Environmental Risk Factors for Bladder Cancer

What You Need to Know

BCAN
Bladder Cancer Advocacy Network

Introduction

Bladder cancer is a complex disease with many risk factors such as age, gender, and genetics. Exposure to harmful chemicals can also put people at risk. People who smoke are two to three times as likely than non-smokers to be diagnosed. Yet, many bladder cancer patients have never smoked. Scientists are learning that other kinds of toxic chemicals in our environment—chemicals that we come into contact with where we live, work, and play—are important contributing factors and can increase a person's risk of developing the disease.

Based on a growing body of research, more than a dozen chemicals and other industrial agents have been linked to bladder cancer. People can be exposed to these chemicals in:

Water pollution: Three water contaminants have been studied and have the potential to affect large numbers of people. They include inorganic arsenic, disinfection byproducts that form during water treatment, and nitrate.

Industrial workplaces: Workers in rubber manufacturing, transportation, dry cleaning, aluminum production, metalworking and machining, textile and dye manufacturing, painting and hair salons have an increased risk. The higher risk is linked to exposures to aromatic amines, polycyclic aromatic hydrocarbons (PAHs), perchloroethylene, mineral oils/metal working fluids, diesel exhaust and coal-tar pitch.

Air pollution: Based on evidence from studies of workers, various components of air pollution, including diesel exhaust and PAHs from vehicles and industries have been shown to contribute to bladder cancer.

Scientists continue to make progress in understanding how these different chemicals cause bladder cancer. In the meantime, there are steps people can take to protect themselves from toxic chemicals in the environment. Just like smoking cessation campaigns have successfully lowered smoking-related cancers, reducing exposures to chemicals that cause bladder cancer represents an important opportunity for prevention, one that could result in fewer people getting the disease.

Water Pollutants & Bladder Cancer

Inorganic Arsenic

Arsenic can occur naturally in groundwater, but it also has been used in some pesticides. The International Agency for Research on Cancer (IARC) classifies arsenic in drinking water as a known cause of bladder cancer. This classification is largely based on studies of people living in Southeast Asia and South America where levels of arsenic in drinking water were especially high—many times higher than those typically seen in the U.S.

However, new evidence shows that even low-to-moderate levels of arsenic exposure may increase bladder cancer risk. One study of private well owners in northern New England, where bladder cancer rates are 20 percent higher than the U.S. overall, found that those who drank more from private wells with arsenic-contaminated water had a greater risk. The trend was especially pronounced among people who used shallow drinking water wells, as shallow wells tend to be more vulnerable to human activity. Among those who got their drinking water from wells dug before 1960—when arsenical pesticides were used—risk of bladder cancer was double in those who drank more water compared to those who drank less.

Disinfection Byproducts

Disinfectants, like chlorine, are added to drinking water to kill germs and protect people from water-borne diseases. However, the practice can cause the formation of disinfection by-products—substances that form when disinfectants react with organic matter in the water. There are hundreds of different types of disinfection byproducts. Studies on the relationship with bladder cancer tend to focus on a group called trihalomethanes. This group includes chemicals such as chloroform, dichlorobromomethane, and bromoform.

Over the years, studies in humans have consistently found an association between drinking water treated

with chlorine and increased bladder cancer risk. At this point, scientists do not yet know which byproducts are responsible for the elevated risk. However, several byproducts including chloroform have been classified as possible or probable human carcinogens by IARC.

There are other ways people can come into contact with these substances, for example, through skin contact and/or inhalation while bathing, showering or swimming. However, the evidence of an increased risk associated with bladder cancer is inconsistent. One study found that people with the highest exposures to trihalomethanes while taking a shower had a two-fold increased risk of bladder cancer compared to those who had the lowest exposures. Although swimming pools are routinely treated with disinfectants causing the creation of disinfection byproducts, the evidence is inconsistent regarding an increased risk associated with bladder cancer and requires further study.

Nitrate

Nitrate is a common drinking water contaminant that originates primarily from agricultural fertilizer, but also from animal manure, leaching from septic systems, and sewage. In recent years, nitrate levels in drinking water in agricultural areas have increased with the higher use of fertilizers and other farming activities. Small water supplies in poor rural areas are especially vulnerable because of their proximity to farms and their limited financial and technical resources.

Studies show nitrate causes bladder tumors in animals, yet few studies have looked at the link between nitrate in drinking water and bladder cancer in humans. Results from the Iowa Women's Health Study did find that long-term exposure to high nitrate levels in drinking water was associated with an increased risk of bladder cancer among postmenopausal women. However, more research is needed to determine if nitrate in drinking water is a risk factor.

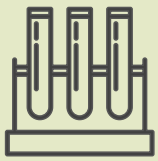
How are these chemicals being managed?

The U.S. Environmental Protection Agency (EPA) has set a drinking water standard for arsenic at 10 parts per billion (ppb). Although the EPA considers this an "acceptable" level, its stated goal is for drinking water to contain no arsenic at all. Studies suggest exposure to arsenic at levels below 10 ppb may still be harmful. This standard only applies to public water supplies, not private wells.

Some disinfection byproducts are regulated under the federal Safe Drinking Water Act through the Disinfectants and Disinfection Byproducts Rule. However, there are many more compounds that have yet to be addressed, despite evidence they can damage DNA, which can lead to cancer. Also, public water utilities use different methods of disinfection to reduce regulated disinfection byproducts, which can inadvertently produce new unregulated compounds. However, there are ways to avoid disinfection byproducts such as removing organic matter in the water prior to treatment.

EPA's drinking water standard for nitrate is 10 part per million (ppm). It was established to protect infants from blue baby syndrome. However, because of potential long-term health effects including cancer, exposure to levels below the federal standard may still be a concern. What's more, nitrate is often a marker for other contaminants in well water. If private well testing reveals nitrate levels greater than 1 ppm, this suggests other contaminants may have seeped into the well.

WHAT YOU CAN DO



Have your water tested. For private well owners, EPA recommends testing your water annually for nitrates and bacteria. Consider testing for arsenic, volatile organic compounds (chemicals found in gasoline and solvents), and pesticides as well since these are common contaminants in private wells.

Install a filter. Disinfection byproducts, arsenic and other contaminants can be removed with various filtration devices—either a reverse osmosis, ion exchange, or distillation system. Counter-top filtration systems (e.g., Brita) do not filter arsenic or disinfection byproducts. Contact a professional to determine which device is best for you given your drinking water quality. Once installed, it is important to test your water annually to ensure the system is working effectively.

Contact your water utility. Request information about levels of disinfection byproducts in your public drinking water. Ask whether they are utilizing best available technologies and practices to minimize the formation of disinfection byproducts.

Advocate for safer rules. Call on EPA to set maximum contaminant

BCAN gratefully acknowledges the contribution of the Cancer Free Economy Network in preparing this resource.

Collaborative Network
For a Cancer Free Economy

(888) 901-2226 www.BCAN.org info@bcan.org 4915 St. Elmo Ave, Suite 202
Bethesda, MD 20814