

# Rabies

Includes Post-exposure Management

## Revision Dates

Case Definition	January 2013
Reporting Requirements	April 2018
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	January 2013

## Case Definition

### Confirmed Case

Clinical illness<sup>[1]</sup> with laboratory confirmation<sup>[2]</sup> of infection:

- Detection of viral antigen in an appropriate clinical specimen (preferably the brain or the nerves surrounding hair follicles in the nape of the neck) by immunofluorescence (i.e., Direct fluorescent antibody),

**OR**

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

**OR**

- Isolation of rabies from saliva, central nervous system (CNS) tissue, or cerebral spinal fluid (CSF) using cell culture or laboratory animal.

### Probable Case

Clinical illness<sup>[1]</sup> with laboratory evidence:

- Detection of rabies-neutralizing antibody in the serum or CSF of an unimmunized person who did not receive rabies immunoglobulin.

### Suspect Case

- Clinical illness<sup>[1]</sup> without laboratory evidence.

<sup>[1]</sup> Clinical Illness: Rabies is an acute encephalomyelitis dominated by forms of hyperactivity (furious rabies) or paralytic syndromes (dumb rabies) that almost always progresses to coma or death within 10 days after the first symptom if intensive care is not instituted.

<sup>[2]</sup> Laboratory Comments:

For viral detection, negative results do not rule out rabies infections because viral antigen or RNA material may not be detectable in early clinical illness.

Negative serological results do not rule out a rabies infection because antibodies may not develop during infection and seroconversion usually occurs very late or not at all.

Serology cannot distinguish between antibodies resulting from vaccination, natural infection or passive immunization.

It is recommended that serology be interpreted in conjunction with all other test results, the patient's clinical history and epidemiological link. Additional testing of appropriate samples should be performed in addition to the submission of serum or CSF samples.

## Reporting Requirements

### 1. Physicians/Health Practitioners and others

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

### 2. Laboratories

All laboratories shall report all positive laboratory results:

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

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

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

### 4. Additional Reporting Requirements

- Canadian Food Inspection Agency (CFIA): Under federal legislation, all confirmed, probable, and suspect animal cases of rabies must be reported. (1) Animal health issues associated with the source of human rabies disease should be reported by the MOH (or designate) to the District Veterinarian of the CFIA. Contact information is available at: <http://www.inspection.gc.ca/english/anima/heasan/offbure.shtml>.

### **Etiology (1-3)**

Rabies infection is caused by the *Rabies virus*, an RNA virus in the *Rhabdoviridae* family. The virus is inactivated rapidly in sunlight and does not survive for long periods outside of the host.

### **Clinical Presentation (1;2;4-6)**

Several factors may affect the outcome of the exposure. These include the dose of the inoculum, the route and location of the exposure as well as individual host factors such as age and immune defences and previous immunization. Rabies is almost invariably fatal.

Once the virus enters the body, it travels from the wound along nerve pathways to the brain where it causes progressive inflammation, resulting in symptoms of the disease. Two forms of the disease can follow. People with furious rabies typically exhibit signs and symptoms of hyperactivity, excited behaviour, hydrophobia and sometimes aerophobia (fear of air drafts). After a few days, death occurs by cardio-respiratory arrest.

Paralytic rabies accounts for about 20% of the total number of human cases. This form of rabies runs a less dramatic and usually longer course than the furious form. The muscles gradually become paralyzed, starting at the site of the exposure. A coma slowly develops, and eventually death occurs. The paralytic forms are often misdiagnosed, which is believed to contribute to underreporting of the disease.

### **Diagnosis**

The diagnosis of rabies in humans is generally made through detection of viral antigen by direct immunofluorescence from clinical specimens or detection of rabies virus RNA in an appropriate clinical specimen. The infection can not be detected during the incubation period. The prospects for detecting infectious rabies virus, rabies virus antigen and/or specific immune response increases with clinical symptoms.

#### **Wild Animal Behaviours:**

In general, rabies should be suspected in terrestrial wildlife acting abnormally. The same is true of bats that can be seen flying in the daytime, resting on the ground, attacking people or other animals, or fighting.

Clinical diagnosis in animals 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 the head removed for laboratory shipment. It is advisable to consult with a Wildlife Disease Specialist if uncertain about animal behaviour.

### **Epidemiology**

#### **Reservoir (4;7-10)**

Rabies can be found in any mammal or bird. It is most commonly associated with some wild and domestic animals including foxes, dogs, coyotes, wolves, ferrets, skunks, raccoons, cats and bats. In developing countries, dogs remain the principal reservoir. Rabbits, hamsters, guinea pigs, gerbils, squirrels, chipmunks, rats, birds and mice are rarely infected.

#### **Transmission (1;4;5;8-11)**

Rabies is transmitted through the percutaneous introduction of virus-laden saliva of a rabid animal through a bite, scratch or lick into a fresh break in the skin or contact with intact mucous membranes

including the eyes, nose and mouth. Airborne spread has been reported in caves and laboratory settings.

Transmission has been reported following corneal transplants and other organs taken from persons who have died of undiagnosed rabies.

Although the virus has been isolated from the saliva of infected cases, person to person transmission from a human bite is theoretically possible but has not been confirmed.

Ingestion of raw meats or other tissues from animals infected with rabies is not a source of human infection.

#### **Incubation Period (4;6;8-10)**

The incubation period is usually 3 – 8 weeks. It may be as short as nine days or up to several years. Incubation periods of up to six years have been confirmed. The incubation period is dependent on the severity of the wound, site of the wound in relation to the richness of the nerve supply, distance from the brain, the amount and strain of virus introduced, if protective clothing was worn, and the age and immune status of the host (i.e., history of pre-exposure immunization).

#### **Period of Communicability (7;9)**

Dogs and cats are infectious 3 – 5 days before the onset of clinical disease and throughout the course of the disease. Some wild animals may shed virus for 8 – 12 days before the onset of symptoms and up to 18 days following. Bats shed virus for approximately 12 – 14 days before symptoms appear.

#### **Host Susceptibility (9)**

All mammals are susceptible. Humans are more resistant to infection than several animal species.

#### **Occurrence**

##### **General (1;4;10-13)**

Rabies is present on all continents with the exception of Antarctica. It is estimated that the great majority of the 55,000 deaths caused by rabies each year occur in rural areas of Asia and Africa. Forty percent of people who are bitten by a suspect rabid animal are children under 15 years of age. Canine rabies is still widespread in stray dogs in Asia, Africa and parts of Latin America. Asia continues to have the highest incidence of human rabies deaths reported, the majority of which occur in India. Bat rabies has recently emerged as a public health threat in Australia, Latin America and Western Europe. In the USA, the predominant vectors for rabies are skunks in the western and central states, raccoons in the eastern states, coyotes in the far south and foxes at the Northern Canadian border and in Alaska. The majority of cases in Europe are reported in the Russian Federation.

