

Facts about Cyanobacterial Harmful Algal Blooms for Poison Center Professionals

This fact sheet provides an overview about cyanobacterial harmful algal bloom exposures in humans and animals. It covers signs and symptoms, laboratory testing, management, as well as contact resources.

What is a cyanobacterial harmful algal bloom (cHAB)?

Cyanobacteria, also referred to as blue-green algae, are microscopic organisms that live primarily in fresh water and salt water, at the surface and below. They usually multiply and bloom when the water is warm, stagnant, and rich in nutrients (phosphorus and nitrogen) from sources such as fertilizer runoff or septic tank overflows.

An algal overgrowth is referred to as an “algal bloom.” Cyanobacterial blooms are usually blue-green in color, but algal blooms can vary in color, ranging all the way to red or brown. When a bloom occurs, scum (a layer of foul extraneous matter) might float on the water surface, resulting in a rotten plant-like odor. Blooms typically occur during late summer or early fall, but can occur anytime during the year.

Not all algal blooms are harmful. A cyanobacterial algal bloom can be harmful when the toxins (cyanotoxins) it produces in air and water reach concentrations that are dangerous to people, marine life, and the environment.

What types of toxins are commonly produced by cHABs?

- Microcystin
- Nodularin
- Cylindrospermopsin
- Anatoxin-a
- Anatoxin-a(s)
- Lyngbyatoxin
- Saxitoxins

Human exposure to cHABs

1. What are the possible routes of exposure to cHABs in humans?

- **Ingestion:** swallowing contaminated water or eating seafood contaminated with toxins
- **Inhalation:** breathing in aerosolized toxins
- **Skin contact:** direct contact with contaminated water when swimming or boating

2. What are the reported signs and symptoms after exposure to cHABs?

Many factors determine whether exposure to cHABs will cause adverse health effects. These include (but are not limited to) toxin type, concentration, duration and route of exposure, and any comorbid conditions of the patient. Cyanotoxins can cause gastrointestinal, neural, hepatic, or dermal toxicity.

Signs and symptoms reported after exposure also vary with the exposure route.

- **Ingestion:** Gastrointestinal (GI) effects include nausea, vomiting, diarrhea, and mild liver enzyme elevations. The time to onset of GI symptoms after oral exposure is usually 3–5 hours and symptoms can last 1–2 days. Exposure can cause conjunctivitis, rhinitis, earache, sore throat, and swollen lips. Respiratory effects can include atypical pneumonia and a hay fever-like syndrome. Exposure can also cause electrolyte imbalances, headache, malaise, and muscle weakness/pain in joints and limbs. Hepatic failure has been reported in dialysis patients treated with dialysis water contaminated with microcystins. Glycosuria, proteinuria, and occasionally hematuria also have been reported.
- **Inhalation:** Rhinitis, sore throat, bronchospasm, pneumonia
- **Skin contact:** Dermatitis, perioral blisters
- **Eye exposure:** Conjunctivitis, lacrimation, swelling, photophobia

3. What laboratory tests can be used to evaluate cHAB-related illness?

- Electrolytes and liver function tests
- Renal function tests, serum glucose, urine to check for proteinuria and glycosuria (in severe toxicity)
- Chest radiograph if respiratory symptoms present

Specialized laboratories (http://www.mywaterquality.ca.gov/monitoring_council/cyanohab_network/docs/cyano_handout.pdf) can perform confirmatory testing to identify cyanobacteria and cyanotoxins in feces urine, stomach contents (if available), tissues, serum, and water specimens. This might be helpful for state and local health departments.

4. What are potential treatments for suspected or known illness related to cHABs?

Treatment is mainly supportive and symptom-directed. There are no specific antidotes for cyanobacterial toxins.

- **For ingestion of contaminated water or seafood:** Stop the exposure by avoiding contaminated seafood or water. If needed, replenish fluids and electrolytes. Activated charcoal can be considered if the patient arrives within 1–2 hours after a toxic ingestion, assuming no contraindications. Provide other supportive and symptom-directed care, as needed.
- **For inhalation of aerosolized toxins:** Stop the exposure by moving to a fresh non-contaminated environment and treat respiratory symptoms accordingly.
- **For skin contact with contaminated water:** Remove contaminated clothing and jewelry and wash skin with soap and water for 10–15 minutes. Antihistamines and steroids can be used.
- **For eye exposure to contaminated water:** Remove contact lenses. Irrigate the eyes with normal saline for at least 15 minutes. Refer the patient to an ophthalmologist if eye symptoms persist after copious irrigation.

