

Human Rabies Prevention

I. Introduction

Rabies is probably the oldest-recognized and most-feared disease that affects humans. It is obvious from ancient texts and artwork dating back to the 23rd century BC that humans thousands of years ago clearly recognized the transmission cycle and signs of rabies. The disease is transmitted in the saliva of infected animals, most often introduced into the body by a bite wound. Historically, most human rabies cases occurred as a result of the bite of rabid dogs or wild carnivores. In modern times in developed countries, rabies has been well controlled by mandatory vaccination of pet dogs and cats. Since vaccination of pet animals became routine, human rabies cases have fallen dramatically and are now considered rare in the U. S. Cases of human rabies occurring in the U.S. today involve contact with non-pet reservoir animals, as well as cryptic cases which are presumed to have originated by some form of contact with wild reservoir animals. Clearly, a small but significant risk of contracting rabies persists for individuals who come into contact with reservoir animals.

Central Oregon Community College follows federal guidelines in the conduct of research and other activities which might place personnel in direct contact with animals, animal carcasses, blood, tissues, or body fluids that could potentially contain infectious zoonotic pathogens, including rabies virus. The Centers for Disease Control and Prevention (CDC) has issued specific guidelines for managing possible exposures to rabies, which are incorporated in this document. Due to the severity of rabies when it does occur in humans, it is incumbent upon the college to provide policy support and clear guidance to at-risk personnel on methods to reduce the risk of exposure and disease. This document is intended to establish policy and to provide guidance on exposure avoidance and management to research and clinical students, faculty and staff of Central Oregon Community College.

II. Background

Rabies is an acute disease that can occur in most mammals. The most common domestic animals associated with rabies transmission are dogs, cats, and ferrets. Less frequently associated domestic animals are cattle, horses, and other livestock. Wild animals frequently associated with rabies transmission are skunks, raccoons, foxes, coyotes, and various species of bats. However, nearly any mammal can be affected. Nocturnal wild animals seen during the day or acting in an unusual manner should be avoided and reported to animal control authorities.

The disease is caused by a negative-strand RNA virus in the Rhabdoviridae family, genus Lyssavirus. There are seven genetically distinct types of Lyssavirus worldwide (Genotype 1 – Genotype 7). Six of the seven viruses can cause fatal encephalitis disease in humans. However, only rabies virus itself (Genotype 1) is present in North America. It is believed that the current rabies vaccine provides at least some level of protection against other genotypes.

The virus invades the peripheral nervous system and travels via axonal movement from the site of infection to the central nervous system. Once the brain becomes infected, the virus also moves to the salivary glands where it is shed in saliva. Most exposures result from bites or other contact with saliva from rabid animals, and occasionally from exposure to brain or other infectious nervous tissue. Other tissues can also be infectious; several organ transplant recipients have died of rabies. In cases where exposures result in infection, the result is serious, almost universally lethal disease in humans for which preventive and therapeutic interventions are available. The clinical disease can develop weeks, months, or even years after exposure.

In recent years, human rabies in the U. S. has largely been controlled by vaccination of pet animals. Nevertheless, human cases continue to occur in the U. S. at a rate of 1-5 per year. For most of these cases, the infected person is not aware that they have been exposed; most are not associated with bites or known exposures to potentially rabid animals. In such so-called cryptic cases, the virus isolate can be molecularly typed and the species of origin can be determined by comparison of genetic features that correlate with rabies viruses from different species. In the majority of these instances, the causative rabies viruses have turned out to be of bat origin. Thus, direct exposure to bats and activities that place persons in close contact with areas where bats dwell warrant special consideration.

Cryptic cases are particularly troublesome, because the infected person is rarely diagnosed until the terminal stages of the disease, by which time interventions are no longer possible. Additionally, by the time of diagnosis a large number of healthcare workers, family members, and other contact persons have usually been exposed and require post-exposure prophylaxis. For example, in each of five fatal human cases that occurred in the U. S. in the year 2000, between 20 and 71 persons with exposure were treated with post-exposure prophylaxis.

In addition to cryptic cases, there are other types of non-bite exposures to rabies that can occur. Scratches, abrasions, open wounds, or mucous membranes contaminated with saliva or other potentially infectious material (such as brain tissue) from a rabid animal all give rise to non-bite exposures. Occasionally, non-bite exposures are such that post-exposure prophylaxis is given. Inhalation of aerosolized rabies virus is also a potential non-bite route of exposure, but other than laboratory workers, most people are unlikely to encounter an aerosol of rabies virus. A total of four cases of rabies have been known to result from aerosol transmission, although it is likely that at least some of the cryptic cases are also associated with this route of transmission. Two of the four documented aerosol cases were in lab technicians conducting research on rabies, and the others were in individuals who had spent time in caves inhabited with large numbers of bats.

III. General Precautions to Avoid Rabies Exposures

Once the clinical signs of rabies infection manifest themselves, the disease cannot be cured or treated, and is nearly always fatal. Avoiding exposures is critical and can be done by following these guidelines:

- 1) Consider mammals larger than a rodent or lagomorphs that are not laboratory animals, especially wild animals, as potentially infected with rabies. Exposures can occasionally occur as a result from contact with livestock animals.
- 2) All personnel whose work places them at risk for rabies infection (all personnel working with certain animals as described in this document) should receive pre-exposure vaccination with the human diploid cell vaccine (HDCV).

- 3) Immediately report any bites or scratches from animals to a supervisor, attending veterinarian, and the Deschutes County Health Department so that arrangements can be made for diagnostic evaluation of the suspect animal. Bites or other exposures must be evaluated as soon as possible by a physician to ensure proper post exposure treatment is administered promptly.
- 4) Exercise extreme care in the handling of these animals: dogs, cats (especially feral dogs and cats), skunks, raccoons, foxes, coyotes and bats.
- 5) Wear appropriate protective clothing, gloves, and eye protection when working with any of the above animals.