In the US, prior to 1960, the majority of animal cases were in domestic animals however, since then the number of these cases has steadily decreased. This reflects the widespread immunization of domestic dogs and also the availability and effectiveness of prophylaxis following exposure. In contrast to this, rabies among wildlife especially bats, raccoons and skunks has become more prevalent. Between 2000 and 2007, 20 of 25 human rabies deaths in the US were acquired locally. In 2004, a 15 year old girl in Wisconsin was diagnosed with clinical rabies approximately 1 month after being bitten by a bat. She became the first person known to recover from her illness without rabies prophylaxis before or after illness onset. Prior to this

case, five other people recovered from rabies but all were either previously immunized or received some sort of prophylaxis before onset of illness.

**Canada (1;14-16)**

Canada has reported 24 cases of rabies from 1924 to 2007. Only one case was acquired abroad. All were fatal. Cases reported are from six provinces: Quebec (12), Ontario (six), Saskatchewan (two), Alberta (two), Nova Scotia (one), and British Columbia (one). A bat bite was identified as the source in the majority of locally-acquired cases.

**Alberta (16-18)**

In Alberta, the most recent case of rabies occurred in 2007. The individual became infected following a bat exposure, did not seek medical intervention and subsequently died within 6 – 7 months of the exposure. This was the first case of rabies in Alberta since 1985.

**Key Investigation (16;17)**

**Single Case/Household Cluster:**

- Determine the immunization status of the case.
- Determine the possible source including:
  - animal involved,
  - type of exposure (bite, scratch, other and provoked vs. unprovoked),
  - geographic location of exposure, and
  - immunization status of animal, if possible.

**Control**

**Management of a Case (9)**

- Routine practices for infection prevention and control.
- Contact isolation for respiratory secretions for duration of illness.
- Disinfect articles soiled with saliva.

**Treatment**

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

**Management of Contacts**

- Although person-to-person transmission has not been documented, health care practitioners should be educated about the potential hazard of infection from saliva, and use protection (Personal Protective Equipment) to avoid exposure from a coughing patient.

**Preventive Measures (9;16;17;19-21)**

- Educate the public and those individuals with the greatest risk of animal exposure to avoid close contact with unfamiliar animals.
- Have all domestic pets vaccinated by a licensed veterinarian.
- Cover up potential entrances, such as uncapped chimneys and openings in attics, roofs, and decks to discourage wild animals, such as bats, from taking up residence in or around homes.
- Do not keep wild animals as pets.
- Report any animal(s) behaving strangely to local public health or animal control departments.
- When a bite and/or direct contact with saliva exposure occurs, report to local public health for assessment.

- Do not attempt to nurse a wild animal back to health. Seek assistance from animal control departments.
- Avoid handling, feeding or unintentionally attracting wild animals.
- Instruct children to avoid unfamiliar wild or domestic animals even if they appear friendly.
- Provincially funded pre-exposure rabies immunization may be considered for the following risk groups.
  - Workers caring for animals including veterinarians, veterinarian health technicians, veterinarian assistants, and SPCA workers and volunteers.
  - Animal research workers including rabies laboratory workers and those in other laboratories working with rabies-prone animal species.
  - Animal control workers including bylaw officers, dog pound workers and zoo workers.
  - Wildlife workers
  - Spelunkers.
    - See the *Alberta Immunization Policy* (AIP).
- Travelers are encouraged to purchase rabies vaccine as recommended by the National Advisory Committee on Immunization (NACI) for use where rabies control programs for domestic animals are inadequate. <http://www.phac-aspc.gc.ca/tmp-pmv/info/rage-eng.php>
- When travelling with pets:
  - ensure rabies immunizations are up to date and
  - keep pets under control to avoid contact with other animals (wild and domestic).
- In the event of direct contact with a bat (bat landing on or touching the person).
  - Call a trained animal control or wildlife professional to capture the bat, if at all possible.
  - While not advisable, if the individual still attempts to capture the bat he/she should avoid further exposures.
  - If attempting to capture the bat:
    - Avoid further exposures
    - Close all doors and windows in the area and
    - Wear thick leather gloves, a hat and a long sleeved garment(s) to avoid bites.
    - Use a blanket, net, broom or towel to catch the bat (without touching it and while protecting any exposed area such as the face).
    - Use tongs to put it in a container with air holes.
    - Place the container in a cool, safe place away from human or pet contact.
    - Do not destroy the brain of the bat.
  - Once captured, contact public health for further direction.

- If exposure to a potentially rabid animal occurs:

- MOH (or designate) should be immediately notified of a potential exposure to rabies including any bat exposure.
- Wash the area immediately; and thoroughly flush and wash the wound with soap and water,
- Seek medical attention immediately.
- Antibiotic treatment/prophylaxis may be recommended depending on the animal involved in the incident
- Sutures or wound closures are *not* advised.
- Assess tetanus immunization status. See AIP.
- Consider need for rabies post- exposure prophylaxis (PEP). The decision to provide PEP is made after careful examination of all the risk factors in a particular exposure situation.
  - One dose of rabies immune globulin helps to neutralize the virus before it becomes established, and then
  - A complete series of rabies vaccine given over the next 28 days helps the immune system make antibodies against the virus.
  - See AIP for further details
- [See Appendix A for post-exposure assessment and management.](#)



## APPENDIX A: Post Exposure Rabies Management

[SECTION I: Purpose of Guidelines and Post-Exposure Rabies Management by Public Health in Alberta](#)

[SECTION II: Algorithms for Rabies Post-Exposure Prophylaxis](#)

[SECTION III: Risk Assessment](#)

[SECTION IV: Management of Individuals Following Possible Exposure to Rabies](#)

[SECTION V: Obtaining and Authorizing Rabies Post-Exposure Biologicals](#)

[SECTION VI: Management of Animals with Potential to be Carrying Rabies Virus](#)

### SECTION I: Purpose of Guidelines and Post-Exposure Rabies Management by Public Health in Alberta

Public Health in Alberta both at Alberta Health Services (AHS) and Alberta Health, has a leadership role in the prevention of human rabies disease. All potential rabies exposures should be reported immediately to AHS. This ensures that steps are taken to locate the animal, place it in confinement or have it euthanized and tested, and make appropriate and timely decisions regarding PEP.

