

# Rabies

## Introduction

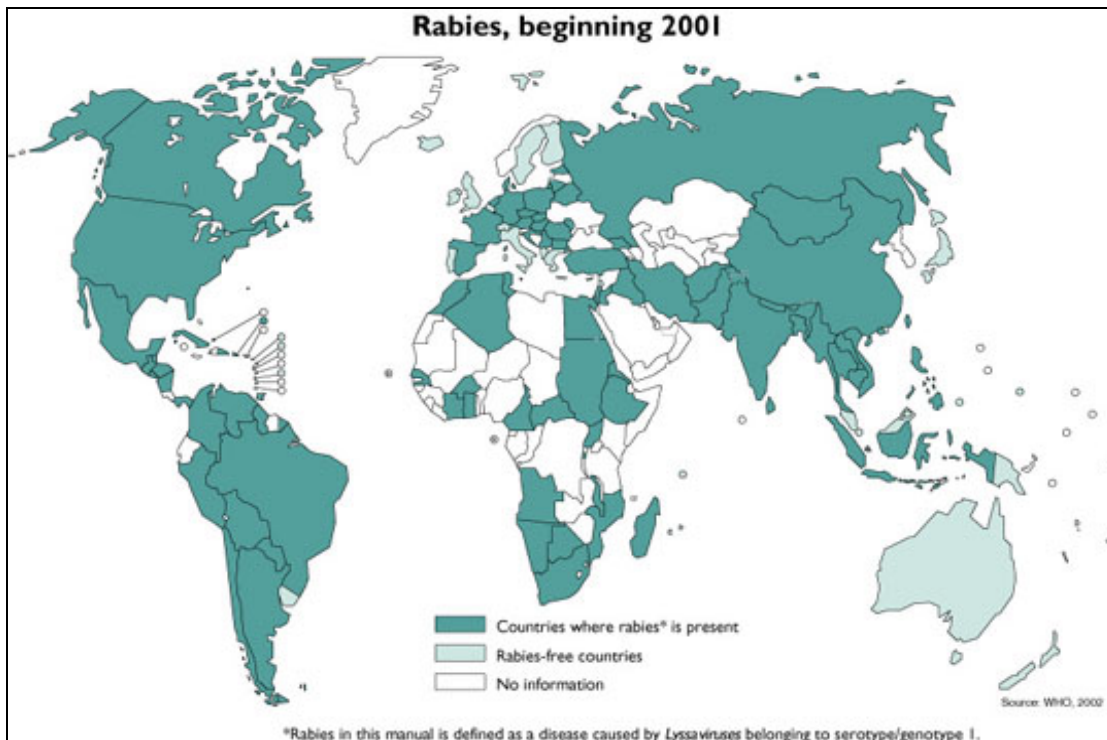
The rabies virus is a species of the genus *Lyssavirus*, of the family *Rhabdoviridae*, or bullet-shaped viruses. The virus attacks the central nervous system, causing progressive paralysis, encephalitis and coma. Once symptoms present, rabies is a fatal infection.

Although rabies occurs primarily in warm-blooded animals (both domestic and wild), it can be transmitted to man, usually by a bite from an infected animal.

## Epidemiology

(Data from the Travel Health Surveillance Section of the Health Protection Agency Communicable Disease Surveillance Centre)

## Global Epidemiology



According to WHO data, 2.5 billion people are at risk of acquiring rabies in more than 100 countries that report the disease<sup>1</sup>. Most parts of the African and Asian continents and many parts of South America are endemic for rabies. An estimated 10 million people worldwide receive post-exposure treatments each year after being bitten by a suspected rabid animal, usually a dog. The UK and most of Western Europe are rabies free due to the success of co-ordinated wildlife oral vaccination programmes, together with the availability of effective commercial vaccination for domestic animals<sup>2</sup>. However, rabies is endemic in wild animals of North America and in the forests of North Eastern Europe.

The annual number of deaths worldwide caused by rabies is estimated to be between 50,000 and 60,000; accurate data on the worldwide incidence of rabies is scarce. More than half of the deaths occur in India and Bangladesh, but the true disease burden of rabies is thought to be largely under-estimated especially in Africa. The vast majority (95-98%) of these deaths worldwide occur in canine-endemic regions where large stray dog populations are ineffectively controlled. This combined with limited availability of human post-exposure prophylaxis in some countries; contribute to the high mortality rates<sup>1</sup>.

