

# Naegleria fowleri



## What is *Naegleria fowleri*?

*Naegleria fowleri* is known as the “brain-eating amoeba.” *Naegleria* is an amoeba (or single-celled living organism) that lives in warm freshwater and soil. *N. fowleri* is the only type of *Naegleria* that infects people. The amoeba travels up your nose and once it has entered the brain, it destroys brain tissue, causing a disease called primary amebic meningoencephalitis (PAM). About 5 days after becoming infected, early symptoms of PAM begin to show, which include fever, headache, nausea, or vomiting. Later symptoms include loss of balance, seizures, stiff neck, confusion and hallucinations. The disease quickly develops after initial symptoms and generally leads to death within about 5 days.

## How common is *Naegleria fowleri*?

Although *N. fowleri* infections are rare, the fatality rate is over 97%. According to the Centers for Disease Control and Prevention (CDC), there have been 138 known cases since the mid-1960s and only three people have survived. Since 2005, there have been 35 infections reported in the United States. Of those cases, 32 people were infected by contaminated lakes, rivers, swimming pools and spas and 3 people were infected after flushing their sinuses (nose) with a neti pot. *N. fowleri* is usually found in southern and southwestern warm-weather states, but recent cases have appeared in lakes, hot springs and even swimming pools in Minnesota, which was found living in the local tap water system. Three known human cases of *N. fowleri* infections were visitors of San Bernardino County.

One person survived, the other was a fatality. The third human case was reported in 1991 after exposure in Deep Creek Hot Springs, located just outside Hesperia, which resulted in death. A resident of our County became infected with *N. fowleri* after submerging their head in a hot spring in Clark County, Nevada in 2000. This individual also died. Although *N. fowleri* infections are not common in San Bernardino County, it is still a health risk to our residents and visitors.

## How do people get infected with this amoeba?

You can get infected when you go swimming or diving in bodies of warm freshwater, such as lakes, rivers and hot springs. If the body of water has *N. fowleri*, the amoeba can travel up your nose and into your brain. Properly chlorinated swimming pools, spas and water parks have a low-level risk of contamination.

However, in very rare cases, *N. fowleri* has been found in poorly maintained, minimally-chlorinated, and/or un-chlorinated swimming pool water or heated, contaminated tap water. Since the amoeba grows best at higher temperatures, *N. fowleri* infections mostly occur during the summer months (July to September). You cannot get infected with *N. fowleri* by **drinking** contaminated water and it cannot be spread from one person to another.

### What can be done to prevent *Naegleria fowleri* infection?

The best way to prevent *N. fowleri* infection is to avoid water-related activities in warm, untreated, or poorly treated water. Other ways to lower risk of infection should focus on making sure water does not go up the nose. These actions include:

- Holding your nose shut or wearing nose clips when swimming in bodies of warm freshwater, especially during activities where water is forced up the nose, such as diving or jumping into the water and water sports.
- Keeping your head above the water in hot springs and other untreated thermal waters.
- Avoiding water-related activities in warm freshwater during periods of high water temperature and low water levels.
- When irrigating (flushing) your sinuses (nose) with a neti pot or other sinus rinse device, use water that has been previously boiled for one minute and left to cool, water that has been filtered, or solutions that have been purchased with a label that says that it contains distilled or sterile water.
- Avoiding digging in, or stirring up, the sediment in shallow, warm freshwater areas such as lakes, rivers or ponds.

### How is the infection diagnosed?

The disease is diagnosed using specific laboratory tests available in only a few labs in the United States. Because *N. fowleri* infections are rare and initial detection is difficult, about 75% of diagnoses are made after the individual has died.

### What are the symptoms of primary amebic meningoencephalitis?

Signs and symptoms of PAM are similar to bacterial meningitis, which makes it difficult to diagnose. Symptoms start 1-7 days after being exposed to the amoeba in two stages. The first stage of symptoms include severe headache, fever, nausea, and throwing up. In stage two, an individual will experience stiff neck, seizures, altered mental status, hallucinations, and coma. Individuals die 1-12 days after symptoms begin.

### How are primary amebic meningoencephalitis treated?

Many drugs appear to be effective against *N. fowleri* in the laboratory. However, their effectiveness is questionable because nearly all infections have resulted in death, even when people were treated with similar drug combinations. Out of all the reported cases, there are only two survivors of *N. fowleri* infection in North America: one from California

*For more information, please contact:*  
County of San Bernardino  
Department of Public Health  
Communicable Disease Section  
[www.sbcounty.gov/pubhlth](http://www.sbcounty.gov/pubhlth)  
(800) 722-4794

*To report a possible foodborne illness, contact:*  
County of San Bernardino  
Department of Public Health  
Division of Environmental Health Services  
(800) 442-2283

*Source: this information was taken from the Centers for Disease Control and Prevention's website [www.cdc.gov](http://www.cdc.gov).*