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1.0 GOAL

The goal of the provincial Rabies Control Program is to prevent the acquisition of human rabies. Control of human rabies disease will be undertaken through:

- Active surveillance of human rabies disease.
- Provision of pre-exposure immunization of persons at increased risk of exposure to animal rabies.
- Provision of post-exposure immunoprophylaxis to persons exposed or potentially exposed to rabies virus.
- Collaboration and consultation with provincial and federal animal health authorities regarding rabies incidence and control in British Columbia in domestic and wild animals.

2.0 CLINICAL DESCRIPTION

Clinical description: 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. Once clinical disease manifests, treatment does not usually affect the rapid progression to 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.

Incubation period: After inoculation, the virus may persist and replicate at the inoculation site for hours to weeks before progressing to nerve endings at the site of the bite. The virus slowly travels up the nerves to reach the CNS where it replicates and then disseminates through nerves to many body sites including the cornea, hair follicles, and salivary glands where there is further replication.

The incubation period is usually 3 – 8 weeks, rarely as short as 9 days or as long as 7 years. Length of incubation period depends on the severity of the wound, site of the wound in relation to the richness of the nerve supply and its distance from the brain, and the amount and strain of virus introduced.

Infectious agent: The rabies virus is a rhabdovirus belonging to the genus *Lyssavirus*.

Mode of transmission: Infection occurs by percutaneous introduction of the virus-laden saliva of a rabid animal through a bite or scratch, or into a fresh break in the skin, or by contact with intact mucous membranes. Transmission has been reported through the transplantation of organs taken from persons who died of undiagnosed rabies. Also, wild animals may bite and infect domestic animals which in turn may infect humans.

Airborne transmission has been reported in 2 instances in a laboratory setting, where there was significant aerosolization and possible lack of personal protection. Also, there have been 2 reports of rabies acquired in a bat infested cave, and attributed to aerosol transmission, but there is no proof in either case that a bite or wound contamination did not occur. No well-documented natural transmission of rabies by aerosols has occurred (Gibbons 2001).

Reservoirs: In BC, bats are the only known reservoir. In other parts of Canada, bats, skunks, raccoons, foxes and coyotes have been found to be infected.
In the developing world, dogs are a major source of infection.

3.0 DEFINITIONS

Confirmed case of human rabies: Clinical illness with laboratory confirmation of infection:

- detection by direct fluorescent antibody of viral antigen in an appropriate clinical specimen (preferably the brain or the nerves surrounding hair follicles in the nape of the neck)
  OR
- isolation (in cell culture) of rabies virus from saliva, cerebrospinal fluid, or central nervous system tissue
  OR
- identification of a rabies-neutralizing antibody titre greater than or equal to 5 IU/ml (complete neutralization) in the serum or cerebrospinal fluid of an unvaccinated person.
  OR
- detection of Negri bodies in brain tissue
  OR
- detection of rabies virus by RT-PCR from tissues

Enzootic: consistently present in an animal population (equivalent to endemic in human population).

Epizootic: greater than expected occurrence in an animal population (equivalent to epidemic in human population).

Physical contact: any contact with a rabid or potentially rabid animal whereby rabies virus could be introduced through contact with eyes or mucous membranes, or through a break in the skin by means of a bite or scratch. This currently includes touching bare skin, which could have breaks that are not visible to the eye.

RPEP: Rabies Post Exposure Prophylaxis is accomplished through the administration of Rabies Immune Globulin **(RabIg)** and rabies vaccine. RabIg provides rapid, short-term protection. Rabies vaccines contain inactivated virus and induce an active immune response beginning 7 to 10 days post-immunization.

Rabies vaccines – WHO-approved:
The following rabies vaccines meet WHO's safety, potency, and efficacy requirements:

- Imovax® Rabies♦; Rabivac - human diploid cell vaccines (HDCV)
- RabAvert®♦; Rabipur™ - purified chicken embryo cell vaccines (PCECV)
- Verorab™; Imovax Rabies vero; TRC Verorab™ - purified vero (African green monkey kidney) cell vaccines (PVRV)
- Lyssavac N™- purified duck embryo vaccine (PDEV)

♦ Licensed in Canada.

Note: Brain tissue derived vaccine (Semple), is **not** WHO-approved, and individuals who have received it should be considered as not being vaccinated (Gamble 2002).

Unusual behaviour: this will vary according to species and other variables. Generally, rabies will manifest as either furious rabies (unprovoked attack, lack of fear) or dumb rabies (increasing paralysis and salivating). See Section 4.8.

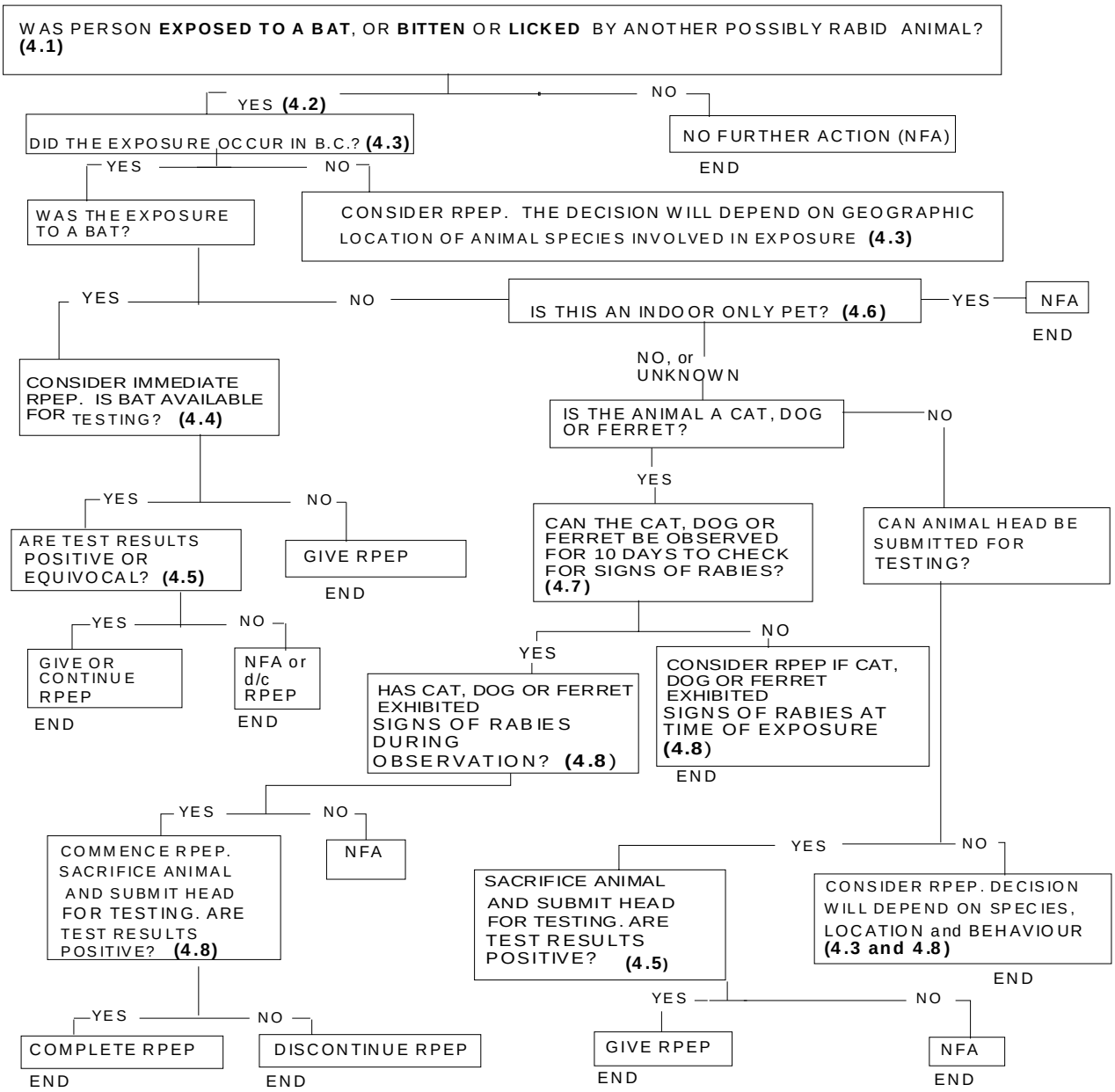
4.0 GUIDELINES FOR RABIES POST-EXPOSURE PROPHYLAXIS (RPEP)

