GEORGIA

Rabies Control Manual

April 2018 | Seventh Edition

Georgia Department of Public Health

Foreword

The purpose of this manual is to provide current information on the control of rabies in Georgia. It is designed to be used by county health departments, hospital emergency departments, private physicians and health care practitioners, veterinarians, and animal control programs. This manual should serve as an educational tool for use in all facets of community rabies control. Additionally, it is hoped that this manual will assist communities in standardizing rabies control practices within the state.

This document was prepared by Cherie L. Drenzek, DVM, MS, Julie Gabel, DVM, MPH, Amanda Feldpausch, MPH, and Ashton Thompson, MPH. Credit is also given to authors of the following: 1) *Georgia Rabies Control Manual*, Third, Fourth, Fifth, and Sixth Editions (1996, 2001, 2007, 2012); 2) National Association of State Public Health Veterinarians (NASPHV) *Compendium of Animal Rabies Prevention and Control 2016*, and 3) *Use of a Reduced (4-Dose) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies – Recommendations of the Advisory Committee on Immunization Practices* (2010).

If you have any questions regarding this manual, please contact the Acute Disease Section, Epidemiology Program, Georgia Department of Public Health (DPH) at (404) 657-2588.

Important Phone Numbers

RABIES CONSULTATIONS

Georgia Poison Center- (Atlanta)	404-616-9000
*Toll Free Number	800-222-1222
County/District Health Departments	See local phone directory
County Animal Control	See local phone directory
Epidemiology Program, DPH	404-657-2588
CDC Clinician Information Line	800-CDC-INFO (800-232-4636)

STATE PUBLIC HEALTH LABORATORIES

Georgia Public Health Laboratory (Decatur)	404-327-7900
GPHL Waycross Regional Laboratory	912-285-6000

SOURCES FOR HUMAN RABIES VACCINE

Sanofi Pasteur (Imovax® Rabies - HDCV)	800-VACCINE (800-822-2463) www.vaccineplace.com/products/
Novartis Vaccines and Diagnostics (RabAvert® - PCEC)	800-CHIRON8 (800-244-7668) www.rabavert.com

SOURCES FOR HUMAN RABIES IMMUNE GLOBULIN

sanofi pasteur (Imogam® Rabies-HT)	800-VACCINE (800-822-2463) www.vaccineplace.com/products/
Talecris Biotherapeutics (HyperRab™ S/D)	800-243-4153

INDIGENT PATIENT RABIES VACCINE SUPPORT PROGRAMS

Both rabies vaccine manufacturers have patient assistance programs that provide vaccines and medications to uninsured and underinsured patients. These programs are administered through the *Rx Assist Patient Assistance Program Center* (http://www.rxassist.org/). The manufacturers may also be contacted directly for more information concerning eligibility requirements.

Sanofi Pasteur (Imovax® Rabies and Imogam® Rabies-HT)	866-801-5655
Novartis Vaccines and Diagnostics (RabAvert®)	800-589-0837

SEROLOGIC TESTING FOR HUMANS AND ANIMALS (see pages 37-38)

Atlanta Health Associates, Inc.
309 Pirkle Ferry Road, Suite D300
Cumming, GA 30040

Phone: 800-717-5612
Fax: 770-205-9021
www.atlantahealth.net

Kansas State University
College of Veterinary Medicine
Veterinary Diagnostic Laboratory
2005 Research Park Circle
Manhattan, Kansas 66502

Phone: 785-532-4483
Fax: 785-532-4474
www.ksvdl.org/rabies-laboratory

RABIES TAGS*

Dogs, cats, and ferrets should be identified (e.g., metal or plastic tags or microchips) to allow for verification of rabies vaccination status. There is no centralized database for rabies tag information (pet name / owner's name, etc.). Rabies tags and any associated data may or may not be maintained by the issuer (veterinary clinic, shelter or animal control agency).

*Licenses/rabies tag requirements are County-based; please contact your County for specifics.

I. RABIES OVERVIEW

Rabies is a viral infection transmitted in the saliva of infected mammals. The virus enters the central nervous system of the host, causing an encephalomyelitis that is almost always fatal. Although all species of mammals are susceptible to rabies virus infection, only a few species are important as reservoirs for the disease in nature. In the United States, several distinct rabies virus variants have been identified in terrestrial mammals, including major terrestrial reservoirs in raccoons, skunks, foxes, and coyotes. In addition to the terrestrial reservoirs for rabies, several species of insectivorous bats also serve as reservoirs for the disease.

Wildlife is the most important potential source of infection for both humans and domestic animals in the United States. Reducing the risk of rabies in domestic animals and limiting contact with wild animals are central to the prevention of human rabies. Vaccination of all domestic dogs, cats, and ferrets, coupled with the systematic removal of stray animals that are at risk of exposure to rabid wildlife, are basic elements of a rabies control program. Georgia law (Rabies Control Law-O.C.G.A.-31-19) requires that **all** owned dogs and cats be vaccinated against rabies by a licensed veterinarian using approved vaccines in accordance with the national *Compendium of Animal Rabies Prevention and Control*. Domestic ferrets also need to be vaccinated against rabies according to the national *Compendium of Animal Rabies Prevention and Control* and Georgia law (O.C.G.A.-27-5-5).

In the United States, indigenously acquired rabies among humans has declined markedly in recent years. The decline is, in part, due to vaccination and animal control programs begun in the 1940s that have practically eliminated the domestic dog as a reservoir of rabies and also to the development of effective human rabies vaccines and rabies immune globulin. During 2003-2013, a total of 34 cases of human rabies were reported in the United States (last case in Georgia in 2000). Among the 33 cases for which rabies virus variants were obtained, 19 (58%) were associated with insectivorous bats, most commonly the Mexican free-tailed, silver-haired, and eastern pipistrelle bats. Of these 34 human cases, 15 (44%) occurred during August-November, coincident with a seasonal increase in prevalence of rabid bats detected in the United States. Despite the substantial number of cases of human rabies attributable to bat exposure, the importance of these exposures is often overlooked or underestimated. In many of these cases, the bat bite was presumably not recognized nor the risk of rabies appreciated in order to seek appropriate medical attention.

Human rabies is a completely preventable disease if the risk of acquisition is appreciated and appropriate rabies post-exposure prophylaxis (consisting of wound care as well as both active and passive immunization) is obtained. Because rabies is a fatal disease, the goal of public health (in coordination with the medical community) is, first, to prevent human exposure to rabies by education and animal control measures and, second, to prevent the disease by administering rabies post-exposure prophylaxis (PEP) if exposure occurs. Tens of thousands of people are successfully treated each year after being bitten by an animal that may have rabies.

Although the decision to provide post-exposure prophylaxis rests with the patient and his or her physician, valuable consultations can be provided by the Georgia Poison Center, District and County health departments, or the Epidemiology Program, Department of Public Health (see page 3 for contact information).

Distribution of Major Terrestrial Reservoirs of Rabies in the United States

http://www.cdc.gov/rabies/exposure/animals/wildlife_reservoirs.html

II. RABIES PREVENTION AND CONTROL

A. Legal Authority

The primary responsibility for the control of rabies in Georgia rests with County Boards of Health. Chapter 31-19-1 of the Official Code of Georgia Annotated (O.C.G.A.) empowers and requires each County Board of Health to adopt and promulgate rules and regulations for the prevention and control of rabies (see pages 48-50).

B. Principles of Rabies Control

As a zoonotic disease, the foundations of rabies control rest upon preventing the disease in animals, preventing the disease in humans, and decreasing the likelihood of exposure between humans and animal rabies vectors. Public education regarding rabies exposure risk is paramount. The following principles apply:

- **Rabies Exposure.** Rabies is transmitted only when the virus is introduced into bite wounds, open cuts in skin, or onto mucous membranes.

- **Human Rabies Prevention.** Rabies in humans can be prevented either by eliminating exposures to rabid animals or by providing exposed persons with prompt local treatment of wounds combined with appropriate post-exposure prophylaxis (including both passive antibody administration and active immunization with cell culture vaccines). In addition, pre-exposure vaccination should be offered to persons in high-risk groups, such as veterinarians, animal handlers, and certain laboratory workers.

- **Domestic Animals.** Local governments should initiate and maintain effective programs to ensure vaccination of all dogs, cats, and ferrets and to remove strays and unwanted animals from the community. Recommended vaccination procedures and the licensed animal vaccines are specified in the *Compendium of Animal Rabies Prevention and Control* (see pages 508-513). In addition, adjunct procedures which enhance rabies control include: 1) identification systems (e.g., metal/plastic tags, microchips; please refer to individual County requirements) to verify animal rabies vaccination status; 2) local domestic animal licensure requirements; 3) requirement of interstate health certificates prior to domestic animal travel; 4) implementation of regulations governing imported domestic animals; and 5) establishment of a local animal control agency responsible for stray control, leash laws, and issuance of citations for failure to vaccinate animals.

  All dogs, cats and ferrets should be vaccinated against rabies and revaccinated in accordance with vaccine manufacturer recommendations and the recommendations of this manual.

  Vaccines should be FDA approved and given by a licensed veterinarian. Check with local rabies authority for specific county regulations on annual or triennial booster vaccinations. There are no State level requirements for vaccine type or manufacturer.

- **Rabies in Wildlife.** The control of rabies among wildlife reservoirs is difficult. Vaccination of free-ranging wildlife or selective population reduction is not always feasible. Rabies control relies upon prevention of exposure to wildlife rabies reservoirs. This can be accomplished via public education about wildlife rabies risk and recommendations regarding

avoidance of contact with wild animals. Leash laws and other control of domestic animals will reduce exposure of pets to potentially rabid wildlife.

C. CONTROL METHODS IN ANIMALS

Animal Vaccination Protocols

In Georgia, parenteral animal rabies vaccines should be administered only by a **licensed veterinarian**. This is the only way to ensure that a responsible person can be held accountable and to assure the public that the animal has been properly vaccinated. Within 28 days after primary vaccination, a peak rabies antibody titer is reached, and the animal can be considered immunized. An animal is currently vaccinated and is considered immunized if the primary vaccination was administered at least 28 days previously and vaccinations have been administered in accordance with the *Compendium of Animal Rabies Prevention and Control* (see page 508). Regardless of the age of the animal at initial vaccination, a second vaccination should be administered 1 year later. Because a rapid anamnestic response is expected, an animal is considered currently vaccinated immediately after a booster vaccination.

- **Dogs, Cats, and Ferrets.** All dogs, cats, and ferrets should be vaccinated against rabies **and revaccinated** in accordance with the *Compendium of Animal Rabies Prevention and Control* (see page 508). For many licensed vaccines, the age at primary vaccination is 3 months, but be aware that for some newer combination rabies vaccines, this age is 8 weeks. If a previously vaccinated animal is overdue for a booster, it should be revaccinated with a single dose of vaccine and placed on an annual or triennial schedule, depending on the type of vaccine used.

- **Livestock.** Vaccinating all livestock against rabies is neither economically feasible nor justified from a public health standpoint. However, livestock that are particularly valuable or that have frequent contact with humans, such as show animals, or those in petting zoos, should be vaccinated against rabies (refer to *the Compendium of Animal Rabies Prevention and Control* for specific vaccines licensed for use in livestock, page 508). Horses traveling interstate or with significant public contact (e.g., riding stables) should be currently vaccinated against rabies.

- **Other Animals.**

  Wild. No parenteral rabies vaccine is licensed for use in wild animals. Because of the risk for rabies in wild animals (especially raccoons, skunks, coyotes, foxes, and bats), the Georgia Department of Natural Resources has rigid regulations which prohibit the keeping of wild and wild/domestic hybrids, including wolf hybrids, as pets. For further information, please see https://gadnr.org/.

Maintained in Exhibits and in Zoological Parks. Captive animals that are not completely excluded from all contact with rabies vectors can become infected with rabies. Moreover, wild animals might be incubating rabies when initially captured; therefore, wild-caught animals susceptible to rabies should be placed in strict isolation for a minimum of 6 months before being exhibited. Employees who work with animals at such facilities should receive pre-exposure rabies vaccination. The use of pre- or post-exposure rabies vaccinations for employees who work with animals at such facilities might reduce the need for euthanasia of captive animals. Carnivores and bats should be housed in a manner that precludes direct contact with the public.

Management of Animals Exposed to Rabies

Any animal potentially exposed to rabies virus by a wild, carnivorous mammal or a bat that is not available for testing should be regarded as having been exposed to rabies.

Dogs, Cats, and Ferrets

- **Unvaccinated** dogs, cats, and ferrets exposed to a rabid animal should be euthanized immediately. If the owner is unwilling to have this done, the animal should be placed in strict isolation for 4 months for dogs and cats and 6 months for ferrets. The quarantined animal should be vaccinated either upon entry to isolation OR 1 month before being released. Isolation in this context refers to confinement in an enclosure that precludes direct contact with humans and other animals.
- **Dogs and cats overdue for a booster** (see Definitions, pages 46-47) who are exposed to a rabid animal, but have documentation of having received at least one licensed rabies vaccination it its lifetime should be revaccinated immediately, kept under the owner's control, and observed at home for 45 days for clinical signs of rabies. This new recommendation is based on the National Association of State Public Health Veterinarians (NASPHV) *Compendium of Animal Rabies Prevention and Control 2016*. The animal should then resume a vaccination schedule based on labeled use of the booster received. At the first sign of illness or behavioral change in the animal, the local rabies control agency should be notified and the animal should be evaluated by a veterinarian. If clinical signs are suggestive of rabies, the animal should be immediately euthanized and tested for rabies.
- **Animals without documentation of prior vaccination** and exposed to a rabid animal should be treated as unvaccinated (refer to Unvaccinated protocol above). If the exposed animal is a **dog or cat**, and there is a strong indication that the animal may have been previously vaccinated, the Progressive Serological Monitoring (PSM) Protocol may be followed to document an anamnestic response to the booster vaccine, indicating prior vaccination. This new recommendation is based on the National Association of State Public Health Veterinarians (NASPHV) *Compendium of Animal Rabies Prevention and Control 2016*. See Appendix B for details on the PSM protocol (applies to dogs and cats only).

- **Currently vaccinated** (see Definitions, pages 46-47) dogs, cats, and ferrets should be revaccinated immediately, kept under the owner's control, and observed at home for 45 days for clinical signs of rabies. During the observation period (see Definitions, pages 46-47) the animal should not be permitted to roam freely and should be restricted to leash walks, if applicable. At the first sign of illness or behavioral change in the animal, the local rabies control agency should be notified and the animal should be evaluated by a veterinarian. If clinical signs are suggestive of rabies, the animal should be immediately euthanized and tested for rabies.

Livestock

- All species of livestock are susceptible to rabies; cattle and horses are the most frequently infected. Livestock exposed to a rabid animal and **currently vaccinated** with a vaccine approved by USDA for that species (see Appendix A) should be revaccinated immediately and observed for 45 days.

- **Unvaccinated** livestock should be euthanized immediately. If the animal is not euthanized it should be kept under close observation for 6 months. Any illness in an animal under observation should be reported immediately to the local health department. If signs suggestive of rabies develop, the animal should be euthanized and the head shipped for testing as described in Part I.B.5.of the *Compendium of Animal Rabies Prevention and Control*.

- Handling and consumption of tissues from exposed animals may carry a risk for rabies transmission. Risk factors depend in part on the site(s) of exposure, amount of virus present, severity of wounds, and whether sufficient contaminated tissue has been excised. If an exposed animal is to be slaughtered for consumption, it should be done immediately after exposure and all tissues should be cooked thoroughly.

