

# Rabies

## Information for Dog Owners



### Key Facts

#### Disease in dogs:

- During initial days of illness, signs can be nonspecific, such as fever, anxiety and consumption of foreign items (e.g. blankets)
- Progresses to more severe signs, such as:
  - Behavioral change (e.g. aggression, excitability)
  - Incoordination, loss of balance, disorientation, weakness
  - Hypersalivation
  - Seizures
- Death results within 10 days of first signs of illness

#### **Rabies in dogs is not treatable.**

#### Vaccination is key to prevention:

- Rabies vaccines are protective if given before exposure to the rabies virus.
- Proof of dog vaccination is mandated by many jurisdictions and required for international travel.
- Dogs not current on vaccination that are likely exposed to the rabies virus may be required to be euthanized or undergo a long and expensive quarantine.

### What is it?

Rabies is caused by infection with the rabies virus. The virus lives in various species of mammals and is most commonly spread through bites from one animal to another or to a human (i.e. in an infected animal's saliva).

Disease in dogs may begin with vague signs of illness, but rapidly progresses to severe neurologic signs (e.g. aggression, incoordination). Typically, death occurs within 10 days of the first signs of illness.

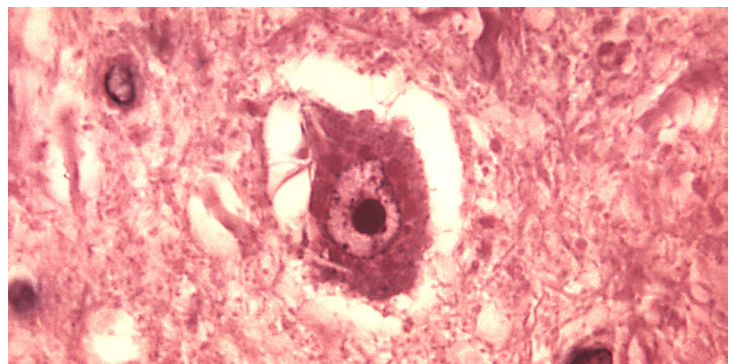
### Where is it?

The rabies virus is present in nearly all parts of the world.

### Who gets it?

All mammals can be infected with rabies. In the Northern hemisphere, rabies is most common in wildlife, while in the Southern hemisphere rabies is most common in feral dogs due to limited vaccination.

In North America, the most common wildlife rabies species (termed reservoirs) vary regionally and include raccoons, skunks, foxes, coyotes, and bats. Each year in the United States over 4,000 rabid animals are reported, including several hundred rabid dogs and cats, other domestic species (e.g., horses, cattle, sheep, goats) and thousands of wildlife animals.



Microscopic examination of brain tissue revealing Negri bodies (round inclusion bodies containing rabies virus) associated with rabies infection (Public Domain: Centers for Disease Control and Prevention)

## Can people get sick with it?

Yes. People are infected in the same way as dogs - bitten by a rabies-infected animal or otherwise exposed to the rabies virus (see *How is it spread?*). Once signs of rabies appear, the disease is nearly always fatal. On average, each year in the United States one or more people are diagnosed with rabies.

## How is it spread?

### (Transmission & Infection risk)

Disease nearly always occurs following the bite of an infected animal. Very rarely, rabies is transmitted when the virus comes into contact with mucosal surfaces (e.g. eyes, nose, throat) or transplacentally. The virus cannot be transmitted through intact skin or through contact with blood.

After the virus enters an animal or person, it travels along the nerves to the spinal cord and brain. The virus then enters the salivary gland and saliva, where the individual can transmit the virus through its saliva to another animal or person. The time between exposure to the virus (e.g. bite) and when signs of disease begin is generally 3 to 12 weeks. However, this can range from several days to months, rarely exceeding 6 months. Given the delay between exposure and signs of disease, bite wounds from the rabid animal (when rabies was transmitted) may no longer be evident when signs first appear.

Infection risk in dogs is highest for young dogs. Dogs appropriately vaccinated against rabies almost never acquire the disease (e.g. in one study less than 1% (2 of 264) of US rabid dogs were currently vaccinated against rabies).

Dogs with rabies shed the virus for a few days prior to the beginning of signs and throughout the illness. People and other animals having contact with the dog during this period must be urgently evaluated by animal and human health authorities to determine the need for rabies preventive measures.