Consult the following algorithm in order to determine the need for RPEP. The bracketed numbers in the algorithm refer to the sections of text that follow the algorithm.

Post-exposure prophylaxis should be started as soon as possible after exposure and should be offered to exposed individuals regardless of the elapsed interval. When notification of an exposure is delayed, prophylaxis may be started as late as 6 or more months after the exposure.

RABIES POST-EXPOSURE PROPHYLAXIS GUIDELINES (RPEP)

Bracketed numbers refer to sub-sections containing further information.



N.B. If a person was previously immunized against rabies, see section 4.9.

Note: When assessing exposure risk and determining if a sample is to be submitted, consultation with the CFIA District Veterinarian (DV) should always occur. It is the DV who will determine if testing is to be done.

4.1 Was the person exposed to a bat, or bitten or licked by another possibly rabid animal?

While the rabies virus can infect any mammal, bats are the only animal species in British Columbia in which rabies is endemic. Over the past 10 years, approximately 4 to 8% of the bats submitted for testing each year have been shown to be infected (Kush J, personal communication). It should be noted that submitted bats do not represent the true rate of rabies infection in the general population of bats, since submitted bats have an indication for testing and thus an a priori higher likelihood of testing positive in that sample.

RPEP should be considered only in situations where there is evidence of direct physical contact with a bat or other potentially rabid animal. Evidence for bat contact may include observation of contact, verbal history of contact, or physical evidence of a bite or scratch. Note that this is a new change in recommendations from those previously in place in BC since 1997.

Previously, in 1995, the Centers for Disease Control and Prevention suggested that, in addition to direct contact exposures, RPEP should also be offered to people awakening to find a bat in their bedroom, even if there was no evidence of direct contact in the form of mucous membrane exposure, a bite or a scratch (Paves et al 1995). This included finding a bat in the bedroom of someone who was awake and unable to articulate that a physical exposure had not occurred, such as a child or disabled person. This was based partly on the recognition that bat bites and scratches may be small enough to go undetected, and because human cases of bat rabies had been reported without recognized contact. Subsequently, all North American jurisdictions revised their policies to reflect this practice (Cooper in press).

Recent re-analysis shows that the risk of rabies in the absence of recognized physical contact with bats is exceedingly small. Overall, the incidence of rabies in the US and Canada remains rare, and is even more rare without physical contact. In total, only 56 non-transplant bat-variant cases were reported between 1950 and 2007 (6 of these in Canada, including one indigenously acquired case in BC); only 2 of these human cases of bat-variant rabies in the US and Canada had unrecognized exposure while sleeping in the bedroom (aDe Serres 2008). The incidence of rabies preventable by providing RPEP to people with unrecognized exposure in the bedroom is therefore estimated at 1 per 2.7 billion person-years. To put this into perspective, this represents about one human rabies case every 675 years in BC due to unrecognized contact through bedroom exposure and preventable through RPEP per historic recommendation (Cooper in press).

A recent Québec survey found that ~0.1% of the population may be exposed annually to a bat in the bedroom while they are sleeping. However, only a small minority (<5%) of these individuals, who were eligible for RPEP, sought medical advice and received RPEP.

The number needed to vaccinate to prevent a single case of rabies in that context is 2.7 million at a cost of $2.1 billion (bDe Serres in press). The financial and human resources needed to protect everyone in BC who has experienced a similar exposure would be staggering. Moreover, RPEP is associated with rare yet serious adverse events (Dobardzic 2007).

On the basis of this re-analysis of the risk of rabies associated with bedroom exposure alone (without recognized bat contact), the BC Rabies Guideline has been revised to recommend that RPEP should only be offered if direct physical contact with a bat or any other animal with suspect or confirmed rabies has occurred. A few other Canadian provinces have already made this policy change and the rest are expected to follow.

Because skin integrity can always be suspect, if a rabid animal licks intact skin, or if a bat has any contact with skin, RPEP is indicated. Where direct contact with a bat has occurred and the bat rabies test result is known reliably to be negative, RPEP may be halted. When there has been no direct contact, bats should not be captured or tested. An attempt to capture a bat may increase the risk of direct contact. Since no RPEP is recommended if there is no contact, there is no point in testing such bats.

In a potentially infected animal, consider the following body substances/tissues as infectious:

- Saliva and salivary glands
- Neural fluid and tissue

Very rarely, virus may also be found in the following tissues or fluids. However, contact with such materials has rarely, if ever, led to transmission of rabies. RPEP is not required in exposures involving the following:

- Urine
- Muscle
- Fresh bat faeces (guano)
- Bat lung tissue

Blood is considered non-infectious, as infected animals are not viremic. However, it is possible that rabies virus from an infected animal's saliva or neural tissue (i.e., through the animals' fighting/playing) can contaminate blood from an exposed animal's wounds.

