

## RABIES

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Reservoirs: wild and domestic canides, felids, viverrids, procyonids, chiroptera. Spillover hosts: primates (including man).	Direct: biting, contact of mucous membranes or wounds to oral mucous secretions or membranes.	In nonhuman primates usually silent rabies: salivation, paralysis, automutilation, sudden death.	Yes.	None.	Quarantine, strict necropsy procedures, prevention of contact to wildlife (including bats!).

<b>Fact sheet compiled by</b> Manfred Brack, formerly German Primate Center, Göttingen/Germany.	<b>Last update</b> 22.11.2008
<b>Susceptible animal groups</b> Street rabies virus: All mammalian species including nonhuman primates. Mokola-virus: Shrews and rodents, other bat rabies viruses chiroptera	
<b>Causative organism</b> Lyssavirus Genus of the Rhabdovirus family with seven genotypes. All rabies virus ( rhabdoviridae, lyssaviridae ) strains: classic street rabies virus (genotype 1), bat rabies viruses : (Lagos bat virus, (genotype 2), Mokola virus (genotype 3 – shrew- and rodent associated but not with bats!), Duvenhage virus (genotype 4), European bat viruses (EBLV) types 1 (genotype 5) and 2 (genotype 6), Australian bat lyssa – type virus (genotype 7).	
<b>Zoonotic potential</b> Yes. Human infections also following bites by nonhuman primates!	
<b>Distribution</b> Worldwide. EBLV I throughout mainland Europe, EBLV type II isolated in Netherlands, UK and Switzerland.	
<b>Transmission</b> Primarily through biting or scratching lesions by rabid canids (Europe, Asia), racoons(USA), vampire bats( South America), other possible routes: contact of mucosal membranes or skin lesions to mucous secretions of rabid animals ( or man ). Vaccination using live rabies virus vaccines. Aerogenous infections questionable European bat lyssavirus type I mainly in <i>Eptesicus serotinus</i> , EBLV type 2 in <i>Myotis daubentonii</i> , <i>M. dasycneme</i> , Lagos bat lyssavirus in <i>Epomorphorus wahlbergi</i> .	
<b>Incubation period</b> Depending on the site of infection varying from 3 weeks to several months.	
<b>Clinical symptoms</b> In nonhuman primates usually silent rabies : salivation, paralysis, depression, automutilation sudden death. Rarely furious rabies: hyperaggression, biting.	
<b>Post mortem findings</b> Nonpurulent encephalitis with formation of large eosinophilic cytoplasmic inclusion bodies ( Negri bodies ) within nerve cells.	
<b>Diagnosis</b> Histopathology : Negri bodies, immunofluorescence staining of brain tissues (particularly hippocampus cerebellum, medulla oblongata), corneal smears, skin or mucosal scrapings, electron microscopy, virus cultivation, PCR, RT-PCR, serotests ( rapid fluorescent focus inhibition test), mouse inoculation tests, western blots.	
<b>Material required for laboratory analysis</b> Brain tissues, serum.	

**EU Reference Laboratory****AFSSA, Nancy**

Laboratoire d'études sur la rage et la pathologie des animaux sauvages

Domaine de Pixérécourt, BP 9  
F-54220 Malzéville  
France

**OIE Reference Laboratories****• Dr A. Wandeler**

Centre of Expertise for Rabies, Animal Diseases Research Institute  
3851 Fallowfield Road, P.O. Box 11300, Station H, Nepean, Ontario K2H 8P9  
CANADA  
Tel: (1.613) 228.66.98 Fax: (1.613) 228.66.69  
Email: [alex.wandeler@inspection.gc.ca](mailto:alex.wandeler@inspection.gc.ca)

**• Dr J. Barrat**

AFSSA-LERPAS, Laboratoire d'études sur la rage et la pathologie des animaux sauvages  
Domaine de Pixérécourt, BP 9, 54220 Malzéville  
FRANCE  
Tel: (33 (0)3) 83.29.89.50 Fax: (33 (0)3) 83.29.89.58  
Email: [j.barrat@afssa.fr](mailto:j.barrat@afssa.fr)

**• Mme F. Cliquet**

AFSSA-LERPAS, Laboratoire d'études sur la rage et la pathologie des animaux sauvages  
Domaine de Pixérécourt, BP 9, 54220 Malzéville  
FRANCE  
Tel: (33 (0)3) 83.29.89.50 Fax: (33 (0)3) 83.29.89.58  
Email: [f.cliquet@afssa.fr](mailto:f.cliquet@afssa.fr)

