

# Rabies: Questions and Answers

## INFORMATION ABOUT THE DISEASE AND VACCINES

### What causes rabies?

Rabies is caused by a virus. The rabies virus invades the central nervous system and disrupts its working.

### How does rabies spread?

The rabies virus is transmitted in the saliva of infected animals. People usually become infected with the rabies virus after being bitten by an infected animal. But any contact with the saliva of an infected animal (alive or dead) can lead to infection if the person has an opening in the skin or if saliva gets into their eyes, nose, or mouth.

You cannot get rabies from the blood, urine, or feces of a rabid animal, or from just touching or petting an animal.

### How long does it take to show signs of rabies after being exposed?

The incubation period of rabies varies more than with other infections. The incubation period in humans is usually several weeks to months, but ranges from days to years.

### What are the symptoms of rabies?

The rabies virus attacks the nervous system (the brain and spinal cord). The first symptoms of rabies are similar to a flu-like illness—fever, headache, and general discomfort. Within days, the disease can progress to symptoms such as anxiety, confusion, agitation, abnormal behavior, delirium, and hallucinations.

Once symptoms appear, rabies is almost always fatal. Therefore, any person who has been bitten, scratched, or exposed to the saliva of a potentially rabid animal should see a physician as soon as possible for post-exposure treatment.

### How serious is rabies?

Rabies is an extremely painful and deadly disease. As mentioned above, if prompt and appropriate treatment is not received, the disease is almost

always fatal. Rabies occurs in more than 150 countries. Each year rabies kills more than 59,000 people around the world, mostly in Asia and Africa.

Deaths from rabies are rare in the United States because of the availability of rabies vaccine and human rabies immune globulin (HRIG).

## ANIMALS THAT HARBOR RABIES

### What should I do if a neighborhood animal bites me or my child?

Rabies is not common in dogs, cats, ferrets, and livestock in the United States because of widespread vaccination of dogs and cats against rabies. But you should get medical attention for any animal bite. If the pet appeared healthy at the time of the bite, the animal can be confined for 10 days and observed; no anti-rabies treatment need be given to you or your child. If the pet appeared ill at the time of the bite, it should be evaluated by a veterinarian for signs of rabies. Your physician will be able to give you more specific advice for your situation.

### If rabies isn't common in U.S. dogs and cats anymore, is there anything to worry about?

Unfortunately, the animals that harbor rabies virus have changed from domestic animals to wild ones. Before 1960, most rabies cases in the United States involved domestic animals. Now more than 90% of all animal cases of rabies reported to health authorities occur in wildlife.

### What animals usually get infected with rabies?

Wild animals accounted for 92% of reported cases of rabies in 2015. Bats were the most frequently reported rabid wildlife species (31% of all animal cases during 2015), followed by raccoons (29%), skunks (25%), foxes (6%), cats (4%), cattle (2%) and dogs (1%).

While rabies is rarely found in rabbits, squirrels, and rodents, any mammal can be infected with rabies.

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**On a camping trip we woke up to find a bat in our tent. Should we have been concerned?**

Yes. Because bats have small teeth and claws, it is possible to be bitten by a bat and not know it. Therefore, if you find you've been sleeping in the same room with a bat you should see a physician as soon as possible. This also applies if a bat is found in a room with a child or a mentally impaired or intoxicated person who could have trouble describing an animal bite.

The bat should be tested for rabies if possible. Call animal control or a wildlife conservation officer for help in capturing the bat if there is any possibility of exposure.

**What should I do if I find a bat in my house?**

If you're confident no family members or pets have had contact with the bat, confine the bat to a room and leave one window open for the bat to exit. If the bat doesn't leave, call animal control for assistance or for advice in safely capturing the bat. Bats that are the easiest to approach and capture (for example, those unable to fly) are the most likely to have rabies, so it is best to never handle any bat.