## What should I look for? (Signs of disease)

Dogs with rabies can show a wide range of signs. It is important that rabies be considered in any dog with sudden altered behavior (e.g. dull,



aggression) or paralysis. Owners who suspect their dog may have rabies or observe any illness in a dog that has potentially been exposed to rabies should immediately speak to their veterinarian.

Dogs with rabies often go through a 1-2-week period of progressive signs, ending in death. Initially, signs may be vague, such as anxiety, fever and behavior change. Animals may lick or chew at the site of virus introduction (e.g. prior animal bite wound). Signs may progress to obviously abnormal behavior, including restlessness, aggression, excitability or hiding. Dogs may eat foreign objects, attack their surroundings, hypersalivate or develop severe weakness or paralysis. Finally, dogs may develop incoordination, loss of balance, or seizures; death occurs in all cases.

## How is it diagnosed?

A history of a dog never receiving or not being current on rabies vaccination, along with consistent signs of disease, will dramatically increase a veterinarian's suspicion for rabies. The veterinarian (and all clinic staff members in contact with the dog) will wear gloves and take precautions to protect against rabies exposure and infection risk.

Unfortunately, the only way to definitively diagnose rabies in animals is through testing performed on brain tissue (after the dog has been euthanized or has died). This testing must be performed shortly after death. It is important that owners immediately speak to their veterinarian if they suspect their dog

could have rabies in order to allow for testing and preventive measures to protect human and animal health.

### What is the treatment? Will my dog recover?

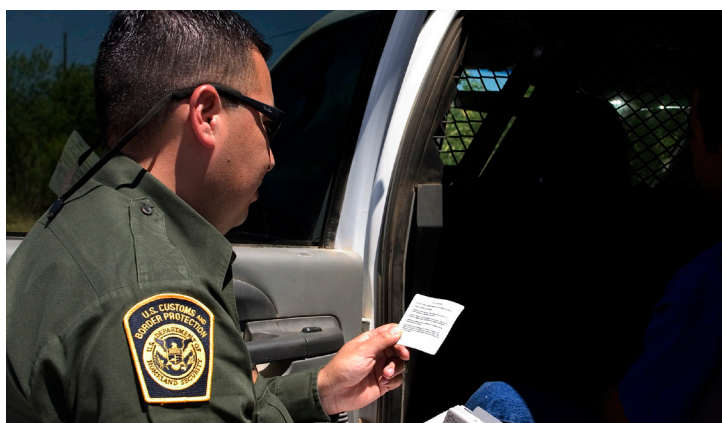
Rabies in animals is not treatable. Dogs do not recover and generally succumb to disease within 10 days after the beginning of disease signs.

Once your veterinarian strongly suspects rabies due to consistent history and disease signs, euthanasia is warranted followed by immediate rabies testing.

### How can I stop this from happening to my dog and other dogs?

Given the outcome of disease in dogs and due to human health concerns, dog owners should take a few simple, but extremely important measures to prevent rabies exposure and rabies in dogs. These measures include vaccination, bite prevention and proper public/animal health notification.

Vaccination. **It is STRONGLY recommended that all dogs be vaccinated against rabies and is legally REQUIRED in most jurisdictions in the US.** Rabies in vaccinated dogs is extremely rare and following a known exposure to rabies, quarantine (special temporary housing limiting contact of an animal with other animals) for vaccinated dogs is shorter, easier and less expensive than for unvaccinated dogs. Following a known exposure to rabies, euthanasia may be required in some jurisdictions for dogs that are not current on rabies vaccination.



Proof of rabies vaccination is required when traveling internationally (Public Domain: Centers for Disease Control and Prevention).

In many jurisdictions, rabies vaccination is required by law, starting at 12 weeks of age, with boosters at 1 year of age and every 1 or 3 years after that. Countries that are currently deemed rabies-free (e.g. Australia, United Kingdom) may require all entering dogs to be quarantined and/or owner provide proof of rabies vaccination. Individuals traveling or moving with a dog (even within the same country) must comply with the regulations of their destination, which may include proof of rabies vaccination (see *Resources* for links to current interstate and international travel requirements and state/federal legal requirements).

Due to vaccine antibody development, animals are considered vaccinated 28 days after first vaccination and immediately after subsequent vaccinations.

Dog importation. Owners of dogs imported from and vaccinated in developing countries should be sure to verify proof of vaccination with their veterinarian – falsified documentation and poor vaccine products can be a significant concern in some countries and may require an immediate vaccine booster.

