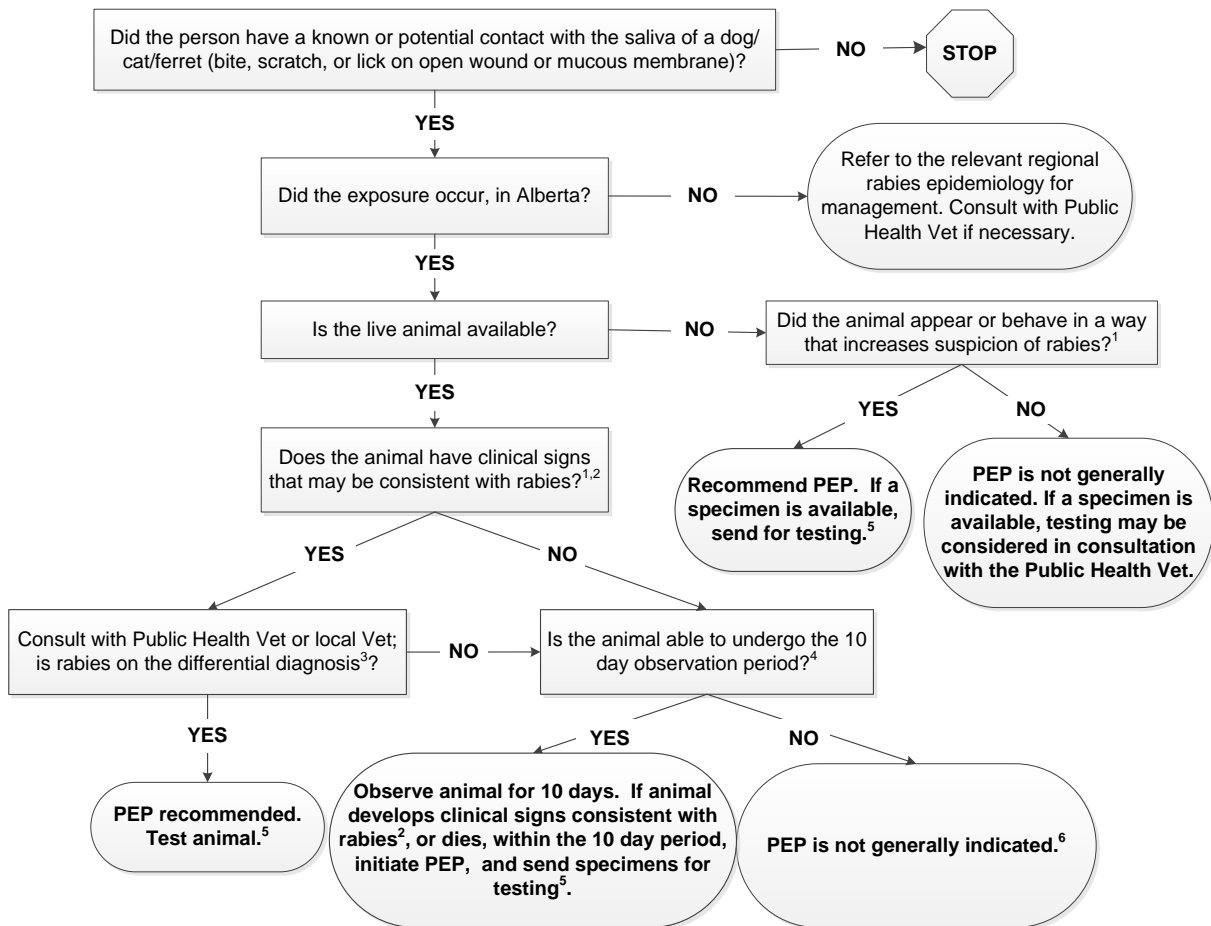
The administration of post-exposure prophylaxis (vaccine) to an animal undergoing a 10-day observation period may be considered in the unlikely scenario in which the animal was potentially exposed to rabies from another high risk animal during observation (e.g., bat exposure). Adverse reactions to the rabies vaccine in animals are very rare, so would not affect the validity of the observation period in ruling out rabies virus in the saliva at the time of the initial human exposure.

Retrospective Risk Assessment:

In cases where rabies is suspected or confirmed in a dog, cat or domestic ferret, a retrospective risk assessment should be immediately conducted to identify individuals who may have been exposed to the animal during the period of communicability. Individuals with significant exposures to the animal within the 10 days prior to the animal displaying clinical signs should receive PEP. Research shows that dogs, cats and domestic ferrets can have rabies virus in their saliva up to 10 days before the onset of clinical signs of rabies.^{5, 18, 19} The PHV can be consulted to aid in the risk assessment.

The following flowchart outlines the risk assessment and management process.

Rabies Risk Assessment and Management: Human Exposure to Dogs, Cats or Ferrets



1. Examples include an unprovoked attack, unhealthy appearance, abnormal behavior (including agitation, isolation, aggression).

2. Clinical signs of rabies can be subtle and nonspecific at first and can include lethargy, fever, vomiting, anorexia, colic and lameness, and changes in behavior. The disease then progresses steadily to more severe signs such as self-mutilation, excessive salivation, abnormal vocalization, aggression, and/or seizures. Animals display either the *furious* form in which they are extremely aggressive, or the *paralytic* or "dumb form" in which the animal is lethargic, immobile and becomes comatose.

3. Local veterinarians may be used for aiding the clinical assessment.

4. Observable means with general agreement/consent of the owner, veterinarian, or other person with care and control of the animal. A 10-day observation may be waived if: the exposure was provoked, AND the animal is kept exclusively indoors or is walked exclusively on leash and/or monitored at all times during outdoor activities, AND the animal is apparently healthy, AND the animal is from Alberta, AND the exposure occurred in Alberta.