**I've been bitten by a raccoon—what should I do?**

If you've been bitten or scratched by any animal, you should:

- Clean the area immediately with soap and water for at least 5 minutes.
- See a health professional as soon as possible, ideally within 24–48 hours
- Contact your state or local health department

**DIAGNOSIS OF RABIES****How is rabies diagnosed?**

Rabies can be very difficult to diagnose. Laboratory tests can find rabies virus in the saliva, skin, or brain tissue of a patient, but this is not possible until late in the disease when it is too late for treatment. Therefore, the physician or other health professional will probably make a diagnosis based on the details of contact with a potentially infected animal and the likelihood of rabies infection in that species in that geographic area.

Diagnosis is easier if the animal involved is available for testing. If the biting animal was killed, try to preserve its head so it can be tested for the presence of rabies virus in a laboratory.

**What treatment is given after exposure?**

In the United States, post-exposure treatment consists of one dose of human rabies immune globulin (HRIG, a blood product containing human antibodies that neutralize rabies virus) and a series of rabies vaccine doses. More detailed information about the vaccine can be found on page 3.

The good news is that if post-exposure treatment is given correctly and in time, it is 100% effective in preventing rabies disease.

**Can you get rabies from another person?**

In recent times in the United States, human-to-human transmission has only been reported in a small number of cases after transplants (such as corneas, liver, kidneys) from an infected person. Stricter guidelines for accepting donor organs are now used, to avoid this from happening again. In theory, infected humans could transmit rabies through a bite or other exposure, but no laboratory-confirmed cases of rabies occurring in this way have been reported.

**HOW COMMON IS RABIES****How common is rabies in the United States?**

In 2015, the 50 states and Puerto Rico reported 5,508 cases of rabies in animals and three human cases to CDC.

In the last 100 years, the number of human deaths from rabies in the United States has fallen from 100 or more per year to an average of two or three per year. This decline is due to both the improved control among domestic animals and effective post-exposure treatment and vaccines for humans. Although human deaths from rabies are now extremely rare in the United States, an estimated 40,000 to 50,000 Americans come in contact with potentially rabid animals and receive post-exposure prophylaxis each year.

**How common is rabies in the world?**

The rabies virus can be found in almost all countries. A few islands and island nations (such as Japan,

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New Zealand, Hawaii, Barbados, Fiji, Maldives, and Seychelles) are rabies-free. Parts of northern and southern continental Europe (such as Greece, Portugal, Sweden, Norway) and Latin America (such as Uruguay, Chile) are free of rabies.

In the United States, Western Europe, Canada, and much of Latin America, rabies has been nearly eliminated from domestic dogs, but still occurs in the wildlife population.

Rabies is a big problem in Asia, Africa, and Central and South America. Each year rabies kills more than 59,000 people and millions of animals worldwide. About 95% of human deaths from rabies occur in Asia and Africa. Exposure to rabid dogs causes over 90% of human rabies cases and over 99% of human deaths from rabies worldwide.

### **How can I help prevent rabies in my pet and myself?**

Vaccinate your animals against rabies as directed by your veterinarian and in accordance with local rabies vaccination requirements in your area. Contact your veterinarian or health department for details.

Contact animal control to remove stray animals or animals acting sick or strange in your neighborhood.

Never touch or approach unfamiliar animals, domestic or wild. Don't touch dead animals. Teach your children the same.

Seal openings into your home (basement, porch, attic, and chimney openings) to prevent wild animals, especially bats, from gaining entrance.

If you do get bitten by an animal, wash the wound with soap and water for at least 5 minutes and then seek medical care.

## **RABIES VACCINE**

### **What kind of vaccine is the rabies vaccine?**

Although the two brands of rabies vaccine available in the U.S. for humans are prepared in slightly different ways, both of them are made from inactivated, or killed, virus. They are equally safe and effective. Rabies vaccine is given in the deltoid muscle (upper arm) as a series of 3 to 5 shots.

### **Who should get rabies vaccine before possible exposure to rabies virus?**

Rabies vaccine is recommended before possible exposure to rabies (pre-exposure prophylaxis, PrEP) for certain groups of people who have a high risk of exposure due to their work or recreational activities. CDC's recommendations for vaccination, booster doses, and periodic blood tests to confirm the presence of protective antibodies vary based on the degree of risk, the duration of risk, and the possibility of unrecognized exposures. For details, please visit CDC's website at [www.cdc.gov/rabies/prevention/pre-exposure\\_vaccinations.html](http://www.cdc.gov/rabies/prevention/pre-exposure_vaccinations.html).

