

## Rabies

**Agent:** Rabies is a viral disease of mammals occurring throughout the world, including the United States (except in Hawaii). Rabies virus is a “bullet-shaped” neurotropic Lyssavirus belonging to the Rhabdoviridae family.

**Brief Description:** Rabies virus infection causes an acute, almost invariably fatal encephalitis. A wide variety of clinical signs may be seen. Early signs are non-specific and may include anorexia, lethargy, fever, and vomiting. Later signs are attributed to central nervous system disturbance that results in behavioral changes and/or ataxia or paralysis. Behavioral changes may include excitation, agitation, and unprovoked aggression toward living and inanimate objects. Animals can also become more subdued than normal and normally friendly animals may avoid interaction. Wild animals may lose their fear of humans and display abnormal activity patterns. Paralysis can affect the pharyngeal muscles resulting in difficulty swallowing, changes in voice, and salivation. In addition, some animals may experience paralysis of muscles of the extremities and trunk. Other neurologic signs of rabies include cranial nerve dysfunction and seizures. In some animals, behavioral changes may be the predominant sign; whereas in others, paralytic signs may dominate. Death usually occurs within days of the onset of symptoms.

### **Differential Diagnosis:**

- Canine Distemper
- Canine Hepatitis
- Feline Infectious Peritonitis
- Listeriosis
- Cryptococcus
- Toxoplasmosis
- Poisonings Which Produce Neurologic Signs (e.g. Acute Lead Poisoning)
- Severe Hepatic Failure
- Viral Encephalitides: WEE, EEE, and VEE, West Nile Virus (WNV), Aujeszky’s Disease (Pseudorabies), Borna Disease, Equine Herpes Virus 1 (EHV1)
- Other Viral, Mycotic, and Bacterial Infections Affecting the CNS (Central Nervous System)
- Foreign Bodies or Other Injuries to the Mouth, Oropharynx or Esophagus

**Reservoir/Host Species:** Although all species of mammals are susceptible to rabies virus infection, only a few species are important as reservoirs for the disease. The major reservoir hosts of the disease in the United States are raccoons, skunks, insectivorous bats, and foxes. The primary wildlife reservoir varies between geographic regions. In Georgia, raccoons and bats are the primary wildlife reservoirs. Canine rabies is an enzootic disease in many regions of the world where vaccine coverage is incomplete and stray dogs are common.

**Mode of Transmission:** Rabies virus is found in the saliva and nervous tissue of infected animals. Rabies virus is not found in the blood, urine, or feces of infected animals. Transmission of rabies virus usually occurs when infected saliva of a host is passed to an uninfected animal, primarily through bite or scratch. Direct contamination of mucous membranes or open wounds with infected saliva or nervous tissue can also result in rabies virus transmission. Aerosolization of the virus in the laboratory setting is an occupational hazard for those who handle tissue samples or viral cultures. Rabies virus survives outside of the host for only very short periods of time and is susceptible to most common disinfectants, drying, and ultraviolet light.

**Incubation Period:** Following exposure, the incubation period may vary from a few days to several years, but is typically 1 to 3 months. Longer periods have been documented.

**Diagnosis:** Definitive diagnosis of rabies in animals is made by Direct Fluorescent Antibody (dFA) testing of fresh brain tissue. The test can only be performed post-mortem. Submission of brain tissue for testing must be coordinated with the environmental health section of the county health department <http://health.state.ga.us/pdfs/environmental/ContactInformation.pdf> and/or animal control agency. Do not ship specimens on weekends or holidays without prior approval. Rabies Submission Form #3062 should accompany all specimens. Testing is available Monday through Friday and reports are sent out the next business day if the sample is received by 10 AM. For very large animals (cows, horses, etc.), only the brain should be submitted, whereas the entire head can be submitted for smaller animals. The whole body will be accepted only for bats and animals of similar size. Appropriate protective gear should be used when extracting specimens for laboratory submission to reduce exposure to potentially infectious material. For specimen collection guidelines, consult the Georgia Rabies Control Manual. [http://agr.georgia.gov/vgn/images/portal/cit\\_1210/41/44/80764590Rabies%20Manual%202007\\_1.pdf](http://agr.georgia.gov/vgn/images/portal/cit_1210/41/44/80764590Rabies%20Manual%202007_1.pdf) Any animal or animal specimen being submitted for testing should preferably be stored and shipped under refrigeration rather than frozen to prevent a delay in testing and to facilitate laboratory processing. Chemical fixation of tissues should be avoided to prevent significant testing delays and because it may preclude reliable testing. Questions about testing of fixed tissues should be directed to the local rabies laboratory or public health department. Rabies testing is performed by all three laboratories (Decatur, Albany, and Waycross) of the Georgia Public Health Laboratory System. <http://www.health.state.ga.us/pdfs/lab/gphlsm01.pdf>.

