

Microcystin-LR in Drinking Water

Microcystin-LR is a contaminant that has been found in waters that could be used as drinking water sources in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for microcystin-LR in drinking water in order to better understand the potential health risks.

What is Microcystin-LR?

Microcystin-LR is a toxin produced naturally by cyanobacteria, also known as blue-green algae. When excess cyanobacteria grow in a lake or pond, they form an algal bloom, which often appears as a layer of green scum. However, not all green scum on a lake is an algal bloom, and not all algal blooms contain the kinds of cyanobacteria that produce microcystin-LR. There are many types of microcystin; microcystin-LR is one of the more toxic and well-studied varieties.

Have Microcystins been found in Minnesota waters?

Microcystins are sometimes found in Minnesota lakes when algal blooms are present. Microcystins were detected at 133 parts per billion (ppb) at Budd Lake in Fairmont during an active algal bloom in 2008. The lake is a drinking water source, but treated drinking water had no detectable microcystins. In 2007, an algal bloom occurred in Little Rock Lake in Benton County.¹ Microcystins were detected in the lake, but nearby shallow wells were not tested. Such wells are potentially vulnerable to microcystin contamination because the water from the contaminated lake can flow underground and into the wells.¹ Additional studies by the Minnesota Pollution Control Agency indicate that high levels of microcystin (up to 80,000 ppb) are found in some Minnesota lakes during severe and obvious algal blooms.²

To date, microcystin-LR has not been detected in groundwater or treated drinking water in Minnesota. Drinking water treatment facilities in Minnesota do not usually test for microcystins, but treatment seems effective at removal. Boiling drinking water will not remove or destroy microcystins.

What is the MDH guidance value for Microcystin-LR?

Based on available data, MDH has derived a guidance value of 0.1 ppb for microcystin-LR in drinking water.³ A person drinking water at or below this level, whether briefly, occasionally, or daily for a lifetime, would have little or no risk of any health effects from microcystin-LR. MDH currently recommends that this guidance for microcystin-LR be used for total microcystins.

At a Glance

Microcystin-LR is...

- A chemical produced by cyanobacteria (blue-green algae) that can grow in lakes and rivers.

Microcystin-LR enters your body from...

- Drinking untreated water affected by cyanobacteria.
- Contact with water affected by cyanobacteria.
- Possibly from dietary supplements made from algae.

Your exposure to Microcystin-LR can be reduced by...

- Keeping yourself and your pets away from lakes and rivers with green scum. Wash thoroughly if you come into contact with these waters.
- Using caution and consulting your doctor about risks when considering whether to take algae supplements.
- Discarding the guts of fish caught from lakes with active algal blooms.
- Waiting a week or two after algal blooms are over before fishing in affected waters.

Microcystin-LR in drinking water is considered safe if...

- The level is lower than the MDH guidance value of 0.1 ppb.

Can Microcystin-LR in drinking water affect my health?

Microcystin-LR is highly toxic, and even drinking a small amount could be harmful to the liver. Microcystin-LR is considered to help stimulate the growth of cancerous tumors in the liver and colon.⁴ Cancer is not likely a major concern for Minnesotans due to the seasonal nature of algal blooms.

How can I be exposed to microcystins?

You may be exposed to low levels of microcystins through recreational activities such as swimming or boating. Exposure can occur through skin contact, swallowing lake water, or breathing water spray. Your exposure will depend on whether there is an active algal bloom in the water. Children are more likely than adults to be exposed through these routes.

Microcystins can accumulate in the guts of fish, and occasionally in the muscle tissue (filet). Fish caught from lakes with active algal blooms may be safe to eat if the guts of the fish are discarded. As a precaution, anglers may want to wait a week or two after an algal bloom ends before fishing in affected waters.⁵

Microcystin-LR and other microcystins have been found in dietary supplements made from algae.^{6,7,8} Contamination is more likely when the algae is harvested from a natural source.⁷

How can I avoid exposure to microcystins?

MDH and the Minnesota Pollution Control Agency (MPCA) recommend that people and pets avoid contact with lake water affected by algal blooms.^{5,9,10} This includes drinking, swimming, fishing, and watering lawns and gardens. Not all blooms contain microcystins, but it is impossible to tell if a bloom is toxic by sight.

Studies have shown that dietary supplements made from algae may contain unhealthy levels of microcystins. Dietary supplements are not regulated as strictly as prescription or non-prescription drugs. Carefully consider the source of your supplements and the potential risks.

How do microcystins get into the environment?

Microcystins are naturally occurring chemicals. Human actions, such as overloading lakes with nutrients from fertilizer or wastewater, can feed algal blooms and increase microcystins in surface water. Algal blooms are symptoms of an unhealthy lake. They can change the biological balance of lakes by blocking sunlight, altering nutrient content, and depleting oxygen. Microcystin concentrations in an impacted lake can vary greatly with location and time, and may “flare up” quickly and then decline again. Most microcystins are bound inside the living cyanobacteria cell. When the cells die, the microcystins can be released to water. Under most conditions, microcystins outside the cell will degrade in about one week.

References

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