

## YELLOW FEVER

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Primary Hosts: Cercopithecidae, Foreign Hosts: Cebidae	Arthropode-vector- bites (mosquitoes)	Haemorrhages, fever, leukopenia,	Yes: in New World monkeys and man	None	<i>In houses</i>  <i>in zoos</i> 17 D-vaccine

<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> Reservoir hosts in Africa : <i>Colobus badius</i> , <i>Cercopithecus aethiops</i> , <i>C.ascanius schmidti</i> , <i>C.diana</i> , <i>C.mona</i> , <i>Cercocebus</i> spp., <i>Papio</i> spp., <i>Galago</i> spp., <i>Pan</i> spp.. Reservoir hosts in South-/ Central America : <i>Alouatta</i> spp., <i>Aotus trivirgatus</i> , <i>Saguinus</i> spp., <i>Ateles</i> spp., <i>Saimiri</i> spp., <i>Cebus</i> spp., <i>Callicebus</i> spp.	
<b>Causative organism</b> Yellow fever virus ( Arboviruses, Flaviviridae ) with two different genotypes in East- and West Africa and two other topotypes in the Americas.	
<b>Zoonotic potential</b> Yes. Yellow fever exists in two different cycles, a sylvatic one with monkeys being the reservoir host and an urban cycle with only man and mosquitoes involved.	
<b>Distribution</b> Originally in Africa between 15 ° North and 10 ° South, in the Americas: Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Peru, Venezuela, Trinidad.	
<b>Transmission</b> Via arthropode vector bites : Africa: <i>Aedes aegypti</i> , <i>Ae. africanus</i> , <i>Ae. simpsoni</i> , <i>Ae. furcifer</i> , <i>Ae. furcifer taylori</i> , <i>Ae. vittalus</i> , <i>Ae. luteocephalus</i> , <i>Ae. bromeliae</i> , <i>Ae. keniensis</i> . South-/ Central America: <i>Ae. aegypti</i> , <i>Ae. albopictus</i> , <i>Haemagogus janthinomys</i> , <i>Sabethes chloropterus</i> .	
<b>Incubation period</b> South American monkeys : 60 hs; man: 3 – 6 days.	
<b>Clinical symptoms</b> In Old World nonhuman primates usually none. Exception: In <i>Galago crassicaudatus</i> fatal with mortality rates up to 50%. In New World monkeys : fever, leukopenia, death.	
<b>Post mortem findings</b> New World monkeys: haemorrhagic diathesis, fatty liver degeneration, extensive hepatocellular necrosis.	
<b>Diagnosis</b> Virology: tissue culture, RT-PCR, mass tag PCR, radioimmunoassays Serology: ELISA- tests.	
<b>Material required for laboratory analysis</b> Altered organs, whole blood, serum.	
<b>Relevant diagnostic laboratories</b> Nationales Referenzzentrum für tropische Infektionserreger am Bernhard-Nocht –Institut für Tropenmedizin Robert-Koch-Str. 17 D 20359 Hamburg, Germany Phone: 040 – 42818 – 401 Fax: “ “ - 400 e-mail: MZD@uni-hamburg.de	
<b>Treatment</b>	