IV. Key Elements of the Prevention Program

Personal Protective Equipment (PPE)

Exposure to rabies can be minimized by the appropriate and effective use of personal protective equipment (PPE). What constitutes appropriate PPE is determined by the procedure being conducted and the type, duration and extent of exposure, but at a minimum the use of fluid-proof barrier gloves and safety glasses should be used at all times when handling animals that have the potential to be infected. PPE must be supplied by the principal investigator / supervisor.

Training

Training is a key element to any hazardous activity. The ability to avoid exposures and to appropriately respond to exposures when they happen requires that personnel understand the risks and have been trained on effective methods for minimizing those risks. Exposures to rabies can be effectively managed with prompt first aid and medical interventions, but at-risk personnel must know how to respond appropriately and when to seek medical attention. For these reasons, all personnel for whom the plan applies will need rabies awareness training to encompass the guidance in this document.

Medical Care and Monitoring

The exposure control plan is primarily intended to prevent accidental infections, but it also contains specific requirements for pre-exposure vaccination and post-exposure medical care and occupational surveillance where warranted.

The use of preventive strategies will not completely eliminate the possibility of exposure to infectious materials or rabid animals. For certain researchers, clinicians, students, or diagnostic laboratory workers who handle suspect animals, samples, or other potentially infectious materials, the plan requires pre-exposure vaccination; for all workers and students, follow-up and documentation of any possible exposure incident is required. Therapeutic interventions are highly effective if administered appropriately and promptly.

V. Pre-Exposure Rabies Vaccination and Serological Testing

Pre-Exposure Vaccination

Pre-existing humoral immunity to rabies virus will prevent the development of disease in persons who have been bitten by a rabid animal or otherwise exposed to rabies virus. In addition, as described above, a majority of recent rabies cases in the U.S. are not associated with a recognized bite or other obvious exposure. Pre-exposure vaccination simplifies post-exposure prophylaxis by eliminating the need for

rabies immune globulin (RIG) and may provide protection in the event that an exposure is not recognized. For these reasons, persons whose activities carry a risk of exposure to rabies are required to receive pre-exposure vaccination or sign a declination waiver. In addition, COCC personnel who travel on COCC business and are likely to encounter animals in areas of the world where most dogs have not been vaccinated against rabies and where immediate access to appropriate medical care is not readily available are also required to receive pre-exposure vaccination, or sign a declination waiver.

Pre-exposure vaccination against rabies consists of a series of three injections, given on days 0, 7, 21 or 28. Depending on the formulation of the vaccine, it is administered either by the intramuscular (IM) or intradermal (ID) route.

The following persons / activities / occupations are required to receive the rabies vaccine or sign a declination waiver:

Veterinarians, veterinary technicians, veterinary students and veterinary technician students in the COCC Veterinary Technician Program who come into contact with reservoir animals (including dogs and cats);

Workers in the Veterinary Diagnostic Laboratory who may come into contact with diagnostic specimens submitted for rabies evaluation;

Persons who conduct research requiring them to enter caves;

Persons who conduct research involving the capture or handling of bats;

Persons who capture or handle other wild reservoir animals;

Persons who conduct research on rabies virus;

VI. Medical Management of Rabies Exposures

All exposures or possible exposures to rabies must be evaluated by a qualified medical professional. Students and Staff should present to St. Charles Medical Center or Bend Memorial Urgent Care.

1) Bite Wound Treatment

Exposures resulting from animal bites or other parenteral contact should be immediately cleansed with soap and warm water, if available. The wound should initially be encouraged to bleed, taking care not to massage the wound directly, followed by the application of pressure to control bleeding as necessary. Once bleeding has stopped or slowed sufficiently, povidone-iodine or other virucidal antiseptic should be used liberally to irrigate the wound area.

Bite victims should be treated promptly by medical professionals. Initial anti-rabies post-exposure prophylaxis needs to be administered within 24 hours of exposure. Under most circumstances, bite wounds are not sutured unless very severe due to the high risk of bacterial infection.

2) Post-Exposure Prophylaxis

The type and extent of post-exposure rabies prophylaxis depends upon the pre-exposure status of the exposed individual:

Persons Previously Vaccinated against Rabies:

One dose of rabies vaccine is administered (IM) on the day of the exposure (day 0), and a second dose is administered on day 3 post-exposure. No rabies immune globulin (RIG) is administered.

Persons Not Previously Vaccinated against Rabies:

A total of 4 doses of rabies vaccine is administered (IM) on days 0, 3, 7, and 14.

On day 0 (at the latest day 7 after vaccine dose is administered) a 20 IU/kg body weight dose of rabies immune globulin (RIG) is administered into and around the wound site.

Deviations and delays in the recommended post-exposure vaccination and RIG schedule should not occur; the regimen described above has been clinically proven to be effective, whereas deviations may not be.

Oregon State Law requires that all animal bites be reported to the local health department within one (1) working day after the bite. In Deschutes County, animal bites need to be reported to the Deschutes County Health Department. An animal bite reporting form is available on the DCHD, Environmental Health Division web site.

Rabies Preventative Vaccination

Bend Memorial Clinic Occupational Medicine
Attn: Melissa DeBaker Ramsey
1501 NE Medical Center Dr
Bend, OR 97701
541-318-3047

Emergency Rabies Treatment

St. Charles Medical Center
2500 NE Neff Rd
Bend, OR 97701
541-382-4321

Animal Bite/Rabies Reporting

Deschutes County Health Department
2577 NE Courtney Dr
Bend, OR 97701
541-322-7400