



BC Centre for Disease Control
An agency of the Provincial Health Services Authority

BC Rabies Guidance for Veterinarians

November 22, 2017



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The intent of this guidance is to provide direction to public health veterinarians and veterinarians in private practice (hereafter called private veterinarians) on risk assessment and management of domestic animals exposed or potentially exposed to rabies to protect the health of both humans and animals. In addition, it provides contact information that veterinarians can use to seek further advice or report possible exposures and details on sample collection and submission for rabies testing.

For questions about rabies, please call the BCCDC Public Health Veterinarian at 778-677-7790.

This guidance was developed by an expert panel of BC veterinarians and public health practitioners. Recommendations were based on evidence, expert opinion and consensus.

Introduction

Rabies is a serious zoonotic disease caused by the rabies virus, a lyssavirus in the Rhabdovirus family. In North America, distinct virus variants associated with specific wild reservoir species exist. The only known reservoirs for rabies in British Columbia (BC) are a number of bat species. Rabies is transmitted through saliva and cerebrospinal fluid from an infected mammal. Infection in humans with rabies virus results in an acute, progressive viral encephalomyelitis and if not treated in time, a rabies infection is almost always fatal.

Reason for surveillance/reporting

To ensure the appropriate and timely sharing of information about potentially rabid animals in order to assess whether there has been exposure to domestic animals or humans, and to take immediate preventive actions to decrease the risk of infection.

Public Health Significance

Rabies is a nearly uniformly fatal disease in humans that can be prevented through the use of post-exposure prophylaxis.

Authority

Rabies is a reportable animal disease to the Chief Veterinary Officer (CVO) in BC under the Reportable and Notifiable Disease Regulation, pursuant to the BC Animal Health Act [2014]. The CVO shares these reports of zoonotic diseases in animals with the Provincial Health Officer (PHO) under an Information Sharing Agreement.

Rabies is a reportable animal disease to the Canadian Food Inspection Agency (CFIA) under the federal Reportable Diseases Regulations, Health of Animals Act. Owners, veterinarians and laboratories fulfill their reporting requirements to the CFIA by submitting suspect animals for testing.

Reporting and timelines

Any veterinarian who suspects rabies in an animal (dead or alive) should inform the BC Centre for Disease Control (BCCDC) Public Health Veterinarian (PHV) at 778-677-7790 to obtain assistance with risk assessment and management.

The veterinarian fulfills his/her reporting requirements by submitting samples from a suspect animal to the CFIA laboratory for rabies testing. To facilitate intra-agency communication, the veterinarian submitting a sample for rabies testing to the CFIA laboratory should indicate on the submission form (See [Appendix E](#)) that the BCCDC



and the relevant Health Authority receive a copy of test results (the relevant Health Authority can be obtained from the BCCDC PHV). If the animal submitted for testing is a wild animal, the veterinarian submitting the sample should indicate on the submission form (See Appendix E) that the Forests, Lands and Natural Resource Operations (FLNRO) Wildlife Veterinarian also receive a copy of test results.

The CFIA reports all BC animal samples that test positive for rabies to the BC CVO and the BCCDC (delegate for PHO). The BCCDC informs the appropriate MHO of an animal which tests positive for rabies in their Health Authority. The Medical Health Officer (MHO) reports human exposures requiring rabies post-exposure prophylaxis (RPEP) to the Provincial Health Officer (PHO) via the BCCDC using an electronic public health information system.

Epidemiology of rabies in BC

The only known reservoirs for rabies in BC are a number of bat species. Because of altered behaviour, infected bats are considered more likely to come into contact with humans and subsequently be tested. Between 4 and 10% of the bat specimens sent for testing to the CFIA are positive (1). It is estimated that less than 0.5% of bats are actually infected.

Other species that have tested positive for rabies in BC include (except as noted, all were found to have bat-variant rabies): 1 cat in Maple Ridge (2007), 4 striped skunks in Stanley Park (2004), 3 cats in Delta (one cat had skunk strain) (1992), 1 beaver (skunk strain) (late 80s), 1 horse in the Sorrento area (1984), 1 cat on Vancouver Island (strain unknown, but presumed to be bat-variant) (1969).

A wildlife survey in Delta (prior to 1989), following the isolation of the skunk strain rabies in a beaver, intense testing of cats following the Delta incident as well as a study examining raccoons indicated that the skunk and other specific strains of rabies are not enzootic in BC.

Human cases of rabies in Canada are very rare. In BC, there has only been 1 human case diagnosed since 1983: an adult male who died of bat-variant rabies in 2003 (2).

Disease in animals

Species affected and clinical manifestations

All mammals are susceptible to infection (3). Clinical presentation can be quite variable. The initial clinical signs are often nonspecific. Animals may show behavioural changes: nocturnal species may be active in the day, calm animals may be excitable and timid ones may become vicious. After 2 to 5 days, these signs may be followed by a stage during which either the paralytic or the furious form of rabies predominates (4). “Furious” rabies is marked by aggression and a loss of fear of humans and other animals. The animal may attack suddenly and without provocation. There are seizures and loss of muscle coordination. Progressive paralysis results in death. In “dumb” or “paralytic” rabies, the throat and masseter muscles are paralyzed, resulting in excessive salivation and inability to swallow. The animal is generally passive and death results quickly from progressive paralysis.

Transmission

Infection occurs by percutaneous introduction of the virus-laden saliva or cerebrospinal fluid of a rabid animal through a bite or scratch, or into a fresh break in the skin, or by contact with intact mucous membranes. The virus travels via the peripheral nerves to the spinal cord and ascends to the brain. After reaching the brain, the virus travels via peripheral nerves to the salivary glands. Involvement of the salivary glands and oral mucosa is responsible for transmissibility (4).



Incubation

The incubation period in domestic animals (from initial exposure to clinical symptoms) may range from two weeks to many months. It can depend on a number of factors, including the strain of rabies and the location of the bite or introduction of the virus. It is important to note that animals may shed the virus in saliva and be able to transmit the disease several days before showing clinical signs.

Case definition -adapted from CFIA (5)

'Suspect'

Any animal exhibiting non-specific central nervous system (CNS) clinical signs (ataxia, abnormal vocalization, biting and eating abnormal objects, aggression, etc.) that include rabies as a differential diagnosis should be considered a suspect rabies case, particularly where there is a supportive history of potential exposure and where the local geographic rabies epidemiology supports the possibility of rabies.

OR

Any animal with a positive screening test including:

- direct rapid immunohistochemical test (DRIT)
- immunohistochemistry

'Confirmed'

Any animal whose CNS tissue tests positive for rabies in a Fluorescent Antibody Test (FAT).

Disease in humans

This section is included for background knowledge only. **Veterinarians are advised to direct anyone with questions about human rabies to speak directly with their physician or local public health authority** (see [Appendix B](#) for contact information).