The Material Safety Data Sheet - Infectious Substances, Public Health Agency of Canada indicates that the virus is “inactivated on exposure to ultraviolet radiation, by heat (1 hour at 50° C), and by lipid solvents, and is inactivated rapidly in sunlight and does not survive for long periods out of host unless protected in a cool dark area.” It is also “susceptible to 1% sodium hypochlorite, 2% glutaraldehyde, 70% ethanol and formaldehyde” (Public Health Agency of Canada 2001).

Being sprayed by a skunk is not considered an exposure.

In all geographic jurisdictions, squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice and other rodents, rabbits and hares are only rarely infected with rabies. They are not known to have caused human rabies in North America. RPEP should only be considered if the animal's behaviour was highly unusual (see Section 4.8).

If a domestic animal is known to have had physical contact with a rabid animal (e.g., a cat played/fought with a bat which is later determined to be rabid) and an individual has an exposure to the animal to which rabies virus could have been transmitted, initiation of RPEP may be indicated. A minimum of 4 days must have passed between the bat/domestic animal contact and the human contact with the domestic animal to allow for incubation, before the rabies virus will be transmitted. That is because the minimum incubation time for symptoms to appear in domestic animals is 14 days, but they can shed virus up to 10 days before symptoms. As with other suspicious exposures to a dog, cat or ferret, the animal should be observed for 10 days for signs of rabies.

In instances where a domestic animal has had a bat in its mouth, and immediately licks broken skin or bites someone, the risk of rabies virus transmission is present but minimal. It is conceivable that rabies virus could be present, but there are no known incidents of transmission by this route (Fehlner-Gardiner C, personal communication). As a rule, transmission of rabies is by infected animals and not by healthy animals that may have recently (in less time than the incubation period of rabies) come into contact with a rabid animal.

Contact the CFIA if rabies may have been transmitted to a domestic animal. The CFIA has responsibility for monitoring the health of animals.

There is low risk of airborne transmission of rabies virus. RPEP should only be considered for an aerosol exposure where the number of bats in an enclosed area is very high, the exposure is prolonged and the appropriate personal protective equipment was not used.

4.1.1 Bat Behaviour

The following information is provided as an aid to assess reports from the public and the likelihood that the exposure was to a bat:

- Bats are primarily nocturnal creatures, sleeping during the day and hunting and feeding at night. If there is an encounter with a bat during daytime hours, it is likely that the bat is ill, possibly with rabies.
- Echolocation is a type of sonar that bats use to detect prey, locate roosting crevices and avoid close obstacles in the dark. The bat emits a very loud and short 'shout' of sound and listens for the echo that bounces back when it hits an object. This can tell the bat how far away the object is. Because of echolocation, it is unlikely that a bat would fly into a person.
- Most Canadian bat species use echolocation calls that are ultrasonic (beyond the range of human hearing). A notable exception is the spotted bat *Euderma maculatum*, which is found in the Okanagan Valley of British Columbia and uses lower-frequency echolocation calls readily audible to most people.

- The “chatter” that bats make in roosts is audible to humans; however, it has a great deal of high-frequency sound (or ultrasound) in it that people cannot hear.

4.2 Have first aid and wound care been performed?

Immediate and thorough washing of the wounds and scratches with soap and water can reduce the risk of rabies by up to 90%. Wash and flush the wound and scratches with copious amounts of water under moderate pressure, with a mild soap, for 5 to 10 minutes.. Consideration can be given to disinfecting the wound with either 70% ethanol, tincture of aqueous solution of iodine, or povidone iodine (Gamble 2002; Heymann 2004).

The wound should not be sutured unless indicated for cosmetic or tissue support reasons. Sutures, if required, should be placed after local infiltration of RabIg. They should be loose and not interfere with free bleeding and drainage (Heymann 2004).

As appropriate, follow-up wound care should be undertaken by a physician. Although the risk of rabies may be small, there is a greater risk of other infections at the wound site.

Tetanus-diphtheria vaccination should be updated as required.

4.3 Did the exposure occur in BC?

For up-to-date details on animal rabies activity in Canada, see the Canadian Food Inspection Agency (CFIA) web site at:
http://www.inspection.gc.ca/english/anima/heasan/disemala/rabrag/statse.shtml

For information on other countries, consult the WHO publication "International Travel and Health" available at: http://www.who.int/ith/en/

Rabies post-exposure prophylaxis should be offered to individuals who have had non-intact skin or mucous membrane exposure to an animal in an out-of-province area where rabies is known to occur in that species or cannot be excluded (e.g., a returning traveller exposed in a rabies enzootic area).

If the animal involved in the exposure is a potential rabies vector in a rabies-enzootic region, RPEP should be started as soon as possible after the exposure. Initiation of RPEP should not await the results of laboratory examination or an observation period of the implicated animal. As a rule, the 10 day observation period for dogs, cats, and ferrets should not be applied to these animals in rabies-enzootic areas since there is evidence in some enzootic areas that transmission of virus may occur more than 10 days before the onset of symptoms in the animal (see section 4.7.3 for possible exceptions) (Dutta 1994; Kasempimolporn 2000).

4.3.1 RPEP started in other countries

From 2003 to 2007 inclusive, 282 people from BC had animal exposures in other countries (unpublished data). Outside of BC, they involved dogs approximately 49% of the time. Worldwide, bites from rabid dogs are responsible for up to 99% of the approximately 55,000 rabies deaths annually (World Health Organization 2007).

When travellers are exposed to an animal in a rabies enzootic country, they are often started on RPEP in that country. There are reports of counterfeit vaccines being used in the developing world, however, there are no specific details as to the countries where this occurs or how widespread the practice is (Wandeler A; Meslin FX; Rupprecht CE; personal communication).

Travellers are advised to obtain detailed, written information on the type of RabIg and vaccine they have received, and the vaccination schedule. It would also be advisable to obtain a label of the biologicals they have received. This will help determine the validity of the vaccine used. Reference should also be made to the list of WHO approved vaccines in Section 3.0.

It is noted that there is no WHO-approved RabIg available in China, apart from Hong Kong (Davis 2008).

When a traveller returns to BC and has begun, or completed a course of RPEP outside the country, the MHO may decide to obtain a blood specimen for determination of rabies antibody titre and start the person on a new course of RPEP with RabIg (World Health Organization 2008). The specimen would be submitted to the National Microbiology Laboratory through BCCDC (allow for at least a two-week turnaround). If the titre returns an Ab level of $\geq$0.5 IU/mL, and the client has had a complete series of vaccinations, the new series of vaccinations can be discontinued. If the titre is <0.5IU/mL, the series of vaccinations started in Canada should be completed. The full series of RabIg and vaccine is warranted if the original RPEP administered does not meet WHO standards (Gamble 2002).

One repeat course of RPEP, including RabIg should not impact the development of antibody in the client (Rupprecht CE, personal communication). However, once a valid vaccination series has been started, RabIg should not be administered more than 8 days after the first vaccination, so as not to interfere with antibody development (Public Health Agency of Canada 2006; MMWR 2008).

