Frequently Asked Questions
MANGANESE

What is manganese and how am I exposed to it?

Manganese is an essential element (or nutrient) for all living organisms and is present in various kinds of foods. It is also found in some drinking water sources. Consuming a small amount of manganese from food or water is needed to stay healthy.

Why was the guideline for manganese in drinking water revised?

Previous limit	New limit	
*AO: 0.05mg/L	**MAC: 0.12mg/L	AO: 0.02mg/L

*Aesthetic Objective
**Maximum Acceptable Concentration

Manganese has long been considered to only be an aesthetic concern in drinking water, causing discoloured water and/or staining of laundry or fixtures. However, new research has shown that exposure to high levels of manganese in drinking water poses a greater health risk than previously thought. The new evidence has shown that consuming drinking water with high levels of manganese may impact the memory, attention, motor function, and the overall intellectual development of infants and young children.

Who is at risk from drinking elevated levels of manganese in drinking water?

Although exposure to high levels of manganese in drinking water can pose a health risk to the general population as a whole, infants are at greater risk from manganese in drinking water than children and adults because their brains are developing rapidly, they drink more water relative to their body weight, and they absorb more manganese and are less able to remove it from their bodies in comparison to children and adults. Infants consuming formula prepared with contaminated drinking water are particularly at risk.

Should I use tap water to bottle-feed my infant?

Formula, reconstituted with tap water, can be a source of exposure to manganese for bottle-fed infants. In areas where the level of manganese in drinking water is above the Health Canada guideline (0.12 mg / L), it is recommended that an alternate source of water (e.g. bottled water) be used to prepare infant formula. If you are on your own water source (i.e. a private well) you should test your drinking water.

Q. If I am pregnant should I source another supply of water?

A. Manganese absorption and excretion is managed by the mother's body. Adults, including expectant mothers, absorb a much smaller amount of manganese from their food and water than infants. As a result, developing fetuses are less sensitive to manganese in drinking water than infants.

Q. Can I transfer manganese to my baby if I am breast feeding?

A. Breastfeeding is not likely to be a significant route of exposure.

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What health effects can result from exposure to manganese in drinking water?

Although humans need to ingest small amounts of manganese to be healthy, too much manganese in drinking water can lead to some health effects, primarily on the central nervous system. Exposure to high levels of manganese could lead to the development of learning and behavioural problems, and potentially deficits in memory, attention and motor skills

Did drinking manganese in the past impact my health?

For communities with historical issues related to elevated levels of manganese in their drinking water, there may be concern regarding potential health impacts. When considering risk, it is important to note:

- The new maximum acceptable concentration (MAC) of manganese given in Health Canada's guidelines is based on animal studies and includes safety factors to ensure even sensitive individuals are protected. Concentrations approaching, but remaining less than, the MAC are not associated with increased health risks in any individuals.
- Health Canada calculated the MAC assuming that people would be constantly exposed to elevated levels of manganese for long periods of time. Occasionally consuming water with manganese concentrations slightly greater than the MAC is unlikely to cause any health issues.
- Health Canada has adopted a precautionary approach due to the limitations on the available information. Manganese concentrations greater than the guideline are only representative of a potential risk to health, but do not represent measurable health impacts.

The health effects from manganese exposure are related to neurological function, and related symptoms could include changes in behaviour, poor memory, or reduced motor function. If you have been consuming water with elevated levels of manganese and are experiencing, or have concerns regarding these issues, you should consult your physician.

If levels of manganese in my water are above the guideline value, can I still use it to bathe, shower and wash hands?

Exposure to manganese through skin contact is not harmful. The exposure risk from hand washing, showering, or bathing from water with manganese is unlikely to be significant. While inhalation of manganese aerosols during showering has not been directly evaluated it is not expected to pose risk to human health.

How do I know if there is manganese in my drinking water?

The only way to determine if you have elevated levels of manganese in your drinking water is to have it tested. Water with high levels of manganese can have a purple, brown, or blackish colour; however, a better indicator is discolouration of fixtures such as kettles or toilet tanks. Manganese may also facilitate the growth of manganese bacteria which may form black-brown (manganese) slime and produce a foul odor that may be mistaken for sewage contamination. Contact can be made with your water supplier to request information on manganese results.

- Results of chemical/metal testing that has been conducted is also publically available at www.healthspace.ca/nha

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Do I need to test my water to make sure the treatment is working?