Clinical manifestations

The first signs of illness are non-specific and include fever, anxiety, and malaise. Often there is tingling and severe pruritus at the site of the animal bite. After 2 – 10 days, frank neurological signs appear, ranging from hyperactivity to paralysis. The disease is divided into encephalitic (“furious rabies”) and paralytic (“dumb rabies”) forms:

- In the encephalitic form, signs of irritation of the CNS predominate, including agitation, confusion, hydrophobia, aerophobia, hyperventilation, hypersalivation, priapism, and convulsions. After a few days to a week, the person may experience a stage of excitement that lasts only a few days before the person lapses into coma and death.
- The paralytic form of rabies differs in that the person does not experience a stage of excitement, but retreats steadily and quietly downhill, with some paralysis, to coma and death.

Rabies remains an almost uniformly fatal illness. Once the virus enters the nervous system, treatment rarely affects the rapid progression to death. Human disease should be prevented in accordance with this guidance and BC rabies guidelines (6). Any person potentially exposed to rabies should be advised to contact their physician or local public health authority for further guidance.



Transmission

Infection occurs by percutaneous introduction of the virus-laden saliva or cerebrospinal fluid of a rabid animal through a bite, or less commonly through scratches, or by contact with intact mucous membranes.

Case definition (6)

Clinical illness with laboratory confirmation 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 OR
- isolation of rabies virus from saliva, cerebrospinal fluid or central nervous system tissue using cell culture or laboratory animal OR
- detection of rabies virus RNA by PCR in an appropriate clinical specimen

Public health and private veterinarian response

A decision-making flowchart is located in Appendix A

The goal of the public health response to a suspect or confirmed animal rabies case is to identify potentially exposed people, assess their level of risk, and provide post-exposure prophylaxis as needed.

The goal of the private veterinarian's response in the context of public health is to identify and manage potentially rabid animals or exposed animals that may represent a risk to public health.

The BCCDC public health veterinarian is available to discuss any questions or concerns regarding specific cases (778-677-7790).

Risk Assessment

Definition of 'exposure'

An exposure is defined as any bite, scratch or other situation in which saliva or nervous tissue from a potentially rabid animal enters an open or fresh wound, abrasion or break in the skin, or comes in contact with a mucous membrane of another animal or person (see [Table 1](#)).

Rabies virus becomes non-infectious when it dries out and when it is exposed to sunlight.

Human exposure

Local public health authorities, under the direction of the MHO, are responsible for assessing risk in potentially exposed humans.

When a veterinarian becomes aware that humans have been exposed to a potentially rabid animal (domestic or wild) they will:

- explain that rabies is a zoonotic disease *and*
- encourage the client to consult their physician or local public health authority for further guidance *and*
- report the potential human rabies exposure to the health authority where the exposed human resides (see [Appendix B](#) for contact information).



The *College of Veterinarian of BC (CVBC) Bylaws*, The *College of Veterinarian of BC (CVBC) Bylaws*, Part 4 – Ethics and Standards, s. 249 (4) (b), Access to information (7) permits disclosure of information about an animal's health under certain conditions, including to an MHO or Environmental Health Officer (EHO). For further information see Appendix C in this document.

If human exposure has been identified, local public health authorities will perform a human risk exposure assessment and determine what actions are required, including if the animal specimen should be submitted to the CFIA laboratory for testing. Some health authorities may send an EHO to pick-up and submit the sample. If the local public health authority does not have a designated person to pick-up and submit the sample, they may ask the private veterinarian to collect, package and submit the sample to CFIA. In cases of human exposure where public health asks a veterinarian to submit samples, the public health authority will provide reasonable compensation to the veterinarian for their work.

Concurrent human and domestic animal exposure¹¹

If there has been both potential domestic animal exposure and human exposure, the private veterinarian will:

- encourage the client to consult their physician or local public health authority for further guidance *and*
- report of the potential human rabies exposure to the health authority where the exposed human resides (see [Appendix B](#) for contact information). *and*
- carry out an animal risk assessment (see '[Domestic animal exposure](#)' below) *and*
- vaccinate the exposed animal against rabies.

Domestic animal exposure¹¹

If a domestic animal may have been exposed, the private veterinarian will conduct an animal risk assessment. A domestic animal is deemed exposed if the exposing animal species:

- is known to carry rabies (see "[Epidemiology of rabies in BC](#)" section) **OR** is behaving abnormally **AND**
- saliva or neural tissue from the exposing animal may have contaminated an open wound or mucous membranes (i.e. single or multiple transdermal bites or scratches, licks on broken skin, or contamination of mucous membranes, nibbling of uncovered skin or minor scratches or abrasions without bleeding).

Assistance with risk assessment and management of domestic animals can be obtained from the BCCDC at **778-677-7790**.

Advice regarding risk assessment of wild animals, and contacts for the handling or management of wild animals can be obtained from the BC Wildlife Veterinarian at 250-751-3234 or 250-361-7619 (cell). In cases where a wild animal is available for testing, but where risk assessment for humans and domestic animals does not support testing for rabies, laboratory submission of wild animals for other purposes may still be

¹¹ For situations of domestic animal exposure without concurrent human exposure, all veterinary fees (e.g. examination, vaccination, sample collection, packaging and shipping) are the sole responsibility of the client. If there is concurrent human exposure, public health authorities will work with the private veterinarian to coordinate sample collection and shipping, and fees for collecting, packaging and shipping the sample may be covered by the local health authority at their discretion.



appropriate. In these situations, please consult with the BC Wildlife Veterinarian at 250-751-3234 or cell at 250 361-7619 or the Wildlife Health Biologist at 250-751-3219.

Domestic animal bites

Dog bites are not provincially reportable in BC. The situations listed below have been identified as elevated risk for rabies transmission. A veterinarian should immediately inform the local public health authorities if they are aware that a person has been bitten/scratched by a domestic animal in the following circumstances:

- the animal is exhibiting clinical signs compatible with rabies at the time of the bite/scratch, or
- the animal was imported from or travelled out of BC in the preceding 6 months, or
- the animal has been known to have had contact with a bat in the preceding 6 months, or
- the animal is not available for assessment and management (e.g. stray or feral)

In these situations, the public health authorities will assess the rabies risk and determine what actions are required, if any. Possible actions include the implementation of a 10 day observation period, euthanasia and testing of the animal and/or administration of rabies post-exposure prophylaxis to the exposed individual. [See Appendix B for contact information](#), and the public health veterinarian is available at 778-677-7790 for consultation as required.



Table 1: Criteria to determine if rabies exposure has occurred by species and location, assuming saliva or neural tissue from the exposing animal may have contaminated an open wound or mucous membranes

“Exposing” Species	Location of exposure	Exposure?
Bat	Globally	Consider rabies exposure unless bat is tested and shown to be negative
Domestic or wild terrestrial mammal	BC	Unlikely rabies exposure, <u>unless</u> animal: <ul style="list-style-type: none"> • demonstrated neurological behavior indicative of rabies or dies; if so, consider rabies exposure unless tested and shown to be negative • known to have contact with bat in last 6 months • imported from, or travel to, a rabies-endemic area in last 6 months
Skunk, raccoon, coyote, bobcat, fox, monkey and other wild animals	Outside BC (except in rabies-free countries) ²	Consider rabies exposure unless tested and shown to be negative
Domestic animals	Enzootic areas outside BC	Consider rabies exposure unless animal tested and shown to be negative. The vaccination status of the ‘exposing’ animal should be considered.