5. Consult Public Health Veterinarian to arrange for testing. Discontinue PEP if results are negative.

6. The 10-day observation period may be mandated under exceptional circumstances. The animal may be euthanized at the owner's request and testing may be considered in consultation with the Public Health Vet.

Public Health Vet:
 Email: albertarabiesprogram@gov.ab.ca
 Phone: 1-844-427-6847 Mon.-Sun. 8:15am-4:30pm

Exposure to all other warm-blooded animals:

In general, rabies should be suspected in terrestrial wildlife acting abnormally. For example, wild animals that become uncharacteristically approachable suggests the animal may be unhealthy. The same is true of bats that can be seen flying in the daytime, resting on the ground, attacking people/animals, or fighting.

Bat exposures:

Any direct physical contact with a live bat is of concern. Bat bites may not be readily apparent so PEP should be considered when there has been physical contact with a bat that could have resulted in a bite, scratch, or saliva exposure into a wound or mucous membrane.

- **In an adult**, a bat landing on clothing would only be considered reason for PEP if a bite, scratch, or saliva exposure into a wound or mucous membrane could not be ruled out.
- **In a child**, any direct contact with a bat should be considered a reason for PEP, including contact through clothes, as a history to rule out a bite, scratch, or mucous membrane exposure may not be reliable.

In cases where the person cannot be certain if an exposure occurred (e.g., a young child that cannot articulate, inebriation or other reasons for uncertainty), the exposure risk assessment can be difficult. The decision to offer PEP should be made by the MOH or designate. When a bat is found in a room with a child or an adult who is unable to give a reliable history, factors indicating that an exposure may have occurred include:

- the individual waking up crying or upset while the bat was in the room or,
- observation of the bat in close proximity to the individual or
- a bite or scratch mark.

PEP should be started immediately and can be discontinued if the bat is captured and sent for testing that rules out rabies. If the bat is captured, contact the PHV to arrange for the bat to be tested for rabies.

Photo of a bat bite on a finger

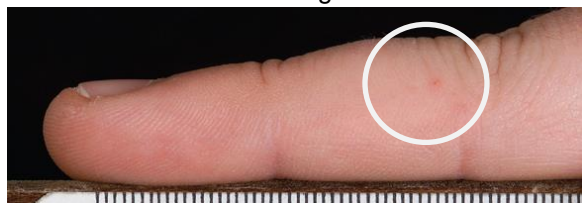


Photo courtesy of the CDC.

This picture illustrates how difficult it can be to identify a bat bite.

Small mammals and bird exposures:

Small herbivorous mammals including rabbits/hares, squirrels, gophers, chipmunks, rats, mice, gerbils, hamsters, hedgehogs, woodchucks, groundhogs and muskrats are often involved in bites to humans; however, bites from these animals seldom, if ever, call for rabies PEP, unless that animal is exhibiting unusual behaviour and/or appears unhealthy. PEP may be considered if the circumstances are highly unusual. Consult with the PHV to arrange testing of the animal.

Birds can be infected with rabies experimentally; however, there is only one documented natural case from a rabies endemic area of India.²² Rabies transmission from contaminated talons has not been documented. Following a bird exposure, rabies PEP would not typically be recommended.

Owned animal exposures (excluding dogs, cats, domestic ferrets, small mammals and birds):

Owned animals refer to animals that have continuous care by a person such that changes in usual behaviour can be determined. Examples include livestock, pets and zoo animals. There are no standard risk assessment protocols for animals that fall under this category, thus consultation with the PHV may be warranted. If the risk assessment does not rule out rabies then PEP may be considered.

Livestock such as horses, cattle and swine have unknown incubation periods but evidence suggests that all mammals will succumb to the rabies virus after 3–4 days of overt rabies clinical signs. The risk assessment may include an examination by a private veterinarian if deemed appropriate following consultation with the PHV. If the animal is behaving in its usual fashion and the risk of rabies in the area is low, a veterinarian assessment may not be required. Euthanizing and testing should be done only if rabies is part of the veterinarian's differential diagnosis.

Exotic animals in captivity (e.g., monkeys, zoo animals, etc.) fall under the "owned animal" category but should be treated as wild animals in terms of risk. They may be confined and observed depending on the animal and the circumstances. A risk assessment should be done by the PHV who may consider animal examination by a veterinarian. Euthanizing and testing of the animal should be done if rabies is part of the veterinarian's differential diagnosis. PEP may be recommended in exposed persons pending lab results.

All other warm-blooded animals:

Exposures to potential rabies reservoirs such as fox, raccoon and skunk are of concern. If the animal is captured, it should be euthanized and the head sent for testing. PEP can be started while results are pending. If the animal is not available for testing PEP is recommended.

Exposures to other wild carnivores such as coyote, wolf, bear, mink, weasel, badger, cougar, lynx etc., is also of concern. Even though these animals are not known to be rabies reservoirs in Canada, they could be exposed to bats or other rabid animals through predation or scavenging. In some situations the animal may be euthanized and tested in consultation with Alberta Fish and Wildlife. PEP can be started while results are pending. If the animal is not available for testing PEP is recommended.

