Chlorination of drinking water saves lives

FAST FACT:

According to the World Health Organization, diseases associated with untreated water kill more than 25,000 people every day in developing countries.

North Americans drink more than one billion glasses of tap water each day. For more than a century, chlorine-based disinfectants have helped ensure that the water we drink is safe and free of bacteria, viruses, and other micro-organisms that can cause disease.

Chlorination Virtually Eliminated Waterborne Diseases

The chlorination of drinking water has been credited by the U.S. Centers for Disease Control and Prevention (CDC) for helping to control infectious diseases and increase life expectancy by nearly 30 years since 1900.[i] Indeed, chlorine has been used as a water disinfectant since 1908 and has helped to virtually eliminate waterborne diseases such as typhoid, cholera and hepatitis A.[ii]

This proven track record is the reason why more than 98 percent of North American water supply systems that disinfect drinking water use chlorine-based disinfectants. It also is the reason why leading health groups throughout the world have lauded chlorine for its contributions to public health and extolled the importance of drinking water disinfection.

Testimony to Chlorine's Effectiveness

In a report on major public health achievements of the twentieth century, the CDC noted, "Chlorination and other treatments of drinking water began in the early 1900s and became widespread public health practices, further decreasing the incidence of waterborne diseases."[iii]

According to the American Water Works Association, "Chlorine disinfection has been extremely effective in protecting drinking water resources from bacterial and viral contamination. It has virtually wiped out instances of waterborne diseases like typhoid fever, cholera, and dysentery in America and other developed countries."[iv]

Many Uses, Many Benefits

Chlorine-based disinfectants are the only methods of water disinfection that protect from the drinking water treatment plant to the tap, for just pennies a day. But chlorine does much more than kill deadly germs and microorganisms in the nation's water supply. Chlorine also:

- Removes unpleasant tastes and odors that come from algae and decaying natural vegetation.
- Helps control microorganisms such as slime bacteria, molds, algae, and fungi that tend to grow on the walls in transmission mains and treatment basins.
- Eliminates or reduces organic coloration.
- Destroys hydrogen sulfide and removes ammonia and other compounds that have unpleasant tastes and impede disinfection.

Our water supply benefits from chlorine in another way. Corrosion-resistant polyvinyl chloride (PVC) pipe, which is made from chlorine, protects our water supply by decreasing leaks in public drinking water systems.

Disinfection Byproducts

In 1974, scientists at the U.S. Environmental Protection Agency (EPA) determined that chlorine reacts with certain organic materials during water disinfection to create trihalomethanes (THMs) and other

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disinfection byproducts (DBPs). Toxicological studies suggested that some THMs are carcinogenic to laboratory animals at levels thousands of times greater than those found in drinking water. More recent studies of how chloroform (the dominant trihalomethane species) causes cancer at very high doses show that chloroform is unlikely to cause cancer at the low levels found in drinking water.

Fears that THMs could be a potential human carcinogen led EPA to set regulatory limits on disinfection byproducts.With the support of the Chlorine Chemistry Council®, EPA developed new regulations in 1998 to control disinfection byproducts while maintaining proper disinfection.[v]

A cause-and-effect relationship between DBPs and adverse health effects in humans has not been established. The World Health Organization's (WHO) International Programme on Chemical Safety recently concluded that "There is insufficient epidemiological evidence to support a causal relationship between bladder cancers and exposures to chlorinated drinking water."[vi] EPA and Health Canada have also reached similar conclusions [vii, viii] Based on these findings, the WHO maintains that the "Risks to health from DBPs are extremely small in comparison with inadequate disinfection."[ix]

This view is supported by the American Academy of Microbiology, which states that "It is important to point out that there is no direct and conclusive evidence that disinfection byproducts affect human health at concentrations found in drinking water."[x]

Recent attention has focused on epidemiology studies reporting an association between adverse reproductive and developmental effects and DBPs. Overall, the epidemiological database available for assessing a potential relationship between DBPs and adverse reproductive outcomes (i.e., miscarriages) is sparse and the findings are inconsistent.[xi] In its December 1998 Stage I D/DBP Rule, EPA concluded, "The reproductive epidemiology studies are insufficient to establish a causal relationship between exposure to chlorinated drinking water and reproductive and developmental effects."[xii] To help determine whether or not disinfection byproducts cause adverse reproductive and developmental effects, the Chlorine Chemistry Council's Research Foundation for Health and Environmental Effects has provided more than $1.5 million for peer-reviewed research. The results of these studies are continually shared with EPA and made public.

Waterborne Diseases Still Pose Threat

In Canada, we are well aware of the threat of waterborne disease as a result of the recent tragedy in Walkerton, Ontario. An additional example outside Canada includes Peru in 1991,where a major causative factor was the absence or inadequacy of drinking water disinfection. Peru's failure to disinfect was partly based on concern about U.S. reports on disinfection byproducts. The result: a five-year epidemic of cholera with more than one million illnesses and 13,000 deaths.[xiii]

Footnotes

i U.S. Centers for Disease Control and Prevention (CDC). "Achievements in Public Health, 1900-1999: Control of Infectious Diseases." CDC Morbidity and Mortality Weekly Report. July 30, 1999.
ii White, G.C. "Chlorination of Potable Water." The Handbook of Chlorination. Von Nostrand Reinhold Company. New York. 1986.
iii U.S. Centers for Disease Control and Prevention (CDC). "Achievements in Public Health, 1900-1999: Control of Infectious Diseases." CDC Morbidity and Mortality Weekly Report. July 30, 1999.
iv American Water Works Association (AWWA). Chlorine Disinfectants/Disinfectant By-Products. From www.awwa.org. 2000.
v U.S. Environmental Protection Agency. "National Primary Drinking Water Regulations: Disinfectants and Disinfection Byproducts Notice of Data Availability. (proposed rule)." Federal Register. March 31, 1998.
vi International Programme on Chemical Safety. World Health Organization. Environmental Health Criteria 216: Disinfectants and Disinfection Byproducts. 2000.
vii U.S. Environmental Protection Agency. "National Primary Drinking Water Regulations: Disinfectants and Disinfection Byproducts (final rule)." Federal Register. December 1998.
viii Health Canada, It's Your Health: Water Chlorination. March 9, 1999.
ix World Health Organization. Guidelines for Drinking Water Quality, Volume 1. 1993.
x American Academy of Microbiology. A Global Decline in the Microbiological Safety of Water: A Call for Action. 1996.
xi Reif, John S. "Reproductive and Developmental Effects of Disinfection Byproducts in Drinking Water". Abstracts from the Second International Conference on The Safety of Water Disinfection: Balancing Chemical and Microbial Risks. International Life Sciences Institute. November 1999.
xii U.S. Environmental Protection Agency. "National Primary Drinking Water Regulations: Disinfectants and Disinfection Byproducts (final rule)." Federal Register. December 1998.
xiii Otterstetter, Horst and Craun, Gunther. "Disinfection in the Americas: A Necessity." Journal of the American Water Works Association. September 1997.

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