Risk Management

Human exposure

When recommended by the MHO, rabies post-exposure prophylaxis for people who have been exposed to animals infected or potentially infected with rabies includes (6):

- First aid to the wound site.
- Rabies immune globulin and 4 doses of vaccine for immunocompetent individuals who have not been immunized before (5 doses for those who are immunosuppressed).
- Two doses of vaccine for those who have been immunized in the past with WHO-approved products and schedule.

² Consult the WHO map at http://gamapserver.who.int/mapLibrary/Files/Maps/Global_Rabies_ITHRiskMap.png?ua=1 and the CFIA animal testing results at <http://www.inspection.gc.ca/english/anim/disemala/rabrag/statse.shtml>



Domestic animal exposure^{3, 4}

Assistance with risk assessment and management of domestic animals can be obtained from the BCCDC at **778-677-7790**.

For domestic animal exposures, the private veterinarian should classify the vaccine status of the pet as either currently vaccinated (up-to-date); previously vaccinated but out-of-date; or unvaccinated⁵.

****Note that administration of a post-exposure rabies vaccine within 7 days is indicated in every scenario.**

Currently vaccinated (up-to-date)

For domestic animal exposures assessed by the veterinarian to pose a risk of rabies transmission and in which the exposed domestic animal is currently vaccinated, the private veterinarian should provide a rabies booster vaccination to the exposed animal within a 7 day window of the exposure event⁶. No further action is required.

In cases where a rabies booster vaccination is not administered within 7 days, a booster vaccination should still be administered as soon as possible after the exposure event. The private veterinarian, together with the PHV, will make decisions about further actions (e.g. need for isolation and observation)

³ Recommendations are based on the *Council of Chief Veterinary Officer Subcommittee for the management of potential domestic animal exposures to rabies*, literature review, expert opinion, and a local risk assessment taking into account the epizootology of rabies in BC.

⁴ Livestock exposures should be discussed with the Ministry of Agriculture Public Health Veterinarian or Chief Veterinary Officer (Appendix B).

⁵ There is no clear evidence to indicate the serum antibody level that is protective against rabies in animals. However, ≥ 0.5 International Units (IU) of antibody per milliliter (ml) of serum is defined as a protective response in humans and by analogy, in animals. In dogs and cats, antibody levels ≥ 0.5 IU/ml are expected to develop within 14 days after vaccination (11, 12). An animal is considered **currently vaccinated** if it has been administered a licensed rabies vaccine in accordance with the labelled directions and at least 14 days have elapsed since the animal's first (primary) vaccination (i.e. both primary and fully vaccinated animals are considered currently vaccinated), and when the exposure occurs within the labelled duration of protection for the vaccine. An animal is considered **unvaccinated** if it does not have documented proof of receiving an initial rabies vaccination at least 14 days prior to rabies exposure. An animal is considered **previously vaccinated but out of date** if it has been administered one or more doses of a licensed rabies vaccine in accordance with the labelled directions, but when the exposure occurs after the labelled duration of protection for the vaccine.

⁶ For currently vaccinated animals, the main purpose of administering a rabies vaccination booster is to reduce the risk associated with a possible previous vaccine failure. Licensed vaccines must show protection of $\geq 88\%$ of vaccinates in a challenge trial that kills 80% of controls. The rabies vaccine failure rate (titre < 0.5 IU/ml) has been reported to be 0.01 to 8% (13, 14). A secondary purpose is to stimulate protective immunity in animals with partial but inadequate response to previous vaccinations. This reasoning is based on general vaccine theory, and there is no supporting evidence specific to licensed rabies vaccines in animals. Finally, there is evidence that in exposed animals that do go on to develop rabies, post-exposure rabies vaccination may reduce the incubation period and hasten death, and therefore serve to decrease the chance of an animal that is incubating rabies being lost to follow up (15, 16, 17). For currently vaccinated animals exposed to rabies, there is no evidence to support a specific minimum interval from recent previous vaccination to administering a booster vaccination, therefore this decision will need to be made on a case-by-case basis.



on a case-by-case basis based on the exposure event and age, health status and vaccination history of the exposed domestic animal. In most cases, an animal that is currently vaccinated at the time of exposure will not require isolation, even if administration of the post-exposure booster vaccination is delayed until after 7 days⁷.

Vaccinated but out-of-date

For animal exposures assessed to pose a risk of rabies transmission and in which the exposed domestic animal has been previously vaccinated, but out of date, the private veterinarian should:

1. Administer a rabies booster vaccination to the exposed domestic animal within 7 days of the exposure event⁸. In cases where a booster vaccination is not administered within 7 days, a booster vaccination should still be administered as soon as possible after the exposure event.
2. If the suspect animal (e.g. the bat) is available, offer to have it tested. If testing is agreed upon, the private veterinarian coordinates the suspect animal's euthanasia (if required) (Appendix D), sampling (if required), packaging and shipment to the CFIA Animal Disease Research Institute (ADRI) in Lethbridge, Alberta (Appendix E and F).
 - a. If the suspect animal tests negative, no further steps are recommended.
 - b. If the suspect animal is unavailable or tests positive, the private veterinarian, together with the PHV, will make decisions about further actions (e.g. isolation and observation) on a case-by-case basis based on the exposure event and age, health status and vaccination history of the exposed domestic animal.
 - i. **When the exposed animal is administered a booster vaccination within 7 days, in most cases no isolation and observation period would be necessary.**
 - ii. In cases **where a booster vaccination is not administered within 7 days**, the private veterinarian, together with the PHV, will make decisions about further actions (e.g. need for isolation and observation) on a case by case basis. **A 90 day isolation and observation period would be required in most cases⁹.**

⁷ The decision to recommend isolation and observation is not without impacts on pet owners and animals, and as such should be based on a careful risk assessment. Because the risk of rabies transmission from wild animals to domestic animals is very low in BC, there was consensus on the expert panel drafting the BC guidelines that recommending isolation in fully vaccinated animals (including those that did not receive a booster within 7 days) was unnecessarily restrictive and might lead to decreased uptake of prophylactic rabies vaccination, as well as create a disincentive to reporting potential animal rabies exposures

⁸ For previously vaccinated, but out-of-date animals, the main purpose of administering a rabies vaccination booster is to generate an anamnestic response and stimulate protective immunity. There is evidence that most animals that are previously vaccinated, but out of date, develop an antibody titre ≥ 0.5 IU/ml by day 15 after being administered a booster and that the response is not inferior to currently vaccinated animals (20). There is also evidence that in exposed animals that do go on to develop rabies, post-exposure rabies vaccination may reduce incubation times and hasten death, and therefore serve to decrease the chance of an animal that is incubating rabies from being lost to follow up (15, 16, 17).



