Ohio Department of Health

Food Safety Program

Bureau of Environmental Health and Radiation Protection

"To protect and improve the health of all Ohioans"

Nitrates and Food Safety

Answers to Frequently Asked Questions

What are Nitrates/Nitrites?
Nitrates and nitrites are chemicals that can be found naturally in our environment. Two of the earth's most common elements, nitrogen and oxygen, combine to form these nitrogen-containing compounds. Nitrates are essential (needed) nutrients for plants to grow. Nitrates can be found in the air, soils, surface waters and groundwater (underground drinking water).

How can I be exposed to Nitrates?
The main exposure route to nitrates is by eating vegetables and preserved meats. Vegetables account for more than 70% of the nitrates in a typical human diet. Cauliflower, collard greens, broccoli, spinach and root vegetables (potatoes, beets, turnips, etc) contain higher amounts of nitrates than other plant foods. About 6% of the exposure comes from meat and meat products, which sodium nitrate is used as a preservative and color-enhancing agent. Individuals may also be exposed to elevated nitrate levels through their water system.

Who is at risk to Nitrate/Nitrite exposure?
Infants are more sensitive to nitrates because they take in more water for their body weight. Also, infants' blood contains a form of hemoglobin, fetal hemoglobin, which is more easily changed into methemoglobin than is adults' hemoglobin. In addition, infants' digestive systems have a higher pH, which increase the changing of nitrates into nitrites.

Infants exposed to nitrates above the safe drinking water levels may experience breathing difficulties, have a decrease/drop in blood pressure (hypotension), less than average weight gain and may fail to meet developmental milestones.

Pregnant women may be more sensitive to nitrates because their blood contains higher levels of methemoglobin. They may be especially sensitive at the 30th week or later of pregnancy.

Those who have medical conditions or take prescriptions that may involve a nitrate concern should consult their doctor.

Should pregnant women and infants consume water with nitrate levels above 10 ppm?
No. Pregnant women and infants should not consume water with nitrate levels above 10 ppm, and should only consume water from an approved alternate source.

Should pregnant women and infants use water with nitrate levels above 10 ppm to make ice, beverages, or baby formula, or use the water to make food such as pasta, rice, noodles, potatoes or soup?
No. Pregnant women and infants should not use water with nitrate levels above 10 ppm for cooking, making ice, beverages or baby formula. An approved alternate water source should be used.

Can water that exceeds 10ppm of nitrates be used to wash dishes, including baby bottles?
Yes. Only a very small amount of water clings to smooth surfaces, like dishes, so exposure to nitrates would not pose a health risk.

Can pregnant women and infants use water that exceeds 10ppm of nitrates to wash fruits and vegetables before they are eaten?
No. Pregnant women and infants should not consume fruits and vegetables that have been washed with water with nitrate levels above 10 ppm. An approved alternate water source should be used for washing fruits and vegetables.

What should a food facility such as a restaurant or grocery store do if their water supply exceeds 10ppm of nitrates?

- Unless the facility has a reverse osmosis, anion exchange or distillation system installed, a food facility should use an approved alternate water source for human consumption, preparation of food, beverages or ice; or
- Post signs advising that pregnant women and infants should not consume the water or food, beverages, or ice made with the water.

Can exposure to Nitrates/Nitrites make me sick?
Yes, exposure to nitrates and nitrites can make you sick. However, getting sick from exposure to nitrates/nitrites will depend on many factors such as:

- The route of exposure (eating or drinking)
- How much you were exposed to (dose).
- How long you were exposed (duration).
- How often you were exposed (frequency).
- General Health, Age, and Lifestyle: Young children, the elderly and people with chronic (on-going) health problems are more at risk to chemical exposure.

Are there any treatment methods available to remove nitrates in water?
Drinking water may be treated to remove nitrates through reverse osmosis, anion exchange or distillation. Note: Installation of a water treatment system may require registration with the Ohio EPA.

Does boiling water remove nitrates?
No, boiling water is not a solution for nitrates, as it can actually increase the nitrate level due to evaporation of the water.

Will disinfecting the water with chlorine remove nitrates?
No, disinfection of the water will not remove nitrate because nitrates are chemicals, not germs that can be "killed".

What levels of Nitrates/Nitrites are safe?
The U.S. EPA MCL (maximum contaminate level) requires the amount of nitrates in drinking water be less than 10 ppm (parts per million). Public drinking water supplies are tested according to Ohio EPA sampling requirements, and the water is filtered to remove impurities. Ohio Administrative Code (OAC) Chapter 3701-28 established a nitrate standard for private water systems in Ohio of 10 ppm. All new and altered wells are pre-screened and tested for the presence of nitrates. Contact your local health district to assist with nitrate testing.

How can I reduce my intake of Nitrates/Nitrites?
Keep in mind that healthy vegetables are the main source of nitrates, but vegetables are good for you and we would never suggest removing vegetables from your diet. However, you can reduce your intake of nitrates by:

- Reducing the amount of preserved meats you eat (such as sausage, bacon, hot dogs, etc.).
- If your public water system has a nitrate advisory posted, use an alternate approved source of water for drinking, food preparation or cooking.
- If you drink well water, make sure you are drinking water that is not contaminated with nitrates.
- Infant formula should be made with safe approved alternate water source when the nitrates are higher than 10 ppm.
- Vitamin C will help prevent the nitrates changing to nitrites. Diets high in vitamin C will reduce the risk of methemoglobinemia.

References:

- Agency for Toxic Substances and Disease Registry, Nitrate/Nitrite Toxicity, September, 2015.
- Toxics A to Z, University of California Press, 1991.
- Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd edition, Noyes Publications, 1985.