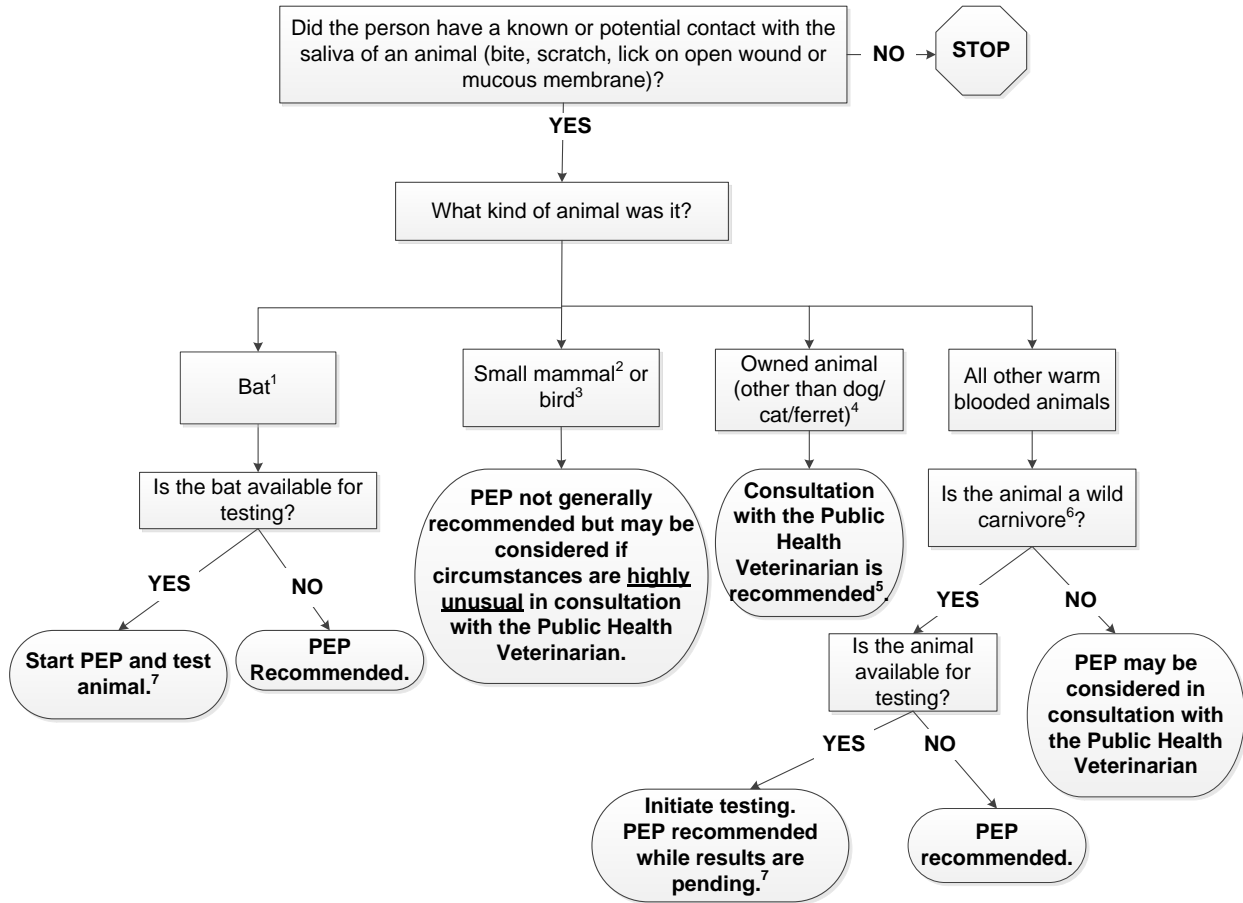
Exposure to non-carnivorous wild animals (excluding small mammals and birds – see their own category above) such as deer, elk, moose, mountain goat/sheep, and porcupine is of less concern than wild carnivores, however these animals can be exposed to rabies reservoirs or wild carnivores. The PHV can be consulted to assist with the risk assessment. PEP may be considered depending on the circumstances.

Retrospective Risk Assessment:

When an animal has suspected or confirmed rabies and a retrospective risk assessment is warranted to identify people who may have been exposed, it should be noted that the period of communicability is not well documented for most animals, and may vary across species. The PHV can be consulted to aid in the assessment.

The following flowchart outlines the risk assessment and management process.

Rabies Risk Assessment: Human Exposures to Warm Blooded Animals (not including Dogs, Cats or Ferrets)



1. Bat bites may not be readily apparent. PEP should be considered for direct contact with a bat AND the exposed person cannot be certain a bite, scratch, or mucous membrane exposure did not occur.

2. Small mammals include rabbits/hares, squirrels, gophers, chipmunks, rats, mice, gerbils, hamsters, hedgehogs, woodchucks, groundhogs and muskrats.

3. Birds are of least concern. Birds can develop rabies experimentally, however there is only one natural case documented from rabies endemic India. There are no documented cases of transmission of rabies from raptors (including talons). Virus is sensitive to desiccation.

4. Owned animal refers to animals that have continuous care by a person such that changes in behaviour can be determined, excluding small mammals and birds. Examples include zoo animals, pets, livestock.

5. There are no standard risk assessment protocols for animals that fall into this category. Thus, consultation with the public health vet is warranted if the risk assessment does not rule out the possibility of rabies.

6. Wild carnivores include fox, coyote, wolf, raccoon, skunk, mink, weasel, badger, cougar, lynx and bear. Consult with the Public Health Veterinarian if unsure, and to arrange testing.

7. Consult Public Health Veterinarian to arrange testing. Discontinue PEP if results are negative.

Public Health Vet:
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Immunizing agents

Post-Exposure Immunization-general guidelines

Refer to the [Alberta Immunization Policy \(AIP\)](#) for detailed instructions on PEP guidelines (rabies vaccine and rabies immune globulin (RIG)). A Medical Officer of Health or designate must be consulted for assessment for rabies PEP.