## **Rabies in UK travellers**

The last case of indigenous terrestrial animal rabies that occurred in Great Britain was in 1922, and the last recorded case of indigenous terrestrial animal rabies outside quarantine occurred in 1969 and 1970 when two imported dogs died soon after completing 6 months quarantine. Since then, most cases of rabies in the UK have only occurred in quarantined animals or in people infected abroad. The exception is a case of human rabies in a bat handler infected with European Bat Lyssavirus 2 (EBL2) in Scotland in 2002<sup>3</sup>. Before that incident, a bat infected with EBL2 was discovered in Lancashire earlier in 2002. Another bat of unknown country of origin infected with EBL2 was found in Newhaven, Sussex in 1996. At that time it was thought to have come from another country, for example flown across the channel from France, but in 2003, it was recognised that UK bats may now carry EBL2.

Rabies is very poorly reported and under-notified in the UK. Since 1902, there have been at least 24 deaths from imported classical rabies reported in the UK. All but two of these resulted from a dog bite (one was from a cat and the other exposure was unknown) and 63% of deaths were after an exposure in the Indian Sub-Continent. The most recent imported cases occurred in 2001. One in an overseas visitor from Nigeria, who had sustained a dog bite on the lower leg five months previously, and the other, a UK resident of Filipino origin who had also been bitten by a dog whilst in the Philippines<sup>4</sup>. None of these cases that have occurred in the UK were known to have received pre-or post-exposure prophylaxis.

## **Risk for Travellers**

It has been estimated that rabies kills between 40,000 and 70,000 people each year worldwide<sup>5</sup>. Most of these deaths occur in Asia, Africa and Latin America, and follow a dog-bite from an infected animal. All these regions have large stray dog populations that pose a significant disease risk to humans. Other mammalian vectors in these countries include bats, monkeys, mongoose and jackal.

In North America and Europe the disease is mainly confined to wild animals (particularly bats, racoons, foxes, coyote and skunks) but human cases have occurred; in North America these have usually followed exposure to an infected bat.

## **Transmission**

Rabies virus is found in the saliva of an infected animal. The virus can be transmitted to humans by a bite or scratch, or when saliva from an infected animal has come into contact with broken skin or mucous membranes (eyes, nose or mouth tissues). Rarely, the virus has been contracted following laboratory exposure or inhalation of infected aerosol in bat caves.

## **Signs and Symptoms**

The incubation period of rabies is between 20 and 90 days, although in rare cases it can be as short as a few days or as long as several years. The prodrome can be a non-specific illness involving symptoms of fever, headache, myalgia and fatigue. Parasthesiae may occur at the site of the bite. The disease progresses to the more common furious rabies, or less common paralytic or 'dumb' rabies.

Furious rabies is characterised by laryngeal spasms, which occur in response to attempts to drink water; these can be accompanied by a feeling of terror. Following further deterioration, coma and death eventually ensue over several days.

The paralytic form of rabies can often be misdiagnosed. Parasthesiae and weakness often first occur around the bite site and begin to ascend. This paralysis results in respiratory failure and inability to swallow, death usually occurs within 1-3 weeks.

## Treatment

All travellers who have possibly been exposed to the rabies virus, whether by bites, scratches or other exposure, should seek medical advice without delay. This also applies to travellers in low risk areas as other infections may be present, or the animal may have strayed across the border from an endemic country. Medical advice should be sought without delay even if pre-exposure vaccine was received.

Although a few patients are claimed to have survived rabies, the disease is considered to have a fatal outcome once symptoms manifest themselves.

## Prevention

Contact with wild or domestic animals during travel should be avoided.

- Do not attempt to pick up an unusually tame, unfamiliar animal
- Do not attract stray animals by being careless with litter

Pre-exposure vaccine should be considered for those travellers at particular risk.

This first aid advice should be given to travellers in the case of a possible exposure to rabies virus. Receiving rabies vaccine prior to travel does not preclude the need for post-exposure medical evaluation and additional doses of rabies vaccine.

- Immediately wash the wound with soap and running water for 5 minutes.
- If possible apply an iodine solution or 40-50% alcohol (whiskey or other spirit can be used)
- Seek medical advice about the need for rabies vaccination and possible antibiotics for a bite wound infection as soon as possible. Tetanus vaccine may also be required, if the traveller is not up-to-date.

## Rabies Pre-Exposure Vaccine

### Indications for use of vaccine

The need for pre-exposure rabies vaccine includes an assessment of:

- The incidence of rabies in the destination countries
- The availability and quality of anti rabies vaccine and rabies immune globulin (RIG)
- The planned activities of the traveller
- The duration of stay
- The possibility of unrecognised or unreported exposure (e.g. in young children)

Rabies pre-exposure vaccine should be considered for

- Those travelling for a month or more in enzootic areas.
- Persons who will be travelling for less than a month in enzootic areas, but who may be exposed because of their travel activities.
- Those at occupational risk e.g. vets, animal handlers, laboratory workers who handle the virus

Other specific indications for vaccination can be found in *Immunisation against Infectious Disease*

The rationale for receiving pre-exposure vaccine is that it will give the individual time to reach medical treatment, in the event of an animal bite or scratch; or possibly protect an individual who has an unapparent exposure. Those who have received a pre-exposure course of rabies vaccine will only require two further doses of vaccine post-exposure, rather the full course of five vaccines. In addition, RIG will not be required in country; RIG is frequently difficult to locate in resource poor countries.

