# Rabies



## What is rabies and what causes it?

Rabies is an infectious disease that spreads from animals to humans. The rabies virus causes the disease by infecting nerves in animals and people. The rabies virus travels to the brain (through nerves inside the brain), the virus reproduces, and then it travels back through the nerves to most parts of the body. Eventually, the virus reaches the salivary glands where it is released into the saliva in the mouth. By this time, the disease has usually damaged the brain, sometimes producing violent behaviour. It eventually causes death.

### How long does it take for rabies to develop?

In people, the incubation period (the time between initial contact with the virus and onset of the disease) generally ranges from two to eight weeks. In rare cases, it can vary from 10 days to 2 years. The incubation period is shorter in children and in people exposed to a large dose of the rabies virus. The dose of virus depends on the size, severity and location of an animal bite or scratch. In animals, the incubation period depends on the species of animal. For dogs it normally ranges between 14 and 60 days, but it can be much longer.

### What is the source of rabies?

The major risk of rabies comes from contact with the saliva, body fluids, or tissue of infected animals. Animals that can be infected with rabies include all mammals, but in particular:

- wild animals—mostly foxes, skunks, bats, and raccoons
- livestock—mostly cattle but occasionally horses, sheep, goats, and pigs
- pets—mostly cats and dogs, and occasionally ferrets

In Canada, rabies is also found in wolves, coyotes and other meat-eating animals. It is rarely found in rodents such as mice, squirrels, chipmunks, groundhogs, rabbits, rats, hamsters, or gerbils, so their bites do not usually pose a risk for rabies.

### How common is rabies in Canada?

Since reporting began in 1924, 25 people have died in Canada from rabies. The

most recent death occurred in British Columbia in 2019. Because of prevention and control programs, there was a decline in cases of animal rabies from around 2000. Between 2009 and 2012 there were no reported cases of rabies in Canada. Since then, a rise in the number of cases has been reported across Canada. The case in British Columbia occurred due to a bat bite. The greater Toronto and Hamilton area in southern Ontario has seen the largest outbreaks in a form of rabies commonly spread by raccoons. Rabies carried by raccoons is also a concern in Quebec and New Brunswick. Rabies carried by Arctic red foxes and dogs is a concern in northern Canada.

## How do rabies infections occur?

To cause an infection, the rabies virus must enter the body and reach nerve cells. The virus can enter the body through broken skin. Droplets containing the virus can pass through mucous membranes in the eyes, nose, mouth, or intestine. Usually, transmission occurs when rabid animals, with the virus in their saliva, bite people. Farmers or veterinarians can become infected when they work with their hands in the mouths of rabid cows which often appear to be choking on food. Laboratory workers have also contracted rabies from cuts or sticks from contaminated needles, scalpels or other contaminated laboratory equipment.

In unusual situations, workers have contracted rabies by breathing air that carried high concentrations of the virus. This phenomenon has occurred in bat caves. It has also happened in the laboratory where improper procedures produced a mist or aerosol containing the virus. Contact with the blood, urine or manure of a rabid animal is not a risk factor for contracting rabies.

The virus can become inactive, but the rate at this occurs depends on moisture, sunlight and temperature. The rabies virus is not infectious if it has dried out or exposed to sunlight.

## What occupations have increased risk of rabies?

Rabies is an occupational risk for people who work with wild animals, livestock, or pets.

- exposure to wild animals—hunters, trappers, forestry personnel, wildlife biologists, forest rangers, conservation officers, taxidermists, veterinarians and their assistants, zoo personnel, and scientists working in caves
- exposure to livestock—farmers, farm workers, ranchers, veterinarians and their assistants, artificial insemination technicians, laboratory animal researchers and technicians, slaughterhouse workers, and meat packers and processors.
- exposure to pets—veterinarians and their assistants, pet groomers, letter carriers, meter readers, delivery personnel, laboratory animal researchers and technicians, animal control officers, and hunters.

## How do you recognize rabies?

Workers who may have been exposed to rabies must never wait until they develop signs of the disease. Once the signs appear, the disease is almost inevitably fatal within weeks of symptoms appearing, if not treated.

It is important to recognize the signs of rabies in animals and take precautions

immediately following bites, scratches, or other potentially infectious contact.

