

# Amphizoic amoebae

**Amphizoic amoebae** include parasites, specifically amoeboid protozoa *Neagleria spp.*, *Acanthamoeba spp.*, *Balamuthia spp.*. These wild amoebae are for humans **pathogens**. They are spread globally and most of the diseases they cause are fatal. Morphological development takes place through cysts. The cysts differ from each other by the arrangement of the wall or the number of nucleoli and the stage of the trophozoite we find after culturing under a microscope.

## Characteristics

They are spread **globally**, especially in humid environments, in the ground, mud and in stagnant or running waters, mostly warm. They also occur in salt water. They cause accidental, not very well known diseases. In case of *Naegleria fowleri*, *Acanthamoeba spp.* a *Balamuthia mandrillaris* they cause serious diseases **affecting the CNS** that end in **death**.

## Naegleria fowleri

### Characteristics

- Cosmopolitan occurrence, thermophilic freshwater amoeba (also in swimming pools).
- Causes primary amoebic meningoencephalitis (PAM).

### Morphology

- The first climbing stage having lobed squids.
- The second free-floating stage has **two flagellas**.
- **Cysts** are the resting stage with one nucleus, they are round, containing a centrally located nucleolus **without peripheral chromatin**.

### Symptoms and pathogenesis

They cause **purulent amoebic meningoencephalitis**, which reaches the CNS failure stage after a few days due to hemorrhagic necrosis in the tissue. Penetration into the brain is mediated through the olfactory nerve in the nasal mucosa, then it multiplies rapidly and spreads along blood capillaries. Symptoms include **fever, headache, coma**, and the disease ends in most cases of **death**.

### Therapy

The disease is **fatal**, in a small number of cases patients survive. Used antibiotics are **Amphotericin B**. Only five cured cases, most therapies are unsuccessful.

### Epidemiology and prevention

It is not recommended to swim in constantly warm and polluted waters, especially swimming pools, because these amoebae are resistant to the effects of chlorine.

### Diagnostics

**Microscopic** detection of cerebrospinal fluid or **cultivation** on non-nutritive agar, on the surface of which there are heat-killed bacteria. After a few days of cultivation, we find trophozoites or cysts under a microscope.

## Acanthamoeba spp.

### Characteristics

- Spread globally, wild.
- Causes **granulomatous amoebic encephalitis** (GAE).
- Causes **keratitis**.

### Morphology

- First stage is **trophozoite**, movement using branched decks.
- Second stage is mononuclear **cyst** with **two-layer** wall.
- Nucleus with a large central nucleolus without peripheral chromatin.

### Symptoms and pathogenesis

Secondary infected CNS from the respiratory tract or skin ulceration.

- **Granulomatous amoebic encephalitis** – GAE.

Subacute to chronic disease, often ending in death. A granulomatous lesion with trophozoites develops.

- **Acanthamoebic keratitis** – AK.

Inflammation of the cornea in connection with the use of poorly disinfected contact lenses.

## Therapy

- **Granulomatous amoebic encephalitis** – no therapy, the drug of choice is Clotrimazole.
- **Keratitis** – ointments with dibromopropamide.

# Balamuthia mandrillaris

## Characteristics

- Spread globally.
- Causes **CNS infections, GAE**.
- It affects not only humans but also mammals (baboon, sheep, horse), immunosuppressed and immunocompetent patients.

## Morphology

- First stage **trophozoite**, tree-branched squids.
- Second stage mononuclear **cyst** with a **three-layer** wall.
- The nucleus contains more nucleoli (this is different from acanthamebes).

## Symptoms and pathogenesis

- Granulomatous amoebic encephalitis – occurrence only rarely.

## Therapy

No effective therapy.

## Epidemiology and prevention

It has not yet been captured in the wild, the transmission is not known, and there is no known effective prevention for this amoeba.

## Diagnostics

Direct detection of amoeba under a **microscope** from a section of brain tissue biopsy. Gomori trichrome stained specimen (Giemsa). Cultivation is not effective. An **immunofluorescence method** can be used for detection.

## Links

## Related articles

- Entamoeba histolytica
- Parazitizmus
- Obecné vlastnosti parazitů

## External sources

- Pubmed: Surviving Naegleria fowleri infections: A successful case report and novel therapeutic approach (<http://www.ncbi.nlm.nih.gov/pubmed/28013053>)

## References

- VOTAVA, Miroslav, et al. *Lékařská mikrobiologie speciální*. 1. vydání. Brno : Neptun, 2003. 495 s. ISBN 80-902896-6-5.