

Naegleria fowleri and Primary Amebic Meningoencephalitis

What is *Naegleria fowleri* and Primary Amebic Meningoencephalitis?

Naegleria (nigh-GLEER-E-uh) is an amoeba commonly found in warm freshwater and soil. Only one species of *Naegleria* infects people, *Naegleria fowleri*. It causes a very rare but severe brain infection called Primary Amebic Meningoencephalitis (PAM), which is often fatal.

How does someone become infected?

Naegleria fowleri infects people by entering the body through the nose. The amoeba travels up the nose to the brain where it destroys the brain tissue. Generally, this happens when people go swimming or diving in warm freshwater, such as lakes or rivers.

More rarely, infections have been reported when people flush their sinuses with tap water contaminated with *Naegleria fowleri*. You cannot be infected by drinking contaminated water or swimming in a properly cleaned, maintained, and disinfected swimming pool. PAM cannot be spread from person-to-person.

What are the symptoms?

Symptoms of PAM usually start about 5 days after infection. Symptoms can be mild at first, but worsen very quickly. In its early stages, symptoms may include:

- headache
- fever
- nausea
- vomiting

Later symptoms may include:

- stiff neck
- confusion
- lack of attention to people and surroundings
- loss of balance
- seizures
- hallucinations

After symptoms begin, the disease can move quickly and cause death within about 5 days.

People should seek medical care immediately whenever they have a sudden fever, headache, stiff neck, and vomiting - particularly if they have been in warm fresh water within the previous 2 weeks.

Where and when is it most commonly found?

Naegleria fowleri is found around the world, often in warm or hot freshwater (lakes, rivers, and hot springs). It is commonly found in lakes in southern-tier states, but has caused infections in more northern states, including Minnesota. The amoeba grows best in warm or hot water.

While infections with *Naegleria fowleri* are rare, they occur mainly during the summer months of July, August, and September. Infections usually occur when it is hot for prolonged periods of time, which results in higher water temperatures and lower water levels. Infections can increase during heat wave years. It grows best at higher temperatures (up to 115°F) and when it is hot for extended periods of time. It can survive for short periods of time at higher temperatures. It is less likely to be found in the water as temperatures decline.

How do you know if a lake has this amoeba?

Unfortunately, there is no rapid, standardized test to detect *Naegleria fowleri* in water. Recreational water users should assume that *Naegleria fowleri* is present in warm freshwater and that there will always be a low level risk of infection when entering these waters. Limiting the amount of water that goes up your nose and following the prevention suggestions will help reduce your risk.

How do you prevent it?

The only sure way to prevent PAM is to avoid participation in freshwater-related activities. You can reduce the risk of PAM by limiting the amount of water going up the nose. When taking part in water-related activities in bodies of warm freshwater:

- Avoid warm freshwater when the water temperature is high and the water level is low.
- Avoid putting your head under the water.
- Hold your nose shut or use nose clips.
- Avoid digging or stirring up the sediment.

If you are making a solution for flushing or rinsing your sinuses, use safe water to protect yourself:

- Boil water for 1 minute and let cool, or
- Filter water using a filter designed to remove water-loving germs; the absolute pore size should be 1 micron or smaller, or
- Buy and use only water labeled distilled or sterile.
- Rinse any devices after use with safe water and let the device air dry entirely.

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