If rabies PEP is recommended:

- Determine the immunization status of the individual;
- PEP started in another country requires individual assessment and consultation with the local Medical Officer of Health (or designate) as necessary;
- The consent for immunization and the importance of the timing of vaccine administration should be discussed with the client, as well as the required schedule for doses;
- Determine the client's willingness and commitment to accept and complete rabies PEP;
- Plan the immunization schedule with the client and confirm the location where the remaining doses will be given;
- Pregnancy is not a contraindication to PEP;
- Persons who present for evaluation and rabies PEP even months after having been exposed should be assessed in the same manner as if the exposure occurred recently. The incubation period for rabies is typically 1–3 months but may vary from under 1 week to 1 year, dependent upon factors such as the location of virus entry and viral load.¹⁰ There are cases of very long incubation periods documented in the literature of multiple years.^{14, 15}

Note: For all exposures where rabies PEP was administered, PEP may be discontinued if CFIA lab testing of the animal brain does not indicate the presence of rabies virus, unless the individual is at continued risk of rabies exposure.

Obtaining and authorizing rabies post-exposure biologicals

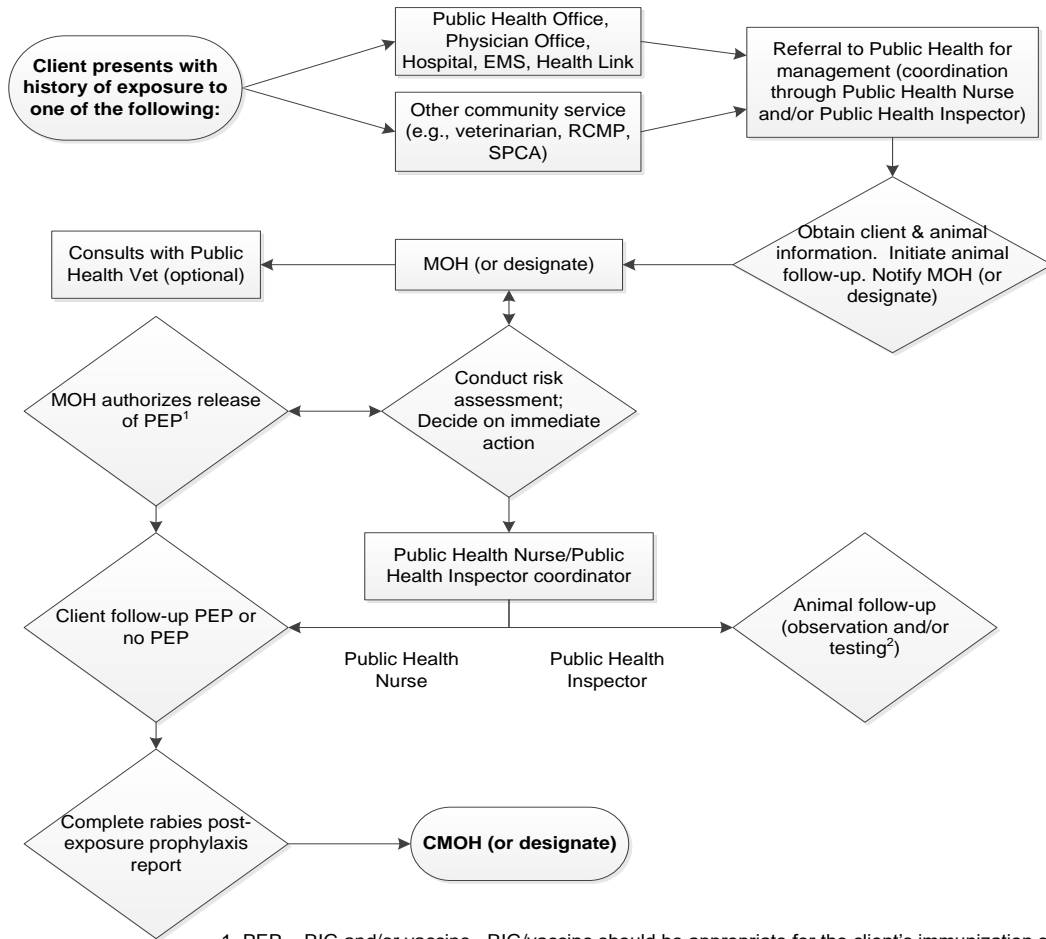
Alberta Health requires timely reporting regarding rabies PEP. Replacement of AHS rabies PEP biologicals by Alberta Health is dependent on the required information being provided.

Authorization of Biologicals

- A Medical Officer of Health can authorize the release of RIG and/or rabies vaccine for a client.
- The Chief Medical Officer of Health is available for consultation if desired by the Medical Officer of Health.
- RIG and rabies vaccine should be stocked within AHS where it can only be accessed with Medical Officer of Health authorization.
- Further information on authorizing and obtaining rabies post-exposure biologicals information is contained in the [Alberta Immunization Policy](#).

The following flowchart shows the general process flow for human rabies risk assessment and post-exposure management by AHS Public Health and FNIHB-AB.

Rabies Post-Exposure Management by Public Health in Alberta



1. PEP = RIG and/or vaccine. RIG/vaccine should be appropriate for the client's immunization status. Refer to the Alberta Immunization Program.

