



***Naegleria* Infection** (nigh-GLEER-e-uh)

What is *Naegleria*?

Naegleria 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. Most infections are fatal.

How does infection with *Naegleria* occur?

Naegleria infects people by entering the body through the nose. Generally, this occurs when people use warm freshwater for activities like swimming or diving. The amoeba travels up the nose to the brain and spinal cord where it destroys the brain tissue. Infections do not occur as a result of drinking contaminated water.

Where is *Naegleria* found?

Naegleria fowleri is found around the world. In the United States, it has caused infections in 15 southern tier states (AR, AZ, CA, FL, GA, LA, MO, MS, NC, NM, NV, OK, SC, TX, and VA). The amoeba grows best in warm or hot water. Most commonly, the amoeba may be found in:

- Bodies of warm freshwater, such as lakes or rivers
- Geothermal (naturally hot) water such as hot springs
- Geothermal (naturally hot) drinking water sources
- Warm water discharge from industrial plants
- Poorly maintained and minimally-chlorinated or unchlorinated swimming pools
- Soil

Naegleria is not found in salt water locations like the ocean.

Can I get a *Naegleria* infection from a disinfected swimming pool?

No. You cannot get a *Naegleria* infection from a properly cleaned, maintained, and disinfected swimming pool.

How common are *Naegleria* infections in the United States?

Infections are very rare even though *Naegleria* is commonly found in freshwater. In the 10 years from 1998 to 2007, 33 infections were reported in the U.S. Thirty-one people had contact with recreational water and two people had contact with water from a geothermal (naturally hot) water supply.

When do *Naegleria* infections most commonly occur?

While infections with *Naegleria* are very rare, they occur mainly during the summer months of July, August, and September. These infections are more likely to occur in southern tier states. They usually occur when it is hot for prolonged periods causing higher water

temperatures and lower water levels. Infections can increase during heat wave years.

Can infection be spread from one person to another?

No. *Naegleria* infection cannot be spread from one person to another.

What are the symptoms of *Naegleria* infection?

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

Initial symptoms of PAM start 1 to 14 days after infection. The initial symptoms 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 3 to 7 days.

Is there effective treatment for infection with *Naegleria*?

It is not clear. Several drugs are effective against *Naegleria* in the laboratory. However, their effectiveness is unclear since almost all infections have been fatal even when people were treated.

What should I do if I have been swimming or playing in warm freshwater and now I think I have symptoms associated with *Naegleria*?

Infection with *Naegleria* is very rare. The early symptoms of *Naegleria* infection are more likely to be caused by 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 fresh water within the previous 2 weeks.

How common is *Naegleria* in the environment?

Naegleria is commonly found in most lakes in southern tier states during the summer. This means that recreational water users should be aware that there will always be a low level risk of infection when entering these waters.

Is there a routine and rapid test for *Naegleria* in the water?

No. It can take weeks to grow and identify the ameba. Newer genetic detection tests for ameba are still under development. Water testing suggests that the amebae are so common that recreational water users should assume that there is a low level of risk when entering all warm fresh water in southern tier states.

How does the risk of *Naegleria fowleri* infection compare with other water-related risks?

Although the infections are severe, the risk of *Naegleria fowleri* infection is very low. There have been 33 reported infections in the U.S. during the 10 years from 1998 to 2007, despite millions of recreational water exposures each year. By comparison, during the ten years from 1996 to 2005, there were over 36,000 drowning deaths in the U.S.

How will the public know if a lake or other water body has *Naegleria*?

Recreational water users should assume that there is always a low level of risk whenever they enter warm freshwater (for example swimming, waterskiing) in southern tier states. Posting signs is unlikely to be an effective way to prevent infections. This is because the location and number of amoebae in the water can vary a lot over time. In addition, posted signs might create a misconception that bodies of water without signs are *Naegleria*-free. Information about the risks of *Naegleria* infection should be put into public health messages discussing general issues of water safety and risk.

How can I reduce the risk of infection with *Naegleria*?

Naegleria is found in many warm freshwater lakes and rivers in the United States, particularly in southern tier states. It is likely that a low risk of *Naegleria* infection will always exist with recreational use of warm freshwater lakes, rivers, and hot springs. The low number of infections makes it difficult to know why some people have been infected compared to the millions of other people using the same or similar waters across the U.S. The only known way to prevent *Naegleria* infections is to refrain from water-related activities. However, some measures that might reduce risk by limiting the chance of contaminated water going up the nose include:

- Avoid water-related activities in bodies of warm freshwater, hot springs, and thermally-polluted water such as water around power plants.
- 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 such as lakes, rivers, or hot springs.
- Avoid digging in or stirring up the sediment while taking part in water-related activities in shallow, warm freshwater areas.

For further information on protecting yourself from recreational water illnesses, go to <http://www.cdc.gov/healthyswimming>.

Developed by the *Naegleria* Workgroup sponsored by the Council of State and Territorial Epidemiologists and CDC, April 30, 2008.

This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider. If you have any questions about the disease described above or think that you may have a parasitic infection, consult a health care provider.

From http://www.cdc.gov/ncidod/dpd/parasites/naegleria/factsht_naegleria.htm



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