

Nitrate & Health Fact sheet



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Introduction

Nitrate, a form of nitrogen, is a water-soluble chemical found at high concentrations in some Iowa waterways and private wells (1, 2, 3). Nitrate is colorless and has no smell, so it is unnoticeable in drinking water. Nitrate occurs naturally in the environment; however, applying nitrogen fertilizers to corn and other crop fields, and manure run-off from animal feeding operations can cause nitrate pollution in drinking water (2, 3). Nitrate can be reduced to nitrite and other compounds that have been shown to have negative health effects (1,5).

Exposure Sources

People are primarily exposed to nitrate through contaminated drinking water and by eating certain nitrate-containing foods, like processed meats (1, 4). Drinking water contaminated with nitrate is a public health concern in Iowa due to the amount of nitrogen fertilizer used in agriculture (1, 2, 3), with shallow wells being most at risk of high nitrate concentrations (3). Nitrate is the most common form of nitrogen entering Iowa streams because of its stability and water-solubility, potentially contributing to downstream contamination of drinking water.

Health Risks Associated with Nitrate

Cancer Health Risks

The International Agency for Research on Cancer (IARC) classifies nitrate in food and water as "probably carcinogenic to humans" (1, 5). Studies conducted in Iowa have shown a positive correlation between exposure to nitrate in the drinking water and some cancers (1). Some studies conducted in Iowa have analyzed cancer risk at or above levels one-half the maximum contaminant level (MCL) over long periods of time. From these studies, consistent associations have been discovered for colorectal cancer. Cancers at other sites have been less studied, however, positive associations have been found at levels below the MCL for cancers of the thyroid, ovary, and kidney (6).

Non-Cancer Health Risks

Methemoglobinemia, or Blue Baby Syndrome, is a condition in which not enough oxygen is transported in the blood to the body's tissues (3). Blue Baby Syndrome can occur when infants are exposed to nitrate levels higher than 10 mg/L. Elevated prenatal nitrate exposure in Iowa has also been connected to increased risk of birth defects, including spina bifida, limb deficiencies, and cleft palate (7,8).

How is Nitrate regulated?

- The EPA established the maximum contaminant level for nitrate to be 10 mg/L in drinking water, to protect infants against methemoglobinemia, or Blue Baby Syndrome (7, 9).
- Public water suppliers must test for nitrate and present results to consumers and the state through consumer confidence reports (3).
- Private wells are not required to be tested for nitrate, and those with water sourced from a shallow well, less than 50 feet, face a disproportionate risk of high nitrate exposure (3,10).

What can you do?

- Test well water for nitrate once a year if the well is privately-owned.
- Water purification methods that remove nitrate include reverse osmosis, ion exchange, and distillation. Using Brita filters, refrigerator filters, and boiling water are not effective at removing nitrate (7).
- Maintain a healthy diet rich in antioxidants and limited in processed, cured, and red meats (1). **Published September 2024**
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References



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