- Barrier precautions should be used by persons handling the animal and tissues. Historically, federal guidelines for meat inspectors required that any animal known to have been exposed to rabies within 8 months be rejected for slaughter. USDA Food and Inspection Service (FSIS) meat inspectors should be notified if such exposures occur in food animals prior to slaughter.

- Rabies virus may be widely distributed in tissues of infected animals. Tissues and products from a rabid animal should not be used for human or animal consumption. However, pasteurization temperatures will inactivate rabies virus; therefore, drinking pasteurized milk or eating thoroughly cooked animal products does not constitute a rabies exposure.

- Multiple rabid animals in a herd or herbivore-to-herbivore transmission is uncommon; therefore, restricting the rest of the herd if a single animal has been exposed to or infected by rabies is usually not necessary. Decisions regarding quarantine of a single animal versus a group of potentially exposed animals in a herd-setting will be made on a case-by-case basis.

Other Animals

- Other animals bitten by a rabid animal should be euthanized immediately. Animals maintained in USDA-licensed research facilities or accredited zoological parks should be evaluated on a case-by-case basis. Consultations can be provided by the Epidemiology Program, Department of Public Health at 404-657-2588.

Management of Animals that Bite Humans

Dogs, Cats, and Ferrets

- Rabies virus may be excreted in the saliva of infected dogs, cats, and ferrets during illness and/or for only a few days prior to illness or death. A healthy dog, cat, or ferret that bites a person should be confined (see Definitions, pages 46-47) and observed for 10 days**, REGARDLESS OF THE ANIMAL'S VACCINATION STATUS**. Administration of rabies vaccine is not recommended during the confinement period to avoid confusing signs of rabies with possible side effects of vaccine administration.

- Confinement (sometimes referred to as quarantine) conditions should prevent direct contact with other animals or persons. The confinement shall be conducted under the authority of the designated local rabies control agency in which the place, manner, and provisions of the confinement are specified. For example, confinement may take place in a kennel in a veterinary hospital, animal control facility, commercial boarding establishment, or a pen at home, depending on local requirements.

- At the first sign of illness or behavioral change in the animal, the local rabies control agency should be notified and the animal should be evaluated by a veterinarian. If clinical signs are suggestive of rabies, the animal should be immediately euthanized and tested for rabies and the exposed person notified.

- Any stray or unwanted dog, cat, or ferret that bites a person should be euthanized immediately (or following the locally-specified impoundment period to give owners sufficient time to claim animals) and the head submitted for rabies examination.

Other biting animals (wild animals, animals maintained in zoological parks, canine or feline wild/domestic hybrids, etc.)

- No parenteral rabies vaccines are licensed for use in animals other than dogs, cats, ferrets, and some livestock.

- Since the duration of clinical signs and the period of virus shedding are unknown for many species, confinement may not be a feasible management

strategy. Most wild mammals that bite or otherwise expose persons should be **considered** for euthanasia and rabies examination. Prior vaccination of an animal might not preclude the necessity for euthanasia and testing if the period of virus shedding is unknown for that species.

- Management of animals other than dogs, cats, and ferrets depends on the species, the circumstances of the bite, the epidemiology of rabies in the area, and the biting animal's history, current health status, and potential for exposure to rabies.

The Epidemiology Program, Department of Public Health, should be consulted at 404-657-2588 when circumstances warrant.

Wildlife

- Most wild mammals that bite or otherwise expose persons should be **considered** for euthanasia and rabies examination. Since the duration of clinical signs and the period of virus shedding are unknown for these species, an appropriate confinement or isolation period cannot be ascertained. Assessing rabies risk and the need for rabies diagnostic testing can be guided by the following:

    - **Wild Carnivores**. Raccoons, skunks and foxes are the terrestrial animals most often infected with rabies in Georgia. All bites by such wildlife must be considered possible exposures to the rabies virus. Signs of rabies among wildlife cannot be interpreted reliably; therefore, any such animal that exposes a person should be euthanized at once (without unnecessary damage to the head) and the brain should be submitted for rabies testing.

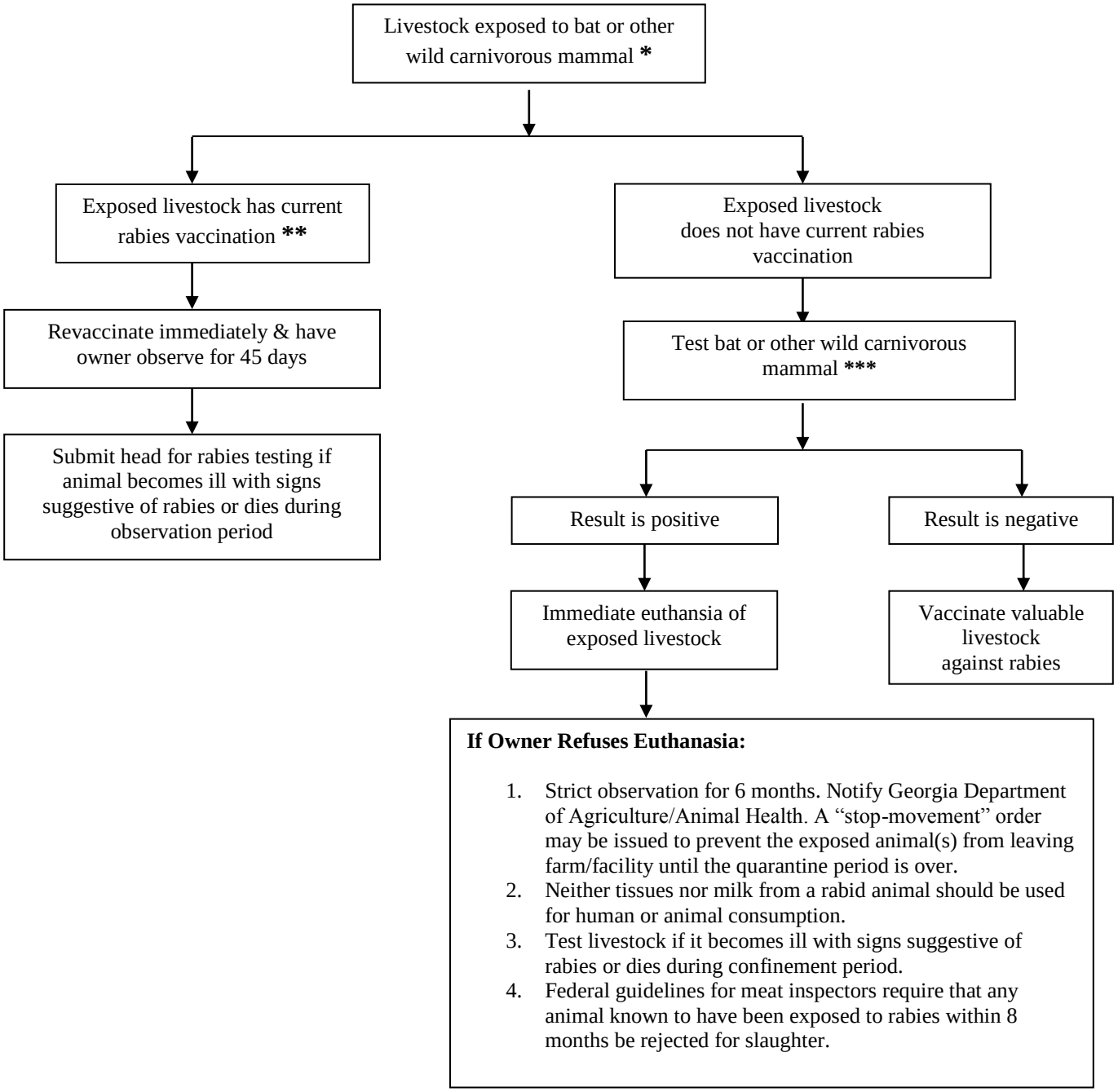
    - **Rodents and Lagomorphs.** Squirrels, rats, mice, hamsters, guinea pigs, gerbils, chipmunks, and rabbits are almost never found to be infected with rabies and have not been known to transmit rabies to humans. Bites by these animals are usually not considered a rabies risk and do not warrant rabies testing unless the animal is sick or behaving in an unusual manner. Rodents that **are** considered to be a rabies risk include woodchucks or groundhogs (*Marmota monax*) because they are frequently large enough to survive the attack of a rabid carnivore. **Approval must be obtained from the Georgia Public Health Laboratory or the Epidemiology Program of the Department of Public Health prior to submitting a rodent for rabies testing.**

    - **Bats.** A bat that bites, scratches, or has any direct physical contact with a person should be safely captured (see page 41 for instructions), immediately euthanized, and the entire animal sent to the laboratory for rabies examination. People usually know when they have been bitten by a bat. However, because bats have small teeth that may leave marks that are not easily seen, there are situations in which rabies testing and medical advice should be sought even in the absence of an obvious bite wound. These include awakening to find a bat in the room, finding a bat in

the room of an unattended child, having a bat physically brush against you, or finding a bat near a mentally impaired or intoxicated person. In these situations a bite cannot be definitively ruled out. If physical contact occurs or the situations above occur and the bat is not available for testing (i.e., escapes from house), rabies post-exposure prophylaxis should be administered as soon as possible.

- **Other wild animals.** In most situations involving non-reservoir species (opossums, otters, polecats, beavers, weasels, etc.), the rabies risk is relatively low. The risk is higher and, consequently, rabies testing may be indicated if the animal is found in a rabies-endemic area, has opportunity for exposure to rabies reservoirs, is large enough to survive an attack by a rabid animal, or is ill or exhibiting abnormal behavior (for example, rabid bobcats have been documented in Georgia).

PROTOCOL FOR LIVESTOCK POSSIBLY EXPOSED TO RABIES

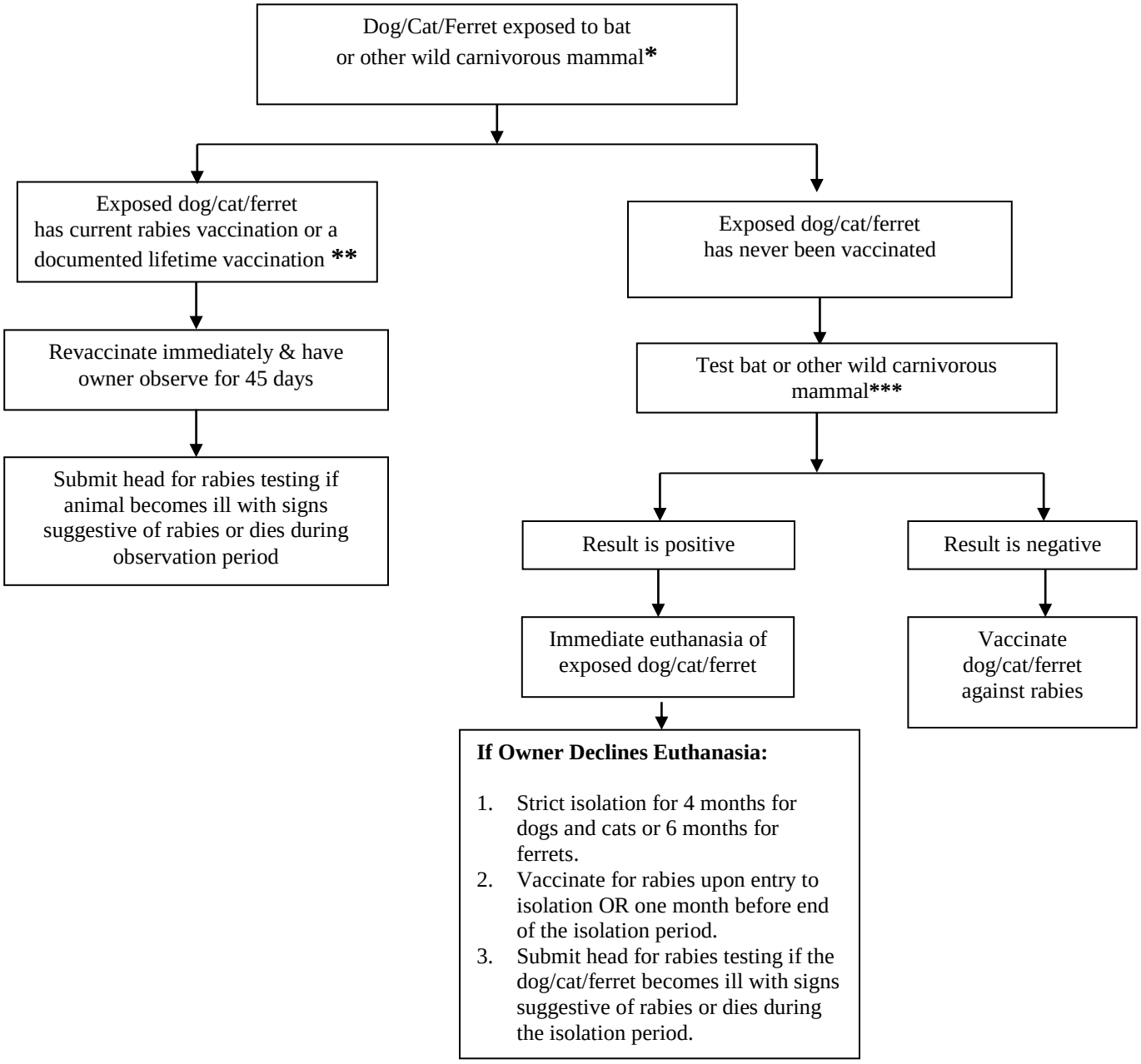


***** Consultations regarding animal exposures can be provided by the Epidemiology Program of the Department of Public Health at 404-657-2588.

****** An animal is currently vaccinated if the primary rabies vaccine (USDA-approved for use in livestock species) was administered by a veterinarian at least 28 days previously and booster vaccines have been administered according to vaccine label.