4.4 Is the bat available for testing?

In situations where there is evidence of direct physical contact with a bat and the bat is available for testing, refer the client to a wildlife specialist or pest control company in the area to capture it, or suggest the client attempt to capture the bat for testing. Instruct the individual to:

- 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 sealable container. Place the container in a cool, safe place away from human or pet contact or put it into the freezer, which will make the bat go into hibernation.
- Tell the individual not to kill the bat.
- Tell them to contact the public health unit for further instructions.

If there is a substantial risk of human exposure, do not encourage the capture of the bat.

If bat exposure occurred but the bat escaped, RPEP is strongly recommended. For other animals not available for testing, a case-by-case decision must be made.

4.5 Testing suspect animals.

Testing of suspect animals should not be undertaken unless the type of exposure warrants testing and a positive result will result in the administration of RPEP. Testing is always the prerogative and decision of the CFIA District Veterinarian.

Rabies virus is detected in the brain of a suspected animal by:

- histology that detects virus inclusions called Negri bodies,
- immunofluorescent microscopy that detects virus infected cells, and
- isolation of the virus in cell culture.

Testing of animals for rabies in suspected cases of human exposure is available without charge at the Animal Disease Research Institute, Lethbridge, Alberta (phone number 403-382-5500). This service is provided by the Canadian Food Inspection Agency (CFIA), as is the preparation of the specimen for shipping (as per Transportation of Dangerous Goods Regulations) and shipment to Lethbridge. Consult the CFIA District Veterinary Officer (see Appendix A) or the Regional Veterinary Office regarding the availability and necessity of testing and shipping logistics.

In some areas of the province not serviced by a District Veterinary Officer, private veterinary practitioners or Health Unit Environment Health Officers must prepare and ship specimens.

Acceptable samples are those with non-decomposed, non-fixed, undamaged animal brains that allow the excision of the medulla oblongata (including pons), hippocampus and cerebellum. This includes whole animal brain extracted (from large animals), animal head including brain, or for small animals the entire carcass (e.g., bats, which also allows for species identification).

A portion of spinal cord should be added when the brain is severely damaged, when the specimen is from a large animal (e.g. elk, bear, cow or horse), or when the animal was killed at a suspected early stage of the disease (Kush J; Wandeler A; personal communication).

If there are any questions, consult the CFIA District Veterinary Officer for further information on specimen submission.

4.6 Is this an indoor only pet?

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

4.7 Can the dog, cat, or ferret be observed for 10 days to check for signs of rabies?

The length of time virus may be excreted in saliva before the development of symptoms has not been determined for the purpose of assessing possible rabies exposure except in domestic dogs, cats, and ferrets. When these animals are in non-enzootic countries of the world, rabies virus excretion does not generally precede symptom development beyond 10 days.

4.7.1 Was the exposure to an animal from BC?

Most exposures to domestic animals from BC do not warrant RPEP. Consideration can be given to foregoing the 10-day observation if the animal is from BC and the exposure occurred in this province. If the animal was displaying neurological behaviour suggestive of rabies (see section 4.8) or if it died subsequent to the exposure (i.e., within 10 days) then immediate testing of the brain is warranted, and provision of RPEP based on the results.

This approach is based on the rarity of positive domestic animals from BC. See section 5.0. (CFIA, 2008) Also, most dog and cat bites in BC are not reported and yet there have only been 2 cases of human rabies since 1983

Dogs, cats, or ferrets that display symptoms of rabies during observation must be humanely killed without injury to the brain and tested for rabies. Contact District Veterinary Officer (see Appendix A and Section 4.5 above) or the Regional Veterinary Office for assistance regarding animal euthanization, shipping, and testing if the animal is in Canada.

The incubation period and period of rabies virus shedding in other animal species are not clearly known. Other animals must be euthanized and appropriate specimens submitted for testing to definitively rule out rabies. This includes dog-wolf and cat-bobcat hybrids, and other wild or exotic animals. If these animals are not available for testing, proceed with RPEP.

4.7.2 Was the exposure outside BC, but in the developed world?

In developed areas of the world, where rabies may be present but not prevalent, quarantine and observation for 10 days (even if the animal has been vaccinated) can be used to rule out rabies in normally behaving dogs, cats, and ferrets. If the animal is still clinically well after that time, it can be concluded that the animal was not shedding rabies virus at the time of the exposure and was therefore non-infectious. For areas outside BC, communication with a reliable agency or responsible person is necessary to assess the health of the animal. However, if the bite wound is to the head and neck region, consideration should be given to immediately initiating RPEP, and not delaying initiation until after the 10-day observation period.

Note: In Canada, unnecessary sacrifice of dogs, cats and ferrets is strongly discouraged, in favour of the 10-day quarantine and observation period.

4.7.3 Was the exposure in an enzootic area of the world?

In enzootic areas of the world, where rabies is prevalent, animals may shed rabies virus for longer than 10 days (Dutta 1994; Kasempimolporn 2000). Usually, exposures to a potentially rabid animal in these settings should immediately lead to RPEP provision. However, the 10-day observation period may be used under certain circumstances, such as:

- If the animal is an indoor pet and has had no known exposure to an animal outside, or
- If the animal has been vaccinated and is up to date on boosters.

Testing of animals may not be available, reliable or done according to accepted standards and should not be pursued. If the conditions for a 10-day observation period as suggested above are not present, initiate RPEP.

