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# CANCER FACTS

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National Cancer Institute • National Institutes of Health  
Department of Health and Human Services

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## Fluoridated Water: Questions and Answers

### Key Points

- Fluoride prevents and can even reverse tooth decay (see Question 3).
- More than 60 percent of the U.S. population on public water supply systems has access to water fluoridated at approximately 1 part fluoride per million parts water—the optimal level for preventing tooth decay (see Question 4).
- Many studies, in both humans and animals, have shown no association between fluoridated water and risk for cancer (see Question 5).

### 1. What is fluoride?

Fluoride is the name given to a group of compounds that are composed of the naturally occurring element fluorine and one or more other elements. Fluorides are present naturally in water and soil.

### 2. What is fluoridated water?

Virtually all water contains some amount of fluoride. Water fluoridation is the process of adding fluoride to the water supply so that the level reaches approximately 1 part fluoride per million parts water (ppm) or 1 milligram fluoride per liter of water (mg/L); this is the optimal level for preventing tooth decay (1).



### **3. Why fluoridate water?**

In the early 1940s, scientists discovered that people who lived where drinking water supplies had naturally occurring fluoride levels of approximately 1.0 ppm had fewer dental caries (cavities). Many more recent studies have supported this finding (1).

Fluoride can prevent and even reverse tooth decay by enhancing remineralization, the process by which fluoride “rebuilds” tooth enamel that is beginning to decay (1, 2).

### **4. When did water fluoridation begin in the U.S.?**

In 1945, Grand Rapids, Michigan, adjusted the fluoride content of its water supply to 1.0 ppm and thus became the first city to implement community water fluoridation. By 1992, more than 60 percent of the U.S. population served by public water systems had access to water fluoridated at approximately 1.0 ppm, the optimal level to prevent tooth decay (2).

The Centers for Disease Control and Prevention (CDC) considers fluoridation of water one of the greatest achievements in public health in the 20<sup>th</sup> century.

### **5. Can fluoridated water cause cancer?**

The possible relationship between fluoridated water and cancer has been debated at length. The debate resurfaced in 1990 when a study by the National Toxicology Program, part of the National Institute of Environmental Health Sciences, showed an increased number of osteosarcomas (bone tumors) in male rats given water high in fluoride for 2 years (3). However, other studies in humans and in animals have not shown an association between fluoridated water and cancer (4).

In a February 1991 Public Health Service (PHS) report, the agency said it found no evidence of an association between fluoride and cancer in humans. The report, based on a review of more than 50 human epidemiological (population) studies produced over the past 40 years, concluded that optimal fluoridation of drinking water “does not pose a detectable cancer risk to humans” as evidenced by extensive human epidemiological data reported to date (4).

In one of the studies reviewed for the PHS report, scientists at the National Cancer Institute evaluated the relationship between the fluoridation of drinking water and the number of deaths due to cancer in the United States during a 36-year period, and the relationship between water fluoridation and number of new cases of cancer during a 15-year period. After examining more than 2.2 million cancer death records and 125,000 cancer case records in counties using fluoridated water, the researchers found no indication of increased cancer risk associated with fluoridated drinking water (5).

In 1993, the Subcommittee on Health Effects of Ingested Fluoride of the National Research Council, part of the National Academy of Sciences, conducted an extensive

literature review concerning the association between fluoridated drinking water and increased cancer risk. The review included data from more than 50 human epidemiological studies and six animal studies. The Subcommittee concluded that none of the data demonstrated an association between fluoridated drinking water and cancer (5). A 1999 report by the CDC supported these findings. The report concluded that studies to date have produced “no credible evidence” of an association between fluoridated drinking water and an increased risk for cancer (2).

**6. Where can people find additional information on fluoridated water?**

The CDC Web site has information on standards for and surveillance of current fluoridated water supplies in the United States. Visit <http://www.cdc.gov> and search for “fluoridation.”

The Environmental Protection Agency (EPA) Web site has more information about drinking water and health. It includes information about drinking water quality and standards. This Web site is located at <http://www.epa.gov/safewater/> on the Internet.

**Selected References**

1. Centers for Disease Control and Prevention. Public Health Service report on fluoride benefits and risks. *Journal of the American Medical Association* 1991; 266(8):1061–1067.
2. Centers for Disease Control and Prevention. Achievements in public health, 1900–1999: Fluoridation of drinking water to prevent dental caries. *Morbidity and Mortality Weekly Report* 1999; 48(41):933–940.
3. Bucher JR, Hejtmancik MR, Toft JD, et al. Results and conclusions of the National Toxicology Program’s rodent carcinogenicity studies with sodium fluoride. *International Journal of Cancer* 1991; 48(5):733–737.
4. Committee to Coordinate Environmental Health and Related Programs. *Review of Fluoride Benefits and Risks: Report of the Ad Hoc Subcommittee on Fluoride*. Public Health Service, Department of Health and Human Services, 1991.
5. National Research Council. Carcinogenicity of fluoride. In: Subcommittee on Health Effects of Ingested Fluoride, editor. *Health Effects of Ingested Fluoride*. Washington DC: National Academy Press, 1993.

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## **Related Resources**

### **Publications (available at <http://www.cancer.gov/publications>)**

- *Cancer and the Environment*
- *What You Need To Know About™ Cancer*

## **National Cancer Institute (NCI) Resources**

### **Cancer Information Service (toll-free)**

Telephone: 1-800-4-CANCER (1-800-422-6237)

TTY: 1-800-332-8615

### **Online**

NCI's Web site: <http://www.cancer.gov>

*LiveHelp*, NCI's live online assistance:

<https://cissecure.nci.nih.gov/livehelp/welcome.asp>

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