*******If bat or wild animal is NOT available for testing, must proceed as if result is positive.

PROTOCOL FOR DOGS, CATS, AND FERRETS POSSIBLY EXPOSED TO RABIES



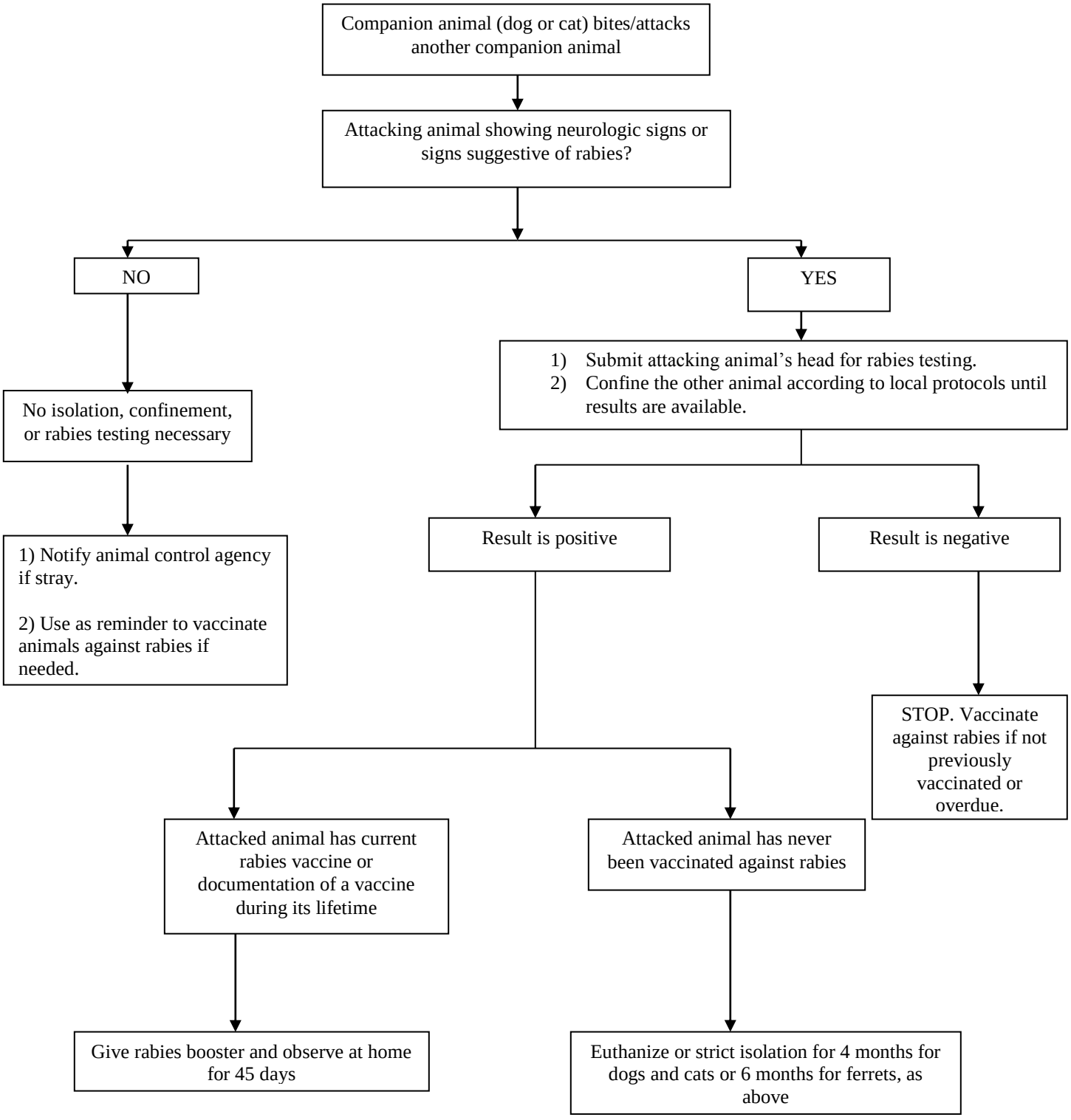
***** Consultations regarding animal exposures can be provided by the Epidemiology Program of the Department of Public Health at 404-657-2588.

****** An animal is currently vaccinated if the primary rabies vaccine was administered by a veterinarian at least 28 days previously and booster vaccines have been administered on an annual or triennial schedule. Animals overdue for a booster are evaluated on a case by case basis (e.g., severity of exposure, time elapsed since last vaccination, number of prior vaccinations, current health status, and local rabies epidemiology).

***If bat, attacking dog, or wild animal is NOT available for testing, must proceed as if the result is positive.

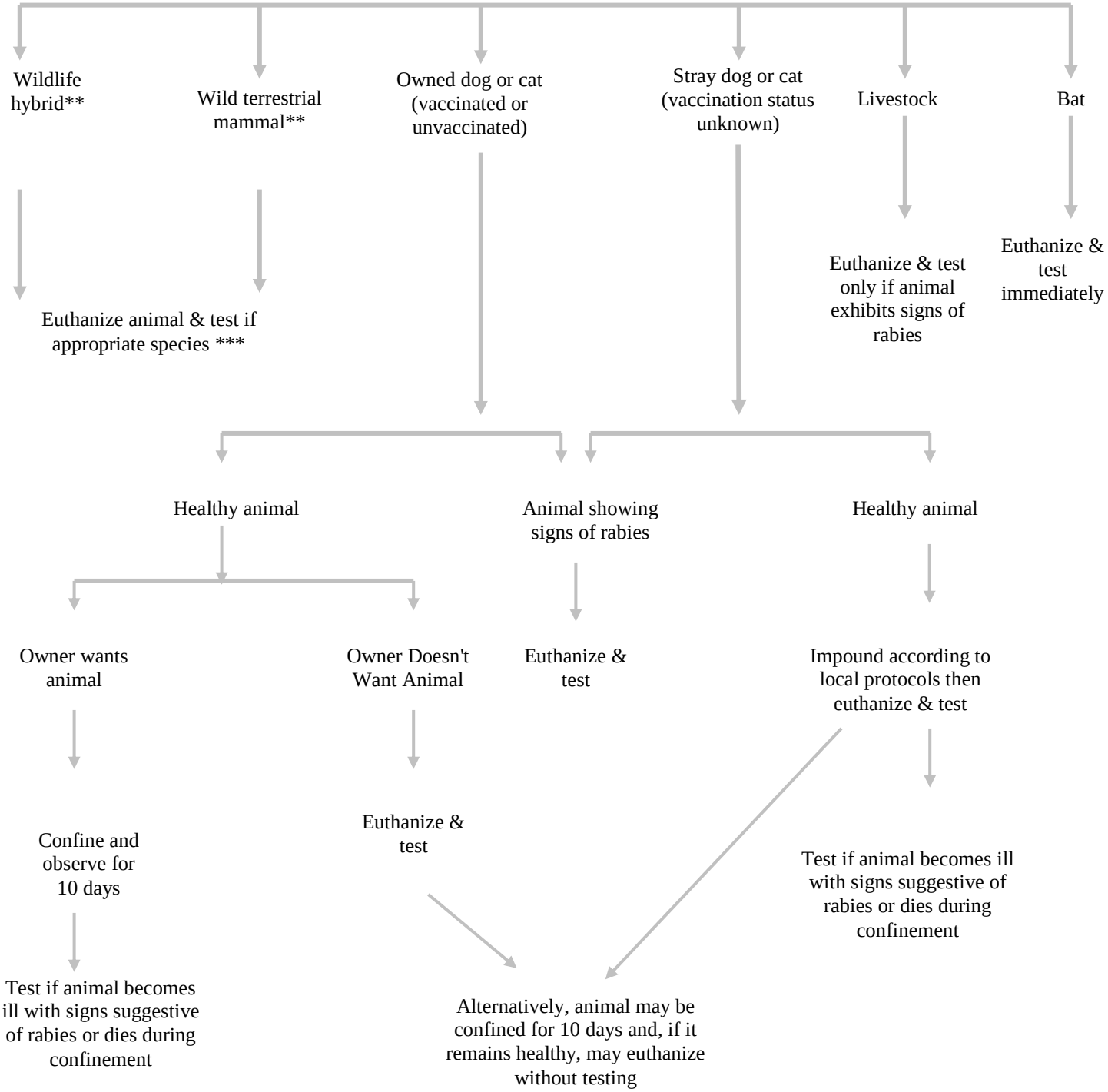
PROTOCOL FOR COMPANION ANIMAL-TO-COMPANION ANIMAL EXPOSURES/ENCOUNTERS

Note: Because the United States has been declared free of canine rabies virus variant transmission, healthy dog-to-dog, dog-to-cat, or cat-to-cat encounters are not generally considered a rabies risk.



RABIES PROTOCOL FOR ANIMALS WHICH HAVE BITTEN PEOPLE

Person Exposed (bitten, scratched, or other*) by: (Refer person to physician)



* Consultations regarding exposure can be provided by the Georgia Poison Center, 24 hours a day, 7 days a week, at 1-800-222-1222 or 404-616-4000.

** No parenteral rabies vaccines are licenses for use in wild animals or hybrids (the offspring of wild animals crossbred to domestic animals). Wild animals or hybrids are illegal to be kept as pets in Georgia. Prior vaccination of these animals does not preclude the necessity for euthanasia and testing.

*** The following animals are NOT CONSIDERED LIKELY TO HAVE RABIES and will not be tested except by special arrangements with the Epidemiology Program of the Georgia Department of Public Health at 404-657-2588: chipmunk, gerbil, gopher, guinea pig, hamster, hare, mole, mouse, rabbit, rat, shrew, squirrel, and vole.

D. CONTROL METHODS IN HUMANS

Prevention of human rabies depends on eliminating exposure to rabid animals and providing exposed persons with prompt local treatment of their wounds, combined with appropriate rabies post-exposure prophylaxis (PEP) consisting of both passive antibody administration and immunization with cell culture vaccines. In addition, pre-exposure vaccination is recommended for persons in high-risk groups, such as veterinarians, animal handlers, and certain laboratory workers.

Rabies Biologics

In general, two types of rabies products are available in the United States, namely, rabies vaccines and rabies immune globulin. Rabies vaccines induce an active immune response that includes the production of virus neutralizing antibodies. This antibody response requires approximately 7-10 days to develop and usually persists for several years. Rabies immune globulin (RIG) provides a rapid, passive immunity that persists for only a short time (half-life of approximately 21 days) to bridge the gap until the production of active immunity in response to vaccine administration.

Two formulations of inactivated rabies vaccines are currently licensed for pre-exposure and post-exposure prophylaxis in the United States (see below). When used as indicated, both types of rabies vaccines are considered equally safe and efficacious. A full 1.0-mL intramuscular (IM) dose is used for both pre-exposure and post-exposure prophylaxis. The vaccine MUST be given IM, therefore the only appropriate site for administration in the adult is the deltoid muscle. In children, the vaccine can also be administered in the anterolateral aspect of the thigh. The vaccine must NEVER be given in the gluteal muscle. There are no currently approved formulations for the intradermal dose and route for pre-exposure vaccination; all must be administered intramuscularly. Usually, an immunization series is initiated and completed with one vaccine product. No clinical studies were identified that document a change in efficacy or the frequency of adverse reactions when the series is completed with a second vaccine product.

Two rabies immune globulin (RIG) formulations are currently licensed and available in the United States (see below). In all post-exposure prophylaxis regimens, except for persons previously vaccinated, RIG should be administered concurrently with the first dose of vaccine.

A. Vaccines

1. **Human Diploid Cell Vaccine (HDCV):** HDCV is prepared from the Pitman-Moore strain of rabies virus grown on MRC-5 human diploid cell culture, concentrated by ultrafiltration, and inactivated with betapropiolactone. HDCV is formulated for IM administration in a single-dose vial containing lyophilized vaccine that is reconstituted in the vial with the accompanying sterile diluent to a final volume of 1.0 mL just before administration. Once dose of reconstituted vaccine contains <150 μg

neomycin sulfate, <100 mg albumin, and 20 μg of phenol red indicator. It contains no preservative or stabilizer.

- Manufacturer: Sanofi Pasteur
- Product name: Imovax®Rabies

2. **Purified Chick Embryo Cell Vaccine (PCECV):** PCECV became available in the United States in 1997. The vaccine is prepared from the fixed rabies virus strain Flury LEP grown in primary cultures of chicken fibroblasts. The virus is inactivated with betapropiolactone and further processed by zonal centrifugation in a sucrose density gradient. It is formulated for IM administration in a single-dose vial containing lyophilized vaccine that is reconstituted in the vial with the accompanying sterile diluent to a final volume of 1.0 mL just before administration. One dose of reconstituted vaccine contains <12 mg polygeline, <0.3 mg human serum albumin, 1 mg potassium glutamate, and 0.3 mg sodium EDTA. No preservatives are added.

   - Manufacturer: Novartis Vaccines and Diagnostics
   - Product name: RabAvert®

B. Rabies Immune Globulin (RIG)

The two RIG products licensed in the United States, HyperRab™ S/D and Imogam® Rabies-HT, are immunoglobulin (IgG) preparations concentrated by cold ethanol fractionation from plasma of hyper-immunized human donors. Both RIG products are standardized at an average potency value of 150 IU per mL, and supplied in 2-mL (300 IU) vials for pediatric use and 10-mL (1,500 IU) vials for adult use. The recommended dose is 20 IU/kg (0.133mL/kg) body weight. Both RIG preparations are considered equally efficacious when used as described.

These products are made from the plasma of hyperimmunized human donors that, in theory, might contain infectious agents. Nevertheless, the risk that such products will transmit an infectious agent has been reduced substantially by screening plasma donors for previous exposure to certain viruses, by testing for the presence of certain current virus infections, and by inactivating and/or removing certain viruses. No transmission of adventitious agents has been documented after administration of RIGs licensed in the United States.

- Product names: Imogam® Rabies-HT (sanofi pasteur) and HyperRab™ S/D (Talecris Biotherapeutics)

Currently Available Rabies Biologics -- United States, 2011

Biologic	Product Name	Manufacturer	Dose	Route	Indications
Human Rabies Vaccine			***1mL***	***Intramuscular***	***Pre-exposure or post-exposure[†]***
Human diploid cell vaccine (HDCV)	Imovax® Rabies*	Sanofi Pasteur 800-822-2463 http://www.vaccineplace.com/products/			
Purified chick embryo cell vaccine (PCECV)	RabAvert®	Novartis Vaccines and Diagnostics 800-244-7668 www.rabavert.com			
Rabies Immune Globulin			***20 IU/kg***	***Local***	***Post-exposure only[§]***
	Imogam® Rabies-HT	Sanofi Pasteur 800-822-2463 http://www.vaccineplace.com/products/			
	HyperRab™ S/D	Talecris Biotherapeutics Bayer Biological Products 800-243-4153 http://www.talecris-pi.info			

*Imovax rabies I.D., administered intradermally, is no longer available in the United States.

[†]For post-exposure prophylaxis, the vaccine is administered on days 0, 3, 7, and 14 in patients who have not been previously vaccinated and on days 0 and 3 in patients who have been previously vaccinated. For pre-exposure prophylaxis, the vaccine is administered on days 0, 7, and 21 or 28.

[§]As much of the product as is anatomically feasible should be infiltrated into and around the wound. Any remaining product should be administered intramuscularly in the deltoid or quadriceps (at a location other than that used for vaccine inoculation to minimize potential interference).

Source: CDC. Use of a reduced (4-dose) vaccine schedule for post-exposure prophylaxis to prevent human rabies – recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2010; 59(02);1-9.

Sources for Rabies Prophylactic Biologics

Large hospital emergency departments routinely maintain supplies of rabies biologics (i.e., rabies vaccine and immune globulin) and healthcare providers can order biologics from the manufacturer/distributor. To obtain prophylaxis, consult your healthcare provider. Occasionally, shortages of human rabies vaccine or HRIG occur. CDC maintains a web-page on vaccine and RIG availability at https://www.cdc.gov/rabies/resources/availability.html

Pre-Exposure Vaccination

Pre-exposure vaccination should be offered to persons in high-risk groups, such as veterinarians and their staff, animal handlers, rabies researchers, and certain laboratory workers. Pre-exposure vaccination should also be considered for other persons whose activities bring them into frequent contact with rabies virus or potentially rabid bats, raccoons, skunks, cats, dogs, or other species at risk for having rabies. In addition, international travelers might be candidates for pre-exposure vaccination if they are likely to come in contact with animals in areas where dog or other animal rabies is enzootic and immediate access to appropriate medical care, including rabies vaccine and immune globulin, might be limited.
Pre-exposure prophylaxis is administered for several reasons. First, although pre-exposure vaccination does not eliminate the need for additional medical evaluation after a rabies exposure, it simplifies management by eliminating the need for RIG and decreasing the number of doses of vaccine needed. This is particularly important for persons at high risk for being exposed to rabies in areas where modern immunizing products might not be available or where cruder, less safe biologics might be used, placing the exposed person at increased risk for adverse events. Second, pre-exposure prophylaxis might offer partial immunity to persons whose post-exposure prophylaxis is delayed. Finally, pre-exposure prophylaxis might provide some protection to persons at risk for unrecognized exposures to rabies.

- Pre-exposure vaccination regimens are as follows:

A. Intramuscular Primary Vaccination

- Three 1.0-mL injections of HDCV or PCECV should be administered intramuscularly (deltoid area) -- one injection per day on days 0, 7, and 21 or 28.