Bite prevention. As rabies can only be spread from an animal infected with rabies, owners should limit contact between their dog and wild animals, especially species known to often be infected with the virus (see *Who gets it?*).

Public/Animal health notification. If your dog has had contact with a known or suspected rabid animal, local requirements often include the dog be immediately vaccinated against rabies and quarantined (specifics vary by jurisdiction and vaccination status of the dog – speak to your veterinarian, state veterinarian or local public health entity). In some areas, rabies testing of an animal (especially wildlife) that has had contact with your dog can be useful to determine if the animal had rabies – this will determine the need for quarantine/vaccination of your dog. Owners should immediately contact their veterinarian or public health entity following such occurrences (e.g. do not bury or release wildlife without first checking with authorities and/or local animal control).

## Outbreak management:

Outside of countries where rabies is common in dogs (e.g. Southern hemisphere), it is rare for several dogs to be simultaneously diagnosed with rabies in a single location. More commonly, mass rabies exposures occur where an animal is diagnosed with rabies that has had close contact with many domestic animals and/or people (e.g. dog diagnosed with rabies at an animal shelter or group event). Such occurrences require immediate evaluation by animal/human health entities often resulting in expensive disease preventive measures, animal quarantine and sometimes euthanasia if exposed dogs are not current on rabies vaccination.

Prevention of these mass exposures is often possible by requiring rabies vaccination of all animals involved in the event (e.g. school program, dog boarding) and general infection control practices (e.g. limiting contact between animals).

## Zoonotic (Human Infection) Alert:

In Africa and Asia, rabies kills over 50,000 people per year (mainly from rabies-infected dogs), whereas in developed countries this number is several per year, with the main source of infection being wildlife.

People bitten by animals should immediately thoroughly wash the wound with soap and water and urgently seek medical advice regarding the need for rabies prevention (i.e. vaccine, rabies immunoglobulin). Receipt of appropriate, timely rabies prevention is completely protective against rabies in people. Given the high cost and to ensure judicious use of vaccine and rabies immunoglobulin, these items should only be used when indicated by a risk assessment (provided by human or animal health authorities), including animal rabies testing/quarantine as indicated. Therefore, it is important (and often the law) for people to report all animal bites to medical/public health authorities.

Vaccinated dogs serve as an important barrier to reducing human and animal rabies-related deaths, and the need for costly rabies prevention in people. Do your part to protect the health of your dog, yourself and your community by ensuring your dog is properly vaccinated.

## Additional Resources

Brown CM, et al. (2016). Compendium of animal rabies prevention and control, 2016. *J Am Vet Med Assoc* 248: 505-517. Available at: [nasphv.org/documentsCompendia.html](http://nasphv.org/documentsCompendia.html)

Center for Food Security and Public Health. "Rabies" Technical Factsheet. Available at: [cfsph.iastate.edu/](http://cfsph.iastate.edu/)

Centers for Disease Control and Prevention. Rabies. Available at: [cdc.gov/rabies/index.html](http://cdc.gov/rabies/index.html)

Day MJ, et al. (2016). WSAVA Guidelines for the vaccination of dogs and cats. *J Small Anim Pract* 57:E1-E45. Available at: <http://wsava.org/guidelines/vaccination-guidelines>

Ma X, et al. (2018). Rabies surveillance in the United States during 2017. *J Am Vet Med Assoc* 253: 1555-1568. Available at: [doi.org/10.2460/javma.253.12.1555](https://doi.org/10.2460/javma.253.12.1555)

Murray KO, et al. (2009). Rabies in vaccinated dogs and cats in the United States, 1997–2001. *J Am Vet Med Assoc* 235.6: 691-695. Available at: [doi.org/10.2460/javma.235.6.691](https://doi.org/10.2460/javma.235.6.691)

RabiesAware.org. Rabies laws and vaccination in the US. Available at: [rabiesaware.org/](http://rabiesaware.org/)

United States Department of Agriculture, Animal and Plant Health Inspection Service (APHIS). APHIS pet travel. Available at: [aphis.usda.gov/aphis/pet-travel](http://aphis.usda.gov/aphis/pet-travel)

## Created by:

Michelle Evason, BSc DVM DACVIM  
(Small animal internal medicine)

Jason Stull, VMD MPVM PhD DACVPM

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For questions or inquiries please contact us at [chf@akcchf.org](mailto:chf@akcchf.org) or 888-682-9696.