2. Consult Public Health Veterinarian to arrange testing. Discontinue PEP if results are negative.

CMOH – Chief Medical Officer of Health
 MOH – Medical Officer of Health
 RIG – Rabies Immune Globulin
 PEP – Post exposure prophylaxis

Public Health Veterinarian:
 Email: albertarabiesprogram@gov.ab.ca
 Phone: 1-844-427-6847 Mon.-Sun. 8:15am-4:30pm

Risk Assessment and Management of Animal Exposures

Similar to human rabies exposure risk assessment, the appropriate management of a domestic animal that may have been exposed to rabies virus is based on an evaluation of risk factors, which are assessed by the private veterinarian in conjunction with the Public Health Veterinarian (PHV). **Any veterinarian who suspects rabies in an animal (dead or alive) must inform the PHV 1-844-427-6847 to obtain assistance with the risk assessment and management process. The veterinarian should inform clients that any person exposed to the potentially rabid animal should seek immediate medical treatment. The veterinarian should inform local AHS Public Health or FNIHB-AB of the potential human exposure – contact information is provided in the [appendices](#).**

If the PHV determines through the assessment that the animal is a rabies suspect case, the PHV will direct the private veterinarian on how to collect, package and submit brain samples, to the CFIA-Rabies Laboratory in Lethbridge for rabies testing. The PHV is responsible for completing the rabies form that is to be included with the sample. The PHV will also work with AHS Public Health and FNIHB-AB to assist in the risk assessment of potential human exposures.

Risk assessment:

When an owned domestic animal or pet is exposed to another animal that may have rabies, the following factors are taken into consideration to determine the appropriate management actions:

1) The victim animal's vaccination status needs to be ascertained. Vaccination of pet animals results in strong protective immunity even when their vaccination status may have lapsed according to manufacturer's recommendations. However, many variables factor in when an animal is trying to mount an appropriate immune response to a rabies virus exposure. These factors can be the titre level, the immune status of the victim animal at the time of the encounter with the rabid animal, the amount of salivary (and potentially rabies virus) contamination and tissue damage to the victim, as well as the site of the potential entry of the rabies virus into the victim animal's body. Rabies titres alone cannot determine the entire outcome of an animal's ability to successfully fend off a rabies virus exposure.

The risk of the pet contracting rabies from an exposure event decreases depending on the historical immunological status of that pet.

2) The species of animal involved in the altercation must be taken into account when assessing the risk to the victim animal. There are five categories of animals that are commonly taken into consideration:

- a) Pet domestic animals (e.g., dog/cat/ferret)
- b) Wild mammalian carnivores
- c) Bats
- d) Unknown wild animals
- e) Rodents, non-carnivorous mammals or birds

Each of these categories of animals represents a different theoretical risk of having rabies based on the prevalence of rabies in the area, the species (e.g., known rabies reservoir species), and the geographical

area where the altercation occurred. If unsure about the rabies risk in a given geographical area, the PHV can be consulted.

- a) **Exposure is to another domestic pet (e.g., dog, cat, ferret):** An example of this would be a fight between owned dogs in an off leash dog park. A rabies risk assessment by the PHV would not be warranted for exposures to domestic pets in Alberta unless there was a reasonable suspicion of rabies in the animals involved. Wound care and bringing the victim animal up to date on rabies vaccination as soon as possible is recommended.

For exposures to a **stray domestic animal** the victim animal should undergo a rabies risk assessment by the PHV, and be brought up to date on rabies vaccination as soon as possible.

- b) **Exposure to a wild mammalian carnivore (e.g., fox, coyote, wolf, skunk, badger, bear, lynx, cougar, weasel):** Exposure to any wild mammalian carnivore should result in a risk assessment by the PHV. If the wild animal is available for testing, it should be euthanized and specimens sent to the CFIA for rabies testing. The victim animal should be brought up to date on rabies vaccination as soon as possible or given a rabies booster. A quarantine or observation period may be required for the victim animal depending on the circumstances of the exposure and/or the results of the CFIA testing of the wild carnivore if completed.
- c) **Exposure to a bat:** Exposure to a bat is of concern as bats are the only rabies reservoir in Alberta. A rabies risk assessment by the PHV is warranted. If a bat specimen is available, contact the PHV to coordinate CFIA testing. The victim animal should be brought up to date or given a rabies vaccine booster as soon as possible. A quarantine or observation period may be required for the victim animal.
- d) **Exposure to an unknown wild animal:** This would include the victim animal being exposed to a wild animal, however the owner cannot confirm what type of animal. For example, a dog or cat who has bite wounds from an unknown source. For these exposures, a risk assessment by the PHV would be warranted. The victim animal should be brought up to date or receive a rabies booster as soon as possible. A quarantine or observation period may be required depending on the circumstances.
- e) **Exposure to a rodent, non-carnivorous mammal or bird (e.g., squirrels, gophers, chipmunks, mice, rats, hamsters, gerbils, guinea pigs, rabbits, hares, muskrats, porcupines, livestock, and all birds):** Exposures to rodents, non-carnivorous mammals and birds does not require a risk assessment by the PHV, unless there is a reasonable suspicion of rabies in the animal. Bringing the victim animal up to date on rabies immunization is recommended.

Management:

Both the aggressor and the victim animal involved in the altercation may undergo management strategies when possible and appropriate. The victim animal is always recommended or required to either receive their first rabies vaccination or to be boosted. This is recommended in order to provide the victim animal with as much protection as possible. Evidence in the literature also suggests that in exposed animals that go on to develop rabies, post-exposure rabies vaccine administration may reduce incubation times and hasten death, thus potentially decreasing the chance of an animal incubating rabies being lost to follow-up.^{34, 35}

If the animals involved in the altercation are owned pets and they appear healthy, then no further management of either party is usually necessary, beyond wound care and ensuring rabies vaccination is up to date.

If the exposure is from a stray domestic dog, cat or ferret, and the stray is caught, it can be either observed for 10 days in an appropriate facility, for development of clinical signs of rabies (see [rabies signs section](#)) or, if necessary, should be humanely euthanized and submitted through the PHV for rabies testing.

