

NITRATE IN YOUR DRINKING WATER: WHAT YOU NEED TO KNOW

Water quality in the State of Iowa has been an increasing public health concern in recent years, primarily due to nitrate levels that exceed the EPA standard set in 1962 of 10 mg/L for drinking water. Originally established to combat blue-baby syndrome, or methemoglobinemia, a serious, life-threatening condition that is now rare, the nitrate standard is intended to protect the public from other potential health risks.



Research has suggested links between elevated nitrate levels in drinking water and certain cancers, birth defects, macular degeneration, and reproductive and thyroid problems. Individuals experiencing long-term exposures or whose health status makes them especially vulnerable to adverse effects of nitrate exposure are at higher risk.

In 2015, the Des Moines Register reported that 60 Iowa cities and towns have experienced high nitrate levels in their drinking water over a five-year period, and 30 percent of the

state's 880 municipal water systems were found to be "highly susceptible of becoming contaminated by nitrates and pollutants," according to the Iowa DNR.

People can be exposed to nitrate through drinking water, and through consumption of some vegetables and processed meats, and exposure to environmental tobacco smoke and a variety of drugs that contain nitrogen-based compounds. Nitrate in drinking water contributes a significant portion of the total body burden of nitrate from these various exposures.

Much of the cancer and birth defects research related to nitrate exposure via drinking water has been conducted with Iowa populations. Studies indicate that increased risks for cancer outcomes are related to long-term consumption of drinking water, even when nitrate levels are at half the EPA standard (5 mg/L). Because of this, one of the major questions currently under debate is whether the EPA's drinking water standard of 10 mg/L is sufficiently protective.

These findings are a strong indication for the need to act now to reduce pollution and improve Iowa's water quality.

Birth Defects - Increased Rates of Occurrence Due to Nitrate Exposure from Drinking Water¹

Daily Ingestion of Nitrates by Pregnant Mothers

DISORDER	RISK	NITRATE CONSUMPTION LEVEL
SPINA BIFIDA	2 times higher	≥ 5.0 mg/L daily
LIMB DEFICIENCIES	1.8 times higher	≥ 5.4 mg/L daily
CLEFT PALATE	1.9 times higher	≥ 5.4 mg/L daily

-National Birth Defects Prevention Study

Cancers - Increased Rates of Occurrence Due to Nitrate Exposure from Drinking Water^{2,3,4}

DISORDER	RISK	DRINKING WATER NITRATE LEVEL	DURATION OF EXPOSURE
BLADDER CANCER	1.6 times higher	> 5.0 mg/L nitrate-N	≥ 4 years
OVARIAN CANCER	2.0 times higher	> 3.0 mg/L nitrate-N	≥ 11 years
THYROID CANCER	2.5 times higher	> 5.0 mg/L nitrate-N	≥ 5 years

-Iowa Women's Health Study

References

- ¹Brender et al. Prenatal nitrate intake from drinking water and selected birth defects in offspring of participants in the National Birth Defects Prevention Study. *Environ Health Perspec.* 2013; 121(9):1083-1089.
- ²Jones et al. Nitrate from drinking water and diet and bladder cancer among postmenopausal women in Iowa. *Environ Health Perspec.* 2016; DOI:10.1289/EHP191.
- ³Inoue Choi et al. Nitrate and nitrite ingestion and risk of ovarian cancer among postmenopausal women in Iowa. *Int J Cancer.* 2015 137:173-182.
- ⁴Ward et al. Nitrate intake from drinking water and diet and the risk of thyroid cancer and thyroid disease. *Epidemiology.* 2010; 21(3):389-95.
- "Nitrate in Drinking Water: A Public Health Concern for All Iowans" <http://www.iaenvironment.org/news-resources/publications/water-and-land-publications>

Prepared by: Iowa Water Quality and Public Health Consortium: University of Iowa, University of Northern Iowa, Drake University, Iowa Public Health Association

For more information: email cheec@uiowa.edu