Rabies Pre-Exposure Prophylaxis Schedule -- United States, 2011

Type of Vaccination	Route	Regimen
Primary	Intramuscular	HDCV or PCECV; 1.0 mL (deltoid area), one each on days 0*, 7, and 21 or 28
Booster†	Intramuscular	HDCV or PCECV; 1.0 mL (deltoid area), day 0* only

HDCV= human diploid cell vaccine; PCECV = purified chick embryo cell vaccine

*Day 0 is the day the first dose of vaccine is administered.

†Persons in the continuous-risk category should have a serum sample tested for rabies virus neutralizing antibody every 6 months, and persons in the frequent-risk category should be tested every 2 years. An intramuscular booster dose of vaccine should be administered if the serum titer fails to maintain a

value of at least complete neutralization at a 1:5 serum dilution by rapid fluorescent focus inhibition test (RFFIT).
Source: CDC. Use of a reduced (4-dose) vaccine schedule for post-exposure prophylaxis to prevent human rabies – recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2010; 59(02); 1-9.

Note: Because the antibody response has been satisfactory after these recommended pre-exposure prophylaxis vaccine regimens, routine serologic testing to confirm seroconversion is not necessary except for persons suspected of being immunosuppressed.

B. Pre-Exposure Booster Doses of Vaccine

Following completion of the pre-exposure primary vaccination regimen, certain persons whose activities bring them into frequent contact with rabies virus or potentially rabid animals may need a **booster** dose of vaccine if their rabies neutralizing antibody level falls below an acceptable level (i.e., if the titer is less than complete neutralization at a 1:5 serum dilution by the RFFIT). The following table provides guidelines based upon level of risk.

Pre-Exposure Booster Doses of Vaccine Based on Risk Categories

Risk Category	Nature of Risk	Typical Populations	Pre-Exposure Recommendations
Continuous	Virus present continuously, often in high concentrations. Specific exposures likely to go unrecognized. Bite, nonbite, or aerosol exposure.	Rabies research laboratory workers; Rabies biologics production workers	Primary course. Serologic testing* every 6 months. Booster vaccination if antibody titer is below acceptable level.†
Frequent	Exposure usually episodic, with source recognized, but exposure also might be unrecognized. Bite, nonbite, or aerosol exposure.	Rabies diagnostic laboratory workers; Cavers, Animal control and wildlife workers in areas where rabies is enzootic; Veterinarians and staff; All persons who handle bats	Primary course. Serologic testing* every 2 years. Booster vaccination if antibody titer is below acceptable level.†
Infrequent	Exposure nearly always episodic with source recognized. Bite or nonbite exposure.	Veterinarians and animal control staff working with terrestrial animals in areas where rabies is uncommon to rare; Veterinary students; Travelers visiting areas where rabies is enzootic and immediate access to appropriate medical care, including biologics, is limited	Primary course. No serologic testing or booster vaccinations.
Rare	Exposure always episodic with source recognized. Bite or nonbite exposure.	U.S. population at large, Including persons in areas where rabies is enzootic	No vaccination necessary.

*Refer to pages 38-39 for information about serologic testing.

†Minimum acceptable antibody level is complete virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test (RFFIT). A booster dose should be administered if the titer falls below this level.

Source: CDC. Use of a reduced (4-dose) vaccine schedule for postexposure prophylaxis to prevent human rabies – recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2010; 59(02); 1-9.

C. Post-Exposure Prophylaxis for Previously Vaccinated Persons

If a person is exposed to rabies, local wound care remains an important part of post-exposure prophylaxis, even for previously vaccinated persons. If exposed to rabies, persons who have been previously vaccinated with either the recommended pre-exposure OR post-exposure regimen should receive **TWO** IM doses of vaccine (1.0 mL each in the deltoid), one immediately and one 3 days later. Administration of RIG is unnecessary and should not be administered to these persons because the administration of passive antibody might inhibit the relative strength or rapidity of an expected anamnestic (or "memory") immune response.

For previously vaccinated persons who are exposed to rabies, determining the rabies virus neutralizing antibody titer for decision-making about prophylaxis is inappropriate for at least three reasons. First, several days will be required to collect the serum and determine the test result. Second, no "protective" titer is known. Finally, although rabies virus neutralizing antibodies are important components, other immune effectors also are operative in disease prevention.

Post-Exposure Vaccination

In general, post-exposure prophylaxis (PEP) is indicated for persons exposed to a rabid animal in order to prevent infection with rabies virus. In the United States, the PEP regimen consists of local wound treatment, administration of one dose of immune globulin (with the exception of persons who have previously received complete vaccination regimens, either pre-exposure or post-exposure), and 4 doses of rabies vaccine over a 14-day period. Rabies immune globulin (RIG) and the first dose of rabies vaccine should be given as soon as possible after exposure. Additional doses of rabies vaccine should be given on days 3, 7, and 14 after the first vaccination. A 5-dose regimen (days 0, 3, 7, 14, and 28) of rabies vaccine should be administered for persons with altered immunocompetence, as they may experience a substantially reduced immune response to rabies vaccines. See chart on the next page for specific schedule and administration instructions.

If RIG was not administered when vaccination was begun (i.e., day 0), it can be administered up to and including day 7 of the post-exposure prophylaxis series. Beyond the seventh day, RIG is not indicated because an antibody response to cell culture vaccine is presumed to have occurred.

Rabies Post-Exposure Prophylaxis Regimen

Vaccination Status	Treatment	Regimen*
Not previously vaccinated	Local wound cleansing	PEP should **always** begin with immediate cleansing of all wounds with soap and water. If available, a virucidal agent such as a povidone-iodine solution should be used to irrigate the wounds.
	RIG	Administer 20 IU/kg body weight. If anatomically feasible, the **full** dose should be infiltrated around the wound(s) and any remaining volume should be administered IM at an anatomical site distant from vaccine administration. RIG should **not** be administered in the same syringe as vaccine. Because RIG might partially suppress active production of antibody, no more than the recommended dose should be given.
	Vaccine	HDCV or PCECV 1.0 mL, IM (deltoid area)[§], one each on days 0[#], 3, 7,and 14[‡] (and 28 if person is immunocompromised).
Previously vaccinated[†]	Local wound cleansing	PEP should **always** begin with immediate cleansing of all wounds with soap and water. If available, a virucidal agent such as a povidone-iodine solution should be used to irrigate the wounds.
	RIG	RIG should not be administered.
	Vaccine	HDCV or PCECV 1.0 mL, IM (deltoid area)[§], one each on days 0[#] and 3[‡].

*These regimens are applicable for all age groups, including pregnant women and children.

[†]Any person with a history of a complete pre-exposure or post-exposure vaccination regimen with HDCV, PCECV, or rabies vaccine adsorbed, or previous vaccination with any other type of rabies vaccine and a documented history of antibody response to the prior vaccination.

[§]The deltoid area is the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh may be used. Vaccine should never be administered in the gluteal area.

[#]Day 0 is the day the first dose of vaccine is administered.

[‡]Vaccination should correspond with this regimen. However, in rare cases when it is not possible to administer the vaccine on the appropriate day, the time between doses should be lengthened rather than shortened (e.g., if a person cannot receive the second dose of vaccine on day 3, it should be administered as soon after day 3 as possible). The schedule of subsequent doses of vaccine should be adjusted so that the time between doses is consistent with recommendations (e.g., if vaccine was administered on day 4, subsequent doses should be given on days 8 and 15) to ensure adequate and proper immune response. Please contact the Epidemiology Program of the Georgia Department of Public Health at 404-657-2588 for consultation.

Source: CDC. Use of a reduced (4-dose) vaccine schedule for post-exposure prophylaxis to prevent human rabies – recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2010; 59(02); 1-9.

Assessing the Need for PEP

Administration of rabies PEP is a medical urgency, not a medical emergency. Persons who have been bitten by animals suspected or confirmed to be rabid should begin PEP as soon as possible. However, very long incubation periods (up to 1 year) have been reported in humans. Thus, when a documented or likely exposure has occurred, PEP is indicated regardless of the length of the delay, provided the symptoms and clinical signs of rabies are not present. Under most circumstances, PEP should not be initiated while the biting, healthy dog, cat, or ferret is still in the 10-day confinement period. However, during the 10-day confinement period, begin PEP at the first sign of rabies in a dog, cat, or ferret that has bitten someone.

Healthcare providers should evaluate each possible exposure to rabies and when necessary consult with the Georgia Poison Center or public health officials regarding the need for rabies PEP.

In the United States, the following factors should be considered in the rabies risk assessment before PEP is initiated:

- type of exposure (bite or non-bite)
- the geographic location of the incident (rabies endemic area)
- the type of animal that was involved
- circumstances of the exposure (provoked or unprovoked)
- the vaccination status of the animal
- whether the animal can be safely captured and observed and/or tested for rabies (captured wild animals are euthanized and tested immediately, depending on species)

In general, the highest risk of rabies transmission is associated with bite exposure from terrestrial wild carnivores or bats (see Decision Trees A-1 and A-2). Raccoons, skunks, and foxes are the terrestrial animals most often infected with rabies. Suggestive clinical signs of rabies among wildlife cannot be interpreted reliably. All bites by such wildlife must be considered possible exposures to the rabies virus. PEP should be initiated as soon as possible following exposure to wildlife, unless the animal is available for testing and shows no evidence of rabies (e.g., a negative test).

In addition, bats are increasingly implicated as important wildlife reservoirs for variants of rabies virus transmitted to humans. In all instances of potential human exposures involving bats, the bat in question should be safely collected, if possible, and submitted for rabies diagnosis. Rabies PEP is recommended for all persons with bite, scratch, or mucous membrane exposure to a bat, unless the bat is available for testing and shows no evidence of rabies (e.g., a negative test). PEP might also be appropriate even if a bite, scratch, or mucous membrane exposure is not apparent when there is reasonable probability that such exposure might have occurred (see pages 40-42 for more specific information about bats and rabies).

The likelihood of rabies in a domestic animal varies by region; hence, the need for PEP also varies. In the continental United States, rabies among dogs has been reported sporadically along the United States-Mexico border and in areas of the United States with enzootic wildlife rabies. During 2000-2006, more cats than dogs were reported rabid in the United States. The majority of these cases were associated with the epizootic of rabies among raccoons in the eastern United States. The large number of rabid cats compared with other domestic animals might be attributed to a lower vaccination rate among cats because of less stringent cat vaccination laws, fewer confinement or leash laws, and the nocturnal activity patterns of cats placing them at greater risk for exposure to infected raccoons, skunks, foxes, and bats. In certain developing countries, dogs remain the major reservoir and vector of rabies and represent an increased risk for rabies exposure in such countries.

In the United States, a currently vaccinated dog, cat, or ferret is unlikely to become infected with rabies (see Decision Tree B). Although all species of livestock are susceptible to rabies, they are infrequently found to be infected (see Decision Tree C). Cattle and horses are among the most frequently reported rabid livestock; in many cases these animals have a previously reported history of exposure to a wildlife rabies reservoir, such as raccoon, skunk, or bobcat.

Small rodents (e.g., squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, and mice) and lagomorphs (including rabbits and hares) are rarely infected with rabies and have not been known to transmit rabies to humans (see Decision Tree D). In all cases involving rodents, Georgia Poison Center or public health officials should be consulted before a decision is made to initiate PEP.

An unprovoked attack by an animal might be more likely than a provoked attack to indicate that the animal is rabid. Bites inflicted on a person attempting to feed or handle an apparently healthy animal should generally be regarded as provoked.

Refer to the chart on the next page and to the Decision Trees on pages 28-32 for specific guidelines.

Rabies Post-Exposure Prophylaxis and Animal Guide

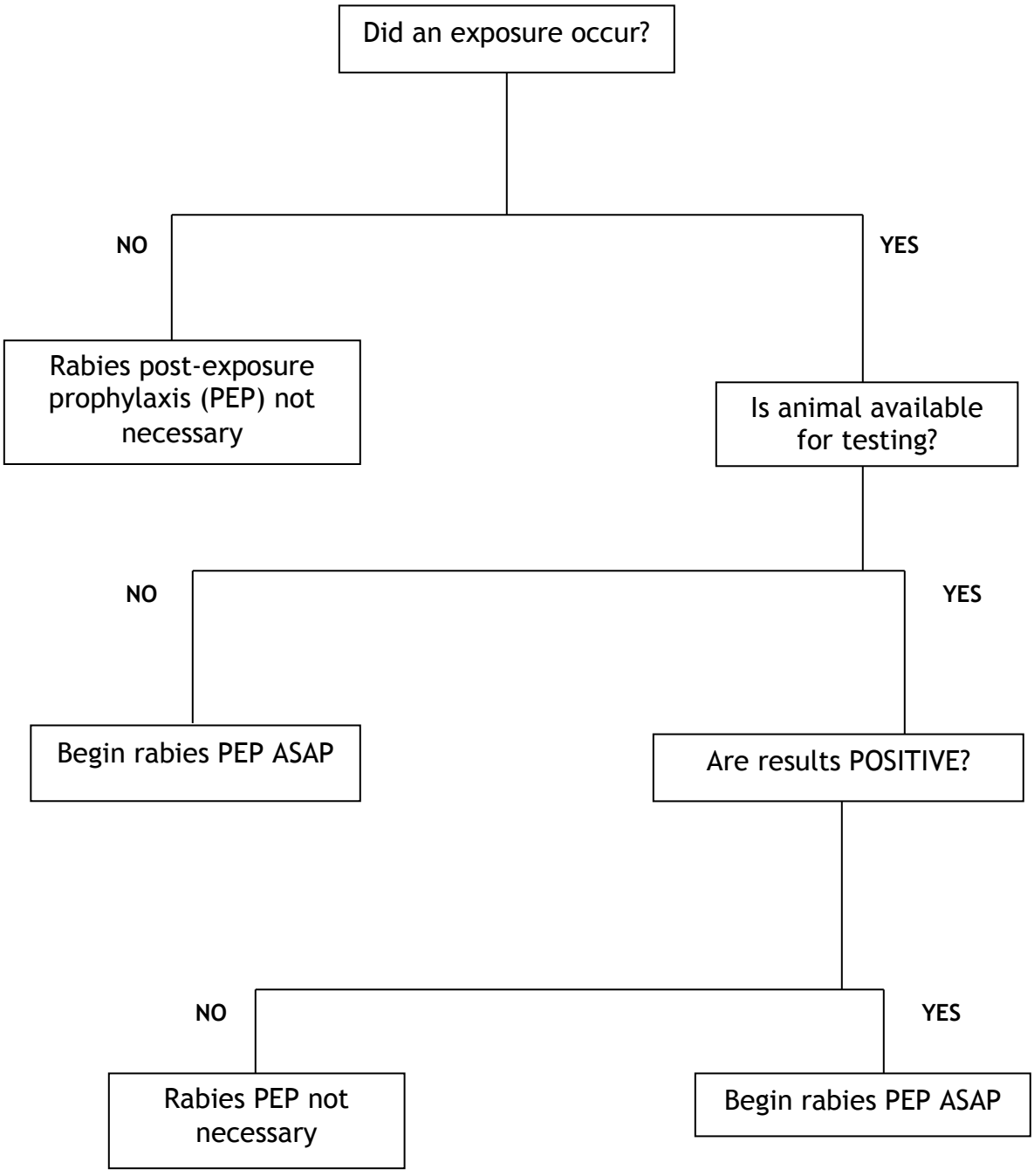
Animal Type	Evaluation and Disposition of Animal	Post-Exposure Prophylaxis Recommendations
Dogs, cats, and ferrets	Healthy and available for 10-day confinement	Persons should not begin PEP unless animal develops clinical signs of rabies.*
	Rabid or suspected rabid	Immediately begin PEP.
	Unknown (e.g., escaped)	Consult Georgia Poison Center or public health officials.
Skunks, raccoons, bobcats, foxes and most other carnivores; bats	Regarded as rabid unless animal proven negative by laboratory tests†	Consider immediate PEP.
Livestock, small rodents, lagomorphs (rabbits and hares), large rodents (woodchucks and beavers), and other mammals	Consider individually.	Consult Georgia Poison Center or public health officials. Bites from squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, other small rodents, rabbits, and hares almost never require PEP. Larger rodents may be a risk.

