

MELIOIDOSIS

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Macaques, <i>Pan troglodytes</i> , <i>Gorilla gorilla</i> , <i>Presbytis melalophos</i> , Callitrichidae <i>Gorilla gorilla</i>	Soil saprophytes, Infection through skin lesions, Aerogenously, Perorally, venereally (nosocomial routes also suspected)	Bronchopneumonia, subcutaneous abscesses, pyoderma, lymphadenitis	Yes	Carbapenems	<i>In houses</i> <i>in zoos</i> Incineration of infected soil and of infected animals.

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Susceptible animal groups <i>Macaca</i> spp., <i>Pan troglodytes</i> , <i>Gorilla gorilla</i> , <i>Presbytis melalophos</i> , Callitrichidae.	
Causative organism <i>Burkholderia pseudomallei</i> . (Pseudomonadaceae). Soil isolates produce less exoenzymes, and are less cytolethal than strains isolated from patients. Soil isolates additionally differ in their biochemical characteristics from clinical isolates., the nonvirulent species is now named <i>B.thailandensis</i> , it can be differentiated from <i>B.pseudomallei</i> by simultaneous use of 2 monoclonal anti-lipopolysaccharide based latex agglutination test systems.	
Zoonotic potential Yes, fatal in man.	
Distribution Originally in South-East Asia and Australia, cases also in France ,Great Britain, USA, and Guadeloupe.	
Transmission <i>B. pseudomallei</i> is a soil saprophyte in endemic areas, but can survive in soil also in temperate climates. The main entrance route is through skin lesions, but aerogenous, peroral, nosocomial and venereal pathways have also been postulated. Infections occur particularly at the end of the dry season.	
Incubation period Up to several years.	
Clinical symptoms Bronchopneumonia, subcutaneous abscesses, pyoderma, lymphadenitis. In gorillas: coma, fever.	
Post mortem findings Yellowish coloration of the subcutaneous tissues, white, milky subcutaneous abscesses. Histopathology: Acute necrotizing – granulomatous inflammations containing giant macrophages with phagocytosed leukocytes and intracellular bacteria.	
Diagnosis Selective enrichment media: Threonine – basal salt solution, Ashdown's agar; Latex agglutination test, PCR, lymphocyte proliferation tests, RAPD (Random amplification of polymorphic DNA), MEE-, tests (multilocus enzyme electrophoresis). Serology: ELISA- tests.	
Material required for laboratory analysis Altered tissues, serum, cell cultures, urine.	
Relevant diagnostic laboratories Konsiliarlaboratorium für Pseudomonas und Mukoviszidose-Bakteriologie	



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Treatment

Carbapenems: Biapenem, Imipenem. *B. pseudomallei* is resistant to aminoglycosides and macrolides, but susceptible to Chloramphenicol, and Doxycycline

Prevention and control in zoos

Necropsy and examination of all died animals, especially equides. Incineration of suspected carcasses and of all contaminated soil.

Suggested disinfectant for housing facilities

Drying of soil to less than 10 % water content (>70 days), UV-light at 465y (> 7.75 min)

