

Anatoxin-a and Drinking Water

Anatoxin-a is a contaminant associated with harmful algal blooms that has been found in potential drinking water sources in Minnesota. The Minnesota Department of Health (MDH) has developed a health-based guidance value for anatoxin-a in drinking water in order to better understand the potential health risks.

Summary

Anatoxin-a is a toxin produced naturally by cyanobacteria (also known as blue-green algae). Anatoxin-a has been found in some Minnesota surface waters that have had algal blooms. Some of the levels of anatoxin-a in these surface waters were over the guidance value MDH developed. The most likely way for anatoxin-a to enter your body is to swallow water or inhale water spray with the toxin in it. Anatoxin-a can harm the nervous system. Swallowing water with high levels of anatoxin-a has caused death in laboratory animals, wildlife, livestock, and pet dogs within minutes to a few hours after exposure.

Anatoxin-a

Anatoxin-a occurs naturally and may be present when a harmful algal bloom has formed on a lake, pond, or stream. Not all algal blooms contain the cyanobacteria that produce anatoxin-a. However, there is no clear way to know if an algal bloom contains harmful toxins.

Anatoxin-a in Minnesota Waters

Anatoxin-a has been found in some Minnesota lakes when algal blooms were present. A 2010 study looked for anatoxin-a in six Minnesota lakes that tended to have algal blooms. The study detected anatoxin-a in three of the six lakes. The highest level of anatoxin-a they detected was 1.1 parts per billion (ppb).¹ Currently, there are ongoing studies of harmful algal blooms, but there are no data about anatoxin-a in drinking water in Minnesota.

MDH Guidance Value

Based on available information, MDH developed a guidance value of 0.1 ppb for anatoxin-a in drinking water. A person drinking water at or below the guidance value would have little or no risk of health effects.

Potential Exposure to Anatoxin-a

The most likely way you can come in contact with anatoxin-a is by spending time in or near lakes with harmful algal blooms. Activities like swimming, boating, and fishing may make it easier for anatoxin-a to enter your body. Anatoxin-a enters your body if you swallow water or inhale water spray from the lake. It may be possible to be exposed to anatoxin-a by eating fish caught during or after a lake has experienced an algal bloom, but there is limited information on anatoxin-a in fish.²

Potential Health Effects

There is limited information about how anatoxin-a affects humans. It is clear, however, that drinking water with high levels of anatoxin-a can harm the nervous system. Symptoms can include muscle twitching, loss of coordination, and seizures. Tests done on laboratory animals show that swallowing high levels of anatoxin-a can cause death from respiratory paralysis. In the spring of 2015, anatoxin-a was confirmed to be the cause of death for a dog who died after spending a short time in a Minnesota lake that had algal blooms.

Keep Yourself and Your Family Safe

The best way to keep yourself and your family safe from anatoxin-a is to follow the same guidelines MDH provides for [Preventing Harmful Algal Bloom-Related Illness](#)³: (<http://www.health.state.mn.us/divs/idepc/diseases/hab/prevention.html>)

- Stay away from water that is discolored or has foam, scum, or mats of algae.
- Immediately rinse off with fresh water if you think you swam in water with a harmful algal bloom.
- To be extra safe, do not fish during an algal bloom. Wait at least a couple weeks after the algal bloom ends to begin fishing again. If you plan to eat fish caught from lakes with algal blooms, remove the guts and liver and rinse fillets before eating.³

Anatoxin-a in the Environment

Anatoxin-a naturally occurs in lakes, rivers, and ponds when harmful algal blooms are present. Algal blooms may be a symptom of an unhealthy lake. Fertilizer run-off and wastewater feed algal blooms and can increase anatoxin-a in surface water. In sunlight, anatoxin-a rapidly degrades, with a half-life of 1 to 2 hours. In the absence of sunlight, it may take several days to months for anatoxin-a to break down.²

Potential Environmental Impacts of Anatoxin-a

Limited information is available regarding the effects of anatoxin-a on aquatic life. Studies conducted with the pure toxin indicate effects to aquatic life likely occur at concentrations greater than those measured in Minnesota waters. However, algal blooms are likely to produce other toxins at the same time as anatoxin-a, which may exert additional stress on aquatic organisms. There is also a well-documented loss of oxygen in the water that happens with nuisance algal blooms as they decay, leading to fish kills.

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in groundwater. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

References

1. Graham J.L., Loftin K.A., Meyer M.T., Ziegler A.C. Cyanotoxin mixtures and taste-and-odor compounds in cyanobacterial blooms from the Midwestern United States. *Environ. Sci. Technol.* 2010;44:7361–7368.
2. USEPA (2015). Office of Water. Health Effects Support Document for the Cyanobacterial Toxin Anatoxin-A. <http://www2.epa.gov/sites/production/files/2015-06/documents/anatoxin-a-report-2015.pdf>
3. Minnesota Department of Health. Preventing Harmful Algal Bloom Related Illness. <http://www.health.state.mn.us/divs/idepc/diseases/hab/prevention.html>

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