Travellers should be advised to perform first aid treatment on a wound and to seek medical advice as soon as possible.

### **Availability of vaccine**

There are two rabies vaccines licensed for use in the UK, both of which are inactivated.

Details of these and manufacturers can be found in the summary table below

## Vaccine schedules

Vaccine	Manufacturer/distributor	Schedule	Length of Protection	Age Range
Rabies Vaccine BP	Aventis Pasteur MSD	3 doses. Day 0, 7 and 28	Reinforcing doses should be given every 2-3 years if at continued risk	No minimum age stated in SPC. However, vaccine should be considered for children from the age of approximately 1 year. Bites in children may be higher risk as they often occur around the face or head
		2 doses given at least 1 week apart can be given if little time prior to departure	A reinforcing dose at 6 months if at continued risk or for longer term protection	
Rabipur®	Chiron vaccine Distributed by MASTA	3 doses. Day 0, 7 and 21 or 28	Reinforcing doses should be given every 2-3 years if at continued risk	Can be given from any age. Vaccine should be considered for children as bites may be higher risk as they often occur around the face or head
		2 doses given at least 1 week apart can be given if little time prior to departure	A reinforcing dose at 6 months if at continued risk or for longer term protection	

We strongly advise that the SPC is consulted prior to the administration of any vaccine

It is good practice to continue a course of rabies with the same brand of vaccine. However, should this not be possible the vaccines may be used interchangeably.

### **Intradermal route of administration**

The intradermal route is not licensed in the UK for any rabies vaccine. The ID route should not be used with Purified Chick Cell Vaccine (Rabipur). If practitioners decide to use the intradermal route, the Human Diploid Cell Vaccine (Rabies Vaccine BP) should be administered. Concurrent use of chloroquine is a contraindication to intradermal rabies vaccine.

Travellers who receive the intradermal rabies vaccine should be advised that in the event of a possible rabies exposure, they may be considered by the treating doctor to be incompletely immunised, and consequently advised to complete a full post exposure vaccine course. RIG is however, unnecessary in this situation.

Animal handlers and immune compromised persons should always receive intramuscular doses of rabies vaccine.

### **Interrupted courses**

If it is not possible to administer three doses of vaccine, it is likely that in the majority of vaccinees two doses will confer protection provided they are given at least four weeks apart.

If there are time constraints to the full pre-exposure course, a single dose is likely to prime the immune system. It is important that travellers are aware that in the event of a possible exposure, they will require a full post exposure course of vaccine. RIG will however, not be necessary.

### **Contraindications**

- Acute febrile or other infectious illness
- Allergy to any constituent of the vaccine
- Individuals who develop symptoms suggestive of hypersensitivity after vaccination should not receive further doses.
- Rabipur vaccine is propagated on chick cell embryo, and is therefore contraindicated by egg allergy.

## Adverse events

Adverse events to rabies vaccine tend to be mild and transient and include itching, pain, and erythema at the injection site. Less commonly fever, malaise, headaches, dizziness and urticaria can occur. An immune-complex reaction of urticaria, pruritis and malaise may occur in about 6% of persons receiving booster doses of the Human Diploid Cell Vaccine.

## Post exposure prophylaxis

Advice regarding post exposure prophylaxis should be sought from the HPA Virus Reference Division, Colindale on 020 8200 6868.

If they are not available, the duty doctor at HPA CDSC should be consulted.

## References

1. World Health Organization. State of the art of new vaccines: research & development. April 2003. WHO: Geneva. Available online at [www.who.int/vaccine\\_research/documents/en/sav\\_final.pdf](http://www.who.int/vaccine_research/documents/en/sav_final.pdf)
2. Department of Health. Memorandum on Rabies Prevention and Control. February 2000.
3. Crowcroft NS. Rabies-like infection in Scotland. *Eurosurveillance* 2002; 6 [www.eurosurveillance.org/ew/2002/021212.asp](http://www.eurosurveillance.org/ew/2002/021212.asp)
4. CDSC. Rabies acquired abroad. *Communicable Disease Report Weekly* 2001; 11 (24)
5. World Health Organisation. Rabies fact sheet no. 99. 2001 [www.who.int/inf-fs/en/fact099.html](http://www.who.int/inf-fs/en/fact099.html)