The Center for Disease Control and Prevention is conducting additional tests on lactating animals. Milk and mammary tissue should be collected and then shipped on dry ice to the CDC if a lactating animal is positive for rabies. <http://www.nasphv.org/Documents/RabiesCompendium.pdf>

**Period of Communicability:** The virus may be shed in the saliva of infected animals for a period of several days preceding the onset of clinical signs. All animals intermittently shed the virus in saliva throughout the course of clinical disease, which typically ranges from 1-7 days in dogs and cats.

**Prevention Measures/Control:** The spread of rabies to humans and domestic animals can be effectively minimized by several methods:

- Vaccination of domestic animals in accordance with local statutes
- Controlling stray animals and enforcement of leash laws by animal control officers
- Limiting contact between humans/domestic animals and wildlife, including bats
- Pre-exposure vaccination for individuals with higher risk of exposure
- Seeking prompt medical attention for wounds inflicted by animals
- Immediately cleaning with soap and water all wounds inflicted by animals. Irrigating the wound with a viricidal agent such as povidone-iodine solution (which is the preferred agent)
- Prompt post-exposure prophylaxis (PEP) consisting of Human Rabies Immune Globulin (HRIG) and 5 doses of rabies vaccine for rabies antibody-naïve humans with documented or suspected exposure to rabies virus

**Vaccine:** Georgia statute requires the administration of rabies vaccine by a licensed veterinarian to dogs, cats, and ferrets over 12 weeks of age. (Authority Ga. L. Sec. 43-50-3 (A) (G)) Primary vaccination is usually done at 3 months of age and then annually or triennially depending on the species, type of vaccine, and county statutes. (Authority Ga. L. Sec. 31-19-1). Regardless of the age of the animal at primary vaccination, a booster vaccination should be administered 1 year later. Within 28 days after primary vaccination, a peak rabies antibody titer is reached and the animal can be considered immunized. Livestock can be legally vaccinated by other personnel, but are considered non-vaccinated if a known rabies exposure occurs unless the vaccine was veterinarian administered and documented. Oral rabies vaccines are currently used only as part of federal rabies control programs in some regions to limit the

spread of rabies in wildlife reservoir species such as raccoons. There are no vaccines available for wildlife species or hybrids kept as pets (a practice which is illegal in Georgia and most other states). Information on rabies vaccines may be found in the Compendium of Animal Rabies Prevention and Control at <http://www.nasphv.org/Documents/RabiesCompendium.pdf>

Pre-exposure vaccine is available for humans at high risk of infection (e.g. wildlife officials, veterinarians and their staff, animal control officers, rabies laboratory workers, and people traveling for long periods of time to areas where the disease is enzootic). Persons who have received pre-exposure rabies vaccination still need to receive two booster doses of rabies vaccine if they are exposed to the virus.

**Zoonotic Risk:** Rabies is a major zoonosis causing over 55,000 deaths worldwide annually. In recent years, fewer than 5 human deaths from rabies in the United States have been reported annually. Bat bites which are undetected or unreported and dog bites sustained in countries where dog rabies is enzootic account for the majority of the human rabies cases in the United States.

Although rabies is a fatal disease, it can be prevented by recognizing risk, thoroughly cleaning bite wounds, and administering appropriate post-exposure prophylaxis. **If you have been bitten by an animal or think that you possibly may have been exposed to a rabid animal, consult a physician immediately.** Health care providers will evaluate each possible exposure to rabies and when necessary consult with the Georgia Poison Center or public health officials regarding the need for rabies post-exposure prophylaxis (PEP). The Georgia Poison Center offers consultation about rabies PEP 24 hours a day, 7 days a week, and can be contacted by calling (404) 616-9000 in Atlanta or 1-(800) 282-5846 outside of Atlanta.

For information on the management of animals exposed to rabies or management of animals that bite humans, consult the Georgia Rabies Control Manual at [http://agr.georgia.gov/vgn/images/portal/cit\\_1210/41/44/80764590Rabies%20Manual%202007\\_1.pdf](http://agr.georgia.gov/vgn/images/portal/cit_1210/41/44/80764590Rabies%20Manual%202007_1.pdf)

### **Reporting Requirements:**

- **Any person who makes a laboratory confirmation of Rabies in an animal shall report it by the close of the next business day to the State Veterinarian's office at (404) 656-3667 or (404) 656-3671 in Atlanta, or 1-800-282-5852 outside of Atlanta, or to the USDA Area Veterinarian in Charge at (770) 922-7860.**
- **All animal bites (from either domestic or wild animals) incurred by humans shall be reported immediately to the appropriate District Health Office or the Georgia Poison Center by calling (404) 616-9000 in Atlanta or 1- (800) 282-5846 outside of Atlanta.**

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### **Electronic References:**

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Major Infectious Diseases of Dogs and Cats. In A Concise Guide to Infectious and Parasitic Diseases of Dogs and Cats Carter G.R. (Ed.). Available from International Veterinary Information Service, Ithaca, NY.

[www.ivis.org](http://www.ivis.org) to register

<http://www.ivis.org/signin.asp?url=http://www.ivis.org/home.asp>

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Office International des Epizooties (OIE) – Manual of Standards for Diagnostic Tests and Vaccines 2000.

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