April 1999 volume 15 number 4

Georgia Epidemiology Report

Division of Public Health
http://health.state.ga.us

The Georgia Epidemiology Report is a publication of the Epidemiology Section of the Epidemiology and Prevention Branch, Division of Public Health, Georgia Department of Human Resources

Human Rabies Prevention-United States, 1999
Recommendations of the Advisory Committee on Immunization Practices (ACIP)

SUMMARY
These revised recommendations [Morbidity and Mortality Weekly Report-MMWR 1999;48{No. RR-1}] of the Advisory Committee on Immunization Practices update the previous recommendations on rabies prevention to reflect the current status of rabies and antirabies biologics in the United States (US). **This report includes information about a new human rabies vaccine approved for U.S. use in 1997, recommendations regarding exposure to bats, recommendations regarding an observation period for domestic ferrets, and changes in the site of administration of rabies immune globulin.** This Georgia Epidemiology Report (GER) is an edited version of the MMWR.

INTRODUCTION
Rabies is a viral infection transmitted by the saliva of infected mammals. The virus enters the central nervous system of the bite victim, causing an encephalomyelitis that is almost always fatal.

Although rabies among humans is rare in the United States, every year approximately 16,000-39,000 persons receive postexposure prophylaxis. To appropriately manage potential human exposures to rabies, the risk of infection must be accurately assessed. Systemic prophylactic treatments occasionally are complicated by adverse reactions, but these reactions are rarely severe.

However, rabies has occasionally developed among humans when key elements of the postexposure prophylaxis regimen were omitted or incorrectly administered.

RABIES BIOLOGICS
Two types of rabies immunizing products are available in the United States (Table 1):

- **Rabies vaccines** induce an active immune response that includes the production of neutralizing antibodies. This antibody response requires approximately 7-10 days to develop and usually persists for 2 or more years.

- **Rabies immune globulin (RIG)** provides a rapid, passive immunity that persists for only a short time (half-life of approximately 21 days).

In all postexposure prophylaxis regimens, except for persons previously immunized, both products should be used concurrently.

POST-EXPOSURE PROPHYLAXIS

Rationale for Treatment
Administration of rabies postexposure prophylaxis is a medical urgency, not a medical emergency. Physicians should evaluate each potential exposure to rabies regarding the possible need for rabies prophylaxis. **The Georgia Poison Control Center is available for rabies consultation 24 hours a day, 7 days a week at 1-800-282-5846 (statewide) or 404-616-9000 (Atlanta).** They will assist health care providers and citizens in decision-making regarding need for post-exposure rabies prophylaxis and can direct callers to a hospital that provides post-exposure rabies prophylaxis. In the United States, the following factors should be considered before specific antirabies postexposure prophylaxis is initiated.

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TABLE 1. Rabies Biologics - United States, 1999

Immunizing Product	Product name	Manufacturer
Human rabies vaccine Human diploid cell (HDCV) • Intramuscular • Intradermal	Imovax® Rabies Imovax® Rabies I.D.	Pasteur-Merieux Serum et Vaccins, Connaught Laboratories, Inc. Phone: (800) VACCINE *(822-2463)*
Rabies vaccine adsorbed (RVA) • Intramuscular	Rabies Vaccine Adsorbed (RVA)	BioPort Corporation Phone: (517) 335-8120
Purified chick embryo cell vaccine (PCEC) • Intramuscular	RabAvert™	Chiron Corporation Phone: (800)CHIRON8 *(800-244-7668)*
Rabies immune globulin (RIG)	Imogam®RabiesHT	Pasteur-Merieux Serum et Vaccins, Connaught Laboratories, Inc. Phone: (800)VACCINE *(800-822-2463)*
	BayRab™	Bayer Corporation Pharmaceutical Div. Phone: (800)-288-8370

Types of Exposure

Rabies is transmitted only when the virus is introduced into bite wounds or open cuts in skin or onto mucous membranes. If no exposure has occurred (i.e., no bite or nonbite exposure), postexposure prophylaxis is not necessary. The likelihood of rabies infection varies with the nature and extent of exposure. Two categories of exposure — bite and nonbite — should be considered.