Unvaccinated (never vaccinated)

For animal exposures assessed to pose a risk of rabies transmission and in which the exposed domestic animal is unvaccinated, the private veterinarian should:

1. Administer a rabies vaccination to the exposed domestic animal within a 7 day window of the exposure event⁹. In cases where a vaccination is not administered within 7 days, a vaccination should still be administered as soon as possible after the exposure event.

Note: In some cases, the unvaccinated, exposed animal may be a puppy or kitten under the vaccine manufacturer's recommended age for vaccination. In these cases, the veterinarian may consider administering the vaccine to the puppy or kitten ("off-label use"), with re-vaccination once the animal has reached the age indicated by the vaccine manufacturer.

2. If the suspect animal (e.g. the bat) is available, offer to have it tested. If testing is agreed upon, the private veterinarian coordinates the suspect animal's euthanasia (if required) (Appendix D), sampling (if required), packaging and shipment to the CFIA Animal Disease Research Institute (ADRI) in Lethbridge, Alberta (Appendices [E](#) and [F](#)).
 - a. If the suspect animal tests negative, no further steps are recommended.
 - b. If the suspect animal is unavailable or tests positive, the private veterinarian will recommend:
 - i. that the owner isolate and observe the domestic animal on the owner's property AND for the owner to consult their veterinarian immediately if the animal exhibits changes in behavior or health that indicate signs of rabies ([Appendix G](#)).

The recommended isolation and observation period is:

- **90 days for animals that receive a rabies vaccination within 7 days of the exposure event,**
- **180 days for animals that do not receive a rabies vaccination, or that received a rabies vaccination more than 7 days after the exposure event** ¹⁰

⁹ For unvaccinated animals, the main purpose of administering a rabies vaccination is to stimulate protective immunity for both the immediate exposure event, and potential future exposure events. There is equivocal evidence that vaccination soon after rabies exposure may decrease the likelihood of developing clinical rabies (15, 18, 19). There is evidence that in exposed animals that do go on to develop rabies, post-exposure rabies vaccination may reduce incubation times and hasten death, and therefore serve to decrease the chance of an animal that is incubating rabies from being erroneously released from isolation (15, 16, 17).

¹⁰ The incubation period and the risk of developing infection with rabies virus varies depending on factors such as the amount of inoculated virus, the anatomic location of the wound, and the variant of rabies virus. The majority of dogs and cats that develop rabies do so within four months of exposure, a minority will incubate longer. A 180-day observation period for unvaccinated pets exposed to rabid or suspect rabid animals has been the precedent and is based on the maximum reasonable incubation period for rabies in a dog or cat (18). A 90 day isolation period for pets being administered a rabies vaccination is based on evidence that shows that in exposed animals that do go on to develop rabies, vaccination immediately after exposure may shorten the incubation period (15, 16, 17).



Note: If there is any concern that the owner will not comply with the conditions of isolation and quarantine, then the veterinarian should inform the public health veterinarian (778-677-7790) and/or the local health authority.

OR

- ii. euthanasia of the exposed domestic animal

Communication with Clients

Messages addressing the risk of disease in both animals and humans should include the following information, also found in the section below on Communication resources and in Appendix G:

- Epizootology and species of animal(s) which carry or could be affected by rabies.
- How to avoid risk of exposure:
 - Receive pre-exposure immunization if in a high risk occupation or area.
 - Vaccinate pets.
 - Avoid physical contact with suspect animals.
- What to do in the event of exposure:
 - First aid.
 - Seek medical attention, including rabies post-exposure prophylaxis.

Workplace Safety

Veterinary practice facilities that employ workers are required to be compliant with the WorkSafe BC Occupational Health and Safety Regulations. The OH&S Regulation requires that a risk assessment be conducted by the employer to determine if there is a potential for occupational exposure (to a biological agent) by any route of transmission and that workers be appropriately protected.

WorkSafeBC has published the reference document “[Exposure Control Plan for Rabies Virus in Veterinary Practices](#).” This document states “All staff who are at low, moderate, or high risk of rabies exposure (as determined by a risk assessment) will be offered the pre-exposure rabies vaccination at the employer’s expense. Any staff members who refuse to be vaccinated will be given work that will not expose them to potentially rabid animals”. As part of the risk assessment, recommendations from appropriate sources, such as the BCCDC, must be considered.

Veterinarians can consult their local public health authority or the [BC Rabies Guidelines](#) for further advice. The BCCDC recommends veterinarians and their staff receive an initial series of rabies pre-exposure prophylaxis vaccination. A booster is only required following a rabies exposure. No serological testing is required, unless the worker is considered at moderate or high risk. If a decision is made to not provide veterinary staff with rabies vaccine, the employer should be able to provide a written rationale regarding their decision not to adopt the recommendations. Rabies vaccine can be purchased from, and administered in most travel clinics.

Veterinary staff may discuss with their physician the need to be immunized against rabies and the possibility of an adverse reaction. It is noted that vaccination of all staff at risk against rabies may be a significant cost to the employer.



Communication Resources

- BCCDC: <http://www.bccdc.ca/health-info/diseases-conditions/rabies>
 - Rabies in BC: Risk to you and your pet (brochure)
- HealthLink BC: <http://www.healthlinkbc.ca/healthfiles/hfile07.stm>
- PHAC: <http://www.phac-aspc.gc.ca/id-mi/az-index-eng.php#rabies>
- CFIA: <http://www.inspection.gc.ca/english/anima/disemala/rabrag/rabragfse.shtml>
- BC CFIA district offices: <http://www.inspection.gc.ca/english/anima/heasan/offbure.shtml>