- To encourage prompt reporting, AHS should remind those in the community who might become aware of potential exposures to rabies (physicians, emergency room staff, police, veterinarians, animal control, SPCA, etc.) of the need to contact public health immediately. These agencies need to be informed as to which potential exposures to rabies should be reported to public health as well as the process for doing so. Protocols for reaching the MOH (or designate) outside of regular working hours need to be established and communicated.
- Discussions and protocols should be established at the local level (with municipalities, animal control, kennels, etc.) regarding clarification of responsibility for locating and observing domestic and stray animals.
- Planning is also required by AHS to transport in a timely fashion rabies post-exposure biologicals to the location where they are required, while maintaining the cold chain.

AHS Public Health coordinates the management of rabies exposure (refer to [Chart A](#)) by:

- investigating all incidents of animal bites/exposures which have the potential to transmit rabies to humans,
- assessing risk of rabies infection,
- deciding on action required,
- ensuring that the animal is observed and/or tested (if indicated),
- authorizing the local release of Rabies Immune Globulin (RIG) and vaccine for a client if indicated by the MOH (or designate),
- arranging for client follow-up and the administration of RIG and vaccine if required, and
- completing reporting requirements of AH.

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 is made after careful examination of all the risk factors in a particular exposure situation. Generally, the following approach is recommended:

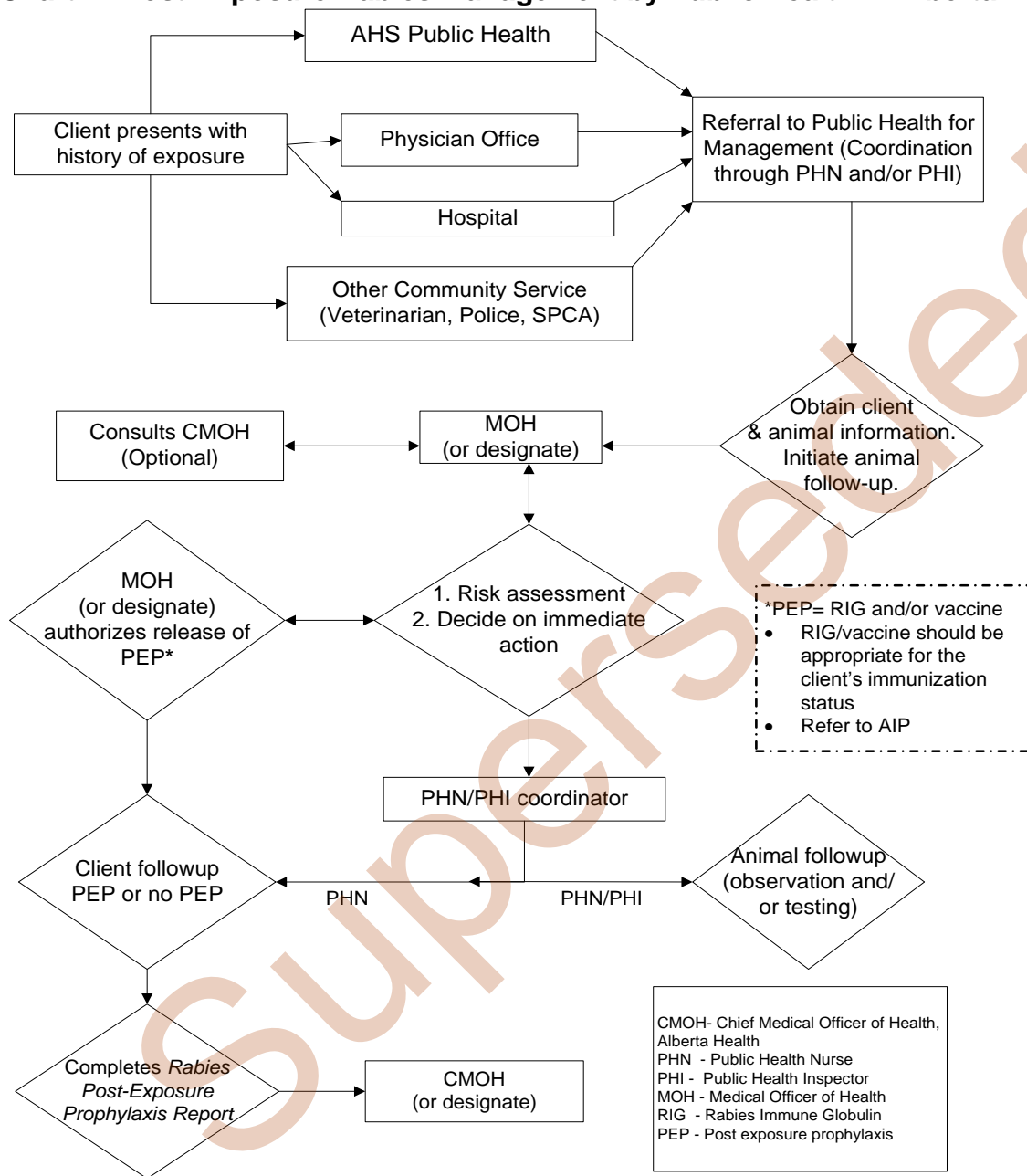
- Immediately notify the MOH (or designate) of a potential exposure to rabies incident.
- Healthy domestic pets should be confined and observed for ten full days rather than euthanized. In cases where the owner requests immediate euthanasia of an animal that is behaving normally, a full ten-day observation period ideally should be completed before euthanasia. (Day 0 = date of incident)
- Attempts should be made to locate stray dogs and cats for assessment.



- A critical aspect of risk assessment due to an attack by a pet dog, cat or ferret is whether the attack was provoked or unprovoked.
- Once a decision is made that the client requires PEP, both rabies immune globulin (RIG) and rabies vaccine should be given (for previously unimmunized individuals).