I. Bite

Any penetration of the skin by teeth constitutes a bite exposure. All bites, regardless of location, represent a potential risk of rabies transmission. Bites by some animals, such as bats, can inflict extremely minor injury and thus go undetected.

II. Nonbite

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 postexposure prophylaxis. 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. Other contact by itself, such as petting a rabid animal or contact with blood, urine, or feces (e.g., guano) of a rabid animal, does not constitute an exposure and is not an indication for prophylaxis. Because the rabies virus is inactivated by desiccation and ultraviolet irradiation, in general, if the material containing the virus is dry, the material can be considered noninfectious.

Evaluation of Involved Species

Bats

Rabid bats have been documented in the 49 continental states, and bats are increasingly implicated as important wildlife reservoirs for variants of rabies virus being transmitted to humans. Recent epidemiologic data suggest that transmission of rabies virus can occur from minor, seemingly unimportant, or unrecognized bites from bats. The limited injury inflicted by a bat bite (in contrast to lesions caused by terrestrial carnivores) and an often inaccurate recall of the exact exposure history may limit the ability of health-care providers to determine the risk of rabies resulting from an encounter with a bat. Human and domestic animal contact with bats should be minimized, and bats should never be handled by untrained and unvaccinated persons or be kept as pets.

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 postexposure prophylaxis is recommended for all persons with bite, scratch, or mucous membrane exposure to a bat, unless the bat is available for testing and is negative for evidence of rabies. Postexposure prophylaxis might be appropriate even if no bite, scratch, or mucous membrane exposure is apparent when there is reasonable probability that such exposure might have occurred.

On the basis of the available but sometimes conflicting information from the 21 bat-associated cases of human rabies reported since 1980, in 1-2 cases, a bite was reported; in 10-12 cases, apparent contact occurred but no bite was detected; and in 7-10 cases, no exposure to bats was reported, but an undetected or unreported bat bite remains the most plausible hypothesis. Clustering of bat-associated human cases within the same household has never been reported.

Consequently, postexposure prophylaxis should be considered when direct contact between a human and a bat has occurred, unless the exposed person can be certain a bite, scratch, or mucous membrane exposure did not occur. In instances in which a bat is found indoors and there is no history of bat-human contact, the likely effectiveness of postexposure prophylaxis must be balanced against the low risk such exposures appear to present. In this setting, postexposure prophylaxis can be considered for persons who were in the same room as the bat and who might be unaware that a bite or direct contact had occurred (e.g., a 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) and rabies cannot be ruled out by testing the bat. Postexposure prophylaxis would not be warranted for other household members.

Wild Terrestrial Carnivores

Raccoons, skunks, foxes, and coyotes are the terrestrial animals most often infected with rabies. All bites by such wildlife must be considered possible exposures to the rabies virus. Postexposure prophylaxis should be initiated as soon as possible after patients are exposed to wildlife unless the animal has already been tested and shown not to be rabid. If postexposure prophylaxis has been initiated and subsequent immunofluorescence testing shows that the exposing animal was not rabid, postexposure prophylaxis can be discontinued.

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. If the results of testing are negative by

immuno-fluorescence, the saliva can be assumed to contain no virus, and the person bitten does not require further postexposure prophylaxis.

Other Wild Animals
Small rodents (e.g., squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, and mice) and lagomorphs (including rabbits and hares) are almost never found to be infected with rabies and have not been known to transmit rabies to humans. From 1990 through 1996, in areas of the country where raccoon rabies was enzootic, woodchucks accounted for 93% of the 371 cases of rabies among rodents reported to Centers for Disease Control and Prevention (CDC). In all cases involving rodents, the Georgia Poison Center should be consulted before a decision is made to initiate antirabies postexposure prophylaxis.