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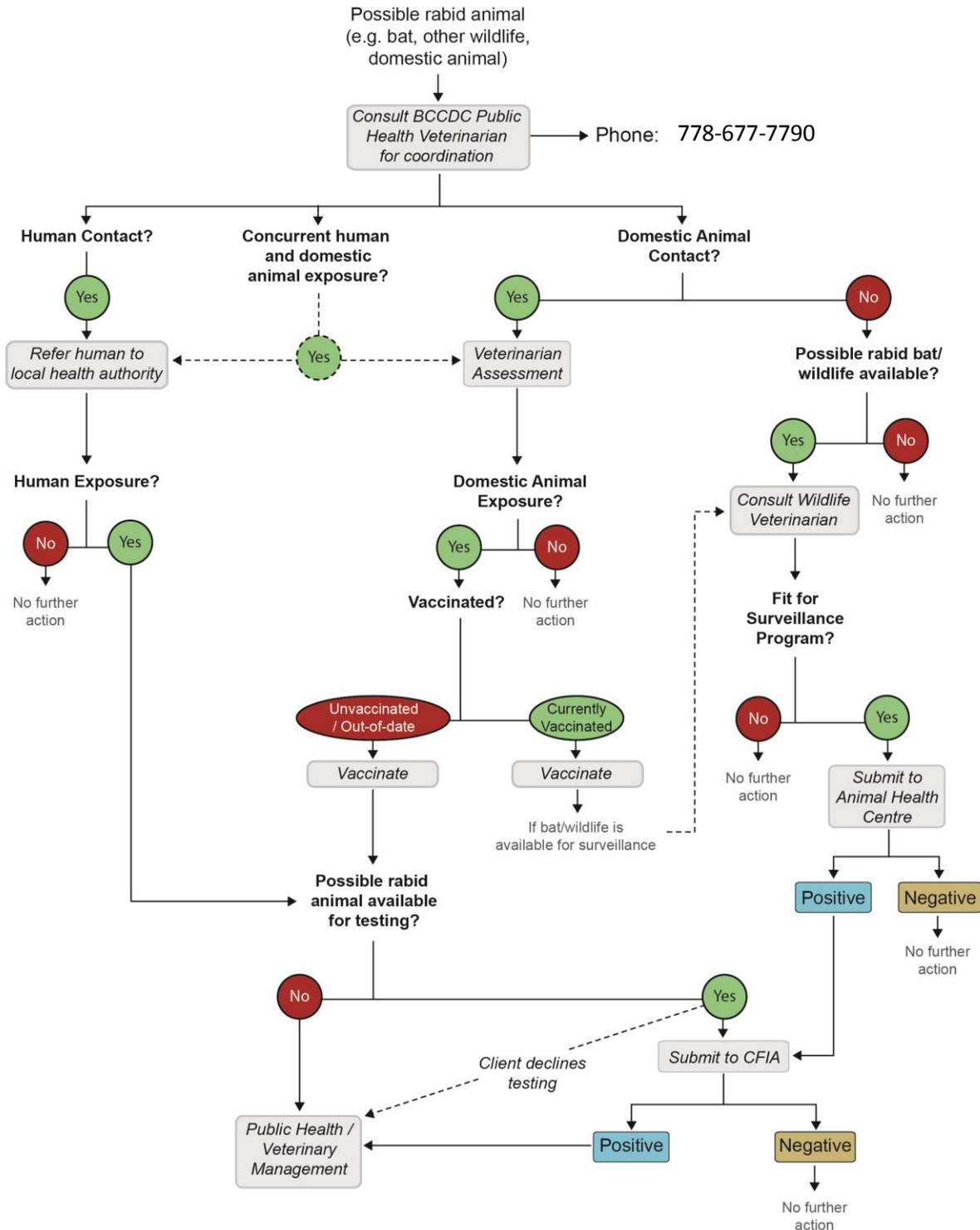
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Appendix A: Flowchart for rabies risk assessment and management by veterinarians in BC





Appendix B: Contact information for rabies in BC

For rabies exposures involving humans contact the BCCDC and the Health Authority¹¹ of residence of the exposed human:

Health Authority	Position	Contact information
Fraser Health Authority	Central Communicable Disease Intake Line - Health Protection	1-866-990-9941
Fraser Health Authority	Medical Health Officer (MHO) on call after hours	604-527-4806
Interior Health Authority	Communicable Disease Unit	1-866-778-7736
Interior Health Authority	MHO on call after hours	1-866-457-5648
Island Health Authority	South Island Communicable Disease Hub	1-866-665-6626
Island Health Authority	Central Island Communicable Disease Hub	1-866-770-7798
Island Health Authority	North Island Communicable Disease Hub	1-877-887-8835
Island Health Authority	MHO on call after hours	1-800-204-6166
Northern Health Authority	Northeast Manager	250-719-6500
Northern Health Authority	Northern Interior Manager	250-565-2150
Northern Health Authority	Northwest Manager	250-631-4249
Northern Health Authority	MHO on call after hours	250-565-2000
Vancouver Coastal Health	Communicable Disease Control	604-675-3900
Vancouver Coastal Health	MHO on call after hours	604-527-4893
British Columbia Centre for Disease Control (BCCDC)	Physician epidemiologist lead on rabies	604-707-2558
BCCDC	Public Health Veterinarian	1-778-677-7790
BCCDC	Physician/nurse on call during and after hours	604-312-9220

For rabies exposures involving animals contact the BC Centre for Disease Control (BCCDC) Public Health Veterinarian and other resources as needed

Agency	Position	Contact information
BCCDC	Public Health Veterinarian	778-677-7790
BCCDC	Physician/nurse on call during and after hours	604-312-9220
Forests, Lands and Natural Resource Operations (FLNRO)	Wildlife Veterinarian	250-751-3234 250-361-7619 cell
FLNRO	Wildlife Health Biologist	250-751-3219
Ministry of Agriculture	Chief Veterinary Officer	604-556-3013
Ministry of Agriculture	Public Health Veterinarian	604-556-3066

¹¹ A map of the BC Health Authorities and Health Service Delivery Areas can be found at: http://whri.org/research-support/documents/ha_hstda_map.pdf

¹² Additional guidance materials can be found at <http://www.canadianveterinarians.net/practice-economics/rabies-guidance>



Appendix C: Disclosure of confidential patient information to BC public health authorities

Rabies, along with 13 other zoonotic diseases, is a reportable animal disease to the Chief Veterinary Officer (CVO) in BC under the Reportable and Notifiable Disease Regulation, pursuant to the BC Animal Health Act [2014]. The CVO shares these reports of zoonotic diseases in animals with the Provincial Health Officer (PHO) under an Information Sharing Agreement. The PHO shares the information with the BCCDC and with the Medical Health Officer (MHO) in the Health Authority of residence of the client.

On occasion, a practice facility may be contacted by a BC MHO who is seeking to obtain information in a client's medical record.

Public health authorities are responsible for assessing and protecting public health. They prevent, investigate and control infectious diseases (e.g. outbreaks), environmental health risks (e.g. toxic chemical spill), chronic diseases (e.g. cancer), among others. Medical Health Officers and Environmental Health Officers in BC have statutory authority under the Public Health Act to request and obtain any information necessary from anyone who may have it to help them investigate a potential human health hazard or infectious disease. Most such information is reported by laboratories, physicians and patients to Medical Health Officers. In some instances, veterinarians may have animal health information that could help public health authorities assess a public health risk.

The circumstances under which a practice facility may disclosure information in a client's record is provided in the *CVBC Bylaws*, Part 4 – Ethics and Standards, s. 249, Access to information (see end of article). Specifically, s. 249 (4) (b) permits disclosure of information about an animal's health under certain conditions, including to a Medical Health Officer or Environmental Health Officer. The practice facility designated registrant has the responsibility to determine whether the person representing themselves as a Medical Health Officer or an Environmental Health Officer is legitimate and that their request meets the requirements of the bylaws, s. 249 (4) (b). Public health authorities have the responsibility to ensure confidentiality of the information provided to them.

CVBC Bylaws, s. 249, Access to information:

Access to information

249(1) In this section, “**access**” includes the opportunity to examine or obtain a copy of a client personal information or medical information as recorded in a medical record.

(2) A registrant must allow a client access to their own personal information or their animal's medical information, except if there is a reasonable likelihood that such access may result in serious harm to a patient, client or a third person.

(3) A registrant must respond in a timely fashion to a client's request for access to their own personal information or medical information, by providing

- (a) full access to the records, or
- (b) written reasons for the refusal to provide full access to the records.