### **Can rabies vaccine protect you if you've already been exposed to rabies?**

Yes. Because rabies usually has a long incubation period, the body has time to respond to vaccination and develop protective antibodies before the disease develops.

## **TREATMENT AFTER EXPOSURE**

### **What does the post-exposure treatment to prevent rabies include?**

An exposed person who has never received any rabies vaccine will first receive a dose of human rabies immune globulin (HRIG), a blood product that contains antibodies to the rabies virus. This shot is typically given in or near the wound area. At the same time, the person is given the first dose of rabies vaccine, with additional doses given on days 3, 7, and 14 after the first dose.

Rabies vaccine is typically given in the deltoid muscle of the upper arm, but may also be given in the thigh muscle.

### **Should I be concerned about rabies if I'm traveling outside the United States?**

It depends. Rabies is a significant problem in some regions of the world, and timely post-exposure treatment might be difficult for travelers spending extended periods of time in remote areas.

If you are traveling to a country where rabies is common, talk to your health care provider about the

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possibility of being protected against rabies before your trip. Vaccination may be recommended depending on your planned activities and length of stay. Avoid contact with animals, especially stray or wild animals, when traveling abroad.

### **Can someone who is pregnant receive rabies vaccine if exposed to rabies?**

Yes. No birth defects or pregnancy complications have been reported with the rabies vaccine. Someone who is pregnant may receive routine pre-exposure vaccination against rabies if the risk of exposure is high.

### **Who recommends rabies vaccine?**

The Advisory Committee on Immunization Practices (ACIP) that advises the Centers for Disease Control and Prevention (CDC) sets the recommendations for rabies vaccine and other vaccines.

### **What side effects have been reported with rabies vaccine?**

Side effects of rabies vaccination are typical of many vaccines. Soreness, redness, swelling, or itching at the site of the injection, and headache, nausea, abdominal pain, muscle aches, or dizziness can happen after rabies vaccine. Hives, pain in the joints, or fever sometimes happen after booster doses.

## **VACCINATION BEFORE EXPOSURE**

### **Rabies vaccine is recommended for me because I'm an animal control officer. How does being treated after an exposure differ from getting vaccinated before an exposure?**

Treatment after an exposure in a previously unvaccinated person requires receiving a dose of human rabies immune globulin (HRIG) and four (or five if the person's immune system is suppressed) doses of vaccine.

Vaccination before an exposure, known as pre-exposure prophylaxis, or PrEP, requires two doses of vaccine for up to 3 years of protection for most people. CDC also describes options for

protection beyond 3 years at its website: [www.cdc.gov/rabies/prevention/pre-exposure\\_vaccinations.html](http://www.cdc.gov/rabies/prevention/pre-exposure_vaccinations.html). People who are up to date on PrEP and have an exposure to rabies do not require HRIG and require fewer post-exposure doses of rabies vaccine.

Check with your health department for details.

### **Is a vaccinated person totally protected if bitten by a rabid animal?**

No. If bitten, a vaccinated person who is up to date on PrEP should receive medical attention and two doses of post-exposure rabies vaccine; one dose right away and a second dose 3 days later.

### **What's the advantage of being vaccinated against rabies if you still have to receive additional doses of vaccine if you're exposed?**

Being vaccinated simplifies treatment by eliminating the need for human rabies immune globulin (HRIG) and decreasing the number of doses of vaccine needed after an exposure.

### **Who should NOT receive rabies vaccine?**

Rabies infection in a person who is not vaccinated is almost always deadly. For this reason, vaccination after rabies exposure is recommended even for people with a history of allergic reactions to components of the vaccine or previous rabies vaccination. As with any possible rabies exposure, always consult the state or local health department; CDC experts are available to help.

### **Can the vaccine cause rabies?**

No. Rabies vaccines for humans do not contain live rabies virus.

For more information, see the resources at [www.cdc.gov/rabies](http://www.cdc.gov/rabies).