*During the 10-day observation period, begin PEP at the first sign of rabies in a dog, cat, or ferret that has bitten someone. If the animal exhibits clinical signs of rabies, it should be euthanized immediately and tested.

†The animal should be euthanized and tested as soon as possible. Holding for observation is not recommended.

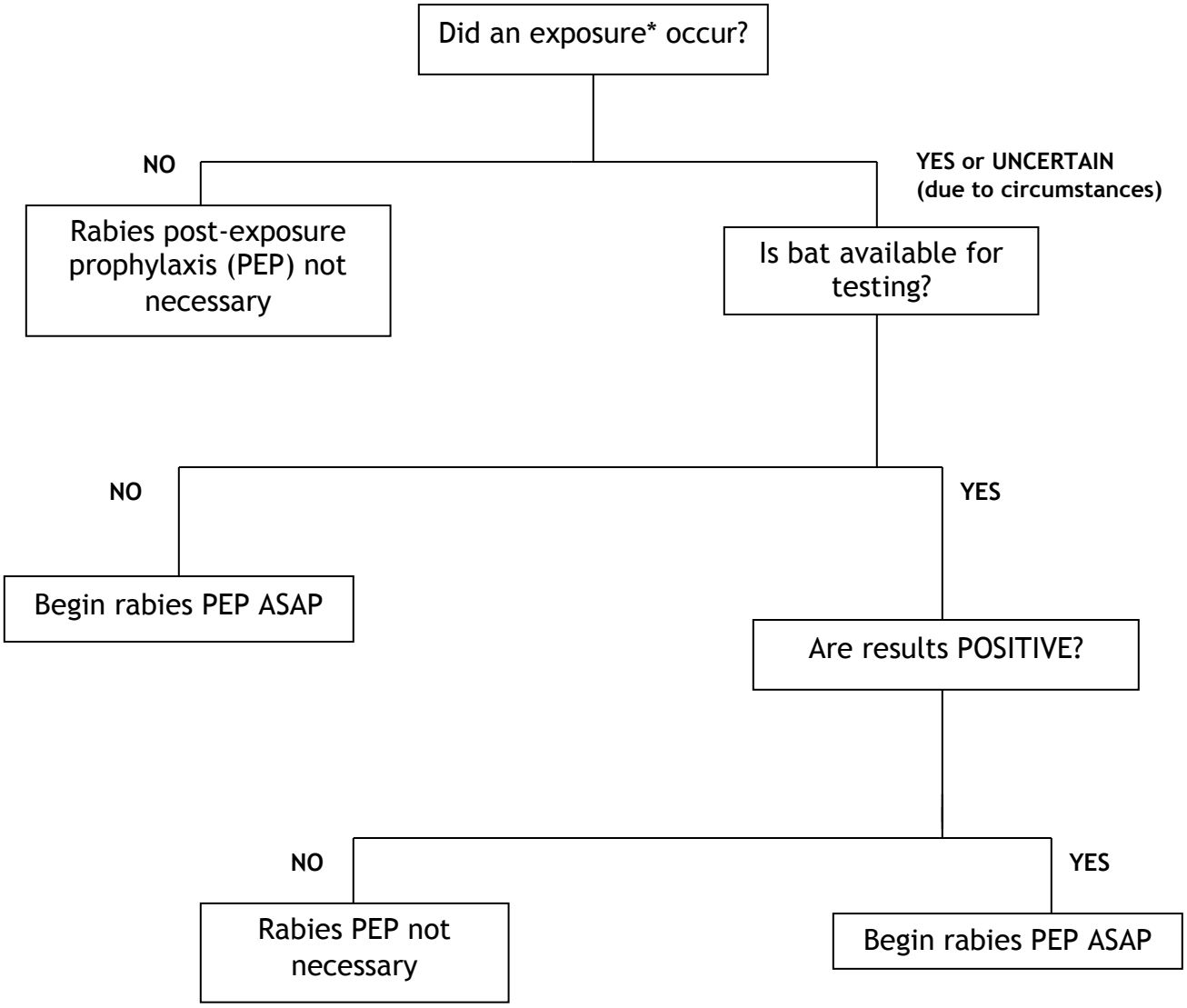
Decision Tree A-1
HIGH RISK ANIMALS

Wild Carnivore (Raccoon, Fox, Skunk, etc.) Exposure



Decision Tree A-2
HIGH RISK ANIMALS

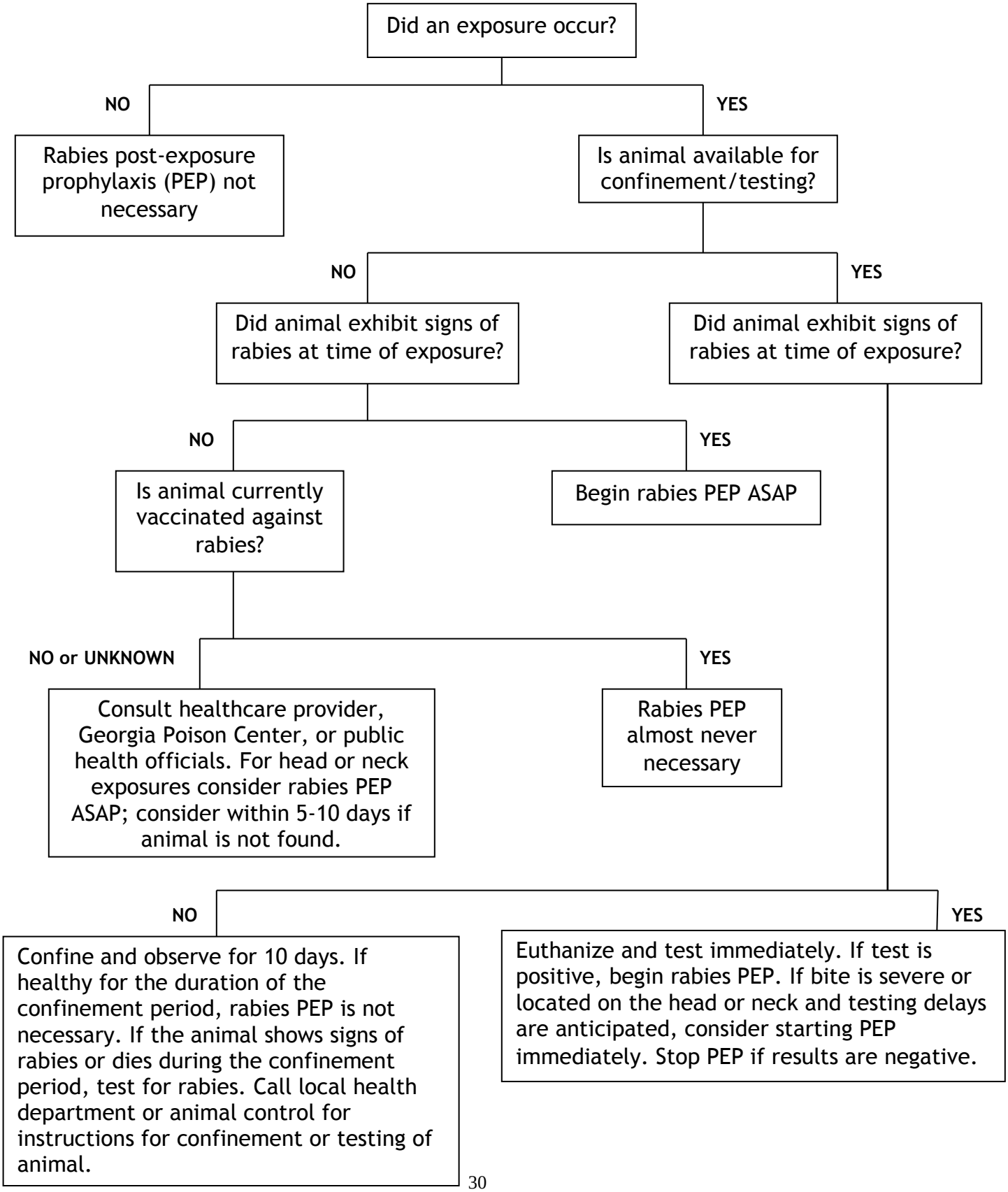
Bat Exposure



*Any direct contact between a person and a bat should be evaluated for an exposure. If the person can be reasonably certain a bite, scratch, or mucous membrane exposure did not occur, or if the bat is available for testing and is negative for presence of rabies virus, post-exposure prophylaxis is not necessary. Other situations that might qualify as exposures include finding a bat in the same room as a person who might be unaware that a bite or direct contact had occurred (e.g., a deeply sleeping person awakens to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person). These situations should not be considered exposures if rabies is ruled out by diagnostic testing of the bat, or circumstances suggest it is unlikely that an exposure took place. Other household members who did not have direct contact with the bat or were awake and aware when in the same room as the bat should not be considered as having been exposed to rabies.

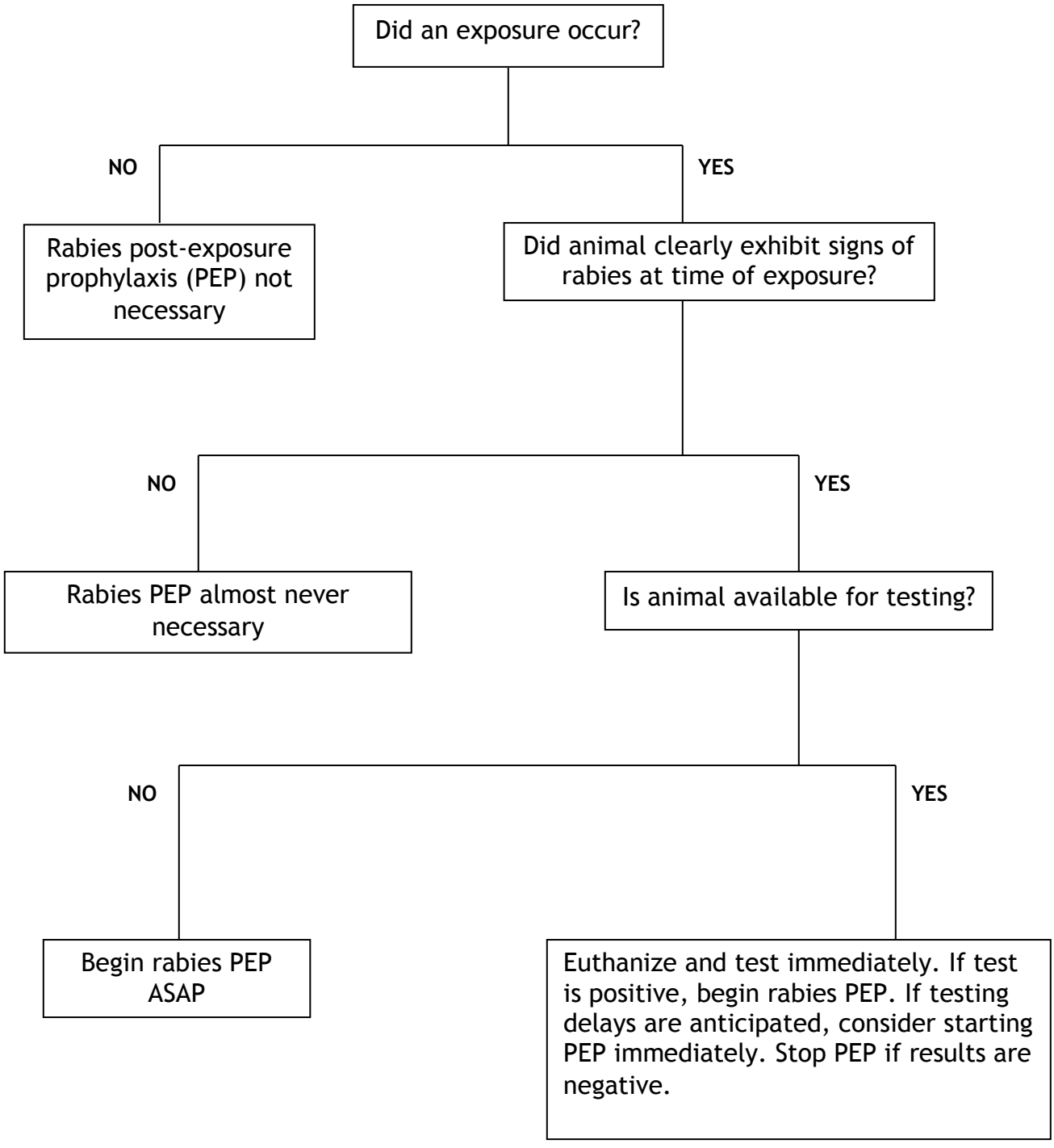
Decision Tree B
INTERMEDIATE RISK ANIMALS

Dog, Cat, or Ferret Exposure



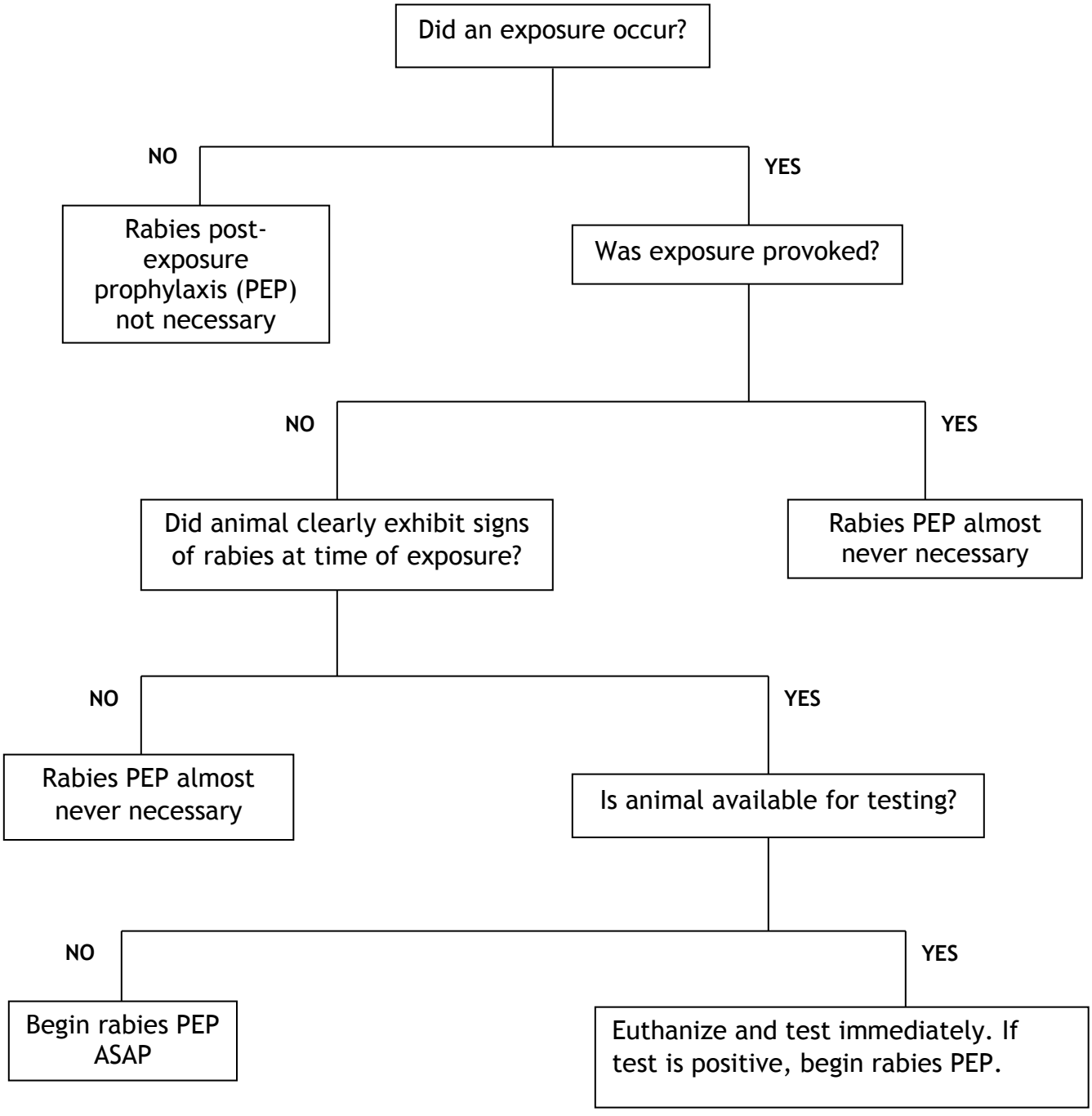
Decision Tree C
LOW RISK ANIMALS

Livestock Exposure



Decision Tree D
VERY LOW RISK ANIMALS

Rodent* & Rabbit Exposure



*Includes squirrels, chipmunks, rats, mice, hamsters, guinea pigs, gerbils.