In people, rabies progresses through several stages. Initially, a person who is bitten may notice unusual feelings or tingling around the wound. Soon afterwards, there is a period of tiredness, possibly with lack of appetite, headache, fever, cough, sore throat, abdominal pain, nausea, vomiting, and diarrhea. A period of extreme worry, irritability, inability to sleep, and depression follows, possibly with hallucinations. “Furious rabies” may follow, for which the signs are strange behaviour including biting other people. At this stage, victims have an uncontrollable fear of water. This fear is why rabies has sometimes been called “Hydrophobia.” Sometimes “paralytic rabies” develops instead of furious rabies. With this form of the disease, the muscles gradually become paralyzed, starting at the site of the bite or scratch. A coma slowly develops, and eventually death occurs.

In animals, rabies appears in two different forms. It may appear as furious rabies in which the animal changes behaviour, becomes restless, wanders aimlessly, and bites any animal, person, or object in its way. Eventually the animal becomes paralyzed in the throat and hind legs, and dies. Or it may appear as “dumb rabies” in which an animal changes behaviour, becomes withdrawn or more affectionate, tries to hide, has difficulty swallowing, and dies after a few days without ever becoming violent.

All animals do not behave in the same manner when they have rabies.

- Foxes and skunks may lose their shyness and fear of people, pets, or livestock.
- Cattle usually become restless and aggressive, bellow loudly, drool, may show gradual weakness in the hind legs, and appear to be choking.
- Cats can often become extremely vicious.
- Dogs usually become excitable, and may be vicious, wander aimlessly, and bite for no reason.

Any animal exhibiting unusual behaviour should be considered a potential rabies hazard for humans.

## What laboratory tests are available for rabies?

Laboratory tests are available to detect the rabies virus as well as specific antibodies. The body produces antibodies to protect itself against the disease. Tests for rabies antibodies are occasionally ordered to determine if people have been successfully immunized against the disease.

Doctors usually do not test people to see if they have been infected with the rabies virus. Reliable test results are usually not obtained until the disease has progressed to an advanced stage. Instead, doctors generally rely on tests of suspect animals to determine if a person has been exposed to the virus.

Federal government laboratories can perform several different tests on animals. The most important test involves examining the brain for the presence of the virus or for specific changes caused by the rabies virus. Because of this test, it is important to avoid damaging the brain when killing an animal suspected of having rabies.

## What is the treatment for rabies?

There is no successful treatment for rabies once the disease has progressed to the point where signs appear. Medical treatment can sometimes extend life but the disease almost always eventually ends in death. It is very important to stop the disease from developing in people who may have been exposed to the rabies virus.

## How can workers be protected from rabies?

All workers at potential risk of contracting rabies should be informed about the disease, its characteristics, and the nature of the risk.

Agricultural, public health, veterinarian, and occupational health officials share the responsibility to control rabies in animals and to protect people.

Vaccination programs, established to immunize dogs and cats, have been effective in reducing rabies in pets. However, rabies will continue to be a threat until the virus can be eliminated from the wild animals that spread the virus to pets and people.

Some workers such as veterinarians or animal control officers have continuing risk of encountering a rabid animal. These workers should be immunized to ensure that they have protection before having contact with any animal. For other workers much less likely to encounter rabid animals, it might be sufficient to provide education on the risks, and training on protection if they encounter an animal with rabies.

Specific recommendations depend on the individual situation. The following general recommendations apply to all workers who risk contacting rabid animals.

Preventive measures include:

- proper precautions for dealing with rabid animals and the possibility of contacting the rabies virus
- immunization of workers either before or immediately after exposure to the virus
- workplace hygiene

## What precautions are required to control rabies?

Workers who have contact with animals must know how to deal with rabid animals and how to protect themselves from the rabies virus.

With the development of an oral vaccine for animals, vaccinating of local wildlife has become a common way to manage outbreaks.

**DEALING WITH RABID ANIMALS**

Do not approach or kill an animal suspected of having rabies except to defend yourself, other people, or other animals. If an animal must be killed, try to avoid damaging its head. An undamaged brain is important for a quick laboratory diagnosis. If an animal suspected of having rabies is responsive or manageable, keep it alive and away from other animals or people. Do not touch it with bare hands. If an animal is unmanageable and dangerous and cannot be restrained or

killed, observe its movements and seek help from qualified experts as soon as possible. If you must handle the animal or carcass, wear protective gloves to prevent infectious material from having contact with cuts or rashes on the skin. Also wear protective masks and goggles to protect against infectious aerosols. When there is a need for personal protective equipment (PPE), then there should be a PPE program in place where you work.

Responsibility for the management of rabies is shared by the public, the veterinary profession and all levels of government. Canadian federal regulations requires all pets, livestock or wild animals that may be rabid, or had contact with a potentially rabid animal, to be reported to a veterinarian, veterinary clinic, local medical health officer or public health authority immediately. These professionals or agencies will in turn report the incident to the Canadian Food Inspection Agency (CFIA).