If the exposure is from a wild animal, it is not advisable or practical to hold a wild animal for observation for several reasons: a wild animal suddenly taken out of the wild will not behave normally and the time for some species to succumb to the rabies virus can be variable and is not always documented. If the wild animal is available for testing it should be humanely euthanized and submitted for rabies testing.

Depending on the results of the rabies risk assessment by the PHV and/or veterinarian, the victim animal will be managed according to their vaccination status, and may be required to undergo a quarantine or owner observation period if they had a high-risk exposure:

- 1) A victim animal that has proof of being up to date on their rabies vaccination may be required to undergo a 45-day owner observation period in conjunction with owner education on rabies symptoms.
- 2) A victim animal that has had past rabies vaccinations but now is out of date according to rabies vaccine manufactures' guidelines should be evaluated and managed on a case-by-case basis by the PHV.
- 3) A victim animal that has never received a rabies vaccination may be required to undergo a 3 month quarantine period as outlined, approved and supervised by the PHV under the Chief Provincial Veterinarian authority.

Further information on rabies management is available in the [Recommendations of the Canadian Council of Chief Veterinary Officers Subcommittee for the Management of Potential Domestic Animal Exposures to Rabies](#).

Quarantine parameters:

If a quarantine period is required, a victim animal can be quarantined on the owner's property. If they cannot meet the quarantine conditions then the animal will need to be quarantined at a suitable facility at the owner's expense. The PHV or designate will visit the property to determine if the quarantine conditions can be met. Those conditions include:

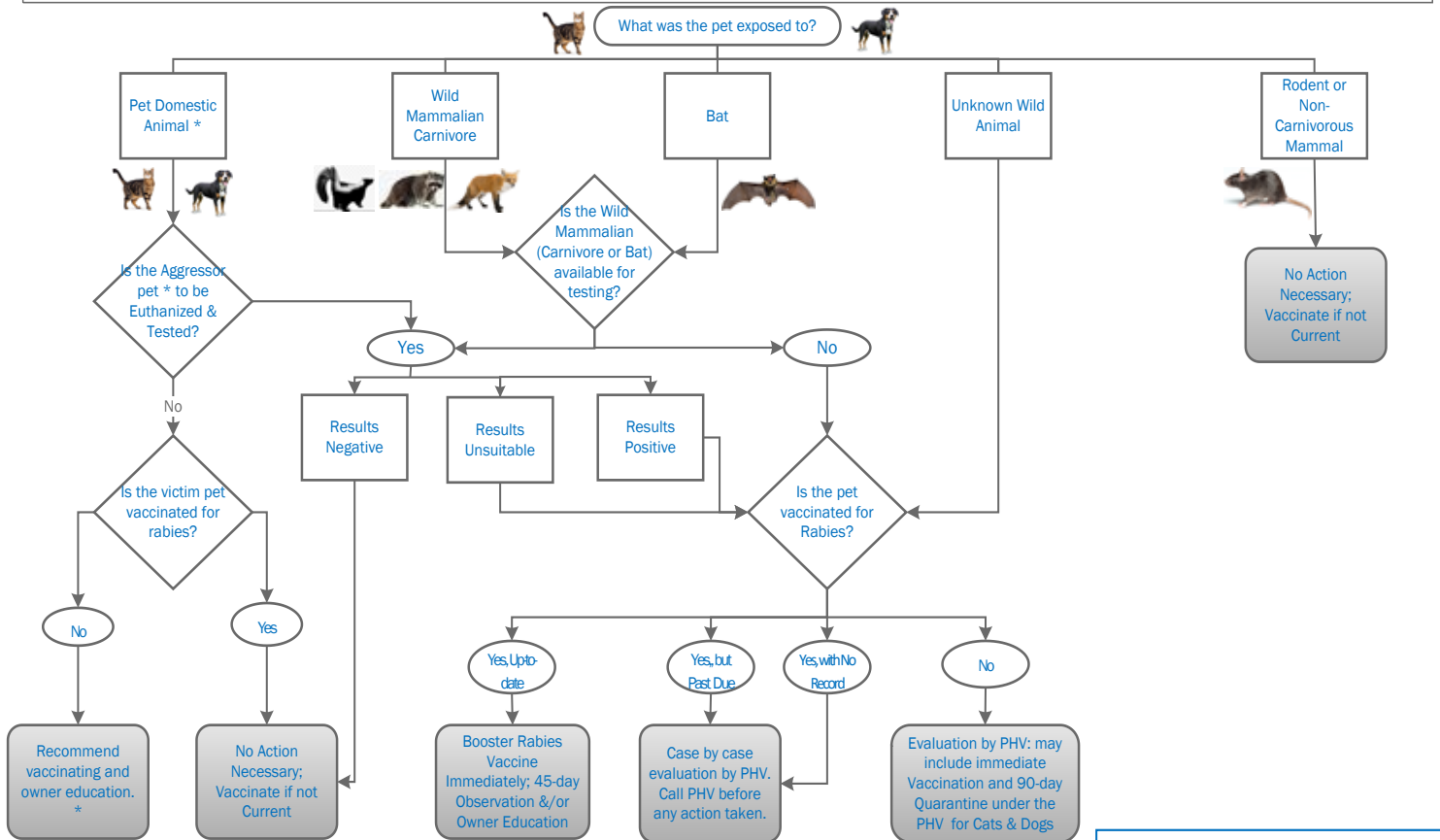
- Vaccination or boosting of the victim animal as soon as possible following the potential rabies exposure. If the victim animal will be housed with other pets then all need to be up to date on their rabies vaccinations or be brought up to date.
- The victim animal must be kept in such a way as to prevent it having contact with other domestic animals (other than those it is in quarantine with), wild animals and the general public.
- If the animal is allowed outdoors, it must be in a completely fenced area, and the fence must be completely closed (e.g., wooden fence with no gaps).