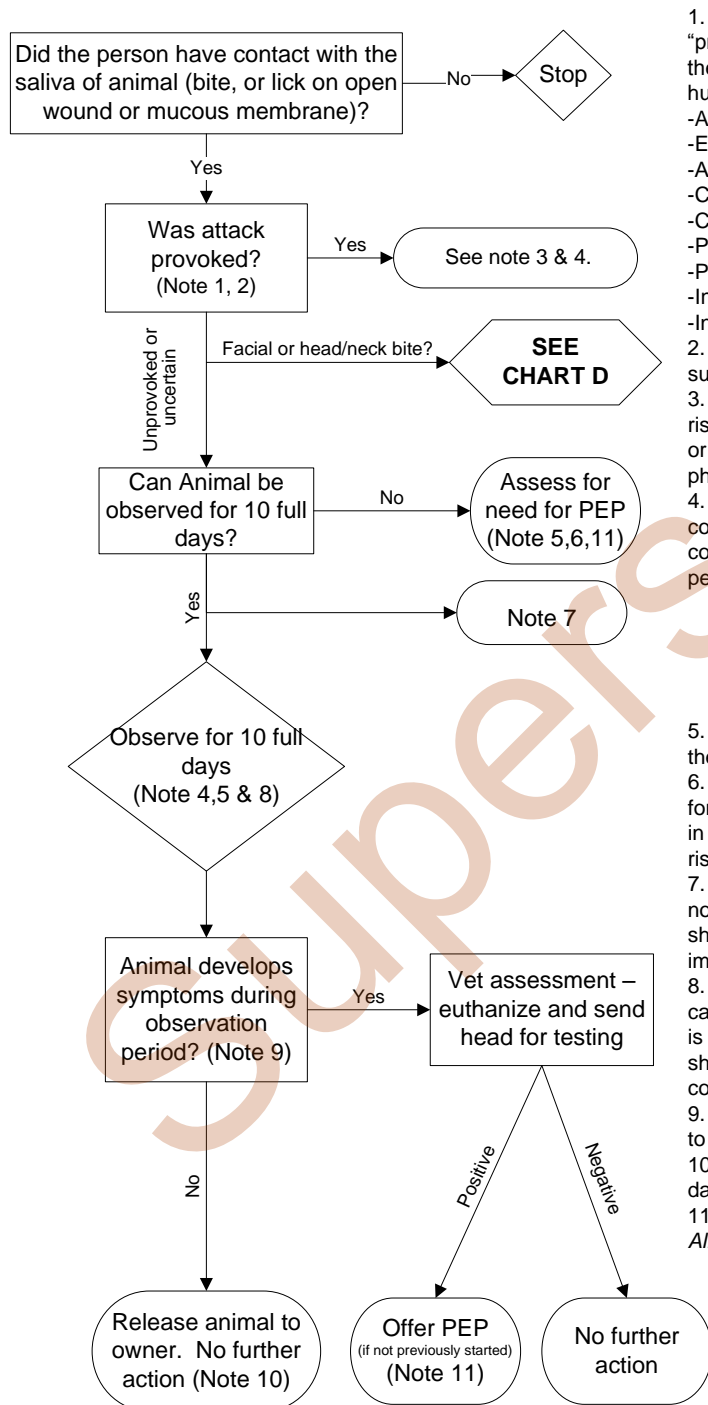
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**Chart A: Post-Exposure Rabies Management by Public Health in Alberta**



SECTION II: Algorithms for Rabies Post-Exposure Prophylaxis

Chart B: Rabies Risk Assessment and Post-Exposure Management for Exposure From Domestic Dogs/Cats/Ferrets (Non-Stray)



1. 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 include:

- Attempting to corner or trap an animal
- Entering an area that the animal considers its territory
- Approaching an animal’s litter
- Coming too close to an injured animal
- Coming between two fighting animals
- Picking up an animal
- Petting an unfamiliar animal
- Interfering with an animal’s food
- Interfering/wrestling with an animal’s owner

2. An unprovoked attack is one where the person did not surprise, antagonize or threaten the animal or enter its territory.

3. A pet kept exclusively indoors (day and night) has virtually no risk of acquiring rabies, unless within the previous 10 days, a bat or other potentially rabid animal entered the house and had physical contact with the pet.

4. A healthy domestic dog/cat/ferret that bites a person should be confined in the home and observed for 10 full days. However, consideration can be given to forgo the 10-day observation period if:

- 1) the attack was provoked AND
- 2) animal is kept exclusively indoors (see note 3) AND
- 3) Exposure was from a clinically healthy domestic cat/dog/ferret AND
- 4) the animal is from Alberta and the exposure occurred in Alberta

5. The animal’s immunization history in itself should not influence the need for PEP or the need to sacrifice the animal for testing.

6. Evaluate each instance for which the animal is not available for testing or observation. If assessment indicates risk of disease in animal, PEP should be discussed with client and offered. If low risk, discuss and leave for family/client to decide.

7. In cases where an animal does not appear to be clinically normal or cannot be held safely, the Medical Officer of Health should consult with CFIA veterinarian to decide whether immediate euthanasia and testing is warranted.

8. Veterinarians should not euthanize healthy non-stray dogs/cats/ferrets that have bitten until the ten-day observation period is verified or they receive authorization from the MOH. Ferrets should be examined by a veterinarian at initiation and upon completion of confinement.

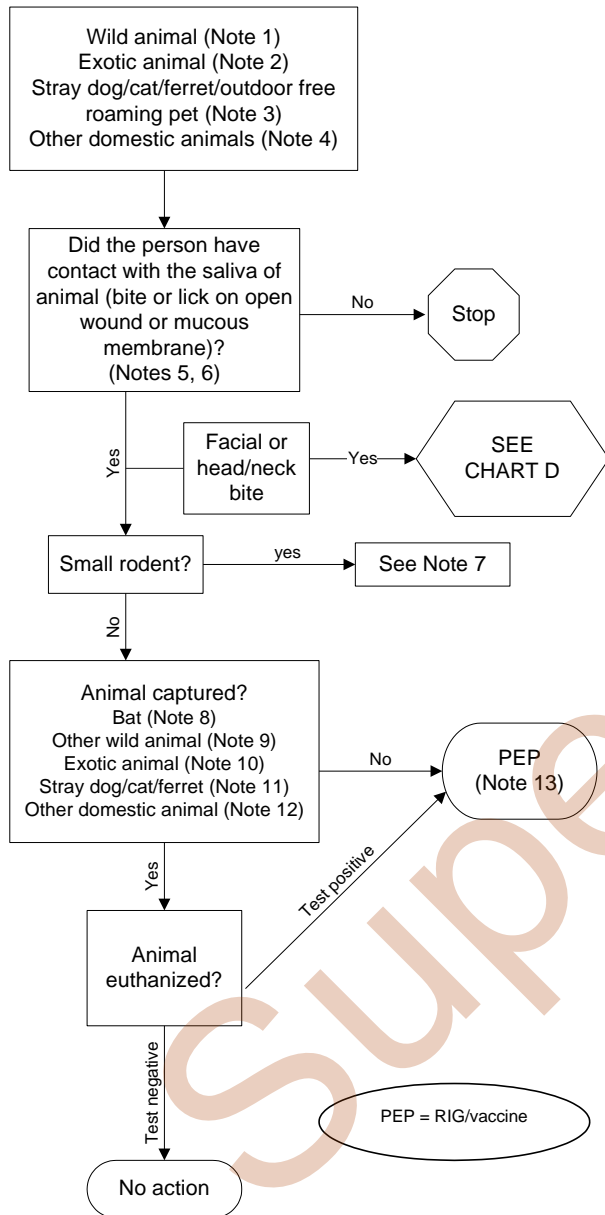
9. Any illness in a confined animal must be reported immediately to public health and the CFIA district veterinarian.

