



WARREN COUNTY COMBINED HEALTH DISTRICT

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Public Health
Prevent. Promote. Protect.

Nitrates/Nitrites Frequently Asked Questions

What are Nitrates/Nitrites?

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

How are Nitrates used?

Because nitrates are needed for plants to grow, concentrated man-made nitrogen-containing fertilizers are often used on golf courses, lawns and are heavily used in farming communities to grow vegetable crops. Nitrates and nitrites are also used as meat preservatives and to improve the color of meats.

How do Nitrates get into the environment?

Nitrates are generally found in surface waters and shallow groundwater. Plants naturally release nitrogen when they die and decompose. The nitrogen from the rotting plants oxidize (combine with oxygen) to form nitrates. During a rainfall, surface water can move through the soil and carry these nitrates down to the groundwater.

Another way that water can be contaminated with nitrates is through the use of products that contain large amounts of ammonia. Ammonia is oxidized and forms nitrites. Liquid ammonia fertilizer spills can form nitrates that also make their way through the soil to the groundwater.

Because humans and animals eat vegetables and preserved meats, nitrates and nitrites can be found in human and animal waste. Old and poorly maintained sewage systems and improper well construction can contaminate groundwater with nitrates as well.

How can I be exposed to Nitrates?

The main exposure risk for nitrates is from 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, because sodium nitrate is used as a preservative and color-enhancing agent. The remainder of the nitrate in a typical diet comes from drinking nitrate-contaminated water (about 21%). In agricultural areas, nitrates are a major source of contamination for shallow groundwater aquifers that provide drinking water.

What happens to Nitrates/Nitrites in my body?

Exposure to nitrates and nitrites does not usually result in an immediate health threat. When you eat or drink nitrates, they are absorbed from the small intestine into the blood. Nitrates then enter the large intestine from the blood. If certain, normal conditions exist in the intestine, such as a low pH, the nitrate is simply processed and removed as waste without any harmful effects. However, under other conditions, such as a high pH in the intestine, the nitrate will be changed into nitrite. This nitrite is then reabsorbed into the blood where it will react with the blood's hemoglobin iron to form methemoglobin.

Note: The hemoglobin in our blood transports oxygen throughout our body.

The condition where the nitrite reacts with the iron and hemoglobin is known as methemoglobinemia. Unlike hemoglobin that carries oxygen throughout our body, methemoglobin is unable to transport oxygen. A person who has methemoglobinemia can lack the proper oxygen levels needed for the body to function correctly. One of the signs of methemoglobinemia is cyanosis (turning a blue color).

Who is at risk to Nitrate/Nitrite exposure?

The persons most at risk to exposure to nitrates/nitrites are infants less than four-months old who are fed formula made with nitrate-contaminated water at levels above the U.S. Environmental Protection Agency's (EPA) safe drinking water standards of 10 ppm.

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 increases the conversion 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, 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 of pregnancy.

What levels of Nitrates/Nitrites are safe?

The U.S. EPA MCL (maximum contaminant level) requires the amount of nitrates in drinking water be less than 10 ppm (parts per million). The public drinking water supplies are tested quarterly and the water is filtered to remove impurities. Ohio Administrative Code (OAC) Chapter 3701-28-04 established a nitrate standard for private water systems in Ohio of 10 ppm as of 2000. 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 avoid exposure to Nitrates/Nitrites?

If you drink well water, make sure you are drinking water that is not contaminated with nitrates. Infant formula should be made with safe bottled water when the nitrates are higher than 10 ppm. Also, vitamin C will help prevent the nitrates changing to nitrites. Diets high in vitamin C may reduce the risk of methemoglobinemia.

Drafted: 09/2013