- If the victim animal is a dog, the dog may be walked on leash but only while wearing a muzzle. Proof of purchase of the muzzle must be provided.
- The PHV will notify AHS public health (in the corresponding zone) or FNIHB-AB if on reserve, of the quarantine. *Contact information is provided in the [appendices](#).*
- If the quarantined animal's health status changes in any way, the PHV must be immediately notified.
- The owner of the animal will be required to sign a quarantine order and once the quarantine period has been completed the revocation of the quarantine order will be signed off by the owner and PHV.

The following flow chart outlines the rabies risk assessment process for domestic animals in Alberta. This flow chart is also available at the following URL:

[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/cpv16353](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/cpv16353)

Domestic Animals Rabies Exposure Assessment Tree



* Because Canada has been declared free of canine rabies virus variant transmission, healthy dog-to-dog, dog-to-cat, or cat-to-cat encounters are not generally considered a rabies risk.

Email: albertarabiesprogram@gov.ab.ca
 Public Health Vet (PHV): 1-844-427-6847

Alberta Health Services Zone Numbers

AB North	800-732-8981
Edmonton	780-433-3940
Central AB	866-654-7890
AB South	844-388-6691
Calgary	403-264-5615

Animal post exposure prophylaxis

As a condition of the quarantine, the domestic animal has to be vaccinated or boosted with a licensed vaccine as soon after the exposure incident as possible. In addition, there is evidence to support additional post exposure vaccinations at three weeks and then again at eight weeks post exposure.³⁴ When it is determined that a domestic animal has to undergo the quarantine period, the PHV will contact the animal owners' private veterinarian and share the information with them. All vaccination costs are to be assumed by the animal owner.

Alberta rabies program sampling guidelines:

Alberta Agriculture & Forestry (AF) has two streams in which rabies samples can be submitted to the CFIA Rabies Lethbridge laboratory and **all rabies samples are to be triaged in Alberta by the Public Health Veterinarian (PHV).**

1. Within 100km zones around the four provincial laboratories (Fairview, Edmonton, Airdrie and Lethbridge), there are veterinary technologists that when available can pick up rabies samples from clients or veterinary clinics. The AF staff picks up the sample and then takes it to the provincial lab to prepare the sample and ship to the CFIA laboratory.

However, **if an owner wants private cremation of their pet** and they wish to receive ashes back, then the vet clinic must remove the head of the pet for testing as AF cannot return the body after it is already taken to the provincial lab for sampling.

2. If the animal is outside of the 100km zone, it must be brought to a veterinary clinic. The transportation of the animal to the vet clinic is the client's responsibility and cost. In some scenarios a private vet can be paid by AF to travel to the client's residence to obtain the sample – this is most commonly pertaining to livestock rabies samples (e.g., horses, cattle, sheep, goats, llamas/alpacas, swine).
3. Euthanasia and cremation costs of an owned pet are at the owner's expense. AF will pay for the cost of euthanasia and cremation for a stray animal or for a wild animal requiring testing for rabies.
4. The PHV will prepare a submission form for the veterinary clinic and provide instructions on how to sample and package the rabies sample. As well, invoicing AF instructions are also included.
5. The PHV can input two additional email addresses for AHS or FNIHB-AB to receive the rabies results directly. As well, the veterinary clinic and the PHV will receive the rabies results.
6. The PHV needs the following information in order to fill out the submission form:
 - Pets name
 - Owners name
 - History of the incident
 - Victim's initials
 - If AHS already has a case number assigned, the PHV can include it on the submission form.
 - Location on the body the victim was bitten and the type of exposure (salivary contamination, bite, or scratch)
 - Email addresses of the vet clinic, AHS public health, or FNIHB-AB.

Livestock rabies testing guidelines:

Rabies in livestock in Alberta is not a common event because the usual transmission mode is between skunk or fox and livestock. As Alberta has not had rabies circulating in our skunk or fox, we do not commonly see the spillover into our livestock species. However, neurological symptoms are common in livestock and rabies infection should still be explored in particular where human exposure may have occurred either to the producer or to the veterinarian.

Depending on the scenario, livestock species, and the management and husbandry of that species, rabies quarantine parameters may be placed upon the remaining livestock groups that potentially had contact with the rabid animal. Each case will be evaluated individually by the PHV, the OCPV, and AHS, or FNIHB-AB where human exposure has occurred.

Very commonly, a bovine case that also qualifies for Bovine Spongiform Encephalopathy (BSE) is identified. As a general rule if the bovine has had symptoms ongoing for longer than 10 days in conjunction with Alberta's low rabies prevalence rate, rabies testing can be omitted. But if in consultation with the PHV, rabies testing is warranted, the following would apply:

- The whole brain (including approximately 2 inches of spinal cord) must be removed from the skull then shipped to the CFIA laboratory intact and whole. This includes horses, cattle, sheep, goats and cervids.
- If BSE testing is required then please include the Canada and Alberta BSE Surveillance (CABSESP) General Information Form with the rabies submission form.
- If the sample tests negative for rabies, the CFIA staff will internally forward the sample on to the BSE testing part of their Lethbridge laboratory. The veterinary clinic will then receive results from both tests through the normal channels.

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Appendices

Appendix I: Contacts for risk assessment and management

The Public Health Veterinarian (PHV) coordinates the response to potentially rabid animals within the province. Animals suspected of having rabies in Alberta should be reported to the PHV **1-844-427-6847** or by email: albertarabiesprogram@gov.ab.ca at the Office of the Chief Provincial Veterinarian.