10. If the animal remains clinically normal throughout this ten-day period, then rabies can be ruled out.

11. Inquire for client’s history of previous immunization. See *Alberta Immunization Policy*.

NOTE: This is a summary chart only. Please refer to [Section III \(Risk Assessment\)](#) for more detail.

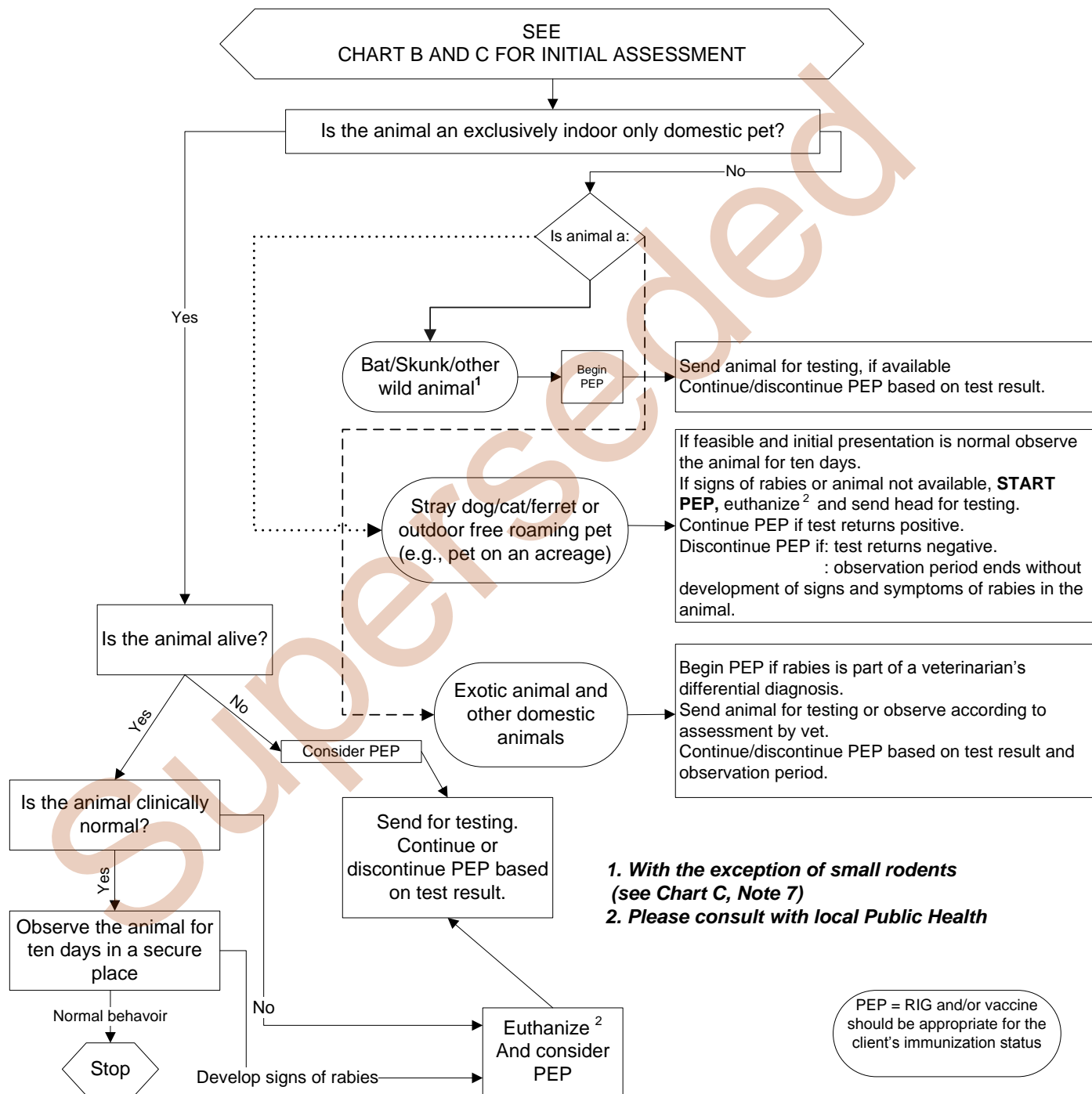
**Chart C: Rabies Risk Assessment and Post-Exposure Management for Exposure from Wild Animals, Exotic Animals, Stray Dogs/Cats/Ferrets, Other Domestic Animals, Outdoor Free Roaming Pets**



1. All wild animal bites (foxes, raccoons, skunks, bats, etc.) are of concern.
2. Exotic animals (monkeys, etc.) should be treated as wild animals in terms of risk.
3. Efforts should be made to locate and assess stray dogs/cats/ferrets/outdoor free roaming pets.
4. Domestic animals such as horses, cattle and swine have unknown incubation periods. If animal is behaving in its usual fashion and the risk of rabies in the area is not present, a vet assessment may not be required. Unusual behavior should be assessed by a veterinarian as part of a risk assessment.
5. Rabies is most commonly transmitted through bites (any penetration of the skin by teeth) or salivary contamination of fresh scratches, abrasions and open wounds, or mucous membranes. Bat bites may not be readily apparent. Prophylaxis should be considered for direct contact with a bat unless the exposed person can be certain a bite, scratch, or mucous membrane exposure did not occur.
6. Petting a rabid animal or handling its blood, urine or feces is not considered to be an exposure nor is being sprayed by a skunk.
7. Bites of rabbits or small rodents (such as squirrels, rats, gerbils, mice, and chipmunks) rarely call for rabies prophylaxis (only if behavior is highly unusual).
8. The bat should be safely collected and sent for testing. PEP may be started pending results.
9. Other wild animals, if captured, should be euthanized in a manner that preserves brain tissue. Prophylaxis may be started for skunk bites, pending results.
10. Risk assessment includes examination by veterinarian. Exotic animals may be confined and observed, depending on circumstances. If rabies is part of veterinarian's differential diagnosis, discuss possibility of PEP and euthanize and test animal.
11. Assess stray dogs/cats/ferrets and/or outdoor free roaming pets (e.g., pet on an acreage). If they are clinically normal and the suspicion of rabies is low, confine and observe for ten full days in a secure facility. If they are aggressive or displaying abnormal clinical signs, or they cannot be held in a secure facility, euthanize immediately for testing. Assess for need of PEP. If they remain clinically normal through this ten-day period, rabies can be ruled out. Any illness in a confined animal must be reported immediately to public health and the CFIA district veterinarian.
12. Euthanize and testing of domestic animals such as horses, cattle and swine should be done **only** if rabies is part of veterinarian's differential diagnosis.
13. Inquire for client's history of previous immunization.