The offspring of wild animals crossbred to domestic dogs and cats (wild animal hybrids) are considered wild animals by the National Association of State and Public Health Veterinarians (NASPHV) and the Council of State and Territorial Epidemiologists (CSTE). Because the period of rabies virus shedding in these animals is unknown, these animals should be euthanized and tested rather than confined and observed when they bite humans. Wild animals and wild animal hybrids should not be kept as pets.

Domestic Dogs, Cats, and Ferrets
The likelihood of rabies in a domestic animal varies by region; hence, the need for postexposure prophylaxis also varies. In the continental United States, rabies among dogs is reported most commonly along the United States-Mexico border and sporadically in areas of the United States with enzootic wildlife rabies. During most of the 1990s, 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 rabies-infected cats might be attributed to fewer cat vaccination laws, fewer leash laws, and the roaming habits of cats. In many developing countries, dogs are the major vector of rabies; exposures to dogs in such countries represent an increased risk of rabies transmission.

On the basis of new information regarding rabies pathogenesis and viral shedding patterns in ferrets, ferrets are now considered in this category with dogs and cats rather than as wild terrestrial carnivores. A healthy domestic dog, cat, or ferret that bites a person may be confined and observed for 10 days. Any illness in the animal during confinement or before release should be evaluated by a veterinarian and reported immediately to the local public health department. If signs suggestive of rabies develop, the animal should be euthanized and its head removed and shipped, under refrigeration, for examination by a qualified laboratory. If the biting animal is stray or unwanted, it should either be observed for 10 days or be euthanized immediately and submitted for rabies examination.

An unprovoked attack by an animal is 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 domestic animal should generally be regarded as provoked. A currently vaccinated dog, cat, or ferret is unlikely to infected with rabies.

Treatment of Wounds and Postexposure Prophylaxis

The essential components of rabies postexposure prophylaxis are wound treatment and, for previously unvaccinated persons, the administration of both RIG and vaccine. Persons who have been bitten by animals suspected or proven to be rabid should begin postexposure prophylaxis immediately. Incubation periods of greater than 1 year have been reported in humans. Thus, when a documented or likely exposure has occurred, postexposure prophylaxis is indicated regardless of the length of the delay, provided the clinical signs of rabies are not present in the patient.

Treatment of Wounds
Immediate and thorough washing of all bite wounds and scratches with soap and water and a virucidal agent such as a povidone-iodine solution irrigation are important measures for preventing rabies. In studies of animals, thorough wound cleansing alone without other postexposure prophylaxis has been shown to reduce markedly the likelihood of rabies. Tetanus prophylaxis and measures to control bacterial infection also should be administered as indicated. The decision to suture large wounds should take into account cosmetic factors and the potential for bacterial infections.

Postexposure Prophylaxis
Postexposure antirabies prophylaxis should always include administration of both passive antibody and vaccine, with the exception of persons who have previously received complete vaccination regimens (preexposure or postexposure) with a cell culture vaccine or persons who have been vaccinated with other types of vaccines and have had documented rabies antibody titers. These persons should receive only vaccine. The combination of RIG and vaccine is recommended for both bite and nonbite exposures, regardless of the interval between exposure and initiation of treatment.

Rabies Immune Globulin Use
RIG is administered only once (i.e., at the beginning of antirabies prophylaxis) to previously unvaccinated persons to provide immediate antibodies until the patient responds to rabies vaccine by actively producing antibodies. If RIG was not administered when vaccination was begun, it can be administered through the seventh day after the administration of the first dose of vaccine. Beyond the seventh day, RIG is not indicated since an antibody response to cell culture vaccine is presumed to have occurred. Because RIG can partially suppress active production of antibody, no more than the recommended dose should be administered. The recommended dose of human RIG is 20 IU/kg body weight. This formula is applicable to all age groups, including children. **If anatomically feasible, the full dose of RIG should be thoroughly infiltrated in the area around and into the wounds.** Any remaining volume should be injected intramuscularly at a site distant from vaccine administration. This change in the recommendations for RIG administration is based on reports of rare failures of postexposure prophylaxis when smaller amounts of RIG were infiltrated at the exposure sites. RIG should never be administered in the same syringe or in the same anatomical site as vaccine.

