



Naegleria fowleri and Drinking Water

WHAT IS NAEGLERIA FOWLERI AND WHERE IS IT FOUND?

Naegleria fowleri is an ubiquitous amoeba (single-celled organism) that is found in freshwater such as lakes, rivers, and hot springs. In addition, the organism has also been found in warm water discharges from industrial processes, swimming pools with minimal or no chlorination, and water heaters. *N. fowleri* grows favorably in higher quantities at warmer temperatures of up to 115°F and can survive for short periods in higher temperatures.

HOW IS ONE INFECTED WITH NAEGLERIA FOWLERI?

Exposure to *Naegleria fowleri* is common since it is found in the United States in warm freshwater sources; however, infection with *N. fowleri* is extremely rare. You can only become infected when water contaminated with *N. fowleri* enters the nasal passage. Activities that can expose one to *N. fowleri* are diving or swimming in warm freshwater recreational sources such as lakes, ponds, rivers, and hot springs or poorly maintained swimming pools that are inadequately chlorinated. Additional exposures, though rare, have occurred during sinus rinsing for health or religious practices.

WHAT ARE THE RISKS OF BECOMING INFECTED WITH NAEGLERIA FOWLERI?

Naegleria fowleri is the disease-causing agent for Primary Amebic Meningoencephalitis (PAM), which is a very rare but fatal disease. Infection with *N. fowleri* occurs once the amoeba enters the nasal passage and eventually reaches the central nervous system resulting in pam. The incubation period for *N. fowleri* is 1-8 days after infection with symptoms including intense headaches, fever, chills, seizures, and confusion. Once someone is infected with pam, it is very rare that they survive.

Since 1962, there have been a total of 145 reported PAM cases in the United States, with an average of 2.5 cases per year. The last reported case in California was in 2018 when a young male was exposed to hot spring water. There have been a total of 9 cases to date for pam in California since 1962.

Additional information regarding the last California case can be found here: [cdc.gov/mmwr/volumes/68/wr/mm6836a3.htm](https://www.cdc.gov/mmwr/volumes/68/wr/mm6836a3.htm)

HOW CAN I REDUCE POTENTIAL EXPOSURE TO NAEGLERIA FOWLERI FROM TAP WATER?

Although it is very rare for *Naegleria fowleri* to grow in disinfected water supplied by water utilities, there may be conditions in the premise plumbing of homes or buildings which can support *N. fowleri* growth.

There have been few rare documented cases of *Naegleria fowleri* associated with activities involving cleansing of the nose and sinuses for ritual or health practices or submerging the head in water. Nasal rinsing devices such as the “Neti Pot” and others should be properly used to reduce the risk of infection.

The CDC suggests implementing one of the following practices when sinus rinsing:

- Use water boiled for 1 minute and then left to cool,
- Use a filter that reads “NSF 53” or “NSF 58” or a filter with a pore size of 1 micron or smaller, or
- Use distilled or sterile water

For more detailed instructions, please visit: [cdc.gov/parasites/naegleria/tap-faucet-water.html](https://www.cdc.gov/parasites/naegleria/tap-faucet-water.html)



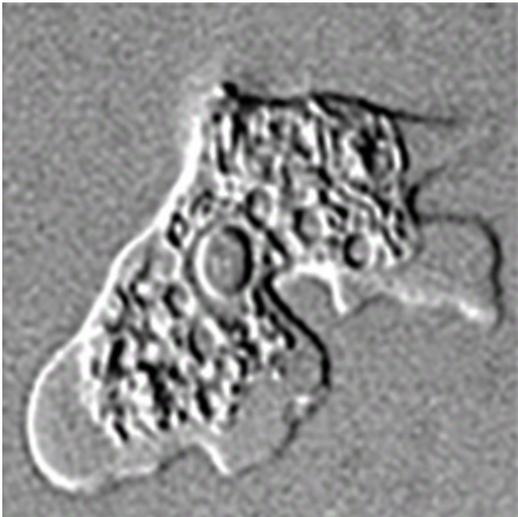
Warning sign of *Naegleria fowleri*.

HOW ARE FEDERAL AND STATE REGULATORS RESPONDING TO NAEGLERIA FOWLERI IN DRINKING WATER?

Currently, there are no federal or California standards to regulate *Naegleria fowleri* in public water systems. However, USEPA has included *N. fowleri* on its Contaminant Candidate List 4 (CCL 4), a list of approximately 100 contaminants that USEPA has compiled for possible regulatory actions in the future.

The potential for occurrence of *Naegleria fowleri* in SFPUC drinking water is very low due to the use of multiple barriers: watershed protection, filtration of local supplies, multiple disinfectants, cross-connection and backflow control, sanitary practices during main breaks and construction, etc. However, the amoeba is considered a high priority due to the health significance in general and recent high-profile cases. The SFPUC proactively addresses emerging water quality concerns with participation in national research projects, when identified.

To learn more about SFPUC's activities on contaminants of emerging concern, please visit: sfwater.org/index.aspx?page=647



Naegleria fowleri, as viewed by microscope.
(South China Morning Post)



Neti pot

CONSUMER RESOURCES: REGULATION/HEALTH

- SFPUC: 2019 Progress Update, Contaminants of Emerging Concern
sfwater.org/Modules/ShowDocument.aspx?documentID=13956
- USEPA: Drinking Water Contaminant Candidate List
epa.gov/ccl/microbial-contaminants-ccl-4
- CDC: General Information on *Naegleria fowleri*
cdc.gov/parasites/naegleria/general.html
- CDC: Number of Case-reports of Primary Amebic Meningoencephalitis
cdc.gov/parasites/naegleria/graphs.html
- AWWA: Article on *Naegleria fowleri*
onlinelibrary.wiley.com/doi/abs/10.5942/jawwa.2014.106.0140
- *Naegleria fowleri*: Pathogenesis, Diagnosis and Treatment Options
ncbi.nlm.nih.gov/pmc/articles/PMC4604384/

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July 2020