NOTE: This is a summary chart only. Please refer to Section III [No. 2 Wild Animal](#) for more detail.

**Chart D: Rabies Risk Assessment and Post-Exposure Management Following Facial and Head/Neck Bites**



NOTE: This is a summary only. Refer for more detailed information.

### SECTION III: Risk Assessment (19;21;22)

The need to confine or euthanize the animal and the need for rabies PEP is based on an evaluation of the following risk factors, which will be described in greater detail in this section:

- A. The type of animal (wild animal versus domestic animal), including the risk of rabies in the animal species involved,
- B. The nature of the exposure (including severity and location of the wound),
- C. The circumstances of the exposure and the behaviour of the animal (provoked or unprovoked attack) at the time of the incident.
- D. The availability of the animal for observation and/or laboratory testing of the animal brain, and
- E. Signs of rabies displayed by the animal.

#### A. The type of animal (domestic pet versus wild animal)

Determine first whether the animal is a “domestic pet” (dog, cat, and ferret) or a “wild animal”. The “wild animal” category for this purpose includes stray dogs/cats/ferrets, (and in some cases, outdoor free roaming pet cats and dogs) wild animals, exotic animals, and other domestic animals (horses, pigs). The species of animal, the risk of rabies transmission in the species, and the geographical location where the exposure occurred, need to be considered. The following recommendations apply to exposure in Alberta.

##### 1. “Domestic” Pets (refer to [Section II Chart B](#))

- If an apparently healthy non-stray dog, cat or ferret bites a person in a circumstance that is assessed as being “unprovoked” (refer to [Section III part B. The Nature of the Exposure](#)), the animal should be confined and observed for ten full days. Ferrets should be examined by a veterinarian at initiation and upon completion of confinement. If the animal’s behavior during the ten-day observation period remains normal, the client need not receive PEP beyond proper wound care. At the first sign of illness during confinement, the Canadian Food Inspection Agency (CFIA) district veterinarian should be contacted (403-292-4301) to make arrangements for evaluation by a veterinarian. If signs suggestive of rabies develop, the animal should be euthanized, its head removed, and the head shipped for examination of the brain by the Animal Diseases Research Institute (ADRI) in Lethbridge (phone 403-382-5500). This is usually done by CFIA, but some veterinarians and public health inspectors in AHS do this directly. If rabies is confirmed in the animal during this period, there is adequate time to institute prophylaxis.
- A clinically healthy domestic dog/cat/ferret that bites a person should be confined in the home and observed for 10 full days. However, consideration can be given to forgo the 10-day period if:
  - 1) The attack was provoked **AND**
  - 2) Animal is kept exclusively indoors **AND**
  - 3) Exposure was from a clinically healthy domestic cat/dog/ferret **AND**
  - 4) The animal is from Alberta and the exposure occurred in Alberta
- If the animal is not available for observation and the attack was “unprovoked” (or it is unclear), PEP can be initiated, depending on the circumstances. Refer to [Section III part C: The Circumstances of the Exposure](#) for examples of circumstances that could be considered provoked or unprovoked.
- An animal’s history of up-to-date rabies immunization makes the chance of rabies much less, but does not eliminate risk. The immunization history in itself **should not** influence

the need for prophylaxis or the need to euthanize the animal for testing. The administration of rabies vaccine to the animal is NOT recommended during the observation period to avoid confusing signs of rabies with possible side effects of vaccine administration. (23)

- Recent studies regarding rabies pathogenesis and viral shedding patterns, and evidence of the efficacy of the IMRAB 3 vaccine in ferrets has led to the recommendation of including domestic (pet) ferrets with domestic cats and dogs rather than with wild animals.

## 2. “Wild” Animals (refer to [Section II Chart C](#))

- All **wild animal** exposures (foxes, raccoons, skunks, bats, etc.) are of concern. If the wild animal is captured, it should be euthanized and the head sent for testing. In the case of bats, the animal should be safely collected, if possible and the entire bat submitted for rabies diagnosis.
- For **skunk** or **bat** contact in Alberta, PEP may be started pending animal examination results. One factor to consider is the availability of test results, particularly if the specimen is being shipped from a remote rural area of northern Alberta. If the results will not be available within 24 hours, prophylaxis may be started.
- **Exotic animals** (lions, monkeys, etc.) in captivity should be treated as wild animals in terms of risk but may be confined and observed depending on the animal and the circumstances. Risk assessment would include an examination by a veterinarian. Euthanize and testing should be done if rabies is part of the veterinarian’s differential diagnosis.
- **Other domestic animals** such as horses, cattle and swine have unknown incubation periods. Risk assessment should include an examination by a veterinarian. Euthanize and testing should be done only if rabies is part of the veterinarian’s differential diagnosis.
- Bites of rabbits or small **rodents** (such as squirrels, rats, gerbils, mice, and chipmunks) seldom, if ever, call for rabies prophylaxis (only if the behavior is highly unusual).
- **Stray** dogs, cats, and ferrets including free roaming pets in unsupervised areas (e.g., pets on acreage) should be located and assessed. If they are behaving normally and the suspicion of rabies is low, they should be held and observed for ten full days in a secure facility. If this is not feasible, they should be euthanized and the head submitted for rabies testing.
- Post-exposure prophylaxis may be discontinued if the Rabies-F-A (Fluorescent Antibody) test of the animal brain does not indicate the presence of rabies virus, unless the individual is at continued risk of rabies exposure.

## 3. Animal exposures outside Alberta

- OCMOH can be consulted for current information related to the risk from the animal species where the exposure occurred.

## B. The nature of the exposure

Rabies is a viral infection transmitted through the saliva of infected warm-blooded animals. Transmission occurs when virus-laden saliva of a rabid animal is introduced by a bite or scratch (or very rarely, into a fresh break in the skin or through intact mucous membranes). If there is no such exposure, PEP is not indicated.

### 1. Bites (17;24)

- Rabies is most commonly transmitted through bites (any penetration of the skin by teeth).
- Bites are usually readily apparent except for bat bites; their needle-like teeth may leave no visible mark.