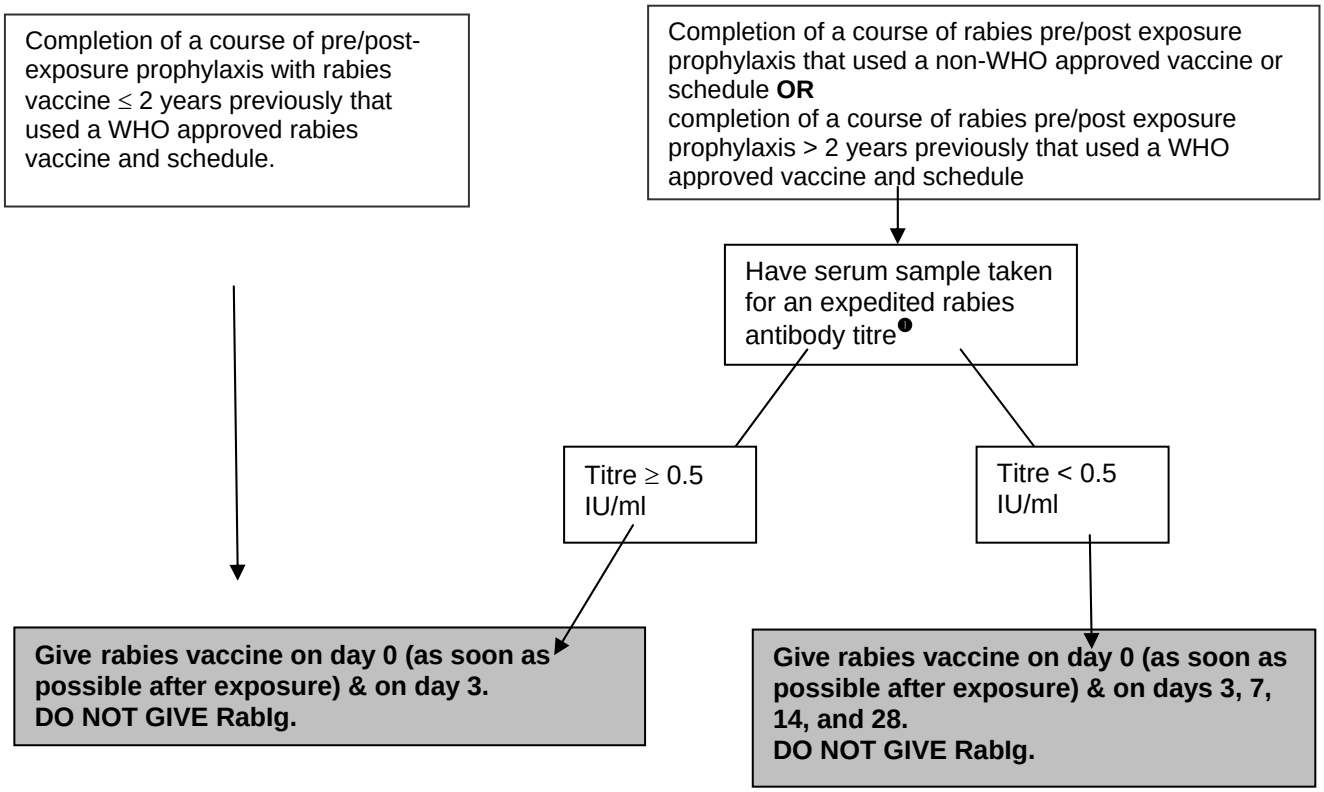
NB: Provoked and unprovoked behaviour – In areas where rabies is enzootic in a specific animal species, do not consider that animal's biting behaviour as provoked or unprovoked. Consider the animal as potentially infectious for rabies.

4.8 Did the animal exhibit signs compatible with rabies?

The signs of rabies infection can vary considerably among species. Some species may become unusually aggressive, while others unusually withdrawn. An animal

exhibiting behaviour that is considered unusual for that particular species could potentially be rabid. Consult a veterinarian if there is any question about the behaviour of an animal. Otherwise, consult the online Merck Veterinary Manual for a description of the neurological symptoms of rabies:
http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/102300.htm&word=rabies

4.9 Exposures in persons previously immunized against rabies



❶Have serum sample taken and administer first doses of rabies vaccine while awaiting lab results. Phone the PHSA Laboratory with the patient's demographics: Lab Supervisor at 604-707-2827 or Medical Microbiologist on call at 604-661-7033.

The PHSA Laboratory forwards samples to the National Microbiology Laboratory in Winnipeg where rabies antibody titre tests are run twice a week. The test takes 2 days. The timing of the notification of testing results will depend when the specimen arrives at Winnipeg Laboratory.

It is very likely that the rabies antibody titre result will not be available by day 7. Administer 3rd dose of rabies vaccine on day 7.

The PHSA Laboratory will attempt to obtain an expedited result in one week. If the rabies antibody titre result is not available by day 14, administer 4th dose of rabies vaccine on day 14.

5.0 EPIDEMIOLOGICAL/HISTORICAL INFORMATION

There have been two cases of human rabies in BC in the last few decades. One occurred in 1983 and the other in 2003. Both cases were identified as bat variant rabies and were fatal.

The following information is selective and based only on human contact and does not rule out rabies in a given animal species, since all warm-blooded mammals are potentially susceptible to rabies. The information may be used to assess the risks and benefits of treatment, particularly when the animal is not available for testing or observation.

Bats are the only animal species in BC in which rabies is enzootic. Over the years, however, rabies has been diagnosed in a few other animal species. In June 2007, bat variant rabies virus was isolated from a cat in Maple Ridge. In the late spring of 2004, bat variant rabies virus was isolated from four skunks in Stanley Park in Vancouver. In 1992, rabies was detected in a cluster of three cats from Delta. One of the cats was shown to have the skunk strain of rabies. Skunk strain rabies was isolated from a beaver in the late 1980s. These 2 findings of skunk variant rabies (1 beaver and 1 cat) have never been fully explained. Testing errors are possible, but only speculative. A wildlife survey in Delta (prior to 1989) following the isolation of the skunk strain rabies in a beaver, and intensified testing of cats following the Delta incident, indicated that the skunk strain of rabies is not enzootic in BC. Further cases include a horse in the Sorrento area in 1984 from which a bat strain was isolated, and a cat on Vancouver Island in 1969. Although strain identification was not available in 1969, investigation indicated that bat contact was very likely.

6.0 RELEASE OF BIOLOGICALS FOR RABIES POST-EXPOSURE PROPHYLAXIS

Health units are encouraged to depot an appropriate quantity of rabies vaccine and RabIg based on historical demand from the previous year.

When the product dating is within 6 months of expiry and there is concern that product will not be used prior to expiry, it should be returned to BCCDC Vaccine and Pharmacy Services under cold chain conditions. Contact BCCDC Biologicals Desk first to obtain authorization for this Field Return.

The MHO must authorize all releases of rabies vaccine and RabIg. Consultation is available with BC Centre for Disease Control, Communicable Disease Epidemiology Services (phone 604-660-6061) for MHOs wishing to discuss the need for offering RPEP.

Evenings, weekends and holidays a BCCDC physician is on-call for consultation (phone 604-312-9220). On establishing that RPEP should be administered, the MHO/designate requests release of the appropriate biologicals from the local depot or from BCCDC Vaccine and Pharmacy Services.

If rabies biologicals are to be released from BCCDC **during regular office hours** (8:30 am to 4:30 pm) the MHO/designate must use the "Rabies Exposure Report and Rabies Biologicals Request Form" (see Appendix B) to obtain the release of the biologicals. Fax the form to the BCCDC Biologicals Desk at (604) 775-2718 [phone number: (604) 660-5692].

This form must specify the required number of doses of vaccine and vials of RabIg. The dose of RabIg is calculated according to the person's body weight. Refer to the chart in Appendix C.

Personnel releasing the biologicals are not responsible for computing this information for the health authority.

