National Academy of Sciences on Fluoride in Drinking Water

What is the National Academy of Sciences and why is its opinion important?

The National Academy of Sciences (NAS) is one of four organizations that comprise the National Academies (http://www.national-academies.org/) (http://www.cdc.gov/Other/disclaimer.html) — the other three are the National Academy of Engineering, the Institute of Medicine, and the National Research Council (NRC). The National Academies perform an unparalleled public service by bringing together committees of experts in all areas of scientific and technological endeavor. These experts serve pro bono to advise the federal government and the general public on scientific and technological issues that affect people's lives worldwide.

There have been several reports and booklets by the NAS and NRC with references to water fluoridation.

The 1951 NRC Fluoridation Report

NRC first reported on fluoride in drinking water November 29, 1951, and found that fluoridation was safe and effective. It was recommended that any communities with a child population of sufficient size, and that obtained their water from sources free from or low in fluoride, should consider adjusting the concentration to optimum levels for oral health. This report is not available through the NRC at this time, although copies may be found in libraries. A summary and presentation of the findings of the original report was published in the January 1952 edition of *Journal American Water Works Association* Vol 44, no. 1, p1–8, January, 1952. National Research Council Fluoridation Report, Kenneth F. Maxcy, J.L.T. Amleton, Basil G. Bibby, H. Trendley Dean, A. McGehee Harvey, Francis F. Heyroth. *Journal of Public Health Dentistry*, Volume 12, Issue 1, Pages 24–33, 1952 by the American Association of Public Health Dentistry.

The 1977 NRC Report on Drinking Water and Health (http://www.nap.edu/catalog.php?record_id=1780) (http://www.cdc.gov/Other/disclaimer.html)

In this 1977 report, the NRC included ingestion of fluoride in drinking water as part of its evaluation to support the U.S. Environmental Protection Agency (EPA) in the effort to comply with the 1974 Safe Drinking Water Act on the scientific basis for the Interim Primary Drinking Water Regulations that were part of the Act. This scientific study specifically considered potential adverse health effects of substances in drinking water. The central effort of the study was an assessment of the long-term biological effects of ingesting the variety of different substances present in trace amounts in drinking water. The volume included an extensive analysis on fluoride intake and concluded that "There is no generally accepted evidence that anyone has been harmed by drinking water with fluoride concentrations considered optimal." Only two adverse health effects were identified including dental fluorosis and skeletal fluorosis "occurring when fluoride is at levels in excess of the concentrations recommended for good oral health." This report can be purchased from the National Academy of Sciences and is identified as Library of Congress Catalog 77–089284 or International Standard Book Number 0-309-02619–9.

The 1993 NRC Report on Health Effects of Ingested Fluoride

(http://books.nap.edu/openbook.php?isbn=030904975X&page=R1) **(http://www.cdc.gov/Other/disclaimer.html)**

In 1993, the NRC concluded that the EPA maximum contaminant level of 4 mg/L in drinking water was an appropriate standard and was safe for ingestion at levels considered optimal for oral health. The report also identified additional studies to address fluoride intake, dental fluorosis, bone strength, and carcinogenicity.

The 2006 NRC Report on Fluoride in Drinking Water: A Scientific Review of EPA's Standards (http://www.nap.edu/catalog.php?record_id=11571) **(http://www.cdc.gov/Other/disclaimer.html)**

In 2006, the NRC stated in this report that in developing regulatory standards for high levels of fluoride in drinking water, three adverse health effects warranted consideration: severe enamel (dental) fluorosis from exposure to these high levels between birth and 8 years of age, risk of bone fractures, and severe forms of skeletal fluorosis (a rare condition in the United States) after lifetime exposure.

See the Community Water Fluoridation: Questions and Answers (/fluoridation/faqs/index.htm) for further information about the responsibilities of the EPA for setting standards for fluoride in water.

The 2007 NRC Report on Earth Materials and Health: Research Priorities for Earth Sciences and Public Health (http://www.nap.edu/catalog.php?record_id=11809) **(http://www.cdc.gov/Other/disclaimer.html)**

In this report, the NRC considered research issues related to the medical geology field on connections between earth science and public health, addressing both positive and negative societal impacts. This report identified fluoride as a mineral that can positively influence human health, and although earlier NRC reports were not conclusive in their opinions, this report concluded that fluoride was considered to be an element essential for human life based on its role in cellular functions involving metabolic or biochemical processes. The report further stated that fluoride in drinking water has two beneficial effects: preventing tooth decay (dental caries) and contributing to bone mineralization and bone matrix integrity.

Does CDC consider the opinion of the NRC on fluoride in drinking water in its own recommendation on community water fluoridation?

Yes, CDC considers comprehensive reviews by the NRC and other systematic scientific studies in its recommendation that community water fluoridation is a safe, effective, and inexpensive method to reduce tooth decay among populations with access to community water systems. Water fluoridation should be continued in communities currently fluoridating and extended to those without fluoridation.

Page last reviewed: July 10, 2013
Page last updated: July 10, 2013
Content source: Division of Oral Health, National Center for Chronic Disease Prevention and Health Promotion

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