(4) Despite the above, a registrant must provide full access to client personal information or medical information or provide a copy of a medical record to:

- (a) any party that has an urgent and compelling need for the information in order to ensure the well-being of an animal;



- (b) any party that has an urgent and compelling need for the information in order to ensure the health or safety of the general public or a particular person;
- (c) the college for the purpose administering the Act or bylaws;
- (d) a government agency or its designate, as required or authorized by law;
- (e) a party on the basis of a court order or subpoena.



Appendix D: Bat capture and euthanasia (8)

Advice for the public about bat capture

In situations where a bat is acting strangely but there has been no human or domestic animal contact, **do not attempt to capture the bat**. Further advice, resources and professional assistance can be accessed by contacting the BC Community Bat Program at <http://www.bcbats.ca>.

In situations where there is evidence of direct human or domestic animal contact with a bat and the bat is available for testing, contact the BC Community Bat Program at <http://www.bcbats.ca>.

Do not encourage someone who was not exposed to try and capture the bat, thus increasing their risk of exposure, since an attempt to capture a bat may increase the risk of direct contact.

If a **person is already exposed and** is willing, they should :

- Close all doors and windows in the area, put on a hat, leather gloves, a long-sleeved jacket and pants;
- 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;
- Not kill the bat;
- Bring the bat to the private veterinarian for euthanasia, packaging and shipping;
- Dispose of or disinfect and wash any tools/surfaces that had contact with the bat in a 10% bleach solution; and
- Wash clothing in hot, soapy water and dry in a hot dryer.

Advice for veterinarians about bat euthanasia

For instruction on euthanasia of bats see *BC Ministry of Forests, Lands and Natural Resource Operations Standard Operating Procedure (SOP): Bat euthanasia* at:

http://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/wildlife-wildlife-habitat/wildlife-health/wildlife-health-documents/bat_euthanasia_sop_july_2.pdf



Appendix E: Sample Selection, Packaging and Shipping (9)

Planning (prior to an exposure event)¹²

- Order gloves and packing supplies¹³.
- Store freezer packs in freezer.
- Preprint shipping labels.
- As appropriate, ensure staff have training in Transportation of Dangerous Goods (TDG) (<http://www.tc.gc.ca/eng/tdg/training-menu-266.htm>).

Selection of material for testing (when an animal needs to be submitted)

1. Ensure animal is dead and sample is suitable¹⁴:
 - a. For most animals:
 - i. Submit entire head (Appendix E).
 - ii. Include cervical spinal cord if the skull has been damaged, e.g. shot in the head.
 - b. For small animals (<500g):
 - i. Submit the entire carcass to aid species identification (e.g. bats).
 - c. For large animals (>100 kg) and all livestock:
 - i. Submit the entire brain and portion of the cervical spinal cord (Appendix E).
 - ii. If entire brain cannot be submitted, collect portions of the brain tissue bilaterally from the cerebellum, hippocampus and brain stem.
2. Ensure proper protective equipment is worn when collection the sample (i.e. disposable waterproof gloves, disposable mask, safety glasses or goggles, and coveralls and/or waterproof apron).
3. Keep animal/sample in fridge prior to packaging. Do not freeze.

¹² Additional guidance materials can be found at <http://www.canadianveterinarians.net/practice-economics/rabies-guidance>

¹³ Packing supplies include bags, boxes, labels, freezer packs and absorbent material ¹⁴ Test sensitivity is decreased for decomposing samples. Samples exhibiting decomposition should still be submitted for testing following a suspected human/domestic animal rabies exposure – It may still be possible to get a definitive positive result.

¹⁴ Test sensitivity is decreased for decomposing samples. Samples exhibiting decomposition should still be submitted for testing following a suspected human/domestic animal rabies exposure – It may still be possible to get a definitive positive result.



Sample preparation

DOs	DON'Ts
<ul style="list-style-type: none"> • Ensure that animals are dead before packaging • Spray with insecticide, if infested with ticks or fleas • Remove maggots • Remove any needles or darts • Make level cuts during disarticulation • Leave the head intact and do not remove skin, ears or snout • Note quills, jagged bone fragments, possible bullets or shot on the submission form in "Submitter Comments" • Remove excess bags, or ones that are opaque, before packaging • Use absorbent material, such as newsprint, between primary and secondary package, and as cushioning in the outer container • Ship sample as soon as possible after collection 	<ul style="list-style-type: none"> • Wrap brain with absorbent material or place into whirl-pak bags • Use gel sachets as absorbent material • Use wet ice, frozen water bottles, soft gel packs or dry ice for cooling sample • Use Styrofoam or other granular packing material

Temperature conditions

- Samples to be submitted should be refrigerated, not frozen.
- Use ice packs to keep the sample cool during shipping according to outdoor temperature:
 - Winter (< 5°C): DO NOT use ice packs.
 - Fall/Spring (5-30°C): USE ice packs.
 - Summer (>30°C): USE additional ice packs.

Determine type of sample (on a case-by-case basis)¹⁵

- Most samples will be "exempt animal specimens": animal specimens not believed to contain infectious substances.
- If there is a very high likelihood of rabies, the sample should be considered "biological substance, Category B": animal specimen believed to contain infectious substances.

get a definitive positive result.

¹⁵Based on expert opinion (21), a decision on type of sample should be made on a case-by-case basis. There are risk and operational issues to consider. The type of sample affects labelling and courier selection but does not affect packaging; packaging should always follow TDG standards. The risk of transmission from a packaged specimen is deemed very low; if exposure did occur, effective RPEP is available. Most samples submitted from BC for rabies testing are not infectious (only 3-10% of submitted BC animals test positive). In other settings, diagnostic specimens are shipped using the Exempt category. Occasionally, the suspicion of rabies is high enough to warrant Biological Substance labelling and transportation. Operational considerations include whether the available courier can transport Biological Substances and whether TDG training and annual certification is feasible. More information can be found: https://www.tc.gc.ca/media/documents/tdg-eng/TDG_BULLETIN_SHIPPING_INFECTIOUS_SUBSTANCES.pdf¹⁶ The CFIA Rabies Sample Submission form can be found here: http://www.inspection.gc.ca/DAM/DAM-aboutcfia-sujetacia/STAGING/text-texte/c2908V1_re_1396296694437_eng.pdf



Completing the online [Rabies Sample Submission form](#)¹⁶

- Refer to the CFIA information sheet “[Rabies Testing at the CFIA: Completing the Electronic Submission Form](#)”¹⁷
- Be sure to assign the sample a **unique identification number (Sample ID)** composed of the clinic name, current year and the sample number (eg. HappyVetClinic2015_1)
- **Include the BCCDC email address (rabies@bccdc.ca) in the ‘intermediary party’ section**
- If requiring weekend or holiday testing, certain criteria need to be met¹⁸ and the request has to be discussed by phone with ADRI at 403-308-1131.

Packaging

1. Place the specimen in the first bag and close tightly.
2. Attach a label with the Sample ID to the inner bag.
3. Wrapped the bagged sample in absorbent material such as newspaper.
4. Place the first bag into a second bag and close tightly (for air transport, this bag must be pressure compliant).
5. Place bagged specimen in a box and add absorbent material and ice packs (in spring, summer and fall) to ensure the specimen remains cool.
6. Place the completed Rabies Sample Submission form in the box. Seal the box.