III. LABORATORY DIAGNOSIS OF RABIES

A. General Principles of Rabies Diagnosis in Animals

The rapid and accurate laboratory diagnosis of rabies infections in animals is essential for the timely administration of rabies post-exposure prophylaxis. Diagnosis may also aid in defining current epidemiologic patterns of rabies and in recognizing the need for the development of rabies control programs. In Georgia, animal rabies diagnosis is provided by the two laboratories of the Georgia Public Health Laboratory (GPHL) in accordance with the established national standardized protocol for rabies testing (http://www.cdc.gov/rabies/pdf/RabiesDFASPv2.pdf).

The direct fluorescent antibody test (DFA) is the most common method to diagnose rabies in animals. All rabies laboratories in the United States perform this test on the brain tissue of animals suspected of having rabies. The DFA test is based on the principle that an animal infected by rabies virus will have rabies virus protein (antigen) present in this tissue. This test has been thoroughly evaluated for more than 40 years and is recognized as the most rapid and reliable of the tests for routine use.

Rabies virus has an affinity for brain tissue (and not blood like many other viruses). Therefore, the ideal test used is DFA for the presence of rabies antigen in the brain. The most important part of a DFA test is flourescein-labeled (FITC) anti-rabies antibody. When labeled antibody is added to rabies-suspect brain tissue and rabies virus is present, it forms a rabies virus FITC-antibody-antigen complex. Unbound antibody can be washed away and the areas where the antigen has bound will appear as a bright fluorescent apple green color when viewed with a fluorescence microscope. If rabies virus is absent, there will be no staining.

B. Specimen Collection, Labeling, and Submission

A key factor in obtaining reliable laboratory results is the condition of the specimen when received by the laboratory. Shipping of specimens should be coordinated with the county health department or animal control officer. Containers for shipment are available from county health departments or from GPHL Virology Lab (404-327-7980).

- **Submission Guidelines**

  1. Only specimens received in good condition with at least two identifiable brain parts are approved for reporting test results.

  2. For a specimen to be accepted for testing, there must have been exposure of a human or domestic animal to the suspected rabid animal.

  3. The laboratories are not equipped to handle whole carcasses: only the HEAD is accepted as a specimen, except for bats and animals of similar size, which should be submitted whole. Whole carcasses of any larger animal will be returned to the sender for resubmission of the HEAD ONLY.

4. The following guidelines are recommended for the removal of animal heads (whenever possible, this procedure should be performed by a person who has received pre-exposure rabies vaccine and training on animal head removal, for example, veterinarians, DPH environmental health staff, Georgia Department of Agriculture staff, and animal control officers).

   - Rubber gloves and protective clothing as well as face and eye protection should be worn while the head is being removed and packaged.
   - Sever the head between the foramen magnum and the atlas. Local veterinarians or trained animal control personnel can assist in this removal.
   - Allow fluids and blood to drain from the head. Keep as clean as possible and place the head in a double plastic bag for transport to the laboratory. **Keep animal head cold by placing ice packs in shipper.**
   - If fleas or ticks are present, spray insecticide into the plastic bag containing the head before closing. Do not send maggots.
   - Cutting surfaces and instruments should be thoroughly cleaned with detergent and water and disinfected. Gloves should also be cleaned and disinfected or discarded following use.

5. Only brain material (not the entire head) of very large or horned animals (e.g., cows, horses, goats) will be accepted due to limitations for handling in the laboratory. Removal of the brain should only be attempted by a veterinarian or referred to Athens/Tifton Diagnostic Labs (706-542-5568). Athens/Tifton Diagnostic Lab will forward half of the brain to GPHL. Whole heads of large animals received by the laboratory will be returned to the sender for resubmission of the BRAIN ONLY.

6. Rodents (e.g., rats, mice, gerbils, hamsters, guinea pigs, chipmunks, voles, squirrels, moles) and rabbits are not usually involved in the rabies cycle and will not be accepted for testing without prior arrangements with the State Epidemiology Program (404-657-2588) or the Georgia Public Health Laboratory to which the specimen is being sent (Atlanta/Decatur: 404-327-7980; Waycross: 912-285-6000)

7. If specimens cannot be delivered to the laboratory immediately, refrigerate but DO NOT FREEZE. Frozen specimens cannot be tested until they thaw, which may cause a delay in reporting.

8. Do NOT send tissue in a preservative such as formalin, as rabies testing cannot be performed on such specimens.

- **Laboratory Submission Form**

    - A Rabies Submission Form #3583B should accompany each specimen submitted for rabies examination. This form should be generated automatically in SendSS from the Animal Bite Module. Hand written forms should not be used. If you are having issues with your SendSS access, please contact our DPH SendSS team at 404-657-6450. If a hand written form must be submitted, it should be filled out completely and legibly, making sure to include accurate addresses and phone numbers for use in reporting results. If you do not have a GPHL submitter code, please call GPHL at 404-327-7980 to have one assigned to you prior to submission. **Veterinary clinics/hospitals and private citizens should not submit specimens directly to GPHL. Veterinarians, clinics/hospitals and private citizens should contact the local health department, environmental health, or animal control agency for assistance in submitting specimens for rabies testing.**

    - Blank forms may be found on the Department of Public Health website at: https://dph.georgia.gov/sites/dph.georgia.gov/files/related_files/site_page/Rabies_Lab_Submit_Form3583B_a1-1%20%282%29.pdf

- **Specimen Shipment Guidelines:**

Specimens submitted to GPHL for rabies testing using ground transportation such as UPS, Greyhound, couriers, etc. must be packaged and labeled according to the Department of Transportation **(DOT)** requirements for transporting infectious substances under U.S. Department of Transportation's(DOT's) Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180).

- Specimens being submitted for rabies testing meet the DOT classification of Biological Substance, Category B.

- Containers for shipment are available from county health departments or from GPHL Virology Lab (404-327-7980). Rabies testing is available Monday through Friday.

Instructions for Packaging and Shipping Biological Substances, Category B:

- Properly package the specimen by placing the severed animal head in a double plastic bag and secure the bag by twisting and knotting. For bats or similar size animals, do not remove the head, but submit whole. For large animals or horned animals (e.g., cows, horses, goats) submit the BRAIN ONLY (consult the attending veterinarian).

- Place the large plastic bag into the Styrofoam container. Add cold packs, not loose ice, to keep animal head cold. DO NOT USE DRY ICE!

- Use sufficient absorbent packing material, to cushion the specimen(s) and to absorb any leaks.

- Seal the Styrofoam container.

- Print and complete the SendSS rabies submission form. Ensure the point of contact name and number are provided on the form. This contact must be available to receive telephone results from the GPHL Virology Unit.

- Place the completed submission form in the gold envelope, and tape to the lid of the Styrofoam container.

- Place the Styrofoam container in the outer cardboard box shipper.

- Secure the outer container with packing tape.

- Tape the GPHL address, found below, and the (supplied) diamond-shaped "Biological Substance, Category B" UN3373 label to this box. **NOTE: DO NOT send specimens for testing to the DPH Epidemiology Program. The Georgia Public Health Laboratory (address below) is located several miles from the state DPH Epidemiology office. Specimens sent to the incorrect address will be returned and may not be suitable for testing after a several day delay**.

- Courier agents may need to inspect the container before accepting the shipment to ensure it is properly packaged for transport. Do not seal the box until inspection occurs, if necessary.

- The package should be shipped PREPAID "Ground Transportation" to the nearest Public Health Laboratory using the method of shipment that will assure prompt delivery.

  CONTAINERS WITH SPECIMENS TO BE SENT BY AIR must meet additional packaging requirements. Please coordinate with specific air courier to ensure air transport packaging and pressure requirements are met.

- Addresses and telephone numbers of laboratories are as follows:

Georgia Public Health Laboratory 1749 Clairmont Road Decatur, Georgia 30033-4050 Phone (GPHL): 404-327-7900 Phone (GPHL-Virology): 404-327-7980	Waycross Regional Laboratory 1751 Gus Karle Parkway Waycross, Georgia 31503 Phone: 912-388-7050

- Any bite case with a strong probability of human rabies exposure **should be handled with utmost speed**. Where possible, hand deliver such

specimens after telephoning ahead to advise the laboratory of the expected time of arrival.

- Avoid shipping specimens on weekends or holidays unless prior approval has been obtained from the laboratory manager. Special instructions regarding labeling will be needed to ensure that weekend courier or security personnel are notified to receive the specimen from the carrier. A better alternative is to place the specimen in double plastic bags as described above and refrigerate until shipment can be made when the laboratory is in operation Monday through Friday, unless the test result is urgent.

C. Reporting and Interpreting Results

Rabies testing is available Monday through Friday. Due to the time required for tissue fixation, reports will ordinarily be issued the **next** business day following receipt of the specimen, provided that the specimen is received by 10:00 a.m. Reporting will be delayed on specimens that are frozen.

- Specimens received on Friday or those involved in emergency situations (i.e., severe human head or neck exposures or human exposures for which emergency testing has been approved by the Epidemiology Program at 404-657-2588) will be tested and reported the same day received, provided they arrive in the laboratory by 10:00 a.m. Otherwise, results will be reported the following business day.

- If the brain is decomposed or damaged to the point that the laboratory is uncertain as to whether the specimen is the appropriate brain tissue, testing will not be done unless there is human exposure. Report will read **"UNSATISFACTORY"** with the comment: "Test requires at least two identifiable brain parts." In this situation, an unsatisfactory test result should be treated as if **POSITIVE**.

- If **POSITIVE** or **NEGATIVE**, the report will so state.

- All positive, negative, and unsatisfactory rabies results are immediately telephoned or electronically reported to the submitter listed on the Rabies Submission Form.

- Electronic reporting is available for all submitters. Please contact GPHL (404-327-7980) to initiate electronic reporting.

Paper copies of reports will be mailed to submitters that do not receive their reports electronically.

D. Serologic Testing

All persons tested during several CDC studies 2-4 weeks after completion of pre-exposure and post-exposure rabies prophylaxis in accordance with ACIP guidelines have demonstrated an adequate antibody response to rabies. Therefore, serum samples from patients completing pre-exposure or post-exposure prophylaxis do not need to be tested to document seroconversion unless the person is immunosuppressed. If titers are obtained, specimens collected 2-4 weeks after completing the pre-exposure or post-exposure prophylaxis regimen should completely neutralize challenge virus at a 1:5 serum dilution by the Rapid Fluorescent Focus Inhibition Test (RFFIT). Although antibody levels do not define a person's immune status, they are markers of continuing immune response.

In animals, neutralizing antibody titers have been shown to be imperfect markers of protection. Antibody titers will vary with time since the last vaccination. Titers do not directly correlate with protection because other immunologic factors also play a role in preventing rabies and our abilities to measure and interpret those other factors are not well developed. **Therefore, evidence of circulating rabies virus antibodies should not be used as a substitute for current vaccination in managing rabies exposures or determining the need for booster vaccinations in animals.**

Although virus neutralizing antibody levels may not definitively determine a person's susceptibility or protection from a rabies virus exposure, titers in persons at risk for exposure are used to monitor the relative rabies immune status over time. Considering these issues, serologic testing to quantitate antibody levels after rabies vaccination in humans and animals is applicable in the following cases:

- A person at "continuous risk" of exposure to rabies should have a serum sample tested for rabies antibody every six months (see page 21). This includes rabies research laboratory workers and rabies biologics production workers.

- A person at "frequent risk" of exposure to rabies should have a serum sample tested for rabies antibody every two years (see page 21). This includes: rabies diagnostic laboratory workers; cavers; veterinarians and staff; animal control and wildlife workers in areas where rabies is enzootic; and persons who frequently handle bats. Local Georgia DPH Environmental Health staff who may remove animal heads for testing fall into this category.

- Some "rabies-free" jurisdictions may require evidence of vaccination and rabies antibodies in domestic animals (dogs and cats) for importation purposes. CONTACT INDIVIDUAL COUNTRIES FOR IMPORT REQUIREMENTS. Keep in mind there is not an established "protective" titer in animals. Titers do not directly correlate with protection because other immunologic factors also play a role in preventing rabies and our abilities to measure and interpret those other factors are not well developed. Therefore, evidence

of circulating rabies virus antibodies should not be used as a substitute for current vaccination in managing rabies exposures or determining the need for booster vaccinations in animals.

There are two types of RFFIT tests depending on the request: a **screen** test simply tells the patient/client if a booster of rabies vaccine is indicated and serum is tested at two dilutions. An **end-point** titer is used to determine the exact titer and is tested at serial five-fold dilutions until an end-point is reached. This test is indicated for those who want to know their exact titer and for animals being exported to some rabies-free countries. Testing requires two milliliters (mls) of serum.

- **Laboratories conducting rabies serologic testing**

  Note: Phoning the laboratory in advance for correct forms, testing costs, and proper instructions is recommended. NOTE: animal serologic testing for dogs and cats exposed to rabies without documentation of a rabies vaccine must be coordinated with the State Epidemiology Program – see Appendix B, Progressive Serological Monitoring Protocol.