**Specific to Bats:** AH recommends intervention\* ONLY when **both** of the following conditions apply;

- There has been direct contact\*\* with a bat;
- AND**
- A bite, scratch, or saliva exposure into a wound or mucous membrane cannot be ruled out.

**In an adult**, a bat landing on clothing would be considered reason for an intervention\* **only** 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 an intervention, including contact through clothes, as a history to rule out a bite, scratch, or mucous membrane exposure may not be reliable.

\***Intervention** is defined as testing the bat for rabies, if it is available, and/or PEP as indicated.

\*\***Direct contact** is defined as the bat touching or landing on a person. PEP is no longer recommended when there is no direct contact involved.

- When a bat is found in the room with a child or an adult who is unable to give a reliable history, assessment of direct contact can be difficult. Factors indicating that direct contact 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
  - an obvious bite or scratch mark. (17)
- 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 disease 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 can influence the incubation period. It has been reported that the incubation period may be shorter when the site of the bite is on the head than when it is on an extremity. Bites on the head/neck or face are more likely to result quickly in disease than those on the extremities. When a domestic dog/cat/ferret has inflicted a facial bite and their behavior is normal, the animal should be confined and observed for ten full days. Prophylaxis should be started immediately if behavior changes or animal dies. (See [Chart D](#))

## 2. Non-Bite Exposures

- When direct contact between a human and a bat has occurred and the exposed person cannot be certain a bite, scratch, or mucous membrane exposure did not *occur*, post-exposure prophylaxis should be considered.
- “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, can transfer the virus.

## 3. Indirect Contact and Activities (11)

- Other contact by itself, such as petting or handling a rabid animal or contact with its blood, urine or feces does not constitute an exposure.
- Being sprayed by a skunk is not considered to be an exposure.
- Because the rabies virus is inactivated by desiccation or ultraviolet irradiation, if the material containing the virus is dry, the virus can generally be considered non-infectious.
- In order to transmit the virus, the host must be infected and have replicated the virus.

### C. *The 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 bite should be considered. This is a key decision in assessing risk where pet dogs/cats/ferrets are involved. An unprovoked attack by an animal in the above group is more likely to indicate that the animal is rabid than a provoked attack.

The signs and symptoms in different animal species can vary, but 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.

1. An **unprovoked attack** is one where the person did **not** surprise, antagonize or threaten the animal or enter its territory.
2. 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 of such human actions could include any or all of the following:
  - attempting to corner or trap an animal,
  - entering an area that the animal considers its territory (dog in a yard) or approaching an animal’s litter,
  - 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

### D. *The availability of the animal for observation and/or laboratory testing*

(Also refer to [Section VI Management of Animals with Potential to be carrying Rabies Virus](#))

1. Animal is available for observation
  - Efforts should be made to locate pet dogs/cats/ferrets before initiating PEP.
  - An apparently healthy pet dog/cat/ferret that bites a person should be confined and observed daily for a full ten days. This may eliminate the need for prophylaxis and unnecessary laboratory testing of the animal brain for rabies.

- Stray dogs/cats/ferrets should be located, and if behaving normal and the suspicion of rabies is low, should be held in a secure facility for ten full days, if feasible.
  - If the animal remains clinically normal throughout this full ten-day period then rabies can be ruled out.
  - Circumstances of the exposure as well as the location and severity of the bite may however justify early initiation of prophylaxis.
2. Animal available for laboratory testing of the animal brain
- Negative test results obtained by appropriate and systematic examination of specimens can be interpreted reliably by public health practitioners so that no PEP is required or PEP that was initiated can be stopped.
  - For skunk or bat contact, RIG and vaccine may be started pending animal examination results.
3. Animal not available for observation or laboratory testing
- Evaluate each instance for which the animal is not available for testing or observation.
  - If the animal is not available for observation and/or testing, PEP could be considered for exposure from:
    - wild animals (bites of squirrels, rats, chipmunks, wild rabbits and hares rarely call for PEP except in instances of clearly abnormal behaviour or health).
    - stray dogs, cats, and ferrets,
    - dogs that are free roaming in unsupervised area (for example, an acreage), cats and ferrets in an unprovoked attack (especially if no previous history of unprovoked attacks).
  - If assessment indicates that the risk is low, prophylaxis should be discussed with the client and offered. Discuss with client/family for decision.

#### **E. Signs of rabies displayed by the animal**

- Signs of rabies cannot be reliably interpreted in wild animals.
- An unprovoked attack in domestic animals is more apt to indicate that the animal is rabid. Rabid cats and dogs may however become uncharacteristically quiet.
- At the first sign of illness during confinement, the CFIA district veterinarian should be contacted to make arrangements for evaluation by a veterinarian.
- The symptoms in different animal species can vary considerably, but there is almost always a change of temperament and evidence of paralysis, with death ensuing within a few days of the onset of symptoms.
- The overall period from onset of clinical symptoms to death rarely exceeds ten days in dogs, cats, and ferrets. In the earlier stages, a common factor is that the animal undergoes a change of temperament so that a normally friendly animal may become snappy and seek to avoid his owner's company, whereas timid, shy animals may become less restrained and unnaturally approachable.

## SECTION IV: Management of Individuals Following Possible Exposure to Rabies

Rabies PEP must be considered in every incident in which potential exposure to the rabies virus has occurred. In evaluating each case, public health officials must be consulted. Rabies in humans can be prevented by providing exposed persons with prompt local treatment of wounds combined with appropriate passive and active immunization.

### A. *Local Treatment of Wounds*

- Immediate and thorough cleaning of all wounds is one of the most important aspects of rabies prevention. Wounds should be thoroughly washed with soap and flushed with running water.
- At the time medical attention is sought, if the wound is caused by a known rabid or highly suspect rabid animal, suturing of the wound should not be done, and RIG should be infiltrated in the area around and into the wound by a qualified physician (e.g., emergency physician). If suturing is unavoidable, it should be done after local infiltration of RIG. If at the time medical attention is sought, the animal is being held for observation to rule out rabies, suturing can proceed.
- Tetanus prophylaxis should be given as indicated.
- An assessment by a physician regarding measures to control bacterial infection should also be done (antibiotic therapy).

### B. *Immunizing Agents* (20)

See *AIP* for further description of Rabies vaccine and RIG.

