

## 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>

<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> <i>Gorilla gorilla</i> , Hylobatidae, <i>Papio</i> spp., Colobidae, <i>Mandrillus sphinx</i> , man, dog.	
<b>Causative organism</b> <i>Balamuthia mandrillaris</i> (Acanthamoebidae).	
<b>Zoonotic potential</b> Yes.	
<b>Distribution</b> Worldwide. Widely distributed in fresh water, soil, and dust.	
<b>Transmission</b> Unknown. Experimentally transmitted by intranasal instillation.	
<b>Incubation period</b> > 10 days.	
<b>Clinical symptoms</b> 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.	
<b>Post mortem findings</b> 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.	
<b>Diagnosis</b> 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.	
<b>Material required for laboratory analysis</b> Affected tissues (brain and skin biopsies).	
<b>Relevant diagnostic laboratories</b>	
<b>Treatment</b> 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.	
<b>Prevention and control in zoos</b>	
<b>Suggested disinfectant for housing facilities</b>	
<b>Notification</b>	
<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>
<b>References</b> <ol style="list-style-type: none"><li>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.</li><li>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.</li><li>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.</li><li>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.</li><li>5. Martinez, A. J., and G. Visvesvara. 2001. <i>Balamuthia mandrillaris</i> infection. <i>J. Med. Microbiol.</i> 50 : 205 – 207.</li><li>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.</li><li>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.</li><li>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 amoebic encephalitis due to <i>Balamuthia mandrillaris</i> ( Leptomyxidae ) : Report of four cases from Mexico. <i>Am. J. Trop. Med. Hyg.</i> 56 : 603 – 607.</li><li>9. Visvesvara, G. S., A. J. Martinez, F. L. Schuster, G. J. Leitch, S. V. Wallace, T. K. Sawyer, and M. Anderson. 1990. Leptomyxid amoeba, a new agent of amoebic meningoencephalitis in humans and animals. <i>J. Clin. Microbiol.</i> 28 : 2750 – 2756.</li><li>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.</li></ol>