¹⁶ The CFIA Rabies Sample Submission form can be found here: http://www.inspection.gc.ca/DAM/DAM-aboutcfia-sujetacia/STAGING/text-texte/c2908V1_re_1396296694437_eng.pdf

¹⁷ The CFIA information sheet “Rabies Testing at the CFIA: Completing the Electronic Submission Form” can be found here: <http://www.canadianveterinarians.net/documents/completing-the-electronic-submission-form>

¹⁸ See “Rabies testing at the CFIA: Weekend/holiday testing”
https://www.canadianveterinarians.net/rabies/en/documents/4_weekend_holiday%20testing%20v1%202014.pdf



Labelling

Addressee and shipper info needs to be on the box.

YOUR COMPLETE NAME	
YOUR EMPLOYER	
YOUR STREET ADDRESS	
CITY, PROVINCE, POSTAL CODE	
YOUR PHONE NUMBER	
	R-UNIT, LETHBRIDGE LABORATORY CANADIAN FOOD INSPECTION AGENCY TOWNSHIP ROAD 9-1 LETHBRIDGE, AB T1J 3Z4 (403) 382-5559

Label box with shipping type:

- Biological substance, Category B or
- Exempt animal specimen

If “Biological Substance, Category B”, apply both of the following labels to box:



Shipping

Specimens can be shipped by courier (e.g. Purolator, Fedex), air, bus or medical laboratory transport. Verify that the shipper can deliver to ADRI within 48h. If submitting over the weekend or during holidays, verify that the shipper delivers during weekends and holidays. If using Transportation of Dangerous Goods, verify that the shipper accepts infectious substances (couriers like Purolator, FedEx, DHL/Loomis, Air Canada Cargo accept TDG). The shipper’s waybill should indicate “Biological Substance Category B UN3373” and the shipper should be TDG certified. If shipping an exempt animal substance, the shipper’s waybill should indicate “Exempt Animal Substance”



Appendix F: Removing head and extraction of a brain for rabies testing (10)

Sample selection

For most domestic small animals including dogs and cats:

- Submit entire head
- Include cervical spinal cord if the skull has been damaged, e.g. shot in the head

For very small animals such as bats (<500g):

- Submit the entire carcass to aid species identification

For large animals (>100 kg) including all domestic large animals:

- Submit the entire brain and portion of the cervical spinal cord
- If entire brain can not be submitted, collect portions of the brain tissue bilaterally from the cerebellum, hippocampus and brain stem

Procedure

Purpose

- Submit a good specimen that will allow for accurate testing
- Prevent human infection

Supplies

- Sharp knife and sharpener
- Optional - sharp hacksaw, dehorner, lopping shears, pruning shears, or brush cutters
- Protective clothing:
 - Waterproof gloves (disposable)
 - Mask (disposable)
 - Safety glasses or goggles
 - Coveralls and/or waterproof apron
- Cleaning Supplies:
 - Detergent
 - Disinfectant
 - Paper towels
 - Plastic trash bags

Collecting the sample (Figure A)

These methods are suggestions where submission of a whole carcass is impractical. Use the technique with which you are most familiar and feel most comfortable.

Removal of the head (Fig. A): Used for domestic small and large animals

- Lay animal on its back and extend the head by pushing top of nose toward ground or bend neck back over edge of table.
- Locate the larynx. Immediately caudal to the larynx (see example that follows), using a sharp knife, make an incision through the skin and continue cutting down through the trachea and esophagus to the backbone.
- Identify the membrane covering the spinal cord between the first vertebrae (atlas) and the skull (occipital bone). The joint made by these two bones can be visualized and palpated as the animal's head is flexed and extended.

- Disarticulate the atlanto-occipital joint. It is possible to dissect the ligaments connecting this joint, but probably easier and faster to hyperextend the head and manually tear the ligaments. You will hear and feel a snap when this is accomplished.
- After disarticulation of the atlanto-occipital joint, the remaining muscle and skin can be cut with a knife to completely free the head from the body.
- Some individuals may prefer to cut through the vertebra instead of disarticulating the joint. After cutting down to the backbone, use shears or a hacksaw to cut through the first vertebra. DO NOT use an axe, hatchet or power saw because of the danger created by flying debris.
- Identify and package each animal individually as per previous instructions.

Extraction of a brain: Used for domestic large animals

- Secure head with dorsal aspect upright. A vice may be helpful for this.
- Skin head from neck to snout across the cranium.
- Make 3 cuts with a chisel or hand-saw such that they penetrate full depth of the cranium, and intersect above the eyes (Fig. B).
- Pry the cut piece of cranium free from the underlying brain.
- Extract the brain and spinal cord immediately distal to the brain stem (Fig. C).

Clean up

- Instruments and contaminated surfaces should be washed with detergent and water, and disinfected with a virucidal solution such as clorox (100 ppm), alcohol (40-70% ethanol), iodine (25 ppm), or quaternary ammonium (200 ppm) compounds.
- The body of the animal should be incinerated or properly disposed of according to local guidelines and regulations.

Figure A: Diagram showing positioning of domestic animal cadaver for removal of head for submission for rabies testing

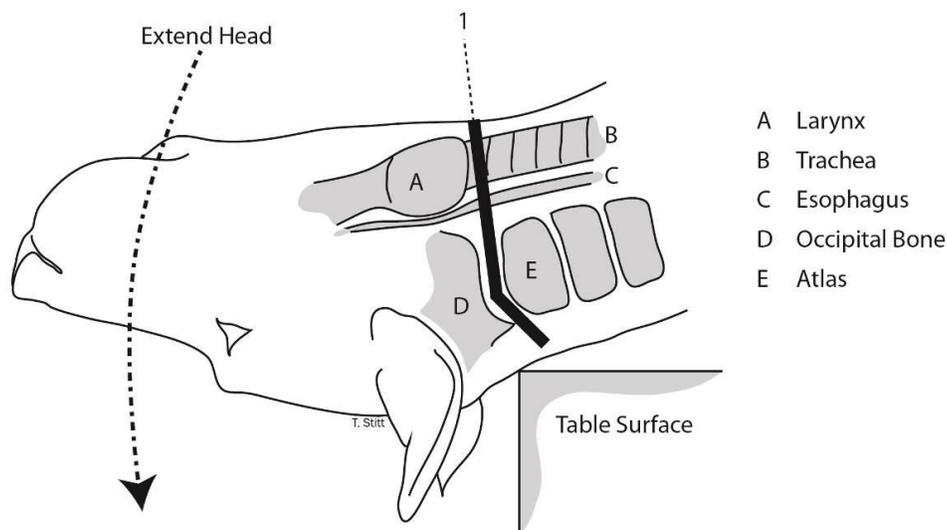


Figure B: Diagram showing location of cuts required to open cranium for removal of brain (large animal rabies suspect)