Vaccine Use
Three rabies vaccines are currently available in the United States (Table 1); any one of the three can be administered in conjunction with RIG at the beginning of postexposure therapy. A regimen of five 1-mL doses of HDCV, RVA, or PCEC should be administered intramuscularly (IM); intradermal administration is **not** appropiate for postexposure prophylaxis. The first dose of the five-dose course should be administered as soon as possible after exposure. Additional doses should be administered on days 3, 7, 14, and 28 after the first vaccination. For adults, the vaccination should always be administered IM in the deltoid area. For children, the anterolateral aspect of the thigh is also acceptable. The gluteal area should never be used for HDCV, RVA, or PCEC injections because administration of HDCV in this area results in lower neutralizing antibody titers.

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April 1999 **Volume 15 Number 4**

Reported Cases of Selected Notifiable Diseases in Georgia Profile* for January 1999

Selected Notifiable Diseases	Total Reported for January 1999	Previous 3 Months Total Ending in January			Previous 12 Months Total Ending in January		
	1999	1997	1998	1999	1997	1998	1999
Campylobacteriosis	48	133	203	160	778	784	768
Chlamydia genital infection	701	2264	4694	6188	13534	16745	24592
Cryptosporidiosis	14	13	21	38	91	81	157
E. coli O157:H7	1	13	5	9	48	38	81
Giardiasis	101	212	255	301	847	911	1253
Gonorrhea	684	3893	4886	4616	19472	18569	19933
Haemophilus influenzae (invasive)	7	16	17	24	51	45	66
Hepatitis A (acute)	52	97	192	189	429	803	873
Hepatitis B (acute)	15	16	71	43	67	246	194
Legionellosis	0	0	3	0	3	6	8
Lyme Disease	0	1	2	0	2	9	4
Meningococcal Disease (invasive)	4	27	34	19	139	115	86
Mumps	0	3	1	1	10	9	2
Pertussis	0	8	2	5	36	15	38
Rubella	0	0	0	0	0	0	0
Salmonellosis	107	356	302	396	1446	1376	1876
Shigellosis	30	402	406	149	1158	1205	1099
Syphilis - Primary	7	44	30	30	196	153	118
Syphilis - Secondary	22	99	57	70	482	349	239
Syphilis - Early Latent	69	308	215	183	1342	1079	774
Syphilis - Other**	38	328	202	130	1106	1175	759
Syphilis - Congenital	1	5	2	6	31	21	13
Tuberculosis	34	197	146	153	775	670	625

* The cumulative numbers in the above table reflect the date the disease was first diagnosed rather than the date the report was received at the state office, and therefore are subject to change over time due to late reporting. The 3 month delay in the disease profile for a given month is designed to minimize any changes that may occur. This method of summarizing data is expected to provide a better overall measure of disease trends and patterns in Georgia.

** Other syphilis includes latent (unknown duration), late latent, late with symptomatic manifestations, and neurosyphilis.

AIDS Profile Update

Report Period	Total Cases Reported *	Percent Female	Risk Group Distribution (%)						Race Distribution (%)		
			MSM	IDU	MSM&IDU	HS	Blood	Unknown	White	Black	Other
Latest 12 Months: 5/98 - 4/99	1400	21.6	35.8	14.6	4.6	13.3	1.2	30.5	22.4	75.4	2.2
Five Years Ago: 5/93 - 4/94	2019	16.6	43.8	23.2	5.1	12.9	1.4	13.6	30.5	67.7	1.8
Cumulative: 7/81 - 4/99	20572	15.5	50.4	19.1	5.8	12.2	1.9	10.6	37.8	60.1	2.1

MSM - Men having sex with men **IDU - Injection drug users** **HS - Heterosexual**

* Case totals are accumulated by date of report to the Epidemiology Section