



Current scientific evidence: Water fluoridation is not associated with osteosarcoma



Background

Osteosarcoma is a type of bone cancer that is relatively rare. According to the [American Cancer Society](#) and the [National Cancer Institute](#), each year, about 900 new cases of osteosarcoma are diagnosed in the United States. About 400 of the new cases diagnosed each year are in children and adolescents younger than 20 years old. The annual incidence of osteosarcoma in boys (5.2 per million) is somewhat higher than in girls (4.5 per million). The major risk factor for osteosarcoma is radiation to the bone: patients who have another type of cancer and receive radiation therapy are at risk of developing osteosarcoma.

Fluoride and Osteosarcoma

The current scientific literature does not support an association between osteosarcoma and drinking water fluoridation, even though in cellular studies, fluoride acts as a mitogen on osteoblasts, and this defines a biologically plausible pathway for it to play a role in the development of osteosarcoma. A search of the peer review medical literature on the key words "[\(fluoride AND osteosarcoma\) OR \(fluoridation AND bone neoplasms\)](#)" returned 64 manuscripts as of September 2005.[†] Of these 64 studies, our abstract review found that 37 were studies of cellular activity, diagnostic imaging techniques using radiolabelled fluoride, or were studies not related to water fluoridation; 11 were reviews, commentaries, or news reports, and seven were letters. Of the remaining nine, one was a genetic study (Ramesh et al. 2001) that showed p53 mutations in tissue of osteosarcoma are correlated with bone fluoride levels. One was a 2-year feeding study conducted in rodents (NTP 1990) in which no increases in osteosarcoma were observed in female rats or in male or female mice. In 130 male rats treated with either 100 ppm sodium fluoride or 175 ppm sodium fluoride, four developed osteosarcomas; the male rats treated with 25 ppm or 0 ppm sodium fluoride did not develop osteosarcoma. (Optimal fluoride

[†] Three studies frequently cited in the medical literature were not returned with this search strategy: Operskalski et al. (1997) found no relationship between fluoride and osteosarcoma, but was not specifically aimed at exploring fluoride exposure; a small case control study conducted by the New Jersey Department of Public Health (Cohn et al. 1991) reported a relationship between fluoride and osteosarcoma; a study by Hoover et al. (1991) is included as an appendix to the 1991 public health service report Review of Fluoride Benefits and Risks. The Hoover study was an ecological analysis of the relationship between cancer trends and fluoridation of drinking water supplies that concluded that temporal increases in osteosarcoma were not linked to the fluoridation of water supplies.

Current scientific evidence: Water fluoridation is not associated with osteosarcoma Page 2

levels in drinking water are approximately 1 ppm.) A total of seven epidemiologic studies were among the 64 in this search, none of which showed a relationship between fluoride exposure and osteosarcoma (Moss et al. 1995, Gelberg et al. 1995, Freni and Gaylor 1992, Grandjean et al. 1992, McGuire et al. 1991, Mahoney et al. 1991, Hrudey et al. 1990).

A bibliography list of the references annotated above is on Page 3.

Bassin Study

In June 2005, media attention was drawn to a doctoral thesis that had been completed in 2001 by Elise Bassin. The thesis included a chapter describing her epidemiologic study of the relationship between fluoride and osteosarcoma. The study appears to be well designed; it utilized a careful exposure assessment which is described in a [manuscript](#) that was subsequently published in 2004 (Bassin et al. 2004). The epidemiologic study has not been subject to peer review, and it is unclear what the author's intentions are for publication. There is one significant issue with the study analysis and presentation that presumably will be addressed through the peer review process. The data presentation does not permit the reader to determine how many cases and controls were included in each of the models that are presented in the figures and it is difficult to tell whether the authors appropriately excluded case-control sets who were younger than the age of exposure for each model, nor what, if any latency period(s) were considered.

The thesis concludes: "In view of our results, it now seems important that our findings be confirmed using data from other studies," acknowledging that if the conclusions hold up in peer review, they will add to the body of evidence about the relationship between osteosarcoma and fluoride, and that one study is not alone cause for reconsideration of support for water fluoridation.

For more information

Follow the links below for additional information on drinking water fluoridation:

- [CDHS - Community Water System Fluoridation](#)
- [CDHS – Public Water System Fluoridation](#)
- [Centers for Disease Control and Prevention - Community Water Fluoridation](#)

References cited:

Bassin EB, Mittleman MA, Wypij D, Joshipura K, Douglass CW. Problems in exposure assessment of fluoride in drinking water. *J Public Health Dent.* 2004 Winter;64(1):45-9.