☆ Atlanta Health Associates, Inc.
309 Pirkle Ferry Road, Suite D300
Cumming, GA 30040
Phone: 800-717-5612
Fax: 770-205-9021
www.atlantahealth.net

☆ Kansas State University
Rabies Laboratory
2005 Research Park Circle
Manhattan KS 66502
Phone: 785-532-4483
Fax: 785-532-4474
www.ksvdl.org/rabies-laboratory

IV. RABIES CONTROL DURING DISASTER RESPONSE

Animals may be displaced during and after manmade or natural disasters and require emergency sheltering. Animal rabies vaccination and exposure histories are often not available for displaced animals and disaster response creates situations where animal caretakers may lack appropriate training and previous vaccination. For these situations it is critical to implement and coordinate rabies prevention and control measures to reduce the risk of rabies transmission and the need for human PEP. Public health officials and other response partners should consider the following control measures, when feasible:

- Examine each animal at a triage site for signs of rabies.
- Isolate animals exhibiting signs of rabies pending evaluation by a veterinarian.
- Ensure that all animals have a unique identifier.
- Administer a rabies vaccination to all dogs, cats and ferrets unless reliable proof of vaccination exists.
- Adopt minimum standards for animal caretakers that include personal protective equipment, previous rabies vaccination, and appropriate training in animal handling.
- Maintain documentation of animal disposition and location (e.g., returned to owner, died or euthanized, adopted, relocated to another shelter, address of new location).
- Provide facilities to confine and observe animals involved in exposures.
- Report human exposures to appropriate public health authorities.

V. BATS AND RABIES

The most common rabies virus variants responsible for human rabies in the United States are bat-related; therefore, any potential exposure to a bat requires a thorough evaluation. During 1990-2013, a total of 43 naturally acquired bat-associated human cases of rabies were reported in the United States. In 9 cases, a bite was reported; in 3 cases, contact with a bat and a probable bite were reported. In 19 cases, physical contact was reported (e.g., the removal of a bat from the home or workplace or the presence of a bat in the room where the person had been sleeping) but no bite was documented. In 12 cases, no bat encounter was reported; in these cases, an unreported or undetected bat bite remains the most plausible hypothesis because the genetic sequences of the human rabies viruses closely matched those of specific species of bats. Clustering of human cases associated with bat exposures has never been reported in the United States (e.g., within the same household or among a group of campers where bats were observed during their activities). The risk for rabies resulting from an encounter with a bat may be difficult to determine because of the limited injury inflicted by a bat bite (compared with more obvious wounds caused by the bite of terrestrial carnivores), an inaccurate recall of a bat encounter that may have occurred several weeks or months earlier, and evidence that some bat-related rabies viruses may be more likely to result in infection after inoculation into

superficial epidermal layers. For these reasons, any direct contact between a human and a bat should be evaluated for an exposure.

Awareness of the facts about bats and rabies can help people protect themselves, their families, and their pets.

- **Bat Rabies Prevention Tips**

    - It is not possible to tell if a bat has rabies by looking at it. Rabies can be confirmed only in a laboratory. However, any bat that is active by day, is found in a place where bats are not usually seen (for example, in a room in the house or on the lawn), or is unable to fly is far more likely than others to be rabid. Such bats are often the most easily approached. Therefore, it is best never to handle any bat.

    - Bat bites are not always visible. Therefore, in situations in which a bat is physically present and there is a possibility of exposure, the person should seek medical advice and the bat should be safely captured (see next page) and submitted to a rabies laboratory for testing. If rabies cannot be ruled out by laboratory testing, or if the bat is not available for testing, people with a reasonable probability of an exposure may be recommended for rabies post-exposure prophylaxis. Scenarios that **may** indicate a reasonable probability of exposure to rabies include:

- a child picks up a live bat
- an adult touches a bat without seeing the part of the body they touched
- a bat flies into a person and touches bare skin
- a person steps on a bat with bare feet
- a deeply sleeping person awakens to find a bat in the room
- a bat is found near an infant, toddler, or mentally impaired or intoxicated person.

Assistance with bat capture may be provided by a local animal control agency or health department. If professional help is immediately unavailable, the bat may be safely captured by following these steps:

Safe Bat Capture

- Equipment needed: leather work gloves; small box or coffee can; piece of cardboard; tape.

- When the bat lands, approach it slowly while wearing the gloves and place the box or coffee can over it. Slide the cardboard under the container to trap the bat inside.

- Tape the cardboard to the container securely and punch very small holes (1/8 inch or less in diameter) in the cardboard, allowing the bat to breathe.

- If any possible contact between the bat and a person or domestic animal has occurred, do not release the bat. Contact the health department or animal control agency to make arrangements for rabies testing.

- If no human or pet exposure has occurred, take the container outdoors immediately and release the bat away from people and pets.

- Some bats live in buildings, and there may be no reason to evict them if there is little chance for contact with people. However, bats should always be prevented from entering living quarters or occupied spaces in homes, churches, schools, and other similar areas where they might contact people and pets. Assistance with "bat-proofing" homes can be provided by an animal control or wildlife conservation agency. Another excellent resource is Bat Conservation International at www.batcon.org.

- If there is suspicion that a pet or domestic animal has been bitten by a bat, contact a veterinarian or health department for assistance immediately and have the bat tested for rabies. Remember to keep vaccinations current for cats, dogs, ferrets, and other animals.

Citation is given to the Centers for Disease Control for information contained in the brochure, "Bats and Rabies: A Public Health Guide"

VI. FREQUENTLY-ASKED QUESTIONS (FAQ) ABOUT RABIES

What is the incubation period of rabies in animals and humans?

The incubation period is the time between exposure and onset of clinical signs of disease. The incubation period may vary from a few days to several years, but typically lasts 1 to 3 months. This period is quite long because the rabies virus spreads slowly through the nerves to the spinal cord and brain. There are no signs of illness during the incubation period; rabies virus is not transmissible during this time. When the virus reaches the brain, it multiplies rapidly and passes to the salivary glands. At this point, clinical signs of rabies are evident and rabies virus can be transmitted via saliva.

How can I protect my pet from rabies?

First, visit your veterinarian with your pet on a regular basis and keep rabies vaccinations up-to-date for all dogs, cats, and ferrets. Second, maintain control of your pets by keeping cats and ferrets indoors and keeping dogs under direct supervision. Third, spay or neuter your pets to help reduce the number of unwanted pets that may not be properly cared for or vaccinated regularly. Lastly, call animal control to remove all stray animals from your neighborhood since these animals may be unvaccinated or ill.

Why does my pet need the rabies vaccine?

Although the majority of rabies cases occur in wildlife, most humans are given rabies vaccine as a result of exposure to domestic animals. This explains the tremendous cost of rabies prevention in domestic animals in the United States. While wildlife are more likely to be rabid than are domestic animals in the United States, the amount of human contact with domestic animals greatly exceeds the amount of contact with wildlife. Your pets and other domestic animals can be infected when they are bitten by rabid wild animals. When "spillover" rabies occurs in domestic animals, the risk to humans is increased. Pets are therefore vaccinated by your veterinarian to prevent them from acquiring the disease from wildlife and thereby transmitting it to humans.

The animal I'm treating is overdue for their rabies booster. Should I administer a 1 year or 3 year booster vaccine to overdue animals?

A 1 year or 3 year booster vaccine can be given to animals with an expired vaccine as long as the animal was initially vaccinated at the appropriate age with a 1 year vaccine. Veterinarians should check with their local rabies authority to see if the county has any regulations on 1 vs 3 year booster vaccines. Boosters should be administered, according to county specifications, if the animal is overdue for any length of time.

My dog just fought with a raccoon and I picked him up to see whether he had any wounds. Am I at risk for rabies?

This would be considered of minimal risk but the first line of defense is to always wash hands with soap and water. Non-bite exposures (other than organ or tissue transplants) have rarely been proven to cause rabies and post-exposure prophylaxis is not indicated unless saliva or other potentially infectious material was directly introduced into fresh, open cuts in the skin or onto mucous membranes. Rabies virus is inactivated by desiccation, ultraviolet irradiation, and other factors and does not persist in the environment (e.g., on a dog's fur).

Can a vaccinated animal ever get rabies?

Rabies is rare in vaccinated animals. If such an event is suspected, it should be reported immediately to District public health officials and the State Epidemiology Program. The laboratory diagnosis should be confirmed and the virus characterized by a rabies reference laboratory. A thorough epidemiologic investigation should be conducted.

Can I use rabies titers as a substitute for current vaccination or in the management of domestic animals exposed to rabies?

No, rabies titers alone are only one marker of immunity and may not indicate absolute protection. Titers do not directly correlate with protection because other immunologic factors also play a role in preventing rabies and our abilities to measure and interpret those other factors are not well developed. Titers may only be used as documented in Appendix B: Progressive Serological Monitoring Protocol to determine past vaccination status of an animal with undocumented vaccine history.

Will the rabies vaccine make me sick?

Adverse reactions to rabies vaccine and immune globulin are not common. Newer vaccines in use today cause fewer adverse reactions than previously available vaccines. Mild, local reactions to the rabies vaccine, such as pain, redness, swelling, or itching at the injection site, have been reported. Rarely, symptoms such as headache, nausea, abdominal pain, muscle aches, and dizziness have been reported. Local pain and low-grade fever may follow injection of rabies immune globulin.

What if I cannot get rabies vaccine on the day I am supposed to get my next dose?

Consult with your doctor or state or local public health officials for recommended times if there is going to be a change in the recommended schedule of shots. Rabies prevention is a serious matter and changes should not be made in the schedule of doses if at all possible.

Should I be concerned about rabies when I travel outside the United States?

Yes. Rabies and rabies-like viruses occur in animals anywhere in the world. When traveling, it is always prudent to avoid approaching any wild or domestic animal.

The developing countries in Africa, Asia, and Latin America have additional problems in that dog rabies is common there and human PEP may be difficult to obtain. The importance of rabid dogs in these countries, where tens of thousands of people die of the disease each year, cannot be overstated. Unlike programs in developed countries, dog rabies vaccination programs in developing countries have not always been successful. Before traveling abroad, consult a health care provider, travel clinic, or health department about your risk of exposure to rabies and how to handle an exposure should it arise. Medical assistance should be obtained as soon as possible after an exposure.

Can rabies be transmitted from one person to another?

The only documented cases of rabies caused by human-to-human transmission, although extremely rare, occurred among recipients of transplanted corneas and other solid organs. Organ and tissue transplantation resulting in rabies transmission has occurred among 16 transplant recipients from corneas (n=8), solid organs (n=7), and vascular tissue (n=1). The 16 cases occurred in six countries: the United States (5 cases: one cornea, three solid organs, and one vascular tissue), Germany (4 cases), Thailand (2 cases), India (2 cases), Iran (2 cases), and France (1 case). Investigations revealed that the donors had died of an illness compatible with or proven to be rabies. Stringent guidelines for acceptance of donor corneas have reduced this risk. No documented laboratory-diagnosed cases of human-to-human transmission have been documented from a bite or non-bite exposure other than the transplant cases. Casual contact, such as touching a person with rabies or contact with non-infectious fluid or tissue (i.e., urine, blood, and feces) does not constitute an exposure and does not require PEP. In addition, contact with someone who is receiving rabies PEP does not constitute rabies exposure and does not require post-exposure prophylaxis.

Citation is given to the Centers for Disease Control for information contained in their rabies website: http://www.cdc.gov/rabies.

VII. REFERENCES

A. Definitions

- **Currently Vaccinated Against Rabies**. An animal is "currently vaccinated" and is considered immunized against rabies if a vaccination certificate documents that the animal received a USDA-approved primary rabies vaccine from a licensed veterinarian at least 28 days previously and that booster vaccinations have been administered on an annual or triennial schedule, in accordance with the *Compendium of Animal Rabies Prevention and Control* (see pages 508-513) or as described on the individual vaccine label.

- **Exposure.** Rabies exposure occurs when the virus is introduced into bite wounds or open cuts in skin or onto mucous membranes. Two categories of exposure, bite and nonbite, should be considered.

    - **Bite**. Any penetration of the skin by teeth constitutes a bite exposure. All bites, regardless of location, represent a potential risk of rabies transmission. Keep in mind that bites by some animals, such as bats, can inflict minor injury and thus be undetected.

    - **Nonbite**. The contamination of open wounds, abrasions, mucous membranes, or theoretically, scratches, with saliva or other potentially infectious material (such as neural tissue) from a rabid animal constitutes a nonbite exposure. Nonbite exposures from terrestrial animals rarely cause rabies. However, occasional reports of transmission by nonbite exposure suggest that such exposures constitute sufficient reason to consider post-exposure prophylaxis.

- **Non-Exposure.** Other contact by itself, such as being in the vicinity of, petting or handling an animal, or coming in contact with blood, urine, or feces does NOT constitute an exposure and does NOT require PEP. Because desiccation and ultraviolet irradiation inactivate the rabies virus, in general, if the material containing the virus is dry, the virus can be considered noninfectious.

- **Confinement**. A general term referring to the restriction of an animal to a building, pen, or other escape-proof enclosure to monitor for clinical signs of rabies. There are **two specific types of confinement**, depending upon the circumstances of the encounter.

    - **Quarantine** (for animal-human encounters). This is a **10-day** period of confinement for observation of health status for a domestic animal (dog, cat, or ferret **only**) which has bitten a person, **no matter if the animal is currently vaccinated or not**. Quarantine conditions should prevent direct contact with other animals or persons. The quarantine shall be conducted under the authority of the designated local rabies control agency in which the place, manner, and provisions of the quarantine are specified. For example, quarantine may take place in a kennel in a

veterinary hospital, animal control facility, commercial boarding establishment, or a pen at home, depending on local requirements. At the first sign of illness or behavioral change in the animal, the local rabies control agency should be notified and the animal should be evaluated by a veterinarian. If clinical signs are suggestive of rabies, the animal should be immediately euthanized and tested for rabies and the exposed person notified.

- **Strict Isolation** (for animal-animal encounters). This is the confinement of an animal exposed or potentially exposed to rabies in a manner that prevents direct contact with other animals or persons. In most cases, this term applies to an **unvaccinated** domestic animal exposed to a rabid wild or domestic animal; the duration of strict isolation should be **four months for dogs and cats and six months for large animals and ferrets.** Strict isolation should be conducted under the authority of the designated local rabies control agency in which the place, manner, and provisions of the confinement are specified. For example, strict isolation may take place in an animal control facility, or an isolation pen at home, depending on local requirements. At the first sign of illness or behavioral change in the animal, the local rabies control agency should be notified and the animal should be evaluated by a veterinarian. If clinical signs are suggestive of rabies, the animal should be immediately euthanized and tested for rabies and the exposed person notified.

  Note: The animal should be vaccinated against rabies upon entry into isolation OR one month prior to isolation exit.

- **Observation period**. In animal (domestic) to animal (potential rabid wild or domestic animal) encounters involving **currently vaccinated** animals (or dogs/cats with documentation of one previous vaccine who receive a booster immediately after exposure), the observation period is a **45-day** period in which the animal is kept under the owner's control to monitor for the development of clinical signs of rabies. During the observation period, the animal should not be permitted to roam and should be restricted to leash walks, if applicable. At the first sign of illness or behavioral change in the animal, the local rabies control agency should be notified and the animal should be evaluated by a veterinarian. If clinical signs are suggestive of rabies, the animal should be immediately euthanized and tested for rabies and the exposed person notified.

- **Provoked Attack**. An attack is considered to be "provoked" if a domestic animal is placed in a situation such that an expected reaction would be to bite or attack. Examples include invasion of an animal's territory, attempting to pet or handle an unfamiliar animal, startling an animal, breaking up an animal fight, running or bicycling past an animal, assisting an injured or sick animal, trying to capture an animal, or removing food, water, or other objects in the animal's possession.

- **Unprovoked Attack**. An attack or bite is considered to be "unprovoked" when none of the above conditions for a “provoked” attack are met; essentially, the animal strikes for no apparent reason.

B. Georgia Rabies Control Law

I. OPINIONS OF THE ATTORNEY GENERAL

- **Control of rabies generally is delegated to county boards of health,** and control of dangerous drugs is vested with the State Board of pharmacy and state drug inspector (now director of Georgia Drugs and Narcotics Agency). 1975 Op. Atty. Gen. No. 75-23.

