

Facts about *Naegleria fowleri* and Primary Amebic Meningoencephalitis

***Naegleria fowleri* is found around the world, often in warm or hot freshwater.**

***Naegleria fowleri* infections are rare and devastating. From 2012 to 2021, 31 infections were reported in the U.S. All but three were fatal.**

- *Naegleria fowleri* is an amoeba found around the world, often in warm or hot freshwater (such as lakes, rivers, and hot springs).
- *Naegleria fowleri* amoebae can travel up the nose and into the brain. This causes the disease primary amebic meningoencephalitis (PAM), which destroys brain tissue and causes brain swelling and death.
- Of 154 people known to be infected in the U.S. from 1962 to 2021, only four people survived.

Symptoms can be mild at first, but they worsen quickly.

- Usually start about 5 days after infection (but can range from 1 to 12 days)
- Can include headache, fever, nausea, or vomiting
- Later symptoms can include stiff neck, confusion, lack of attention to people and surroundings, loss of balance, seizures, and hallucinations
- After symptoms start, the disease causes death within about 5 days (but can range from 1 to 18 days)

You cannot be infected with *Naegleria fowleri* by drinking contaminated water, and the infection cannot spread from one person to another.



Infections are contracted through the nose.

People are infected when water containing the amoeba enters the body through the nose. Infections are most often associated with swimming or diving during the summer in warm freshwater, such as lakes and rivers. Sometimes infections occur after people put their head under water in hot springs.

Infection has also happened when people use contaminated drinking water to cleanse their nasal passages during religious practices, use contaminated tap water in a neti pot or other device to rinse their sinuses through the nose, or get the contaminated water up their nose during recreational play.



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Young boys are most at risk for *Naegleria fowleri* infections.

While the reasons are unclear, young boys might participate in more water activities like diving and playing in the sediment at the bottom of lakes and rivers.

In the U.S., most infections have come from freshwater lakes, rivers, and hot springs located in southern-tier states. Recently people have become infected in northern states following periods of very warm temperatures.

The amoeba can be found in:

- Bodies of warm freshwater, like lakes and rivers
- Geothermal (naturally hot) water, like hot springs
- Warm water discharge from industrial plants
- Tap water
- Other recreational water that is not treated, such as some splash pads, surf parks, or other recreational venues

Recreational water-associated infections occur most often in July, August, and September, when temperatures are high for prolonged periods of time, causing water temperatures to rise.

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

Protect Yourself

How to lower risk when swimming and rinsing your sinuses.

We do not know how to lower natural *Naegleria fowleri* levels in lakes and rivers. People should assume that there is always a low level of risk of *Naegleria fowleri* infection whenever they enter warm freshwater lakes, rivers, and hot springs, especially in southern-tier states.

Swimming

The only certain way to prevent an infection is to avoid water-related activities in warm freshwater.

If you choose to swim, you can reduce your risk of infection by limiting the amount of water that goes up the nose.

Hold your nose shut, use nose clips, or keep your head above water when taking part in water-related activities in bodies of warm freshwater.

Avoid putting your head under water in hot springs and other untreated geothermal waters.

Avoid water-related activities in warm freshwater during periods of high water temperatures.

Avoid digging in, or stirring up, the sediment while taking part in water-related activities in shallow, warm freshwater areas.



Rinsing sinuses, including with neti pots

When making a solution for irrigating, flushing, or rinsing your sinuses (for example, when using a neti pot, sinus rinse bottle, or other irrigation device, or performing ritual nasal rinsing), use safe water to protect yourself.

Take **at least one** of these actions to lower your risk of becoming infected:

- **Boil:** Use water that has been previously boiled for 1 minute and left to cool.
 - » At elevations above 6,500 feet, boil for 3 minutes.
- **Filter:** Use a filter designed to remove some water-loving germs.
 - » The label may read “NSF 53” or “NSF 58.”
 - » Filter labels that read “absolute pore size of 1 micron or smaller” are also effective.
- **Buy:** Use water with a label specifying that it contains distilled or sterile water.
- **Disinfect:** Learn how to disinfect your water to ensure it is safe from *Naegleria fowleri*.
 - » Chlorine bleach **used at the right level and time** will work as a disinfectant against this germ.

Rinse the irrigation device after each use with safe water, and leave the device open to air dry completely.