Bassin EB. Association Between Fluoride in Drinking Water During Growth and Development and the Incidence of Osteosarcoma for Children and Adolescents. Doctoral Thesis, Harvard School of Dental Medicine. 2001.

Cohn PD. A brief report on the association of drinking water fluoridation and the incidence of osteosarcoma among young males. New Jersey Department of Environmental Protection and Energy and the New Jersey Department of Health, 1992.

Freni SC, Gaylor DW. International trends in the incidence of bone cancer are not related to drinking water fluoridation. *Cancer.* 1992 Aug 1;70(3):611-8.

Gelberg KH, Fitzgerald EF, Hwang SA, Dubrow R. Fluoride exposure and childhood osteosarcoma: a case-control study. *Am J Public Health.* 1995 Dec;85(12):1678-83.

Grandjean P, Olsen JH, Jensen OM, Juel K. Cancer incidence and mortality in workers exposed to fluoride. *J Natl Cancer Inst.* 1992 Dec 16;84(24):1903-9.

Hoover RN, Devesa SS, Cantor KP, Fraumeni JF Jr. Time trends for bone and joint cancers and osteosarcomas in the Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute. Review of fluoride benefits and risks. Report of the Ad Hoc Subcommittee on Fluoride of the Committee to Coordinate Environmental Health and Related Problems. Washington, DC: DHHS; 1991. p. F1-F7.

Hrudey SE, Soskolne CL, Berkel J, Fincham S. Drinking water fluoridation and osteosarcoma. *Can J Public Health.* 1990 Nov-Dec;81(6):415-6.

Mahoney MC, Nasca PC, Burnett WS, Melius JM. Bone cancer incidence rates in New York State: time trends and fluoridated drinking water. *Am J Public Health.* 1991 Apr;81(4):475-9.

McGuire SM, Venable ED, McGuire MH, Buckwalter JA, Douglass CW. Is there a link between fluoridated water and osteosarcoma? *J Am Dent Assoc.* 1991 Apr;122(4):38-45.

Moss ME, Kanarek MS, Anderson HA, Hanrahan LP, Remington PL. Osteosarcoma, seasonality, and environmental factors in Wisconsin, 1979-1989. *Arch Environ Health.* 1995 May-Jun;50(3):235-41.

National Toxicology Program. NTP Toxicology and Carcinogenesis Studies of Sodium Fluoride (CAS No. 7681-49-4) in F344/N Rats and B6C3F1 Mice (Drinking Water Studies). *Natl Toxicol Program Tech Rep Ser.* 1990 Dec;393:1-448.

Operskalski EA, Preston-Martin S, Henderson BE, Visscher BR. A case-control study of osteosarcoma in young persons. *Am J Epidemiol.* 1987 Jul;126(1):118-26.

Ramesh N, Vuayaraghavan AS, Desai BS, Natarajan M, Murthy PB, Pillai KS. Low levels of p53 mutations in Indian patients with osteosarcoma and the correlation with fluoride levels in bone. *J Environ Pathol Toxicol Oncol.* 2001;20(3):237-43.

Note, for those reading a printed version of this fact sheet: the following link URLs are embedded on pages 1 and 2:

American Cancer Society: http://www.cancer.org/docroot/CRI/content/CRI_2_4_1X_What_are_the_key_statistics_for_osteosarcoma_52.asp?rnav=cri

National Cancer Institute: <http://seer.cancer.gov/publications/childhood/bone.pdf>

(fluoride AND osteosarcoma) OR (fluoridation AND bone neoplasms):

[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=PureSearch&db=pubmed&details_term=\(\(fluoride AND osteosarcoma\) OR \(fluoridation AND bone neoplasms\)\) AND \("1900"\[EDAT\] : "2005/09/19"\[EDAT\]\)\)](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=PureSearch&db=pubmed&details_term=((fluoride AND osteosarcoma) OR (fluoridation AND bone neoplasms)) AND ()

Bassin et al. 2004 manuscript: http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15078061&query_hi=1

San Francisco Department of Public Health,
Occupational and Environmental Health Section
1390 Market Street, Suite 210,
San Francisco CA 94102
Phone 252-3800, Fax 252-3875

October 2005