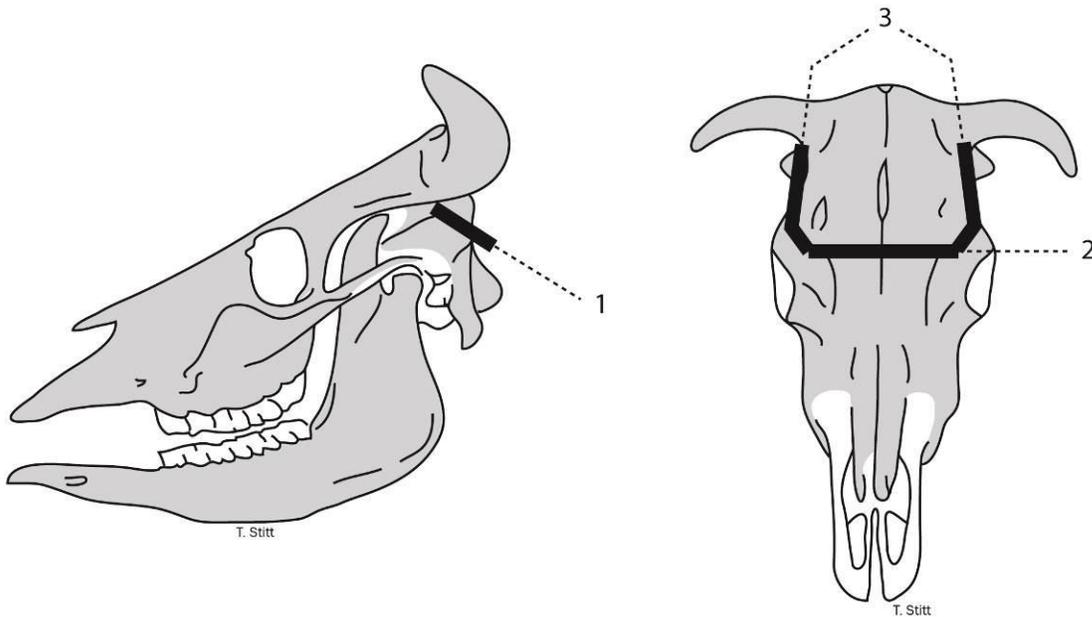
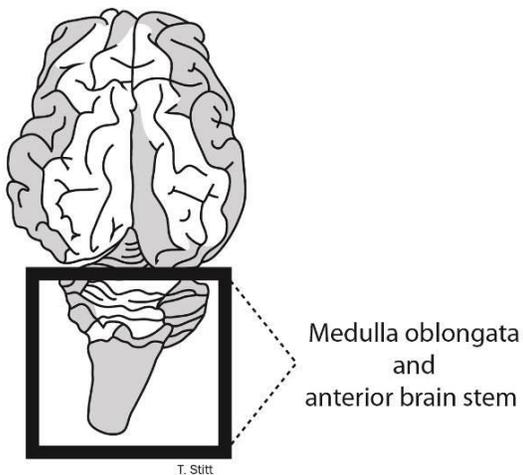


Figure C: Areas of brain (medulla oblongata and brain stem) most critical for rabies testing





Appendix G: Recommendations for animal isolation and observation by owners of a domestic animal that has been exposed to a rabid or potentially rabid animal

The private veterinarian should provide the following information to the owner of an unvaccinated or vaccinated but out-of-date domestic animal that has been exposed to a potentially rabid animal that is unavailable for testing or tests positive.¹⁹

- The exposed animal should be isolated and observed for the period of time recommended by the veterinarian in accordance with these guidelines.
- There is a risk of zoonotic transmission of rabies should their animal be infected.²⁰

If the private veterinarian does not think that the owner will comply with the recommendations for observation and there is a high risk exposure (e.g. pet was exposed to an animal that tested positive for rabies) or there is an imminent public health risk, the private veterinarian should consult the BCCDC public health veterinarian (PHV) at 778-677-7790. The PHV will conduct a risk assessment including a possible discussion with the client. If the PHV feels there is a public health risk which cannot be mitigated, the PHV will inform the relevant Health Authority for further assessment and management.

Provide owners with a take-home copy of the information below: “Instructions for Owners: Isolation and observation protocols after rabies exposure in a pet”.

¹⁹ Observation scenarios may include the following:

1. Pet exposed to an animal that tested positive for rabies
2. Pet exposed to a potentially rabid animal and owner declined to submit the specimen for testing (no human contact).
3. Pet exposed to a potentially rabid animal and specimen is not available for testing.

²⁰ The incubation period (from initial exposure to clinical symptoms) may range from two weeks to many months. It is important to note that they may be able to transmit the disease several days before showing clinical signs



Instructions for Owners

Your pet may have been exposed to the rabies virus. Rabies is a very serious disease that can be transmitted between animals, and from animals to people, through bites and/or scratches. The virus infects the brain and nervous system of animals. It is fatal for unvaccinated animals, and also in humans unless preventive treatment is taken immediately after exposure.

It is very important that you follow the protocol described below in order to protect the health of people and animals that might come into contact with your pet. The isolation period is 3-6 months (depending on your pet's vaccination status) because rabies can take this long to become apparent following exposure. Your pet is only at risk of transmitting rabies if it is showing signs of the disease or up to 10 days before it shows signs.

Contact your veterinarian immediately if there is any change in your pet's behaviour or if you observe other signs consistent with rabies. Dogs, cats and ferrets with rabies may show a variety of signs including lethargy, nervousness, loss of appetite, excitement, wanting to be alone, fearfulness, aggression, excessive drooling, difficulty swallowing, staggering and seizures.

Isolation and observation protocols after rabies exposure in a pet:

- Identify an age-appropriate person(s) to be responsible for the pet during the observation period.
- Vaccinate all pets against rabies as soon as possible, recommended within 7 days of the exposure event.
- Confine all pets indoors - in your residence only – and **observe it for a period of ____ months, ending on _____ (fill in date).**
 - If a cat, this includes moving your cat's litter box indoors.
 - If a dog, keep the dog on-leash/harness and under the control of the identified-responsible person when taking it outside to go to the bathroom.
- Close all windows that are not completely screened and seal any openings your pet may use to gain access to the outdoors.
- Secure your pet in a room with the door shut or in a pet carrier when you are opening a door to areas not within your residence (i.e. outside or a hallway in an apartment building).
- Limit potential exposures to any visitors to your home by securing your pet in a room with the door closed or within a pet carrier while visitors are present.
- It is not recommended to acquire any additional pets during this confinement and observation period, and you are not to permit pets of others to have access to your pet.
- Should you need to have your pet cared for by someone other than yourself, either make arrangements for your pet to be boarded at your veterinarian or care is to be provided in your home.
- Inform any other person caring for your pet temporarily that your pet has been exposed to rabies and the conditions of the observation. They should also be informed of their personal risk, of what signs and symptoms they should watch for in your pet and to whom they should report any changes in your pet's behaviour.
- Keep a list of any person(s) that is/are exposed to your pet either while caring for it, or through accidental exposure.
- Make your pet available for observation/assessment by your veterinarian or public health official periodically upon request.