

Nitrate in Drinking Water & Human Health

Q. Is nitrate in drinking water a health concern?

Nitrate itself is generally not a concern with respect to human health. However, bacteria and other substances in the human body can transform nitrate from drinking water into nitrite, which can then be transformed into nitrosamines. Nitrosamines are compounds formed by the reaction between nitrite and secondary amines; they are also found in trace amounts in some processed fish and cured meats. Nitrite and nitrosamines have been shown to adversely affect human health. This is why the federal government regulates nitrate and nitrite levels in public drinking water supplies.

Blue Baby Syndrome (methemoglobinemia), rarely diagnosed in the U.S., is caused by exposure to elevated levels of nitrite in infants less than six months old. Nitrite adversely affects the blood's ability to carry oxygen, which can result in a bluish color in the infant's skin. If not treated, blue-baby syndrome can be life threatening. Possible risk factors for Blue Baby Syndrome include nitrate in drinking water, some genetic conditions, and certain intestinal infections.

Research is ongoing on the possible association between exposure to nitrate in drinking water and the risk for certain cancers. In the body, the transformation of nitrate to nitrite to nitrosamines can occur; nitrosamines have been shown to be carcinogenic (cancer-causing) in laboratory animal studies. Conflicting results from studies on human exposure to nitrate in drinking water and risks for cancer have been reported in the scientific literature.

Q. How much nitrate in drinking water is safe?

The U.S. Environmental Protection Agency (EPA) regulates nitrate and nitrite based on concerns related to blue-baby syndrome. The maximum contaminant level (MCL) for public drinking water supplies is set at 10 mg/L for nitrate nitrogen and the MCL for nitrite nitrogen in public drinking water supplies is set at 1 mg/L. Public water supplies cannot exceed these MCLs. Private well water is not regulated.

Q. Is water the only source of nitrate to which humans are exposed?

No. Nitrate also occurs naturally in the environment, is found in many vegetables and some processed meats, and is produced naturally within the human body. Nitrate from drinking water accounts for between 15% - 75% of a person's exposure to nitrate from environmental sources. The higher the nitrate nitrogen level in water, the greater the overall contribution. In addition, many vegetables and fruits contain substances (such as vitamins C and E) that inhibit the transformation of nitrate nitrogen to nitrite to nitrosamines. This "protective factor" may lessen the contribution of nitrate from vegetables that is available for conversion to nitrite in the digestive system.

Q. What can I do about nitrate in my drinking water?

Nitrate levels in municipal and other public water supplies are required to be within federal standards. This includes regular monitoring and testing drinking water supplies. If you have a private well, you should have your water tested on a regular basis (every one- two years). Boiling water increases the nitrate concentrations. Certain types of in-home treatment systems will remove nitrate, but they must be maintained regularly to protect public health. If you have health concerns about nitrate in your water, talk to your doctor. For information on public programs, contact your local health department or your county sanitarian.

For more information, call Des Moines Water Works at (515) 283-8700 or visit www.dmww.com.