Rabies

Traveler Summary

Key Points
- Rabies is an acute, 100% fatal, viral infection of the brain, acquired through penetrating bites, licks, or scratches from rabid dogs, bats, and other mammals.
- Overall risk is low for travelers, but risk becomes significant after a potential bite exposure.
- Symptoms are initially mild and include tingling at the site of the bite, fever, and extreme fear of water; the illness rapidly progresses to fatal consequences.
- Consequences of infection are paralysis, coma, and death once the rabies virus reaches the brain from the site of the bite or wound. The virus will reach the brain more quickly from bites to the face.
- Prevention includes avoiding any contact with dogs and other biting mammals (monkeys and bats) in countries with a high risk of rabies.
- Rabies vaccine for prevention prior to any exposure or potential bite is given in 3 doses: 1 dose of vaccine on days 0, 7, and 28. In those already vaccinated, 2 doses of vaccine spaced by 3 days must be given after every subsequent, potentially rabid bite or lick. In those who have never been vaccinated and who have sustained a bite or lick, 4 doses of vaccine on days 0, 3, 7, and 14 must be given with rabies immune globulin on the first day.
- Vaccine side effects are mild, local reactions such as pain, swelling, or itching at the injection site.
- Duration of vaccine protection is limited to the time interval until any subsequent rabies exposure, at which time postexposure vaccination will be required. Regular boosters are recommended only for veterinary and wildlife workers.

Introduction
Rabies is an acute, progressive, and uniformly fatal viral infection of the central nervous system. Almost all rabies deaths are due to dog or bat bites. Tens of millions of human exposures and tens of thousands of deaths may occur each year due to rabies.

Risk Areas
Rabies is found on all continents except Antarctica. Canine rabies is most prevalent in Africa and Asia and is absent from Western Europe, Japan, Australia and many small island countries. Bat rabies occurs worldwide, with the exception of New Zealand. Bats are present in every country of the world. In some countries, rabies does not exist in any land animals. In the U.S., bats that feed on insects (notably silver-haired and Mexican free-tailed bats) cause more than 90% of human rabies cases. In Central and South America, rabies transmitted by vampire bats causes significant death in cattle and occasional outbreaks in humans. Rabies virus of this type can also be found in raccoons, skunks, cats, and foxes in the U.S. and mongooses and jackals in southern Africa, Central America, and the Caribbean islands.

Transmission
Rabies is transmitted to humans through penetrating bites, scratches, or licks from rabid animals. Rabies virus is present in the saliva (which is highly infectious) of a rabid animal or bat, even those that do not exhibit features of disease. Animals that can harbor the rabies virus are dogs, foxes, wolves, jackals, and coyotes. Monkeys are a potential but uncertain source; nevertheless, monkey bites must be treated as a potential rabies risk. Bat rabies is transmitted by bat bites or scratches (which may not be noticed) or, more rarely, by inhalation of aerosolized bat saliva in caves where numerous bats congregate. Bat bites are a cause of concern, and preventive measures should be considered. Human-to-human transmission through exposure of mucous membranes or open wounds to saliva, tears, or nervous tissue from an infected individual has never been reported.

Risk Factors
Rabies is a low risk but high impact disease in travelers and can be prevented through vaccination. Very few cases of potential
exposure progress to rabies among travelers, as shown by the low number of imported cases reported in the E.U., U.S., and Japan.

A bite, a scratch, or a lick from a dog or other mammal in a rabies-endemic country or a bite or scratch from a bat in any country presents a risk of rabies to an unvaccinated traveler.

The risk of developing rabies increases with severity (number and depth) of bites and proximity to the head. Timely immunization is protective when given before and/or after exposure to neutralize the rabies virus before it reaches the brain via an affected peripheral nerve. Bites to the face carry an especially high risk and require more urgent initiation of treatment following exposure.

Symptoms
Symptoms most commonly develop 20 to 90 days after exposure, depending on the severity and site of the bite. In very few cases, an infected person can remain asymptomatic for up to 4 years or longer.

Tingling at the site of the bite is usually followed by fever, headache, muscle pain, anxiety, depression, irritability, and sometimes respiratory or gastrointestinal symptoms, which progress to the classical features of either furious (hyperactive) or paralytic rabies. Patients with furious rabies, which is common after dog bites, are terrified of water (hydrophobia) and develop severe spasms of the breathing muscles, which may lead to suffocation, generalized convulsions, coma, and death. Patients with paralytic rabies, which is common after bat bites, become lethargic, dribble saliva, and develop an ascending loss of muscle tone and paralysis.