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**

1. Anuntagool, A., P. Intachote, P. Naigowit, and S. Sirisinha. 1996. Rapid antigen detection assay for identification of *Burkholderia (Pseudomonas) pseudomallei* infection. J. Clin. Microbiol. 34: 975-976.
2. Brack, M. 1987. Agents Transmissible from Simians to Man. Springer, Berlin, Germany.
3. Brett, P. J., D. Deshazer, and D. E. Woods. 1997. Characterization of *Burkholderia pseudomallei* and *Burkholderia pseudomallei*-like strains. Epidemiol. Infect. 118: 137-148.
4. Brett, P. J., D. Deshazer, and D. E. Woods. 1998. *Burkholderia thailandensis* sp.nov., a *Burkholderia pseudomallei*-like species. Int. J. Syst. Bacteriol. 48: 317 – 320.
5. Brook, M. D., B. Currie, and P. M. Desmarchelier. 1997. Isolation and identification of *Burkholderia pseudomallei* from soil using selective culture techniques and the polymerase chain reaction. J. Appl. Microbiol. 82: 589-596.
6. Dance, D. A. B., C. King, H. Aucken, C. D. Knott, P. G. West, and T. L. Pitt. 1992. An outbreak of melioidosis in imported primates in Britain. Vet. Rec. 130: 525-529.
7. Desakorn, V., M. D. Smith, V. Wuthiekanun, D. A. B. Dance, H. Aucken, P. Suntharasamai, A. Raschanuwong, and N. J. White. 1994. Detection of *Pseudomonas pseudomallei* antigen in urine for the diagnosis of melioidosis. Am. J. Trop. Med. Hyg. 51: 627-633.
8. Dharakul, T., S. Songsivilai, N. Anuntagool, W. Chaowagul, S. Wongbunnate, P., Intachote, and S. Sirisinha. 1997. Diagnostic value of an antibody enzyme-linked immunosorbent assay using affinity-purified antigen in an area endemic for melioidosis. Am. J. Trop. Med. Hyg. 56: 418-423.
9. Furlong, W. B., and T. A. Rakowski. 1997. First case of melioidosis in Guadeloupe, a French West Indies archipelago. Clin. Infect. Dis. 25: 164-165.
10. Lee, S.-S., T. S. Ling, J.-C. Chen, B.-Y. Huang, and W. B. Sheih. 1999. Melioidosis with adrenal gland abscesses. Am. J. Trop. Med. Hyg. 61: 34-36.
11. Mollaret. H. H. 1988. “ L’affaire du jardin des plantes” ou comment la melioidose fit son apparition en France. Med. Malad. Infect. Special: 643-654.
12. Norton, R., B. Roberts, M. Freeman, M. Wilson, C. Ashhurst-Smith, W. Lock, D. Brookes, and J. LaBrooy. 1998. Characterization and molecular typing of *Burkholderia pseudomallei*: Are disease presentations of melioidosis clonically related. FEMS Immunol. Med. Microbiol. 20: 37-44.
13. Phung, L. V., Y. Han, S. Oka, H. Hotta, M. D. Smith, P. Theeparakun, E. Yabuuchi, and I. Yano. 1995. Enzyme-linked immunosorbent assay (ELISA) using a glycolipid antigen for the serodiagnosis of

- melioidosis. FEMS Immunol. Med. Microbiol. 12: 259-264.
14. Scott, I. A., A. M. Bell, and D. R. Staines. 1997. Fatal human melioidosis in south-eastern Queensland. Med. J. Aust. 166: 197-199.
 15. Simpson, A. J. H., N. J. White, and V. Wuthiekanun. 1999. Aminoglycoside and macrolide resistance in *Burkholderia pseudomallei*. Antimicrob. Agents Chemother. 43: 2332.
 16. Sirimanne, R. A. 1985. Report on the deaths of the four male lowland gorillas in the collection of the Singapore Zoological Gardens. 1985. Singapore Zool. Gard. Rep. February: 2-5.
 17. Smith, M. D., V. Wuthiekanun, A. L. Walsh, and N. J. White. 1996. In-vitro activity of carbapenem antibiotics against β -lactam susceptible and resistant strains of *Burkholderia pseudomallei*. J. Antimicrob. Chemother. 37: 611-615.
 18. Steinmetz, I., A. Reganzerowski, B. Brenneke, S. Häussler, A. Simson, and N. J. White. 1999. Rapid identification of *Burkholderia pseudomallei* by latex agglutination based on an exopolysaccharide-specific monoclonal antibody. J. Clin. Microbiol. 37: 225-228.
 19. Tong, S., S. Yang, Z. Lu, and W. He. 1996. Laboratory investigation of ecological factors influencing the environmental presence of *Burkholderia pseudomallei*. Microbiol. Immunol. 40: 451-453.
 20. Vuddhakul, V., P. Tharavichitkul, N. Na-Ngam, S. Jitsurong, B. Kunthawa, P. Noimay, A. Binla, and V. Thamlikitkul. 1999. Epidemiology of *Burkholderia pseudomallei* in Thailand. Am. J. Trop. Med. Hyg. 60: 458-461.
 21. Wong, K. T., S. D. Putchuachary, and J. Vadivelu. 1995. The histopathology of human melioidosis. Histopath. 26: 51-55.
 22. Wuthiekanun, V., N. Anuntagool, N. J. White, and S. Sirisinha. 2002. Short report: A rapid method for the differentiation of *Burkholderia pseudomallei* and *Burkholderia thailandensis*. Am. J. Trop. Med. Hyg. 66: 759 – 761.
 23. Wuthiekanun, V., M. D. Smith, D. A. B. Dance, A. L. Walsh, T. L. Pitt, and N. J. White. 1996. Biochemical characteristics of clinical and environmental isolates of *Burkholderia pseudomallei*. J. Med. Microbiol. 45: 408-412.
 24. Yabuuchi, E., Y. Kosako, M. Arakawa, H. Hotta, and I. Yano. 1992. Identification of Oklahoma isolate as a strain of *Pseudomonas pseudomallei*. Microbiol. Immunol. 36: 1239-1249.