For after hours release of RPEP biologicals from BCCDC, the MHO needs to phone:

BCCDC Vaccine and Pharmacy Services: Pager # (604) 977-0059 **Cell: (604) 809-4670**

The MHO/designate may wish to provide an instruction sheet (Appendix C and D) to personnel who will be administering the RPEP series.

The Rabies HealthFile should be used for obtaining informed consent from the individual who will be receiving RPEP:
http://www.healthlinkbc.ca/healthfiles/hfile07.stm

7.0 RECORDING

Record the administration of rabies vaccine and RabIg in the Integrated Public Health Information System (iPHIS). Note: Do not use the Rabies Module, Immunizations Tab. Use the PHS Module, Immunizations/TST tab. Upon request, BCCDC forwards the RabIg administration information to Canadian Blood Services on behalf of Health Authorities.

If the Health Unit cannot access iPHIS, the vaccine and RabIg administration should be recorded on the "Record of Rabies Vaccine and Rabies Immune Globulin Administration" (Appendix E). This completed record should then be faxed to the Biologicals Desk at (604) 775-2718.

If a non-Health Unit site is administering the RPEP, the Health Unit should fax the "Record of Rabies Vaccine and Rabies Immune Globulin Administration" (Appendix E) to the person who will be administering the RabIg. Instruct this person to fax the completed record back to the health unit after the RabIg has been administered. The Health Unit then enters the data in iPHIS or faxes the record to the BCCDC Biologicals Desk, if iPHIS cannot be accessed.

In the rabies module of iPHIS, record incident/exposure information from the "Rabies Exposure Report and Rabies Biologicals Request Form" (Appendix B). Information on how to enter data is now available in the BCCDC "iPHIS Training Manual – Communicable Disease – Rabies" and the Data Standards document identifies mandatory entry fields.

If biologicals are depoted and not needed, it is important to note that if the Health Authority is not reporting contacts that require RPEP in iPHIS, that they complete the "Rabies Exposure Report and Rabies Biologicals Request Form" and fax it in regardless, making sure to indicate they do not need biologicals if that is the case. Otherwise, if the Health Authority has adequate biologicals and they do not submit a form, BCCDC will not be aware of the incident and it will not be entered into iPHIS by BCCDC on behalf of the Health Authority.

If iPHIS cannot be accessed - fax the "Rabies Exposure Report and Rabies Biologicals Request Form" (Appendix B) to the Biologicals Desk at (604) 775-2718. BCCDC will enter this information into iPHIS as it is needed for monitoring the epidemiology of rabies in BC and the utilization of RPEP.

If the MHO decides that RPEP is indicated, and the exposed client refuses it, document this refusal in iPHIS. If the client discontinues RPEP prior to completion, document this in iPHIS. Inform the client's physician if RPEP has been refused or discontinued.

8.0 REPORTING

Rabies in animals is a reportable disease under the Reportable Disease Regulations of the federal Health of Animals Act, and is reportable to the CFIA.

9.0 DETENTION, OBSERVATION, AND TESTING OF ANIMALS SUSPECTED OF BEING RABID OR HAVING PHYSICAL CONTACT WITH A BAT

If any domestic animal has had physical contact with an animal suspected of having rabies (including any bats), call the CFIA District Veterinarian to report this exposure and to discuss the next steps. The CFIA is responsible to investigate potential rabies exposures (real or suspect) of domestic animals and apply appropriate disease control measures. These measures may include observation, quarantine, etc. depending on various criteria. See (Appendix A) for list of District Veterinarians.

10.0 SIMIAN B VIRUS

When there is a report of a bite or scratch from a monkey, the species of monkey should be identified. The client can be referred to the website http://www2.gsu.edu/~wwwvir/VirusInfo/macaque.html to help determine the species of monkey. Simian B virus infection can be acquired by the bite of apparently healthy **macaque** monkeys, or by exposure of injured skin or mucous membranes to infected saliva or macaque monkey cell cultures. Human illness is extremely rare but highly fatal. Refer to Communicable Disease Control Manual Simian B Virus

11.0 PRE-EXPOSURE RABIES IMMUNIZATION

Pre-exposure rabies immunization is elective and should be offered to persons at potentially increased risk of contact with rabid animals. Refer to the Immunization Manual for details regarding vaccine administration. The BCCDC will only provide pre-exposure rabies vaccine free to British Columbia students attending a Canadian Veterinary College or Animal Health Technology Training Centre.
Table 1 presents the personal risk categories for which pre-exposure rabies immunization is recommended.

Table 1: Pre-exposure Rabies Immunization

Personal Risk Category	Nature of Risk	Typical Populations	Pre-exposure Immunization
Very low risk (BC population at large)	Rare exposure to virus♦ Potential for mucous membrane, bite or non-bite exposure.	BC population at large and most travellers to epizootic areas not in any of the higher risk groups below.	No immunization necessary.
Low risk	Exposure to virus nearly always episodic with source recognized. Potential for mucous membrane, bite, or non-bite exposure.	Veterinarians and staff, animal control and wildlife workers in areas of low rabies enzooticity (BC); veterinary and animal health technology students. Children and travellers visiting foreign epizootic areas for one month or more. Travellers to foreign epizootic areas, trekking/hiking for any length of time, and going to be far away from a major medical centre.	Initial series. Booster only following a subsequent exposure, or as determined by post-exposure serology.
Moderate Risk	Virus present episodically, with source recognized, but exposure may be unrecognized. Potential for mucous membrane, bite, non-bite or aerosol exposure.	Rabies diagnostic lab workers and spelunkers. Veterinarians and staff, animal control and wildlife workers in rabies epizootic areas. Hunters and trappers in high-risk areas such as the far north.	Initial series. Serologic testing every 2 years. Booster immunization when antibody level is < 0.5 IU/ml.
High Risk	Frequent exposure. Virus present continuously, often in high concentrations. Potential for mucous membrane, bite, non-bite or aerosol exposure. Specific exposures may go unrecognized.	Rabies research lab workers; rabies biologicals production workers.	Initial series. Serologic testing every 6 months. Booster immunization when antibody level is < 0.5 IU/ml

♦ **Bats are the only animal reservoir in BC in which rabies is enzootic.**

12.0 AUTHORITY

Health Act (1983) and Communicable Disease Regulation

13.0 REFERENCES

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APPENDIX A: Canadian Food Inspection Agency – Animal Health Programs