Consequences of Infection
Consequences of infection are paralysis, coma, and ultimately death once the rabies virus reaches the brain via an affected peripheral nerve from the site of the bite or wound.

Need for Medical Assistance
A traveler who has been bitten, scratched, or licked by a mammal in a rabies-endemic country or by a bat anywhere in the world should urgently seek medical advice on postexposure prophylaxis. Bites to the face require urgent medical attention. Any potentially rabid exposure, even from months earlier, warrants immediate initiation of appropriate postexposure vaccination.

National, state, or local health authorities should be consulted by the traveler or medical provider for recent information on rabies risk according to the particular exposure.

Prevention
Preexposure
Non-vaccine
Preventive measures include the following:

- Avoid contact with all dogs and other biting mammals in countries with canine rabies.
- Avoid contact with all wild mammals, especially those that are behaving abnormally, in countries with rabies in wild mammals (e.g., skunks, raccoons, mongooses).
- Avoid touching or feeding monkeys, especially those in temples and national parks, because they often show little fear of humans.
- Avoid bat exposure if planning to visit bat-infested caves and avoid the cave if not previously vaccinated.
- Watch children carefully; children are at high risk for exposure and may not report bites, scratches, or other incidents that might occur.

Vaccine
Rabies vaccine can be given before travel for travelers going to any country with rabies (especially canine rabies).

Preexposure rabies vaccination is recommended for:

- Long-stay travelers in high-risk destinations
Shorter-stay travelers in high-risk destinations if more than 24 hours from a reliable source of modern cell-culture rabies vaccine and rabies immune globulin (RIG)

Travelers with extensive outdoor exposure (occupational or adventure) in high-risk destinations where immediate access to appropriate medical care may be limited, regardless of length of stay

Risk-averse travelers going to high-risk destinations, especially those engaging in high-risk activities

### Postexposure

#### Non-vaccine

The following measures are recommended:

- If a bite or other exposure occurs, immediately clean the wound with soap and water under a running tap if possible, for a minimum of 15 minutes.
- If available, a virucidal agent that destroys the virus (such as povidone-iodine) should also be used to clean the wound.
- Deep wounds are usually not closed or sutured.
- Treatment should be sought urgently.

#### Vaccine or Vaccine and Rabies Immune Globulin (RIG)

Postexposure prophylaxis (PEP), with or without RIG (see below), is recommended for:

- Bite exposures that include any penetration of the skin by the teeth of a potentially rabid animal
  - PEP does not need to be initiated if a biting dog, cat, or ferret is healthy and available for 10 days’ observation. If PEP has been initiated and the animal remains healthy, PEP can be discontinued.
  - Bites caused by livestock, small and large rodents (rats, mice, hamsters, gerbils, guinea pigs, woodchucks, beavers), and lagomorphs (rabbits, hares) almost never require initiation of PEP.
- Nonbite exposures, including scratches or contamination of open wounds, abrasions, or mucous membranes with saliva or other potentially infectious material
- Bat exposures (all bats should be considered potentially rabid):
  - PEP is recommended for all bat-bite exposures.
  - PEP is recommended if it is not reasonably certain that exposure did not occur, even if evidence of exposure is not visible.
  - PEP is not indicated for bat exposures if it is reasonably certain that exposure did not occur or if the bat is available for testing and is negative for rabies virus.

Persons with underlying medical conditions or who have concerns about the vaccines should speak to their health care provider before vaccine administration.

### Side Effects

Mild local reactions can include pain, redness, swelling, or itching at the injection site. Fever, headache, dizziness, abdominal pain, and gastrointestinal symptoms may also occur. Neurological complications have been reported, albeit rarely.

### Timing

The preexposure vaccine is given in 3 doses: 1 each on days 0, 7, and 28 (the third dose may be given as early as day 21 if time is limited). If the 3-dose preexposure series cannot be completed before travel, do not start the series.

Duration of vaccine protection is limited to the time interval until any subsequent rabies exposure, at which time postexposure vaccination will be required. Regular boosters are recommended only for veterinary and wildlife workers. Postexposure vaccination timing depends on whether the preexposure vaccine was previously given at any time during life and in a complete series:

- Persons who have received the complete preexposure vaccine series are given rabies vaccine only; usually 2 doses are given: 1 each on days 0 and 3.
- Persons who have not received the complete preexposure vaccine series need both rabies vaccine and RIG: 4 doses of vaccine are usually given (1 each on days 0, 3, 7, and 14) and RIG is injected into and around the bite or exposure site.