Any potential human exposures to a rabid animal should be reported to the local Alberta Health Services (AHS) Public Health Office or First Nations and Inuit Health Branch Regional Office (FNIHB-AB) on reserve.

AHS Local Public Health Office contact information can be found here:

<https://www.albertahealthservices.ca/>

AHS 24-hour Zone Numbers:

North	800-732-8981
Edmonton	780-433-3940
Central AB	866-654-7890
AB South	844-388-6691
Calgary	403-264-5615

FNIHB-AB contacts for on-reserve exposures:

- Monday to Friday from 8:00 am to 4:00 pm contact the Regional CDC Nurse Manager by phone at 780-495-5439; or the Regional CDC Nurse at 780-495-8903; or fax 780-495-8070.
- After 4:00 pm, or on weekends/holidays, the FNIHB-AB Medical Officer of Health or designate can be reached at 780-218-9929.

Alberta Fish & Wildlife Area Office contact information can be found on the AEP website:

<http://aep.alberta.ca/about-us/contact-us/fish-and-wildlife-area-office-contacts.aspx>

The Alberta Veterinary Medical Association has a searchable contact information for veterinary practices across the province on their website:

<https://abvma.in1touch.org/company/roster/companyRosterView.html?companyRosterId=23>

Appendix II: Rabies testing at CFIA: weekend testing

An animal will only be considered for rabies testing on a weekend or holiday if the following criteria are satisfied:

1. The animal is reasonably suspected of being rabid, based on a thorough investigation including consideration of the animal species involved, its behaviour at the time of the exposure, presentation of clinical signs consistent with rabies, geographical area, and for domestic animals, potential for previous contact with a rabid animal.
2. The person has suffered a WHO Category III exposure (i.e., single or multiple transdermal bites or scratches, licks on broken skin; contamination of mucous membrane with saliva from licks, contact with bats).
3. There is a hypersensitivity to the rabies vaccine or a component, or a known warning or precaution in the exposed human receiving post-exposure prophylaxis.
4. The attending physician or Medical Officer of Health provides the laboratory with the name and telephone number of a contact who is readily available to receive and act upon the result on the day of testing. The laboratory must be able to speak with an individual, test results will not be left on an answering machine.

Please note that shipping options are limited outside of normal business hours and vary for Lethbridge and Ottawa. It is the responsibility of the submitter to ensure that the sample can be delivered to the laboratory for testing on the weekend or holiday, prior to making a request for testing.

Note: There are no definite contraindications to the use of rabies vaccine as post-exposure prophylaxis following an exposure to a rabies infected animal. However, care should be taken before vaccine is administered to persons known to be hypersensitive to any ingredient in the formulation or component of the container. In the extremely rare event that animal testing could eliminate the need to provide vaccine to a person with known hypersensitivity, weekend testing may be considered on a case-by-case basis in consultation with the Public Health Veterinarian. For all other individuals, if there is a high suspicion of rabies exposure, post-exposure vaccine should be given and may be discontinued if the source animal is later found to be negative for the infection.

Appendix III: How to capture a bat

Any bat that may have exposed someone to rabies should be captured for testing if possible. If you are certain there was no possible rabies exposure, then the bat should be left alone, or returned to the wild.

To capture a bat:

1. Find a small container like a box or a large can, and a piece of cardboard large enough to cover the opening in the container. Punch small air holes in the cardboard.
2. Put on leather work gloves and if available, a safety mask/goggles or face shield.
3. When the bat lands, approach it slowly and place the container over it. Slide the cardboard under the container to trap the bat inside.
4. If you are certain there's been no contact between the bat and any people or pets, carefully hold the cardboard over the container and take the bat outdoors and release it into the air (not onto the ground) away from people and pets.

If there is any question about contact between the bat and people or pets, save the bat for testing. Tape the cardboard to the container, securing the bat inside. For potentially exposed persons, contact the local public health office for follow-up, or seek medical attention immediately. Contact a veterinarian to seek treatment for any exposed pets. The local public health office or the veterinarian will coordinate testing of the bat with the Public Health Veterinarian if warranted.

The following are web sites with additional information:

Alberta Office of the Chief Veterinarian rabies information landing page:

[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/cpv16353](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/cpv16353)

Bats and Rabies, A Public Health Guide – Bat Conservation International brochure:

<http://www.batcon.org/pdfs/BRBrochureaspages.pdf>

Appendix IV: Alberta Environment and Parks guidelines for responding to reports of potentially rabid wildlife:

- Any situation involving rabies-suspect wildlife that occurs within *lands under federal jurisdiction* is handled by federal authorities (e.g., national park staff or RCMP).
- Any situation involving rabies-suspect wildlife that occurs within a *Provincial Park, Recreation Area, Wilderness Area, Natural Area, Heritage Rangeland, Ecological Reserve, or Willmore Wilderness Park* is handled by AEP. Furthermore, rabies-suspect large carnivores, such as **black bear, grizzly bear, cougar or wolf** are handled by an AEP Conservation Officer if in their jurisdictions listed above. If outside of those areas, a Fish and Wildlife officer will be the responsible party.
- Any situation involving a rabies-suspect of any wild species that occurs on unoccupied Crown land is handled by a Fish and Wildlife Officer.
- Any situation involving rabies-suspect wildlife (other than the listed large carnivores) in an **urban setting** is handled by city bylaw or pest control personnel. Local Fish and Wildlife Officers may be able to assist in some capacity depending on resource availability particularly in locations where bylaw or pest control personnel are not present.
- Any situation involving rabies-suspect wildlife (other than the listed large carnivores) in a **rural setting** is handled by the local municipal agriculture fieldmen or pest control personnel. Local Fish and Wildlife Officers may be able to assist in some capacity depending on resource availability particularly in locations where such personnel are not present.