- **Expense of confining animals included in county board’s budget**—Local County Boards of Health should prescribe rules for prevention and control of rabies by providing for vaccination, tagging, and certification of dogs, and for confinement of any animal which exhibits any signs of rabies; cost of such confinement would be an expense of County Board of Health to be included in its budget which is submitted to local taxing authorities under provision of section 31-3-14, 1965-66 Op. Atty. Gen. No. 65-21.

- **Responsibility of County Boards of Health regarding strays and unwanted dogs**—Local County Boards of Health should adopt rules and regulations relative to catching and impounding of strays and unwanted dogs. 1965-66 Op. Atty. Gen. No. 65-21.

II. OFFICIAL CODE 31-19, CONTROL OF RABIES

31-19-1. Responsibility for Control

Each county board of health shall have primary responsibility for the control of rabies within its jurisdiction. Such boards, in addition to their other powers, are empowered and required to adopt and promulgate rules and regulations for the prevention and control of such disease.

31-19-2. Powers of department in infected area.

The department (DPH) may declare any County or any area therein or any group of counties or areas therein where rabies exists to be an infected area and may provide for immunization and such other measures as shall be indicated for the prevention and control of the disease.

31-19-3. Licensing and regulation of animals by local authorities.

The governing authorities of each county and municipality are authorized and required, in the control of rabies, to require regulation or licensing of animals.

31-19-4. Duty of notification.

It shall be the duty of any person bitten by any animal reasonably suspected of being rabid immediately to notify the appropriate county board of health. It shall be the duty of the owner, custodian, or person having possession and knowledge of any animal which has bitten any person or animal or of any animal which exhibits any signs of rabies to notify the appropriate county board of health and to confine such animal in accordance with rules and regulations of the county board of health.

31-19-5. Inoculation of canines and felines against rabies.

The county boards of health are empowered and required to adopt and promulgate rules and regulations requiring canines and felines to be inoculated against rabies and to prescribe the intervals and means of inoculation, the fees to be paid in county sponsored clinics, that procedures be in compliance with the recommendations of the National Association of State Public Health Veterinarians for identifying inoculated canines and felines, and all other procedures applicable thereto. As used in this chapter, the term "inoculation against rabies" means the administering by a licensed veterinarian of antirabies vaccine approved by the department.

31-19-6. Certificates of inoculation: tags.

Reserved. Repealed by Ga. L. 1992, p. 2089, sec. 2, effective July 1, 1992.

31-19-7. County rabies control officer.

(a) The County board of health shall appoint a person who is knowledgeable of animals to be the County rabies control officer. It shall be the duty of the County rabies control officer to enforce this chapter and other laws which regulate the activities of dogs.

(b) The County governing authority of each County is authorized to levy a fee not to exceed 50 cents for each dog, such fee to be collected by the veterinarian administering the antirabies vaccine required by this chapter. This fee shall be in addition to that provided for in Code Section 31-19-5. If any County has no resident veterinarian, the out-of-county veterinarian administering the antirabies vaccine and collecting the fee provided for by this Code section shall forward to the treasurer of the County of the dog owner's residence the fee prescribed by that County's governing authority.

(c) The fees collected under this Code section shall be used to help in paying the salary of the County rabies control officer.

31-19-8. Joint administration of chapter by adjoining counties.

The governing authority of each County may devise and implement plans whereby this chapter, as amended, is administered jointly with one or more adjoining counties.

31-19-9. Applicability to municipalities with rabies control laws.

This chapter shall not apply to municipalities which already have a rabies control law unless and until such law is repealed.

31-19-10. Penalty.

Any person who violates any provision of this chapter or any rule or regulation adopted pursuant thereto shall be guilty of a misdemeanor.

Appendix A. Animal Rabies Vaccines (adapted from the NASPHV Compendium of Rabies Prevention and Control, 2016, page 516)

Product Name	Produced By	For Use In	Dose	Age at Primary Vaccination	Booster	Route
Monovalent (inactivated)						
RABVAC 1	BIVI[1]	dogs/cats	1 ml	3 mo.	annually	IM/SC
RABVAC 3	BIVI[1]	dogs/cats	1 ml	3 mo.	1-yr and triennially	IM/SC
		horses	2 ml	3 mo.	annually	IM
EQUI-RAB with Havlogen	Merck Animal Health	horses	1 ml	4 mo.	annually	IM
DEFENSOR-1	Zoetis	dogs	1 ml	3 mo.	annually	IM/SC
		cats	1 ml	3 mo.	annually	SC
DEFENSOR-3	Zoetis	dogs	1 ml	3 mo.	1-yr and triennially	IM/SC
		cats	1 ml	3 mo.	1-yr and triennially	SC
		sheep/cattle	2 ml	3 mo.	annually	IM
NOBIVAC: 1-Rabies	Zoetis	dogs	1 ml	3 mo.	annually	IM/SC
		cats	1 ml	3 mo.	annually	SC
NOBIVAC: 3-Rabies and 3-Rabies CA	Zoetis	dogs	1ml	3 mo.	1-yr and triennially	IM/SC
		cats	1ml	3 mo.	1-yr and triennially	SC
		sheep/cattle	2 ml	3 mo.	annually	IM
IMRAB I	Merial	dogs/cats	1 ml	3 mo.	annually	SC
IMRAB I TF	Merial	dogs/cats	1 ml	3 mo.	annually	SC
IMRAB 3	Merial	dogs/cats	1 ml	3 mo.	1-yr and triennially	IM/SC
		sheep	2 ml	3 mo.	1-yr and triennially	IM/SC
		cattle/horses	2 ml	3 mo.	annually	IM/SC
		ferrets	1 ml	3 mo.	annually	SC
IMRAB 3 TF	Merial	dogs/cats	1 ml	3 mo.	1-yr and triennially	IM/SC
		ferrets	1 ml	3 mo.	annually	SC
IMRAB Large Animal	Merial	dogs/cats	1 ml	3 mo.	1-yr and triennially	IM/SC
		cattle/horses	2 ml	3 mo.	annually	IM/SC
		sheep	2 ml	3 mo.	1-yr and triennially	IM/SC
Monovalent (rabies glycoprotein; live canary pox vector)						
PUREVAX Feline Rabies	Merial	cats	1 ml	3 mo.	annually	SC
PUREVAX Feline Rabies 3 YR	Merial	cats	1 ml	3 mo.	1-yr and triennially	SC
Combination (inactivated)						
Equine POTOMAVAC+IMRAB	Merial	horses	1 ml	3 mo.	annually	IM
Combination (rabies glycoprotein; live canary pox vector)						
PUREVAX Feline 3/Rabies	Merial	cats	1 ml	8 wk.	every 3-4wks until 3 mo. and annually	SC
				3 mo.	3-4 wks later and annually	SC
PUREVAX Feline 4/Rabies	Merial	cats	1 ml	8 wk.	every 3-4wks until 3 mo. and annually	SC
				3 mo.	3-4wks later and annually	SC

1 - Boehringer Ingelheim Vetmedica, Inc. (BIVI)

Animal Rabies Vaccine Manufacturer Contact Information (adapted from the NASPHV Compendium of Rabies Prevention and Control, 2016, page 517)

Manufacturer	Phone Number	Internet Address
Boehringer Ingelheim Vetmedica, Inc	800-638-2226	https://www.bi-vetmedica.com/
Merck Animal Health Inc	800-521-5767	https://www.merck-animal-health-usa.com/
Merial, Incorporated	888-637-4251	http://us.merial.com/
Zoetis	800-366-5288	https://www.zoetis.com/

ADVERSE EVENTS: Adverse events should be reported to the vaccine manufacturer and to USDA, Animal and Plant Health Inspection Service, Center for Veterinary Biologics
(Internet: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/veterinary-biologics/adverse-event-reporting/ct_vb_adverse_event
; telephone: 800-752-6255;).

Appendix B. Progressive Serological Monitoring Protocol (adapted from the NASPHV Compendium of Animal Rabies Prevention and Control, 2016)

GEORGIA DEPARTMENT OF PUBLIC HEALTH PROSPECTIVE SEROLOGIC MONITORING (PSM) PROTOCOL FOR DOGS/CATS EXPOSED TO RABIES WITHOUT DOCUMENTATION OF PREVIOUS RABIES VACCINATION

This protocol applies only to a DOG or CAT;

- **exposed to a confirmed or suspected rabid animal (as defined in Part I A.2 of the Compendium), and;**
- **has been, or VERY LIKELY has been, previously vaccinated with a USDA-licensed rabies vaccine, but for which there is no valid documentation, e.g. a rabies vaccination certificate, and;**
- **whose owner or guardian wants to avoid euthanasia or a strict 4 month quarantine, and;**
- **can immediately be managed by a veterinarian who can collect serum specimens as described below and administer a rabies vaccine.**

The dog or cat must be seen by a veterinarian immediately (within 96 hours) following an exposure to a confirmed or suspected rabid animal. The veterinarian **must** report the case to the Georgia Department of Public Health (DPH) Epidemiology Program and speak with the Rabies Epidemiologist or State Public Health Veterinarian, at 404-657-2588 or their county Environmental Health Program BEFORE blood is drawn and vaccine given. DPH staff should be provided all relevant details on what is known about the animal's vaccination history and the specifics of the current rabies exposure. After business hours and on weekends follow the protocol EXACTLY as described below and call DPH in the morning of the next business day.

DPH staff will work with the veterinarian and owner to define a timeline during which the protocol must be implemented and will interpret the test results. Laboratory testing, submission and all associated fees will be assumed by the animal owner and submitting veterinarian. The veterinary visit in which the first serum is collected and the rabies vaccine is administered must occur as soon as possible following the exposure and should not exceed 96 hours post exposure. The date of this visit will be counted as Day 0.

On Day 0:

1. Call DPH Rabies Epidemiologist or State Public Health Veterinarian at 404-657-2588 or county Environmental Health Rabies Officer.

2. Collect 1-2 mL of serum;

3. Label and keep the serum specimen refrigerated until the second specimen is collected. Serum held for more than 7 days may need to be frozen. Follow the instructions provided by the laboratory that will be performing the tests;

4. Administer a USDA-licensed rabies vaccine labeled for use in that species; and

5. Schedule a follow up appointment to ensure the pet will return in 5-7 days, **preferably on Day 6**. The timing of the follow up blood draw is critical; any deviation may result in termination of the PSM protocol and a strict 4 month quarantine or euthanasia will be implemented.

On Day 5 or 6 (but no later than day 7):

1. Collect a second (paired) serum specimen (1-2 mL), **preferably on Day 6**.

2. Label and store the specimen appropriately according to the instructions from the laboratory where it will be submitted;

3. Submit the paired serum specimens to an approved Rabies Laboratory for Rapid Fluorescent Foci Inhibition Test (RFFIT) testing with the appropriate forms completed and carefully following shipping instructions provided by the laboratory; and

4. Contact the DPH Epidemiology Program to document submission of the specimens.

The paired serum specimens must be delivered to an approved Rabies Laboratory. At this time, the laboratories approved and available to perform the testing are:

- Atlanta Health Associates, Inc.
- Kansas State University Rabies Laboratory (KSU-RL)

The Centers for Disease Control and Prevention (CDC) may occasionally provide testing services by special arrangement only. The definition of an approved laboratory is one that is currently licensed by CLIA or NYSDOH and has been approved to participate in this Prospective Serological Monitoring Protocol by NASPHV's Rabies Compendium Committee.

The submission form for the appropriate laboratory must be complete, accurate, and accompany **properly labelled paired specimens** to avoid delays in testing. The submitting veterinarian is responsible for ensuring the accuracy of all specimen collection, submission form completion and shipping. Turn-around time for results are dependent upon the laboratory and their current testing volume. The submitting veterinarian is responsible for immediately contacting the DPH Epidemiology Program with the results to finalize recommendations for the animal.

The dog or cat shall remain in strict quarantine during the testing process unless and until otherwise approved by DPH staff.

Interpretation of the results will be done by the Rabies Epidemiologist and the State Public Health Veterinarian. Interpretation will be done in conjunction with the laboratory performing the testing as the determination of a statistically significant change in titer is determined by analysis of the laboratory's own data regarding testing performance. The test results will be used to determine whether the animal has evidence to suggest a previous rabies vaccine. Based on data analysis from the approved

Rabies Laboratories, in general, the paired serum specimens must show both a statistically significant (usually defined as greater than two-fold) rise in titer between the first and second specimens and the second titer must be above 0.5 IU/mL. If either of these conditions is not met, the animal must be treated as previously unvaccinated for the purposes of rabies control decisions.

Serology test results do not pre-empt the authority of public health staff or animal control to order continued strict quarantine of the animal if it judges such actions to be in the best interest of protecting the public's health. Nor do these recommendations supersede any applicable state laws and regulations or local ordinances.

FREQUENTLY ASKED QUESTIONS:

1. What if the dog or cat did not receive care immediately (within 96 hours) after the exposure?

Such cases should be discussed with the DPH Epidemiology Program and managed on a case by case basis. Factors to consider include the number of days that have elapsed since the exposure, the severity of the exposure, number of previous vaccinations, the health of the animal, and the local rabies epidemiology.

2. What if the dog or cat cannot return to the veterinarian for collection of the second specimen on DAY 5?

The second specimens must be collected by Day 7. Delaying collection of the specimen prevents accurate interpretation of the test results as any increase in rabies antibody titer might be due to the rabies exposure itself or the booster vaccination rather than an anamnestic response to a previous vaccination.

3. What test will be used to test the serum specimens?

The laboratory will test the specimens using a Rapid Fluorescent Focus Inhibition Test (RFFIT). It is a serum neutralization (inhibition) test, which means it measures the ability of rabies specific antibodies to neutralize rabies virus and prevent the virus from infecting cells. These antibodies are called rabies virus neutralizing antibodies (RVNA).

4. What values will be used to determine if the dog or cat has evidence of a prior rabies vaccination and an acceptable anamnestic response?

A greater than two-fold rise in the titer values of the paired specimens, as well as a RVNA titer equal to or above 0.5 IU/mL for the second specimen, provides evidence of a robust anamnestic immune response after rabies vaccination.

Considerable variability exists as to any individual's response to vaccination and the DPH Epidemiology Program should consult the laboratory for help in interpreting results that fall outside these guidelines.

If an anamnestic response is demonstrated, the animal should be issued a vaccine certificate with an expiration date consistent with the vaccine label. If there is no evidence of an anamnestic response, the vaccine is considered the initial dose and the animal should be boostered in one year, consistent with the vaccine label.

5. If the titer is equal to or above 0.5 IU/mL and there is evidence of an anamnestic response, is it impossible for the animal to go on to develop rabies?

A specific value equal to or above 0.5 IU/mL and evidence of an anamnestic response suggests the animal will be protected. However, there have been rare instances in which vaccinated animals have gone on to develop rabies. Contributing factors may include other immunological factors involved in the protection from rabies infection, or the location, viral dose, and severity of the wound. Because of this uncertainty, confinement with observation or quarantine is warranted regardless of the presence of antibodies.

6. Where can I find the appropriate submission forms and shipping instructions?

• Atlanta Health Associates, Inc.: http://www.atlantahealth.net/

• Kansas State University Rabies Laboratory: http://www.ksvdl.org/rabies-laboratory/rffit-test/rffit-submission-forms.html

7. Can this protocol be used for animals other than dogs or cats such as ferrets?

No. At this time, data regarding anamnestic responses following revaccination with rabies vaccine are available only for dogs and cats.