



# Amoebic meningitis

Amoebic meningitis is a disease that causes inflammation and eventual destruction of the brain and brain linings. It is rare but usually fatal.

It is caused by a single-celled amoeba that lives in fresh water and damp soil. The amoeba, *Naegleria fowleri*, can survive in soil for a long time and still reactivate when put in fresh water.

## Terms explained

- Amoeba – a tiny single-celled organism.
- Amoebic meningitis is also known as primary amoebic meningoencephalitis or PAM).

## How do you get amoebic meningitis?

Amoebic meningitis occurs only if water containing active amoebae goes up the nose. The amoebae can then make their way up the nerves to the brain. Children and young adults are the most susceptible to the infection, although it can occur at any age. You cannot catch amoebic meningitis from another person or by drinking the water.

## Where do you find

### *Naegleria fowleri* amoeba?

*Naegleria fowleri* is a naturally occurring organism, so any natural fresh water body, water that has not been disinfected with chlorine or water that has been poorly treated could contain it. They are too small to be visible to the naked eye.

The amoebae are most active in water temperatures between 28° and 40°C.

You can get amoebic meningitis from:

- unchlorinated or incorrectly chlorinated fresh water, including tap drinking water or bore water
- warm inland waters such as dams, lakes, geothermal water (hot springs) or waterholes, even if the water looks clear and clean
- poorly maintained swimming pools and spas
- water piped above ground for long distances without proper treatment
- garden hoses and sprinklers containing warm or stagnant water
- nasal irrigation with contaminated water.

The amoebae will not grow in salty water (above 2 per cent salt), such as sea water and river estuaries. Correct use of chlorine in swimming pools and spas will also stop the amoebae growing.

## What are the signs and symptoms?

The following symptoms usually occur within 5 days (between 1 to 7 days) of infection:

- severe and persistent headache
- high fever
- sore throat
- nausea
- vomiting



- neck stiffness
- confusion and hallucinations
- drowsiness
- coma.

Similar symptoms can occur in many other conditions, including viral and bacterial forms of meningitis. For the most part these other conditions are less severe than amoebic meningitis and more common.

## How do I know if someone has amoebic meningitis?

Diagnosis must be made by a medical professional. See a doctor or attend a hospital emergency room urgently if you suspect anyone has contracted amoebic meningitis or has the above symptoms. Make sure you advise the doctor of any incident where you believe water may have gone up the nose.

## How is amoebic meningitis treated?

Amoebic meningitis is usually untreatable, with almost all cases resulting in death, but there is a small chance of successful treatment with antibiotics if the diagnosis is made at a very early stage.

## How can amoebic meningitis be prevented?

Be careful when swimming, diving, water-skiing or jet-skiing in fresh or natural water bodies that feel warm to the body. Never allow water to go up your nose or a child's nose and do not sniff water into your nose when bathing, showering or washing your face.

- Run all water from any hose or sprinkler for a few minutes until cool water flows through the hose before letting any child play with water from a hose or sprinkler.
- Always supervise children playing with hoses or sprinklers and teach them not to squirt water up their noses.
- If the water in a hose or sprinkler remains warm even after flushing for a few minutes, do not let children play with it.
- Let bath and shower taps run for a few minutes to flush out the pipes.
- Never jump or dive into water – walk or lower yourself in.
- Swim in and play with safe (disinfected) water only. Stay out of dirty pools, waterholes, dams, swimming pools or spas.
- Disinfect your swimming pool water with chlorine. Chlorine is the most effective way to continually disinfect water as it kills all stages of the amoeba.
- Keep wading pools clean by emptying, scrubbing and allowing them to dry in the sun after each use.
- Swim in sea water or properly chlorinated pools rather than fresh water.
- Do not dig or stir up sediment.
- Don't use tap water for nasal irrigation unless it has been further treated.
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## Can water be tested for amoeba?

There is no simple or rapid test for detecting amoeba in water. Detecting *Naegleria fowleri* in water requires specialised testing and equipment.

It should be assumed that any warm fresh water body as described above potentially contains the amoeba *Naegleria fowleri*.

## How can household water be made safe?

Chlorine kills amoeba like *Naegleria fowleri* and is the most effective way to disinfect your swimming pool, household water tanks or your private water supply.

In Western Australia, chlorinated or chloraminated drinking water supplied to urban properties via reticulation pipes connected to a scheme drinking water supply will be safe to drink and use.

For rural properties or properties not connected to a scheme drinking water supply, it is essential that the water you use or your children play or bathe in is always chlorinated if it is warmer than 25°C.

In most circumstances domestic household water filters or ultra violet treatment systems will not make water safe in relation to amoeba unless you also disinfect with chlorine.

No matter where your water is supplied from, water in an outdoor irrigation, fountain, garden hose, misting sprayer or sprinkler system is very susceptible to being colonised by *Naegleria* if it is warm or still. This water will almost certainly not have enough chlorine in it to reliably kill the amoeba, regardless of whether it is filtered or not or has been chlorinated at the point of supply to your property.

Please seek professional advice about chlorination of large scale outdoor water

distribution systems on your property.

Follow these safety tips about running all water from any hose or sprinkler for a few minutes until cool water flows through the hose before letting any child play with water from the hose or sprinkler. Always supervise children playing with hoses or sprinklers and teach them not to squirt water up their noses.

## Where to get help

- See your doctor or attend a hospital emergency room urgently if you suspect anyone has contracted amoebic meningitis.
- Visit a GP after hours.
- Ring *healthdirect* on 1800 022 222.

## Remember

- Amoebic meningitis is usually fatal – prevention is vital.
- Attend a hospital emergency room urgently if you suspect anyone has contracted amoebic meningitis.
- Don't allow water to go up your nose.

## More information

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