NITRATE IN DRINKING WATER

Nitrate is one of the most common contaminants in drinking water. Nitrate naturally occurs at low levels in ground and surface water. However, elevated levels of nitrate are associated with contamination from commercial fertilizer, manure or effluent from municipal or industrial wastewater treatment plants. **EWG data for 2015-2017 show that detectable levels of nitrate are present in the drinking water served to 231 million Americans.** And drinking water in agricultural areas frequently has the highest nitrate concentrations.

CURRENT LEGAL LIMITS AND THE NEED FOR A NEW APPROACH TO PROTECT PUBLIC HEALTH

The federal limit of 10 milligrams per liter, or mg/L, equivalent to parts per million, for nitrate in drinking water, was set in 1962 and has not been updated. This standard was developed to prevent acute cases of methemoglobinemia, which causes an infant to suffer from oxygen deprivation in the blood after ingesting excessive nitrate.

More recent studies, discussed briefly below, have found increased risk for other troubling health outcomes at nitrate levels significantly below 10 mg/L. A comprehensive scientific review of nitrate drinking water concentrations and related impacts on human health showed strong evidence of an increased risk of colorectal cancer, thyroid disease and neural tube defects at nitrate concentations in drinking water below the current legal limit of 10 mg/L.[1]

Based on more recent studies showing correlation between serious health impacts and nitrate levels significantly below 10 mg/L, the Environmental Protection Agency and the states should reassess legal limits for nitrate in drinking water. In 2017, the EPA's Integrated Risk Information System program began a review of health effects from nitrate in drinking water.[2] However, the agency later suspended the review and did not prioritize nitrate reassessment for 2019.[3]

To ensure safe drinking water, protect public health and wisely use limited public resources, regulatory and programmatic action to reduce sources of nitrate contamination should be implemented immediately when levels in ground or surface water are above naturally occurring background levels. It is irresponsible to wait to implement nitrate source reduction measures until nitrate levels are at or near the current legal limit of 10 mg/L. This delayed approach has failed to protect public health and has saddled the individuals and communities least able to afford drinking water treatment with millions in costs.

NITRATE DRINKING WATER CONCENTRATIONS OF 1 TO 5 MG/L AND ABOVE MAY INCREASE CANCER RISK

Danish researchers have found an elevated risk of colorectal cancer associated with drinking water concentrations of just 1 mg/L – tenfold lower than the U.S. Safe Drinking Water Act limit.[4] A study conducted in Spain and Italy found an increase in colorectal cancer risk at 1.7 parts per million, or ppm, of nitrate.[5] Moreover, studies conducted in the U.S. found greater incidence of colorectal, ovarian, thyroid, bladder and kidney cancers among people exposed to nitrate from drinking water at levels half the federal standard and lower.[6, 7, 8, 9, 10] **According to a 2019 peer-reviewed study by EWG, there is a one in 100,000 cancer risk associated with a nitrate concentration of 1.4 mg/L in drinking water.[11]**

NITRATE DRINKING WATER CONCENTRATIONS ABOVE 1 MG/L MAY HARM THE DEVELOPING FETUS

Epidemiological studies report that nitrate ingestion during pregnancy can harm the development of the fetus. Adverse outcomes associated with nitrate levels below 10 mg/L include spontaneous abortion, fetal deaths, prematurity, low birth weight and congenital malformations.[1, 12]

A 2013 study found associations between prenatal nitrate exposure from drinking water and neural tube defects such as spina bifida, oral cleft defects and limb deficiencies.[13] In 2017, researchers from the University of Illinois in Chicago reported that women who consumed drinking water with nitrate concentrations above 1 mg/L during pregnancy had an elevated risk of very low birth weight and very preterm birth. These findings were based on birth data for four Midwestern states (Ohio, Indiana, Iowa and Missouri).[14]

More recently, the same research group analyzed birth data for the state of Missouri and found that nitrate concentrations above 1 mg/L during pregnancy were associated with a significant increase in birth defects including limb deficiencies.[15]

NITRATE DRINKING WATER CONCENTRATIONS OF 2.5 MG/L TO 6.5 MG/L MAY HARM THE THYROID

Research by the National Cancer Institute found that women drinking nitrate-contaminated water face a greater risk of thyroid cancer.[16] These effects were observed at nitrate concentrations above 2.5 mg/L.[8] A 2012 publication from the same research group reported a link between nitrate intake and subclinical hypothyroidism in women who consumed nitrate at concentrations above 6.5 mg/L.[17]

UNLIKE DRINKING WATER AND CURED MEAT, NITRATES IN SPINACH ARE NOT LINKED TO INCREASED CANCER RISK

According to the International Agency for Research on Cancer, once ingested, nitrate is converted into N-nitroso compounds, such as nitrosamines, by bacteria in our digestive systems. Nitrosamines damage DNA and cause cancers in the blood and in various organs, including the stomach, bladder, colon and esophagus.

Cured meats, which are commonly preserved with nitrates, can be a significant source of dietary nitrate. Like nitrate in drinking water, nitrate in cured meat is also linked to an increased risk of cancer. Nitrate also occurs naturally in green leafy vegetables, such as spinach. However, leafy greens have been shown to fight cancer, likely because of naturally occurring antioxidants that are also present in those foods.

HUMAN HEALTH IMPACTS AND DRINKING WATER TREATMENT ARE COSTLY

The cost of addressing the human health impacts from nitrate-contaminated drinking water is significant. Nitrate pollution of U.S. drinking water may be responsible for up to 12,594 cases of cancer a year, which equates to up to $1.5 billion in additional health care costs, according to an EWG peer-reviewed study.[11] Of these, 10,379 cases and $1.3 billion in costs are estimated for colorectal cancer, and the remaining cases encompass kidney, bladder, ovarian and thyroid cancers.

The cost of treating drinking water to remove nitrate can be large and often falls disproportionately on residents of small rural towns and cities.[18] Hiawatha, Kansas, for example, began building a new water treatment plant in 2017 after nitrate contamination of drinking water reached 11 mg/L. The plant will cost the town of about 3,300 an estimated $3.5 million.[19] Moreover, the millions of households that use water from their own wells for drinking and other household purposes will bear the entire cost.

Agricultural sources of nitrate are a massive problem. Taking swift and effective action to require and help farmers to manage their fertilizers and manures – often the largest source of nitrate drinking water contamination – is necessary to protect drinking water and public health and to use limited public resources wisely.

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