Routine testing on both water entering a treatment device and the treated water should be conducted to verify that the device is working. Analysis of the water samples should be conducted by an accredited laboratory.

How does manganese get in my drinking water? Do groundwater supplies have more manganese than water from lakes or rivers?

Manganese is a naturally occurring element commonly found in soils and rocks. Manganese gets into drinking water sources when water dissolves minerals that contain manganese. It can also enter drinking water sources through human activity such as industrial discharge, mining activities and leaching from landfills. Generally, manganese is more commonly found in groundwater sources rather than surface waters. It is typically found at higher concentrations in groundwater than in surface water because it is more easily dissolved when there is a lack of oxygen, which is more common in groundwater than in surface water. In some cases, levels in surface water can be elevated, such as in lakes and drinking water reservoirs under warm and stagnant conditions.

Are there treatment devices that I can use to remove manganese from my drinking water?

Home drinking water treatment systems are an option for reducing high levels of manganese. Appropriate treatment to reduce levels of manganese in drinking water include: reverse osmosis, ion exchange/water softeners and oxidizing filters. These treatment systems are typically installed at the point-of-entry into the home. They can also be used at the point-of-use (e.g. taps or faucets). Boiling water will not remove manganese and may actually increase the manganese concentration.

Look for a water treatment device that is certified by the Standards Council of Canada (SCC). Certification means that a device works as claimed by the manufacturer. *Note: There are currently no devices specifically intended for removing only manganese. However, any device that meets NSF/ANSI Standard 42 is able to reduce manganese to safe levels.

How you select an appropriate treatment system will depend on a variety of factors, including ‘how much’ and the ‘form’ of manganese. Other factors that would influence treatment choice include: hardness, iron, alkalinity, sulphide, ammonia and dissolved organic carbon concentrations.

How does Health Canada’s guideline for manganese compare internationally?

Health Canada has established a health-based maximum acceptable concentration (MAC) for manganese in drinking water of 0.12milligrams per litre (mg/L) and an aesthetic objective of 0.02 mg/L. Health Canada is the first national jurisdiction to develop a health-based limit for manganese in drinking water that takes into account new science suggesting potential effects on the central nervous system during development. The calculated health-based limit, which is the basis for the MAC, is lower than the United States Environmental Protection Agency’s (EPA) non-regulatory health advisory (0.3 mg/L), the Australian Drinking Water Guideline (0.5 mg/L), and the ‘health-based value’ established by the World Health Organization (0.4 mg/L, though no formal guideline was established).

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Similarly, Health Canada's aesthetic objective is based on new science and is also lower than those currently established by other agencies. The U.S. EPA established a secondary maximum contaminant level for manganese in drinking water of 0.05 mg/L, based on aesthetic considerations. The Australian Drinking Water Guideline has an aesthetic guideline of 0.1 mg/L for manganese in drinking water.

Is short-term exposure to manganese in drinking water at levels above the MAC a health risk?

The MAC is established based on accumulative long-term exposures therfore short-term exposures slightly above the MAC are not expected to pose a risk of negative health outcomes. Short-term exposure far above the MAC may have health risks. Consult your water supplier and/or local health unit if there are concerns.

How should drinking water systems monitor to determine if the drinking water exceeds the MAC for manganese?

Health Canada recommends that water sources should be characterized to determine if manganese is present. This should include sampling during periods when manganese is mostly likely to be elevated in surface waters such as during thermal stratification in the summer and lake turnover in the fall. While manganese concentrations in groundwater are less likely to fluctuate between seasons, large variations have been observed between wells located in close proximity to each other. Therefore, all wells in a well field should be characterized. Monitoring of surface water should be conducted quarterly with weekly monitoring during summer/fall in lakes and reservoirs subject to stratification and/or large fluctuations in manganese concentrations. Groundwater sources should be monitored semi-annually. Authorities may consider reduced monitoring when it has been demonstrated that manganese is present at concentrations equal to or below 0.02 mg/L in the source water and/or appropriate treatment is in place.

How do I obtain more information?

Please visit our webpage for more information and links to a number of resource materials:

https://www.northernhealth.ca/services/environmental-health/drinking-water/drinking-water-resources
or email us at php@northernhealth.ca

References

Ministry of Health – Province of British Columbia
HealthLinkBC Health File Number 49g:
https://www.healthlinkbc.ca/healthlinkbc-files/manganese-drinking-water

Health Canada
Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Manganese (FAQ) https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-manganese/guidance-document.html

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