**• Dr T. Müller**

Institute of Epidemiology, Friedrich-Loeffler Institut, Federal Research Institute for Animal Health  
Seest. 55, 16868 Wusterhausen/Dosse  
GERMANY  
Tel: (49.33) 97.98.01.86 Fax: (49.33) 97.98.02.00  
Email: [thomas.mueller@wus.bfaw.de](mailto:thomas.mueller@wus.bfaw.de)

**• Dr Claude Taurai Sabeta**

Onderstepoort Veterinary Institute, Rabies Unit  
Private Bag X05, Onderstepoort 0110  
SOUTH AFRICA  
Tel: (27.12) 529.94.39 Fax: (27.12) 529.93.90  
Email: [sabetac@arc.agric.za](mailto:sabetac@arc.agric.za)

**• Dr Anthony Fooks**

Rabies and Wildlife Zoonoses Group, Virology Department, VLA Weybridge  
New Haw, Addlestone, Surrey KT15 3NB  
UNITED KINGDOM  
Tel: (44.1932) 35.78.40 Fax: (44.1932) 35.72.39  
Email: [t.fooks@vla.defra.gsi.gov.uk](mailto:t.fooks@vla.defra.gsi.gov.uk)

**Relevant diagnostic laboratories**

Konsiliarlaboratorium für Tollwut,  
Universitätsklinikum Essen,  
Institut für Virologie,  
Tel.: 0201.723-3561  
" " -3550

E-mail.: [roggendorf@uni-essen.de](mailto:roggendorf@uni-essen.de)  
[Stefan.ross@uni-essen.de](mailto:Stefan.ross@uni-essen.de)

Friedrich-Loeffler-Institut, Bundesforschungsinstitut für Tiergesundheit,  
Standort Wusterhausen,



Tel.: 033979.80-0

Nationales Referenzzentrum für Tropische Infektionserreger am Bernhard-Nocht-Institut, Hamburg.

Tel.: 040. 42818 – 401

e-mail: MZD@bni-hamburg.de

Local veterinary laboratories (State laboratories).

**Treatment**

None

**Prevention and control in zoos**

Proper quarantine of new arrivals, prevention of contact to wildlife including bats. Vaccination (**inactivated vaccines only!**) of possibly exposed animals including bat colonies. In man: immediate woud disinfection, antisera, vaccination.

**Suggested disinfectant for housing facilities****Notification**

In Germany: State Veterinarian according to § 1 “Verordnung über anzeigepflichtige Tierseuchen, 3.Nov.2004”.

**Guarantees required under EU Legislation****Guarantees required by EAZA Zoos****Measures required under the Animal Disease Surveillance Plan****Measures required for introducing animals from non-approved sources****Measures to be taken in case of disease outbreak or positive laboratory findings****Conditions for restoring disease-free status after an outbreak****Experts who may be consulted****References**