District Office	Name	Office No	Fax No
CFIA Regional Office (BC) 400 – 4321 Still Creek Drive Burnaby BC V5C 6S7	**Disease Control Specialist:** **Program Assistant:** Josée Pauls	(604) 666-8900 (604) 666-2484	(604) 666-1963
Abbotsford Rm 102, 30585B Progressive Way Abbotsford BC V2T 6W3	Dr. Robert Cooper Robyn Raspberry	(604) 557-4505 (604) 557-4500	(604) 557-4502
Airport District/Harbour Office Unit 201 4831 Miller Road Richmond BC V2T 6W3	Dr. Rod Livingstone Joyce Gomes	(604) 666-7042 (604) 666-7172	(604) 666-6027
Cranbrook 108 Ranch & Home Centre 1525 Cranbrook St, North Cranbrook BC V1C 3S7	Dr. Shirley McDonald Maureen Williamson	(250) 417-2293	(250) 417-2292
Dawson Creek Room 102, 1005 - 104 Ave Dawson Creek BC V1G 2H9	Dr. Al Chambers/ Dr. Corinna Harvey Lynne Litwin	(250) 719-6855	(250) 719-6849
Import Service Centre		(888) 732-6222 (604) 666-9240	(604) 666-1577
Kelowna Office	Inspection/Rick Czuba Shauna Woodworth	(250) 470-4894	(250) 470-4899
Oliver 34577 91st Street PO Box 1530 Oliver BC V0H 1T0		(250) 498-5301	(250) 498-5303
Osoyoos 202 Hwy. 97th Street Osoyoos BC V0H 1V1	Dr. Ken Roblesky Marg Harkness	(250) 495-6574	(250) 495-3255
Surrey Room 207, 17637 – 1st Ave Surrey BC V3S 9S1	Dr. Doug Aitken Lucia Hunter	(604) 541-3364	(604) 541-3375
Vernon 2814 - 48th Avenue Vernon BC V1T 3R4	Dr. Witold Wince Tova Wadsworth/Linda Fedyniak	(250) 260-5030	(250) 260-5031
Victoria 103 – 4475 Viewmont Avenue Victoria BC V8Z 6L8	Dr. Sujinder Bhachoo Kenan Sweezie	(250) 363-3097 (604) 363-3618	(250) 363-0144
Williams Lake Room 307 – 35 South 2nd Ave Williams Lake BC V2G 3W3	Dr. Gary DeBruin Stella Ramsay	(250) 392-3004	(250) 305-3003
Harbour Operations	Inspection Officer	(604) 666-3837	(604) 666-1156

APPENDIX B: Rabies Exposure Report and Rabies Biologicals Request Form

If rabies biologicals are to be released from BCCDC **during regular office hours,** complete the following information **and fax it to BCCDC Biologicals Desk at (604) 775-2718.**
Phone (604) 660-5692. (Mandatory fields underlined)

CLIENT INFORMATION	
Last Name:	First Name:
Sex: □ Male □ Female	PHN:
Present Weight: (kg)	Date of Birth: _____/_____/_____ (*yyyy/mm/dd)*
No. and Street Address:	
City/Town: Postal Code:	Phone #: H: ( )_____ W: ( )_____ Other: ( )_____
PHYSICIAN INFORMATION	
Last Name:	First Name:
No. and Street Address:	Phone: ( )_____
City/Town:	Postal Code:
ANIMAL INFORMATION	
Animal species: □ Bat □ Cat □ Dog □ Monkey: *note* ♦ □ Other (describe) _____	
Animal type: □ Household pet -indoor □ Household pet -outdoor □ Stray □ Wild □ Unknown	
Animal immunized against rabies? □ Yes: _____/_____/_____ (*yyyy/mm/dd)* □ No □ Unknown	
Animal behaviour at time of exposure:	
Observation period following exposure? □ No □ Yes, from:_____/___/___ to: _____/____/_____ Observation location: _____ (*yyyy/mm/dd)* (*yyyy/mm/dd)* Symptoms: _____ _____ Onset date: _____/___/___ (If clinically rabid, Symptoms and Onset date are mandatory.) (*yyyy/mm/dd*)	
Vet name: _____ Phone: ( ) _____	
Brain sent for testing? □ Yes □ No □ Unknown	Date specimen shipped: _____/_____/_____ (*yyyy/mm/dd)*
Testing Result: ____ Rabies Status: ____ (Positive, Negative, Indeterminate)	Date of test: _____(yyyy/mm/dd)

♦ If exposure was to a monkey, assess risk for Simian B virus. Refer to Communicable Disease Control Manual Simian B Virus

Date of exposure: ____/_____/_____ *yyyy mm dd*	Date of report: ____/_____/_____ *yyyy mm dd*
Place of exposure: □ BC: HSDA _____ □ Other Canadian province/territory: _____ □ Other country: _____	
Type of exposure: □ 1-Bite □ 2-Scratch □ 3-Saliva □ 4-Handling □ 5-Unknown	
Location of exposure: □ 1-Head/Neck □ 2-Torso □ 3-Extremities □ 4-Finger □ 5-Mucosa □ 6-Unknown □ 7-Other, describe _____	
Any bleeding or breaks to skin? □ Yes □ No	
Client previously immunized against rabies? □ No □ Yes, give date: _____/_____/_____ (*yyyy/mm/dd)* Vaccine type: _____	
Reporting Health Service Delivery Area: _____ Client No. (to be filled in by HSDA): _____	
RPEP authorized by:_____ (print name of MHO or BCCDC Clinical person. If signed, MHO recommended RPEP.) Person who received authorization: _____ (print name)	
Biologicals to be shipped from a local depot: □ Yes □ No	
BIOLOGICALS TO BE SHIPPED TO	
Full Address:	Person Receiving:
Office Hours & Special Instructions:	Phone Number: ( ) _____ After Hours Number: ( ) _____ Expected Date/Time for Biologicals Arrival: ____/_ __/___ (*yyyy/mm/dd)* □ AM □ PM
Submitted by: (please print)_____Phone #: ( ) _____	
BIOLOGICALS REQUESTED	
Rabies vaccine _____ vials **(1 vial = 1 dose = 1ml)** Rabies immune globulin _____ vials **(1 vial = 2ml = 300 IU)** **Dose in ml: (20 IU x wt in kg) / 150 IU per ml = _____ml**	

APPENDIX C: Rabies Immune Globulin (RabIg) Dosage by Bodyweight

RabIg: 1 vial = 2 ml = 300 IU

Dose (ml): 20(IU per kg) x wt (kg)/150(IU per ml)

Infiltrate as much RabIg as possible deep into and around the wound(s) in order to neutralize the virus. Inject the remaining amount intramuscularly (IM) in the ventrogluteal area (in those > 7 months of age) or in the anterolateral thigh. When more than one wound site exists, each site should be locally infiltrated with a portion of the RabIg using a separate syringe and needle for each infiltration. If there are extensive wounds, where the calculated dose of RabIg (by weight) is **not** adequate in volume to infiltrate all wounds, dilute the RabIg 2-3 fold in normal saline to create an adequate volume to infiltrate all wounds. When there is no wound site, the RabIg should be given IM in the ventrogluteal site (in those > 7 months of age) or in the anterolateral thigh.