### C. *Post-Exposure Immunization-general guidelines* (20)

When post-exposure rabies prophylaxis is recommended:

- Determine immunization status of individual
  - Immunization or post exposure prophylaxis started in another country requires individual assessment and consultation with the CMOH (or designate) as necessary.
- RIG should always be administered before suturing.
- The consent for immunization and the timing of vaccine administration should be discussed with the client.
- Determine the client's willingness and commitment to accept and complete rabies prophylaxis.
- Plan the immunization schedule with the client and confirm the location where the remaining doses will be given.
- Rabies vaccine and RIG should be administered concurrently for optimum post exposure prophylaxis, except in certain previously immunized persons. (Refer to AIP for further explanation)
- Pregnancy is not a contraindication to PEP.
- Persons who present for evaluation and rabies PEP *even months after having been bitten* should be dealt with in the same manner as if the contact occurred recently.
- If the person needs to complete a post-exposure series outside of the province of Alberta, contact Alberta Health Immunization program.

See *AIP* for further information about Rabies vaccine and RIG.

## SECTION V: Obtaining and Authorizing Rabies Post-Exposure Biologicals(20)

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

### **Authorization of Biologicals**

- The MOH (or designate) within AHS can authorize release of RIG or rabies vaccine for a client.
- The CMOH (or designate) is available for consultation if desired by the MOH/designate.
- RIG and rabies vaccine should be stocked within AHS where it can only be accessed with MOH (or designate) authorization.

## SECTION VI: Management of Animals with potential to be carrying Rabies virus.

Any animal that has bitten a human or is suspected of being rabid should be reported to the local MOH. The CFIA should be notified of any animal suspected of being rabid, regardless of whether it has been involved in a biting incident. If the MOH and CFIA agree that the animal should be euthanized, the CFIA will make arrangements for this with a veterinary clinic.

Efforts to locate animals such as dogs, cats, and ferrets should be made. Discussion should take place at the local level (with municipalities, animal control, kennels, etc.) regarding clarification of responsibility for locating and observing domestic and stray animals.

In non-urban areas, Alberta Environment Conservation Officers as well as the RCMP may be involved in the collection of rabies-suspect animals for submission to Animal Diseases Research Institute (ADRI). The Alberta Environment Conservation Officers provide efficient response to reports of suspected rabies cases. Their procedures include notifying CFIA (if not already done) as well as finding/destroying the suspect animal, collecting the head, and submitting the sample to ADRI in Lethbridge. These procedures are applicable to any suspect animal, wild or domestic. In the latter case, the animal is destroyed only if the destruction is authorized by the local MOH and a registered veterinarian in consultation with the owner and possibly the RCMP (if they are involved).

Locating the animal for observation or testing, as appropriate, can reduce unnecessary PEP.

### **A. Observation of Animals**

- Apparently clinically healthy non-stray dogs/cats/ferrets, and if feasible, clinically normal strays, should not be euthanized before a full ten-day observation period has elapsed (unless authorization is given by the MOH). If the animal was shedding rabies virus in its saliva at the time of the bite but not yet showing signs and symptoms, it will develop symptoms of rabies within 10 days of the bite.
- If the attack by a domestic non-stray dog/cat/ferret was unprovoked, and there are no clinical signs of rabies in the animal, the animal can be confined at home. It should be confined in a building or secured area so that it cannot run away.
- If the owner refuses, an Executive Officer's Order can be issued for the animal to be secured alive and uninjured and confined in a secure place at the owner's expense for up to ten full days. (Refer to Schedule 4: 5 (1) of the *Communicable Diseases Regulation: Rabies* )
- AHS may want to develop a list of kennels where pet dogs/cats/ferrets under observation could be detained (at the owner's expense) if the owners refuse to confine them at home.
- If the animal is euthanized, public health must have the head tested in order to rule out rabies.

- If the animal remains clinically normal throughout the full ten-day observation period, then rabies can be ruled out. The order can be rescinded after the full ten-day period if the animal is alive.
- Ferrets should be examined by a veterinarian at initiation and upon completion of confinement.
- At the first sign of illness during confinement, AHS Public Health department should be immediately contacted. The CFIA district veterinarian should be contacted to make arrangements for evaluation by a veterinarian.

## B. Laboratory Testing of Animal Specimens

Testing of animal specimens for rabies in Alberta is done at the ADRI in Lethbridge (phone 403-302-5500). CFIA veterinarians are familiar with the regulations concerning rabies and will collect and ship appropriate specimens to the federal laboratory for diagnosis. Some Public Health Inspectors in AHS have the appropriate packages and forms for shipping the specimens. When the animal is euthanized, its head should be removed and shipped under refrigeration for examination of the brain. The specimen(s) can be frozen, but this will delay test results as specimen must be thawed prior to testing. The specimen must be shipped appropriately as it is classified as “dangerous goods”.

If an AHS Executive Officer orders that an animal be euthanized (without involvement or agreement of CFIA) the cost may need to be borne by AHS.

Rabies diagnosis is based on the observation that, in all mammals, the rabies virus reaches the salivary glands and is excreted in saliva only after replication in the central nervous system. Absence of the rabies virus antigen in the brain of the animal essentially rules out the presence of virus in saliva, the risk for rabies transmission, and the need for PEP. Clinical signs leading to a suspicion of rabies occur only after the effects of the neurological damage have set in. At that time, most tests for rabies reveal considerable amounts of viral antigen in all areas of the brain.

The fluorescent antibody test (FAT) for detection of rabies virus antigen in brain tissue is used as the primary diagnostic test. The test has a sensitivity approaching 100 percent. Results are usually available within 24 hours. Positive results are immediately phoned.

If the animal has already been euthanized and burned or buried, there may still be enough matter suitable for testing. The CFIA veterinarian should evaluate each circumstance individually.

### 1. “Domestic” Pets

- At the first sign of illness during confinement, AHS Public Health should be immediately contacted. The CFIA district veterinarian should be contacted to make arrangements for evaluation by a veterinarian. If signs suggestive of rabies develop, the animal should be euthanized and its head removed and shipped for testing.
- In cases where a domestic dog/cat/ferret does not appear to be behaving normally or cannot be held safely, the MOH can decide whether immediate euthanasia and testing is warranted.
- Euthanize and testing of non-feline/non-canine domestic animals such as horses, cattle and swine should be done **only** if rabies is part of the veterinarian’s differential diagnosis.



## 2. “Wild Animals”

- In the case of bats, the animal should be safely collected, if possible, and the entire bat submitted for testing.
- If the wild animal is captured, it should be euthanized and the head sent for testing.
- Euthanize and testing of exotic animals should be done if rabies is part of the veterinarian’s differential diagnosis.
- A stray dog, cat, or ferret that bites a person and is aggressive or displaying abnormal behavior may be euthanized immediately and have its head sent for testing. Otherwise, euthanize only if observation for ten full days in a secure facility is not feasible.

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