

## ACANTHAMOEBIASIS

Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
-Primates -Dogs -Sheep -Cattle -Horses -Kangaroos -Birds -Reptiles -Amphibians -Fish -Invertebrates	-Source: soil, water -Gains entry via: breaks in skin; respiratory tract; corneal surface; hematogenous spread to central nervous system	-Cutaneous lesions -Sinusitis -Pneumonitis -Neurologic signs -Fever -Nausea -Vomiting	-Asymptomatic in immune-competent individuals  -Frequently fatal in immuno-compromised individuals	Pentamidine isethionate; Sulfadiazine; Flucytosine; Fluconazole; Itraconazole Amphotericin B; Azithromycin	-Difficult due to ubiquitous nature of the organism -Limit exposure to dust, soil, and water	-Not directly transmitted -Can cause disease in humans

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**Susceptible animal groups:** Primates, dogs, sheep, cattle, horses, kangaroos, birds, reptiles, amphibians, fish, invertebrates.

**Causative organism:** Opportunistic protozoan parasites, *Acanthamoeba* spp. (*A. castellanii*, *A. culbertsoni*, *A. hatchetti*, *A. healyi*, *A. polyphaga*, *A. rhyssodes*, *A. astronyxis*, *A. divionensis*)

**Zoonotic potential:** May infect cornea of contact lens wearers and cause disseminated infection in immunocompromised individuals.

**Distribution:** Ubiquitous worldwide. It may be found in soil; fresh and brackish water; bottled mineral water; cooling towers of electric and nuclear power plants; heating, ventilating, and air conditioning units, humidifiers; Jacuzzi tubs; hydrotherapy pools in hospitals; dental irrigation units; dialysis machines; dust in the air; bacterial, fungal, and mammalian cell cultures; contact lenses and ophthalmic saline flush; aural discharge; pulmonary secretions; feces.

**Incubation period:** 1 day to 2 weeks

**Clinical signs:** Granulomatous amoebic encephalitis: depression, nausea, vomiting, low-grade fever, lethargy, cerebellar ataxia, visual disturbances, hemiparesis, cranial nerve deficits, seizures, and coma. Cutaneous lesions: ulcers, nodules, and subcutaneous abscesses. Respiratory: sinusitis and pneumonitis. *Acanthamoeba* keratitis (reported in humans only): ocular pain, photophobia, corneal ulceration, loss of visual acuity, and blindness.

**Post mortem, gross, or histologic findings:**

Gross Findings: multifocal encephalomalacia and cerebral hemorrhage; nodular necrosis in the liver, kidney, lung, pancreas; multifocal granulomatous pneumonia; cutaneous granulomas

Histologic Findings: Focal areas of necrosis and granulomatous inflammation in affected tissues; necrotizing vasculitis; [resence of cysts (12-16 um diameter) and trophozoites (14-40 um diameter) in affected tissues

**Diagnosis:** Direct observation of amoebae in tissues stained with hematoxylin-eosin; indirect immunofluorescence staining using rabbit anti-amoeba sera; polymerase chain reaction to detect amoeba DNA in tissue and cerebrospinal fluid samples; computed tomography and magnetic resonance imaging

**Material required for laboratory analysis:** Serum, cerebrospinal fluid, formalin-fixed tissue samples, fresh

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tissue samples for culture (culture should only be done by accredited laboratories with the proper safety equipment)
<b>Relevant diagnostic laboratories:</b> Centers for Disease Control and Prevention, Atlanta, Georgia
<b>Treatment:</b> Pentamidine isethionate, sulfadiazine and other sulfa drugs, flucytosine, fluconazole, itraconazole, amphotericin B, and azithromycin.
<b>Prevention and control:</b> Limit exposure to airborne soil particles that may carry cysts to the respiratory system; prevent exposure of open wounds to contaminated soil or water; preventative measures are especially important for immunocompromised individuals.
<b>Suggested disinfectant for housing facilities:</b> Chlorhexidine, isopropyl alcohol (20%), hydrogen peroxide
<b>Notification</b> Not required
<b>Measures required under the Animal Disease Surveillance Plan</b> None required
<b>Measures required for introducing animals to infected animal</b> None required
<b>Conditions for restoring disease-free status after an outbreak:</b> It is not possible due to ubiquitous nature of this organism.
<b>Experts who may be consulted</b> Centers for Disease Control
<b>References:</b> <ol style="list-style-type: none"> <li>1. Mehlhorn, H. 2008. Encyclopedia of Parasitology Volume 1, 3<sup>rd</sup> Ed. Springer-Verlag, New York. Pp: 2.</li> <li>2. Schuster, F.L., and G.S. Visvesvara. 2004. Amebae and ciliated protozoa as causal agents of waterborne zoonotic disease. Vet. Parasitol. 126: 91-120.</li> <li>3. Rutala, W.A., D.J. Weber, and the Healthcare Infection Control Practices Advisory Committee. 2008. Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008. <a href="http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf">http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf</a>. Accessed 14 April 2011.</li> <li>4. Visvesvara, G.S., H. Moura, and F L. Schuster. 2007. Pathogenic and opportunistic free-living amoebae: <i>Acanthamoeba</i> spp., <i>Balamuthia mandrillaris</i>, <i>Naegleria fowleri</i>, and <i>Sappinia diploidea</i>. FEMS Immunol. Med. Microbiol. 50: 1-26.</li> </ol>