

ACANTHAMOEBIASIS

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Gorillas, Hylobatidae, Colobidae, <i>Papio</i> spp., <i>Mandrillus sphinx</i>	Unknown, probably perorally	Granulomatous amoebic encephalitis : limb paresis, paralysis, ataxia	Yes	Clarithromycin, Fluconazole, Sulfadiazin, Fluorocytosine, Miltefosine	<i>In houses</i> <i>in zoos</i>

Fact sheet compiled by Manfred Brack, formerly German Primate Center, Göttingen/Germany.	Last update 22.11.2008
Susceptible animal groups <i>Gorilla gorilla</i> , Hylobatidae, <i>Papio</i> spp., Colobidae, <i>Mandrillus sphinx</i> , man, dog.	
Causative organism <i>Balamuthia mandrillaris</i> (Acanthamoebidae).	
Zoonotic potential Yes.	
Distribution Worldwide. Widely distributed in fresh water, soil, and dust.	
Transmission Unknown. Experimentally transmitted by intranasal instillation.	
Incubation period > 10 days.	
Clinical symptoms Cutaneous granulomas, progressive limb paresis, hemiparesis, aphasia, seizures, cranial nerve paralysis (mainly 3. and 6. cranial nerve). Usually fatal within 2 months of symptom onset.	
Post mortem findings Random multifocal encephalomalacia and cerebral haemorrhages, nodular necroses in liver, kidney, lung, pancreas. Histology: poorly demarcated focal necroses, presence of trophozoites and cysts in the affected neuropil, necrotizing vasculitis.	
Diagnosis Methenamine silver- or PAS staining: presence of amoebic cysts in tissue sections (<i>Naegleria fowleri</i> does not produce cysts in tissues !), growth on monkey kidney cells or human lung fibroblasts or fetal bovine serum containing media, CSF, indirect immunohistochemistry, PCR, electron microscopy, computer tomography.	
Material required for laboratory analysis Affected tissues (brain and skin biopsies).	
Relevant diagnostic laboratories	
Treatment in man: Clarithromycin (500 mg 3 x daily), Sulfadiazine (1.58 g every 6 hs), 5- fluorocytosine (1,5 every 6 hs), 2.5 mg/kg /day i.v. Miltefosine.	
Prevention and control in zoos	
Suggested disinfectant for housing facilities	
Notification	
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 <ol style="list-style-type: none">1. Anderson, M. P., J. E. Oosterhus, S. Kennedy, and K. Benirschke. 1986. Pneumonia and meningoencephalitis due to amoeba in a lowland gorilla. <i>J. Zoo Anim. Med.</i> 17 : 87 – 91.2. Foreman, O., J. S. Sykes, L. Ball, N. Yang, and H. De Cock. 2004. Disseminated infection with <i>Balamuthia mandrillaris</i> in a dog. <i>Vet. Pathol.</i> 41 : 506 – 510.3. Huang, Z. H., A. Ferrante, and R. F. Carter. 1999. Serum antibodies to <i>Balamuthia mandrillaris</i>, a free – living amoeba recently demonstrated to cause granulomatous amoebic encephalitis. <i>J. Infect. Dis.</i> 179 : 1305 – 1308.4. Intalapaporn, P., C. Suankratay, S. Shuangshoti, K. Phantumchinda, S. Keelawat, and H. Wilde. 2004. <i>Balamuthia mandrillaris</i> meningoencephalitis : The first case in Southeast Asia. <i>Am. J. Trop. Med. Hyg.</i> 70 . 666 – 669.5. Martinez, A. J., and G. Visvesvara. 2001. <i>Balamuthia mandrillaris</i> infection. <i>J. Med. Microbiol.</i> 50 : 205 – 207.6. Reed, R. P., C. M. Cooke – Yarborough, A. L. Jaquiere, K. Grimwood, A. S. Kemp, J. C. Su, and J. R. L. Forsyth. 1997. Fatal granulomatous amoebic encephalitis caused by <i>Balamuthia mandrillaris</i>. <i>Med. J. Aust.</i> 167 : 82 – 84.7. Rideout, B. A., C. H. Gardiner, I. H. Stalis, J. R. Zuba, T. Hadfield, and G. S. Visvesvara. 1997. Fatal infection with <i>Balamuthia mandrillaris</i> (a free – living amoeba) in gorillas and other Old World primates. <i>Vet. Pathol.</i> 34 : 15 – 22.8. Riestra – Castaneda, J. M., R. Riestra – Castaneda, A. A. Gonzalez – Garrido, P. P. Moreno, A. J. Martinez, G. S. Visvesvara, F. J. Careaga, J. L. O. de Alba, and S. G. Cornejo. 1997. Granulomatous amebic encephalitis due to <i>Balamuthia mandrillaris</i> (Leptomyxidae) : Report of four cases from Mexico. <i>Am. J. Trop. Med. Hyg.</i> 56 : 603 – 607.9. Visvesvara, G. S., A. J. Martinez, F. L. Schuster, G. J. Leitch, S. V. Wallace, T. K. Sawyer, and M. Anderson. 1990. Leptomyxid ameba, a new agent of amebic meningoencephalitis in humans and animals. <i>J. Clin. Microbiol.</i> 28 : 2750 – 2756.10. Wallace, R. S., A. Gendron – Fitzpatrick, J. A. Teare, and G. Morris. 1997. Leptomyxid amoebic meningoencephalitis in a Western lowland gorilla (<i>Gorilla gorilla gorilla</i>). <i>Am. Assoc. Zoo Vet. Annu. Conf. Proc.</i> 1997 : 59 – 61.