



PERTH ACCREDITED FOR REAL-TIME PCR AMOEBIA CONFIRMATIONS

Naegleria fowleri

Naegleria fowleri is a potentially pathogenic bacterium eating amoeba that can cause naegleriasis, a sudden and severe brain infection. It is the only species within the *Naegleria* genus to infect humans.

Naegleria fowleri is commonly found in warm freshwater and soil. It is a thermophilic organism, growing optimally at temperatures up to 46.1°C and so is more prevalent in summer months.

Medical Implications

Although infection does not occur through drinking contaminated water, it does occur when contaminated water enters the nasal cavity. The amoeba then travels upward to where it begins to destroy brain tissue.

Symptoms of *Naegleria fowleri* infections may be similar to those of bacterial meningitis in its early stages. After the onset of symptoms (within 9 days of infection) the disease progresses extremely rapidly and usually causes death within 12 days due to brain swelling. Based on the 138 documented cases in the USA naegleriasis has a 97% fatality rate. *Naegleria fowleri* can also cause meningoencephalitis.

Australian Impact

Australia does have a great deal of experience in monitoring and dealing with *Naegleria fowleri* as a result of multiple deaths across Western Australia, South Australia, Queensland and New South Wales in the 70s and 80s. The infections were linked to piping drinking water overland, sometimes for hundreds of kilometers, hence resulting in the water being heated and having low disinfectant levels. These conditions allowed the water and pipes to become colonised by *Naegleria fowleri*. Several water systems in the states of Western Australia and South Australia continue to be monitored regularly for *Naegleria fowleri* colonisation in drinking water distribution systems.

As the transportation of drinking water via pipes, boats or road is still a necessity across much of Australia for both rural and mining communities the continuous monitoring of potable water is essential.

References:

1. Queensland Government: *Naegleria fowleri* Q's and A's. Available online: <http://conditions.health.qld.gov.au/HealthCondition/condition/14/165/101/Naegleria-fowleri-Qs-As> [24/03/2017]
2. Centers for Disease Control and Prevention: *Naegleria fowleri* – Primary Amebic Meningoencephalitis. Available at: <https://www.cdc.gov/parasites/naegleria/public-water-systems.html> [24/03/2017]
3. *Naegleria fowleri*: Barricading the brain against amoeba. Available online: <https://www.dawn.com/news/1140067> [24/03/2017]

Real-time PCR

Polymerase Chain Reaction (PCR) has been utilised in the research field for many years, used for the analysis of gene expression, disease diagnostics, and detection of viruses, pathogens, and bacteria. While ALS Melbourne is already utilising the PCR process for Amoeba confirmation, ALS Perth has recently gained NATA accreditation for the analysis of Amoeba spp. using Real-time PCR.

Real-time PCR is a laboratory technique utilising molecular biology. It monitors the amplification of a targeted DNA molecule, in this case amoeba spp., during the PCR process, i.e. in real time, and not at the end, as in conventional PCR methods. The speciation of the amoeba sample is confirmed as either *Naegleria fowleri*, *Naegleria* spp. or *Acanthamoeba* spp. via the comparison of the outputted sequence to the reference material.

Advantages of real-time PCR

- Turnaround time for the presence and confirmation of either *Naegleria fowleri*, *Naegleria* spp. or *Acanthamoeba* spp. is confirmed in 5 days – down from 10 days.
- Eliminates the need for electrophoresis or gel imaging used in the traditional PCR techniques.
- Reduces the risk of cross-contamination.
- RT-PCR does not require the use of Ethidium bromide (which is a carcinogenic).

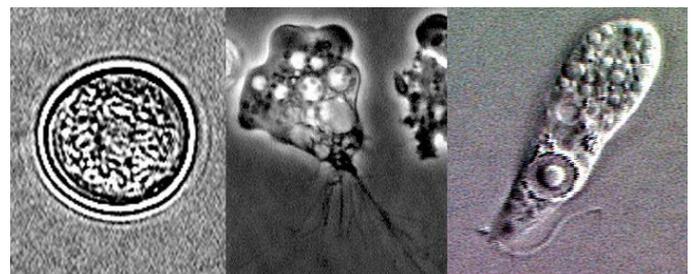


Figure 1. *Naegleria fowleri* biotic phases: Cyst, trophozoite and flagellate

General Information

Shipping and storage: ambient temperature.

Bottle requirements: 500ml sodium thiosulphate preserved bottle.

Recommended holding time: 24 hours (up to 3 days acceptable).

ALS Method Codes

MP684: Thermotolerant Amoeba by Culture

MP699: Confirmation / Speciation of Thermotolerant Amoeba by PCR

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