<b>Prevention and control in zoos</b> Personnel: vaccination.
<b>Suggested disinfectant for housing facilities</b>
<b>Notification</b> Yellow fever is subject to official notification of the WHO through the national authorities
<b>Guarantees required under EU Legislation</b>
<b>Guarantees required by EAZA Zoos</b>
<b>Measures required under the Animal Disease Surveillance Plan</b>
<b>Measures required for introducing animals from non-approved sources</b>
<b>Measures to be taken in case of disease outbreak or positive laboratory findings</b>
<b>Conditions for restoring disease-free status after an outbreak</b>
<b>Experts who may be consulted</b> 1. Prof. Dr. B.Fleischer, NRZ, Hamburg 2. Prof. Dr. H. Schmitz, “ “
<b>References</b> 1. Anon. 1986. Update : <i>Aedes albopictus</i> infestation – United States. <i>Morb. Mortal. Wkly. Rep.</i> 35 : 649 – 651. 2. Anon. 1992. Yellow fever – the global situation. <i>Bull. World Health Org.</i> 70: 667. 3. Anon. 1999. Gelbfieber und Überlegungen anlässlich einer importierten Erkrankung. <i>Epidemiol. Bull.</i> 32 : 235 – 239. 4. Anon. 2000. Traveller's health notes. <i>Lab. Primate Newsl.</i> 39 (3) : 13 – 14. 5. Anon. 2001. Brazil yellow fever outbreak kills twelve. <i>Lab. Primate Newsl.</i> 40 (3): 21. 6. Anon. 2001. Monkey mortality , yellow fever ? <i>Lab. Primate Newsl.</i> 40 (3) : 21. 7. Arroyo, J. I., S. A. Apperson, C. B. Cropp, B. J. Marafino, jr., T. P. Monath, R. B. Tesh, R. E. Shope, and M. A. Garcia – Blanco. 1988. Effect of human gamma interferon on yellow fever virus infection. <i>Am. J. Trop. Med. Hyg.</i> 38 : 647 – 650. 8. Barros, M. L. B., and G. Boecken . 1996. Jungle yellow fever in the central Amazon. <i>Lancet</i> 348: 969 – 970. 9. Brack, M. 1987. <i>Agents Transmissible from Simians to Man.</i> Springer, Berlin. 10. Bres, P. L. J. 1986. A century of progress in combating yellow fever . <i>Bull. World Health Org.</i> 64 : 775 – 786. 11. Bres, P. L. J. 1987. Un siècle de progrès dans la lutte contre le fièvre jaune. <i>Bull. World Health Org.</i> 65 : 149 – 160. 12. Cordellier, R. 1991. L'epidémiologie de la fièvre jaune en Afrique de l'Ouest. <i>Bull. World Health Org.</i> 69 : 73 – 84. 13. Coulanges, P., H. Zeller, Y. Clerk, F. Rodhain, et R. Albignac. 1979. Bactéries, virus, parasites, pathologie et pathologie expérimentale des lemuriens malgaches. <i>Intéret pour l'homme . Arch. Inst. Pasteur Madag.</i> 47 : 201 – 209. 14. Fontenille, D., M. Diallo, M. Mondo, M. Ndiaye, and J. Thonnon. 1997. First evidence of natural vertical transmission of yellow fever virus in <i>Aedes aegypti</i> , its epidemic vector. <i>Trans. R. Soc. Trop. Med. Hyg.</i> 91 : 533 – 535. 15. Gould, E. A. 2001. Tracing the origin and dispersal of flaviviruses by molecular phylogenies. <i>Infect. Dis. Rev.</i> 3 : 88 – 99. 16. Kalra, N. L., and V. P. Sharma. 1997. Yellow fever threat? <i>Curr. Sci.</i> 71 : 948. 17. Mathiot, C. C., V. M. Herve, and A. J. Georges. 1990. Antibodies to haemorrhagic fever viruses and to selected arboviruses in monkeys from the Central African Republic. <i>Trans. R. Soc. Trop. Med. Hyg.</i> 84 : 732 – 733. 18. Meunier, D.F. M. Y., N. Aron, and M. J. Mazzariol. 1988. The 1987 yellow fever epidemic in Mali : viral and immunological diagnosis. <i>Trans R. Soc. Trop. Med. Hyg.</i> 82 : 767. 19. Monath, T. P. 1991. Yellow fever : Victor, Victoria ? Conquerer, conquest ? <i>Epidemics and research in the last forty years and prospects for the future.</i> <i>Am. J. Trop. Med. Hyg.</i> 45 : 1 – 43. 20. Monath, T. P. 1994. Yellow fever and dengue – the interaction of virus, vector and host in the

- re – emergence of epidemic diseases. *Semin. Virol.* 5 : 133 – 145.
21. Millere, B. R., C. J. Mitchell, and M. E. Ballinger. 1989. Replication, tissue tropism and transmission of yellow fever in *Aedes albopictus*. *Trans. R. Soc. Trop. Med. Hyg.* 83 : 252 – 255.
  22. Niedrig, M., N. Stolte, D. Fuchs, G. Hunsmann, and C. Stahl – Hennig. 1999. Intra – nasal infection of macaques with yellow fever (YF) vaccine 17 D : A novel and economical approach for YF vaccination in man. *Vaccine* 17 : 1206 – 1210.
  23. Rawlins, S. C., B. Hull, D. D. Chadee, R. Martinez, A. le Maitre, F. James, and L. Webb. 1990. Sylvatic yellow fever activity in Trinidad, 1988 – 1989. *Trans. R. Soc. Trop. Med. Hyg.* 84 : 142 – 143.
  24. Robertson, S. E., B. P. Hull, O. Tomori, O. Bele, J. W. Le Duc., and K. Esteves. 1996. Yellow fever. A decade of reemergence. *J. Am. Med. Assoc.* 276 : 1157 – 1162.
  25. Stuyft, P. van der, A. Gianella, M. Pirard, J. Cespedes, J. Lora, C. Peredo, J. L. Pelegrino, V. Vorndam, and M. Boelaert . 1999. Urbanization of yellow fever in Santa Cruz, Bolivia. *Lancet* 353 : 1558 – 1562.
  26. Vasconcelos, P. F. C., S. G. Rodrigues, N. Degallier, M. A. Morales, J. F. S. Travassos da Rosa, E. Travassos da Rosa, B. Mondet, V. L. R. S. Barros, and A. P. A. Travassos da Rosa. 1997. An epidemic of sylvatic yellow fever in the southeast region of Maranhão State, Brazil, 1992 – 1994 : Epidemiologic and entomologic studies. *Am. J. Trop. Med. Hyg.* 57 : 132 – 137.
  27. Wang, H., A. D. Jennings, K. D. Ryman, C. M. Late, E. Wang, H. Ni, P. D. Minor, and A. D. T. Barrett. 1997. Genetic variation among strains of wild – type yellow fever virus from Senegal. *J. Gen. Virol.* 78 : 1349 – 1352.