1. Aaron, E., I. Kamei, E. V. Bayer, R. W. Emmons, and J. Chin (1975). Probable vaccine – induced rabies in a pet marmoset. CDC Morb. Mortal. Wkl. Rep. March 15, p. 99.
2. Abdussalam, M. (1966). Natural rabies in a laboratory monkey. Lab. Primate Newsl. 5 (3): 13.
3. Anon. 2004. Großbritannien. Info Dienst Reisemedizin aktuell 19 : 5.
4. Beran, G. W. (1981) Rabies and infections ba rabies – related viruses ; pp. 57 – 135 in “CRC Handbook Series in Zoonoses (Steele, D. H., Series editor), Section B : Viral Zoonoses , Vol II (Beran, G. W., Section editor), CRC Press, Boca Raton.
5. Favoretto, S. R., C. C. de Mattos, N. B. Morais, F. A. A. Araujo, and C. A. de Mattos (2001). Rabies in marmosets ( *Callithrix jacchus* ), Ceara , Brazil. Emerg. Infect. Dis. 7, ? - ? . – [www.cdc.gov/ncidod/eid/vol7nob/favoretto.htm](http://www.cdc.gov/ncidod/eid/vol7nob/favoretto.htm).
6. Fekadu, M. ( 1982 ). Rabies in Ethiopia. Am. J. Epidemiol. 115: 266 – 273.
7. Fiennes, R. N. T – W. (1971). Rabies in Primates. ; pp. 683 – 685 in “ Medical Primatology 1970 “. (Goldsmith, E. I. and J. Moor – Jankowski, eds. ), Karger, Basel.
8. Fieenes, R. N. T – W. (1972). Rabies ; pp. 646 – 662 in “ Pathology of Simian Primates, Part II” (Fiennes, R. N. T – W. ed.), Karger, Basel.
9. Fooks, A. R., L. M. McElhinney, D. A. Marston, D. Selden, T. A. Jolliffe, P. R. Wakeley, N. Johnson, and S. M. Brookes. (2004). Identification of a European bat Lyssavirus type 2 in a Daubenton’s bat found in Staines, Suirrey, UK. Vet. Rec. 155 : 434 – 435.
10. Johnson, N., P. R. Wakeley, S. M. Brookes, and A. R. Fooks . (2006). European bat lyssavirus type 2 RNA in *Myotis daubentonii*. Emerg. Infect. Dis. 12: 1142 – 144.
11. Kaplan, C. (1969) Rabies in non – human primates. Lab. Anim. Handb. 4 : 117 – 118.
12. Khawplod, P., K.-I. Inoue, Y. Shoji, H. Wilde, S. Ubol, A. Nishizono, I. Kurane, and K. Morimoto. (2005). A novel rapid fluorescent focus inhibition test for rabies virus using a recombinant rabies virus visualizing a green fluorescent protein. J. Virol. Meth. 125 : 35 – 40.
13. Lima, K. C., J. Megid, A. V. Silva, and A. Cortez. ( 2005 ). The heminested RT-PCR for the study of rabies virus pathogenesis . J Virol. Meth. 124 : 79 – 85.
14. Markotter, W., J. Randles, C. E. Rupprecht, C. T. Sabeta, P. J. Taylor, A. I. Wandeler, and L. H. Nel. (2006). Lagos bet virus, South Africa. Emerg. Infect. Dis. 12 : 504 - 506
15. Miot, M. R., and R. K. Sikes (1973). Rabies in a chimpanzee. Lab. Primates Newsl. 12 (1): 6.



16. Paweska, J. T., L. H. Blumberg, C. Lieberberg, R. H. Hewlett, A. A. Grobbelaar, P. A. Leman, J. E. Croft., L. H. Nel., L. Nutt, and R. Swanepoel . 2006. Fatal human rabies – related Duvenhage virus , South Africa. *Emerg. Infect. Dis.* 12 : 1965 - 1967
17. Peters, C., R. Isaza, D. J. Heard, R. D. Davis, S. M. Moore, and D. J. Briggs. (2004). Vaccination of Egyptian fruit bats (*Rousettus aegyptiacus*) with monovalent inactivated rabies vaccine. *J. Zoo Wildl. Med.* 35 : 55 - 59
18. Picard-Meyer, E., J. Barrat, E. Tissot, M. J. Barrat, V. Bruyere, and F. Cliquet. (2004). Genetic analysis of European bat lyssavirus type 1 isolates from France. *Vet. Rec.* 154 : 589 – 595.
19. Prakash, S. (1970). Rabies in and around Delhi. First WHO Reg. Sem. Vet. Publ. Hlth., Mukteswar U.P., India.
20. Richardson, J. H. (1971) Rabies in nonhuman primates. *Primate Zoonoses Surveill. Rep.* 4: 18 – 20-
21. Richardson, J. H., and G. L. Humphrey (1971). Rabies in imported nonhuman primates. *Lab. Anim. Sci.* 21: 1082 – 1083.
22. Röttcher, D., and A. M. Sawchuk (1978) Wildlife rabies in Zambia. *J. Wildl. Dis.* 14: 513 – 517.
23. Smith, R. E., G. J. Pirie, and J. J. England (1987). Rabies vaccination of captive white – handed gibbons potentially exposed to wild rabies virus. *Lab. Anim. Sci.* 37: 668 – 669.
24. Swanepoel, R., B. J. H. Barnard, C. D. Meredith, G. C. Bishop, G. K. Brückner, C. M. Foggin, and O. J. B. Hübschle (1993). Rabies in southern Africa. *Onderstepoort J. Vet. Res.* 60: 325 – 346.