5. What are other illnesses that mimic cHAB-associated illness?

The most commonly reported signs and symptoms in patients with suspected CHAB-associated illness are blisters, rash, nausea, vomiting, weakness, and fatigue. Other illnesses, medical conditions, and exposures to chemicals can cause those signs and symptoms and should be ruled out. Those include organophosphate poisoning, mushroom poisoning, drug overdose, plant intoxication, chemical burn, exposure to irritants, and acetaminophen toxicity.

6. What can people do to protect themselves from a toxic bloom exposure?

- Avoid drinking, playing, swimming, water skiing, boating, or practicing other activities in areas where the water is discolored and has a bad odor or where there are visible foam, scum, or mats of algae on the water's surface.

7. What can people do to help prevent toxic blooms from forming?

People can help prevent blooms from forming by following these recommendations:

- Use only the recommended amounts of fertilizers on lawns and plants
- Properly maintain household septic systems
- Maintain a buffer of natural vegetation around ponds and lakes to filter incoming water

Animal exposure to cHABs

1. How are animals exposed to cHABs?

Animals can be exposed to cHABs in the same ways that humans are exposed. These routes include ingestion, inhalation, skin contact, and eye contact. Exposure can occur while swimming or by licking cyanobacteria or toxins off their fur or hair. Animals are often the first to be affected because they are more likely than humans to swim in or drink water contaminated by cHABs, even if it looks or smells bad.

2. What are the expected signs and symptoms?

Domestic animals, especially dogs, may be early victims of a toxin-producing bloom. Dogs become engaged in outdoor activities and do not differentiate between clean or contaminated water; they will drink anyway if they are thirsty. Effects seem to be more serious in animals than in humans. This might be the result of higher ingested doses or a difference in the reaction to toxins.

The most frequently reported symptoms in dogs exposed to cHABs are gastrointestinal, such as vomiting and foaming at the mouth. Exposure can also cause lethargy and neurologic symptoms, including stumbling, behavior changes, spastic twitching, loss of coordination, ataxia, violent tremors, partial paralysis, and respiratory paralysis.

Hepatoenteritis, toxic liver injury, hepatic lesions with necrosis, and petechial hemorrhages of the heart have been reported in animals. Exposure has caused death in fish, dogs, cattle, and birds.

3. How can people protect their pets and livestock in the event of an exposure?

People should use clean fresh water to immediately wash cyanobacteria off pets and livestock that contact a bloom. They should also prevent the animal from licking cyanobacteria off its fur.

Advise callers to keep their pets or livestock from grazing near, drinking, or swimming in water with a bloom.

Callers should contact a veterinarian if the animal shows any signs or symptoms of illness after suspected or known exposure to cHABs or potentially contaminated water. Signs and symptoms include loss of energy or appetite, vomiting, stumbling or falling, foaming at the mouth, diarrhea, convulsions, excessive drooling, tremors, or any other unexplained sickness.

4. What laboratory tests can identify cyanobacteria and cyanotoxins in animals exposed to a cHAB?

The same confirmatory tests used for humans can be used for animals (see section 3 in human exposure).

Other information

Who should be contacted about cHAB-related health issues?

The primary responsibility for the control of harmful algal blooms rests with agencies such as state and local health departments. Report any cyanobacteria-related health events to those agencies. Tell people to report any “musty” smell or taste in their drinking water to their local water utility and to obey any water body closures announced by local public health authorities.

Can we expect changes to coding and guidelines for capturing information about exposure to cHABs?

The American Association of Poison Control Centers (AAPCC) and the Centers for Disease Control and Prevention (CDC) are working to develop coding guidelines about cyanobacterial HAB exposure and related illness. This information will be released and distributed to poison centers when it is finalized.

For more information

- Visit <https://www.cdc.gov/habs>
- Call CDCInfo: 800-CDC-INFO (800-232-4636)
- Contact your local or state health department
- Call the Poison Information Center (800-222-1222)