RabIg should not be given in the deltoid. Both deltoid muscles should be reserved for the administration of rabies vaccine.

Do not exceed the recommended dose

POST-EXPOSURE RABIES VACCINE :
Not previously immunized:

- 1 ml IM days 0,3,7,14,28 (RabIg on day 0)

Previously immunized:

- Refer to Subsection 4.9 Exposures in persons previously immunized against rabies

Weight (pounds)	Weight (Kg)	Dose (I.U)	# of vials	Dose (ml)
10	4.5	91	1	0.6
12	5.4	109	1	0.7
15	6.8	136	1	0.9
20	9.1	181	1	1.2
22	10.0	200	1	1.3
25	11.3	227	1	1.5
30	13.6	272	1	1.8
35	15.9	318	2	2.1
40	18.1	363	2	2.4
45	20.4	408	2	2.7
50	22.7	454	2	3.0
55	24.9	499	2	3.3
60	27.2	544	2	3.6
65	29.5	590	2	3.9
70	31.8	635	3	4.2
75	34.0	680	3	4.5
80	36.3	726	3	4.8
85	38.6	771	3	5.1
90	40.8	816	3	5.4
95	43.1	862	3	5.7
100	45.4	907	3	6.0
105	47.6	953	4	6.4
110	49.9	998	4	6.7
115	52.2	1043	4	7.0
120	54.4	1089	4	7.3
125	56.7	1134	4	7.6
130	59.0	1179	4	7.9
135	61.2	1225	5	8.2
140	63.5	1270	5	8.5
145	65.8	1315	5	8.8
150	68.0	1361	5	9.1
155	70.3	1406	5	9.4
160	72.6	1452	5	9.7
165	74.8	1497	5	10.0
170	77.1	1542	6	10.3
175	79.4	1588	6	10.6
180	81.6	1633	6	10.9
185	83.9	1678	6	11.2
190	86.2	1724	6	11.5
195	88.5	1769	6	11.8
200	90.7	1814	6	12.1
205	93.0	1860	7	12.4
210	95.3	1905	7	12.7
215	97.5	1950	7	13.0
220	99.8	1996	7	13.3
225	102.1	2041	7	13.6
230	104.3	2087	7	13.9
235	106.6	2132	8	14.2
240	108.9	2177	8	14.5
245	111.1	2223	8	14.8
250	113.4	2268	8	15.1

APPENDIX D: Instructions for the Administration of Rabies Vaccine and Rabies Immune Globulin

Date: _____ (yyyy/mm/dd)

Dear Doctor/Nurse:

Re: _____ , dob ____/____/____
(yyyy/mm/dd)

The following outlines the protocol for rabies post-exposure prophylaxis (RPEP). RPEP consists of a series of rabies vaccine and one dose of rabies immune globulin. Additional information can be found in the package inserts for these products. **Please note that these products must remain refrigerated (between 2°- 8°C) at all times and should only be handled and stored where this can be assured.** If this temperature has not been maintained, please contact the local health unit.

RABIES IMMUNE GLOBULIN (RabIg) - given if not previously immunized against rabies:

Series: A single dose of RabIg is given as soon as possible after exposure **(day 0)** for those who have not been previously immunized against rabies.

Dose: The dose of rabies immune globulin is calculated based on weight in kilograms. The calculated volume should not be exceeded because of possible interference with active antibody production.

The dose of RabIg (in ml) is calculated as: [20 (IU/kg) x Weight (kg)] / 150 IU/ml

We have calculated RabIg dose for this client to be _____ml, using _____kg as the weight. You have been shipped ____ vials of RabIg (each vial contains 2 ml). **The client's weight should be confirmed prior to RabIg administration.**

Site: Infiltrate as much RabIg as possible deep into and around the wound(s) in order to neutralize the virus. Inject the remaining amount intramuscularly (IM) in the ventrogluteal area (in those > 7 months of age) or in the anterolateral thigh. When more than one wound site exists, each should be locally infiltrated with a portion of the RabIg using a separate syringe and needle for each infiltration. If there are extensive wounds, where the calculated dose of RabIg (by weight) is **not** adequate in volume to infiltrate all wounds, dilute the RabIg 2-3 fold in normal saline to create an adequate volume to infiltrate all wounds. When there is no wound site, the RabIg should be given IM in the ventrogluteal site (in those > 7 months of age) or in the anterolateral thigh. The deltoid should **not** be used for rabies immune globulin administration. Both deltoid sites should be reserved for the administration of rabies vaccine. ***Under no circumstances should rabies immune globulin be administered in the same syringe or at the same site as rabies vaccine.***

RABIES VACCINE:

Person not previously immunized for rabies: Give the first dose of rabies vaccine as soon as possible after exposure **(day 0).** Give subsequent doses on **days 3, 7, 14 and 28** after the first dose given on day 0.

Dose: Each dose is 1 ml intramuscularly (IM).

Site: Vaccine should be administered into the anterolateral upper thigh for infants less than 12 months of age and into the deltoid muscle for children ≥ 12 months of age and adults **(never in the gluteal region).**

Person previously immunized for rabies: consult local health unit (see below)

TETANUS:

Tetanus is also an important consideration and the opportunity to update tetanus-diphtheria immunization should not be missed. If you have any further questions, please contact your local health unit at: ( ) _____. Also, the Medical Health

Officer is on call after hours at: ( ) _____.

APPENDIX E: Record of Rabies Vaccine and Rabies Immune Globulin Administration

Please complete the following information **and fax it to your local health unit at: ( )_____.**

Health Unit: Please record in iPHIS. If iPHIS is not accessible, fax to Biologicals Desk at (604) 775-2718.

CLIENT INFORMATION	
Last Name:	First Name:
Sex: □ Male □ Female	Personal Health No.
Date of Birth: _____/_____/_____ (*yyyy/mm/dd)*	
No. and Street Address:	
City/Town:	Postal Code:

RABIES VACCINE		
Dose 1: _____ (yyyy/mm/dd) Dose 2: _____ (yyyy/mm/dd) Dose 3: _____ (yyyy/mm/dd) Dose 4: _____ (yyyy/mm/dd) Dose 5: _____ (yyyy/mm/dd)	Lot #: _____ Site: _____ Lot #: _____ Site: _____ Lot #: _____ Site: _____ Lot #: _____ Site: _____ Lot #: _____ Site: _____	#1 _____ (Provider) #2 _____ (Provider) #3 _____ (Provider) #4 _____ (Provider) #5_____(Provider)

RABIES IMMUNE GLOBULIN
Date administered: _____ (yyyy/mm/dd) Lot #(s): _____ _____ Provider: _____