



Naegleria fowleri, A Public Health Risk

Naegleria is an amoeba (a single-celled living organism) commonly found in warm freshwater and in the soil. Only one species (type) of *Naegleria* infects people: *Naegleria fowleri*.

Naegleria fowleri is found around the world. The amoeba can be found in:

- Bodies of warm freshwater, such as lakes and rivers
- Geothermal (naturally hot) water, such as hot springs
- Warm water discharge from power plants and other industrial facilities
- Geothermal drinking water sources
- Soil
- Swimming pools that are poorly maintained, minimally-chlorinated, and/or un-chlorinated
- Water heaters with temperatures less than 47°C (2,3)

Naegleria fowleri is not found in salt water, like the ocean.

In the United States, the majority of infections that have been caused by *Naegleria fowleri* originate in freshwater located in southern-tier states (4).

Naegleria fowleri infects people by entering the body through the nose. This typically occurs when people go swimming or diving in warm freshwater places. The *Naegleria fowleri* amoeba travels up the nasal passages to the brain.

You cannot get a *Naegleria fowleri* infection from a properly cleaned, maintained, and disinfected swimming pool.

Naegleria fowleri infections are very rare. In the 10 years from 2001 to 2010, only 32 infections were reported in the United States. Of those cases, 30 people were infected by contaminated recreational water and two people were infected by water from a geothermal (naturally hot) drinking water supply.



Infections with *Naegleria fowleri* occur mainly during the summer months of July, August, and September. Infections are more likely to occur in southern-tier states, but can also occur in other locations. Infections usually occur when it is hot for prolonged periods of time, which causes higher water temperatures and lower water levels. Infections can increase during heat wave years.

A *Naegleria fowleri* infection cannot be spread from one person to another.

Naegleria fowleri causes the disease primary amoebic meningoencephalitis (PAM), a brain infection that leads to the destruction of brain tissue. In its early stages, symptoms of PAM may be similar to symptoms of bacterial meningitis.

Initial symptoms of PAM start 1 to 7 days after infection and include headache, fever, nausea, vomiting, and stiff neck. Later symptoms include confusion, lack of attention to people and surroundings, loss of balance, seizures, and hallucinations. After the start of symptoms, the



disease progresses rapidly and usually causes death within 1 to 12 days.

Several drugs are effective against *Naegleria fowleri* infections in laboratory settings. However, their effectiveness in humans is unclear because almost all infections have been fatal, even when people were treated.

The early symptoms of *Naegleria fowleri* infection are often confused with symptoms of other, more common illnesses, such as meningitis. People should seek medical care immediately whenever they develop a sudden onset of fever, headache, stiff neck, and vomiting, particularly if they have been in warm freshwater recently.

It can take weeks to identify the amoeba, but new detection tests are under development. Previous water testing has shown that *Naegleria fowleri* is very common in freshwater locations. Therefore, recreational water users should assume that there is a low level of risk when entering all warm freshwater, particularly in southern-tier states.



Naegleria fowleri has been found in warm water springs of Lake Mead National Recreation Area. If you do plan to take part in water-related activities, some measures that might reduce risk include:

- Avoid water-related activities in warm freshwater during periods of high water temperature and low water levels.
- Hold the nose shut or use nose clips when taking part in water-related activities in bodies of warm freshwater.
- Avoid digging in, or stirring up, the sediment while taking part in water-related activities in shallow, warm freshwater areas.

The only certain way to prevent a *Naegleria fowleri* infection is to refrain from water-related activities in or with warm, untreated, or poorly-treated water.

References:

<http://www.cdc.gov/parasites/naegleria/faqs.htm>

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