**PROTECTION FOR WORKERS WHO HAVE HAD CONTACT WITH THE RABIES VIRUS**

Workers who have come into contact with saliva, body fluids, or tissue of animals suspected of having rabies must take the following steps without delay.

Immediately clean and flush their skin (even if there is no obvious bite or scratch) with water for several minutes. Cleaning will help wash out the virus. If available, use soap or detergent to help kill the virus. Washing the area or wound is probably the most effective procedure in the prevention of rabies. While cleaning is being done, shield the eyes, nose, and mouth from spray. After cleaning, follow by 70% ethanol or an iodine containing solution when available.

Remove any clothing that may be contaminated, place it in a plastic bag properly labelled and wash it promptly and separately from other clothing. Get medical advice as soon as possible.

Contact the police, your local health unit and district veterinarian or local office of the Canadian Food Inspection Agency. If possible, provide the following information:

- the name and address of all persons attacked or exposed to the animal’s saliva, body fluids or tissues
- the time and place of the incident
- any other information to help find and identify the offending animal

**LABORATORY PRECAUTIONS FOR RABIES**

Biosafety containment level 3 is recommended when working with the rabies virus (includes full coverage protective clothing, front gowns with tight fitting wrists, gloves, respiratory protection, and eye protection (if risk of splashes)).  Additional precautions may be necessary.

## What kind of immunization is available for workers?

**IMMUNIZING BEFORE CONTACT**

In Canada, pre-exposure immunization with a rabies vaccination should be offered as a choice to workers at possible high risk of contacting rabid animals. These workers include veterinarians, animal handlers, and certain laboratory workers dealing with rabies.

Workers with continuing high risk should have their blood tested every two years to determine if booster injections are required. Laboratory workers who could have accidental contact with the rabies virus without knowing it should be tested every six months.

**IMMUNIZING AFTER CONTACT**

People who have had contact with the rabies virus require both the rabies immune globulin (RabIg) and the rabies vaccine (HDCV or PCECV) as soon as possible.

Immunization may be considered after contact in the following situations:

- The animal appeared to have rabies.
- The animal may possibly have had rabies.
- The animal was wild, from a region where rabies is known to be a problem.
- The animal was a dog or cat that escaped after the contact without being tested.

Immunization is usually recommended if the animal makes contact by biting, or if the animal’s saliva, body fluid or tissue makes contact with a rash, scratch, open wound, eyes, nose, or mouth.

Wild animals or unwanted dogs or cats suspected of having rabies are humanely killed without delay. Their heads are submitted for laboratory examination. Vaccination may be discontinued if tests of animals killed at the time of attack are negative.

Medical professionals generally do not recommend immunization if the animal had no contact with a person’s skin or mucous membranes. Nor is immunization recommended if workers have had only casual contact with the animal such as petting, with no possible contamination of broken skin or mucous membranes.

Healthy dogs or cats involved in biting incidents are held in confinement for at least 10-14 days, according to provincial regulations. If rabies does not develop in that time, no immunization is required for the injured worker. If signs of rabies do develop, the Canadian Food Inspection Agency should be notified, the animal humanely killed and analyzed; and the person’s immunization started without delay.

## What is recommended for workplace hygiene?

Develop procedures to prevent contact with the rabies virus within the workplace. Where appropriate, have workplace procedures posted for disinfecting or sterilizing areas that may be contaminated with the rabies virus.

Quarantine all wild animals before introducing them into an animal research program. Avoid using animals obtained from a pound in research studies.

Use caution if handling animals killed by the roadside since they may have had rabies.

Wear protective face masks, gloves, clothes, and shoes when handling anything from an animal suspected to have rabies or when cleaning areas where suspected rabid animals are confined.

The rabies virus does not survive long outside of animals. It is generally destroyed by heat, sunlight, or air. If needed, decontaminate all materials for disposal by steam sterilization, chemical disinfection, and/or incinerations.

Routinely disinfect working surfaces, tools and instruments, floors and walls that may have been contaminated with fluids from animals, using procedures established for infection control.

Use ultraviolet light for disinfecting areas such as laboratories where the rabies virus may become airborne. These lamps must only be used during nights or weekends when no workers are in the workplace.

Package infected waste in puncture-proof, leakproof containers. Clearly label and sterilize them before disposal according to procedures developed for biological hazards.

© *Copyright 1997-2021 CCOHS*