

Free Living Amoeba (FLA)

FAQ & Key Points

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What are free-living amoebae?

- **Accidental parasite of people and animals**
- One-cell protozoan that otherwise **lives freely in the environment**
 - Found **throughout the world in soil and water**
 - Thrives in **warm fresh or brackish water ~75-115F – Not sea water**
 - Need consistently high levels of free chlorine to kill FLA
 - Brain infections have been associated with:
 - **Natural fresh bodies of water in summer**
 - **Hot springs** and unchlorinated **hot spring-fed pools**
 - **Residential and municipal plumbing** – tap water, water heaters
 - Sinus or nose rinsing for health or religious reasons
 - Slip-and-Slide toy – any **hose-fed** toys
 - **Under-chlorinated recreational pools**
 - Man-made lakes, rivers, surf parks
 - Splash pads
 - Residential and public pools

How do you get infected?

- Infection ONLY occurs when the amoeba reach the top of the nasal cavity where the olfactory nerves sit at the surface.
- Water with enough amoebae must be flushed or forced up there – how much is unclear
- They are attracted to nerve chemicals (acetylcholine) produced by these nerves. (we don't know why)
- They invade the tissues and track directly up these nerves into the brain
- Infection has never been reported from swallowing amoebae

What is amoebic meningoencephalitis?

- Primary Amoebic Meningoencephalitis (PAM)
 - *Naegleria fowleri*
 - 1-14 days before symptoms start
 - severe headache, neck stiffness, fever, vomiting, change in consciousness (confusion, sleepy)
 - Very rapid progression, death within 1 to several days
 - Severe inflammation and brain swelling – organ failure, brain death
 - 97-99% mortality
 - Difficult to diagnose unless strongly suspicious—often at autopsy
 - Treatment requires 6 drugs, therapeutic coma, hypothermia, and weeks to months of intensive care and rehabilitation
- Granulomatous Amoebic Meningoencephalitis (GAE)
 - *Balamuthia mandrillaris*, *Acanthamoeba* species (multiple)
 - Weeks to years before symptoms start
 - Starts with skin lesions---brain abscesses, meningitis, encephalitis
 - >90% mortality
 - Difficult to diagnose unless strongly suspicious—brain biopsy, skin biopsy, autopsy
 - Similarly hard to treat

Why don't we test for it?

- These organisms come & go – testing one day doesn't reassure us that it's gone
- No cheap & easy test available
- Experts recommend that people assume that it is present at any given time and take precautions

Why aren't warning signs put up?

- Some places have put up warning signs at sites where PAM has occurred.
- Others worry that people may assume that lakes, etc, without a sign are not at risk.
- Experts recommend that people assume that any unchlorinated body of fresh or brackish water may contain FLA.

How can we protect ourselves?

- AWARENESS is the key.
- Don't take "rare" for an answer.
- PAM infects almost exclusively young, active, robust people who are accidentally exposed.
- Every family affected by this disease was unaware or felt it is "rare" & would not impact them. The word "rare" cost a healthy, active life.
- Every physician who was aware of the risk and patient's exposure has been able to rapidly get treatment started to save life and brain function--- It is difficult, many potential side effects, intensive care, costly.
- YET PREVENTION IS EASY...
- 0% predictable*, 99% fatal, 100% preventable
 - *We may not know exactly when it's there, but we do know it's more likely when it's warm—"Summer is Amoeba Season".

Prevention is EASY – At Home

- Blow out through the nose when splashing the face - Teach kids as well
- For sinus or nose rinsing
- Scrub your neti pot or equipment with soap and water, & let it dry completely before using
- Use only distilled water, or boil tap water for at least 1 minute – pour in clean glass jar to cool, store at room temperature
- Sinus Rinsing For Health or Religious Practice | *Naegleria fowleri* | CDC – includes other methods to make water safe
- Use water filters labelled with “cyst removal”, “NSF 53”, “NSF 58”, “absolute pore size of 1 micron or smaller”, or “0.2 micron absolute pore size”
- Household bleach, as instructed at the link
- Don’t allow tap water to touch contact lenses – disinfect right away

Prevention is EASY – At Play

- Nose clips when swimming in lakes, rivers, ponds, hot springs
- Water-resistant bandages (barefoot water skier, Lane “Dawg” Bowers’ hack—careful if you have sensitive skin or sunburn)
- Swim masks can puddle water around the nose, I don’t recommend them for this
- Hold the nose when jumping or diving into unchlorinated fresh water
- Teach kids not to put their faces in water jets or under bathtub faucets
- Bring pool strips when traveling for a quick check
- Operators of recreational water facilities should make sure they are following the most up-to-date, science-backed standards for safe water treatment.
 - [The Model Aquatic Health Code \(MAHC\) | CDC](#)

USF Health “Summer is Amoeba Season” Campaign

- [Summer is Amoeba Season \(Amoeba-Season.com\)](https://Amoeba-Season.com) – facts, diagnostic and treatment information, awareness materials
- [Jordan Smelski Foundation for Amoeba Awareness](#) – our amazing awareness partner in Orlando
 - [Research - Jordan Smelski Foundation for Amoeba Awareness](#)
 - [Video: LAB Detection of Naegleria fowleri \(jordansmelskifoundation.org\)](#)
 - Expert-developed [Care Pathway Recommendations - Jordan Smelski Foundation for Amoeba Awareness](#)
- [Giving | USF Health – Philip T. Gompf Memorial Fund for Infectious Diseases Education and Research](#)

Subject Matter Expertise and References

- [Naegleria fowleri — Primary Amebic Meningoencephalitis \(PAM\) — Amebic Encephalitis | CDC](#) - Dr. Jennifer Cope, Medical Epidemiologist for CDC National Center for Emerging Zoonotic and Infectious Diseases
- [Prevention & Control | Naegleria fowleri | CDC](#)
- [Swimming Precautions | CDC](#)
- [Tap & Faucet Water | Naegleria fowleri | CDC](#)
 - [Sinus Rinsing For Health or Religious Practice | Naegleria fowleri | CDC](#)
 - [Ritual Nasal Rinsing & Ablution | Naegleria fowleri | CDC](#)
 - [Public Drinking Water Systems | Naegleria fowleri | CDC](#)
- [The Model Aquatic Health Code \(MAHC\) | CDC](#)

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