Fluoridation Then and Now

Dr. Frederick McKay's observations of "Colorado brown stain" in 1901 set off a cascade of events that led to one of the most successful public health ventures in the United States—fluoridation of public water supplies. McKay determined that the brown stain prevalent at the time among residents of Colorado Springs, Colo, was developmental in origin. Further, he noted that the stained teeth were highly resistant to decay. It was not until 1931 that scientists determined that a high level of fluoride in the drinking water was causing mottled enamel. The condition received a new name—dental fluorosis.

In the 1930s, subsequent studies revealed that in communities with naturally-occurring fluoride at a concentration of about 1 part per million (ppm) in drinking water, the prevalence of cosmetically-disfiguring fluorosis and dental caries were low.

This led to the next logical step: why not adjust the fluoride of community drinking water supplies to 1 ppm? Thus, were born the largest, best-controlled epidemiologic intervention studies of their time—water fluoridation. The first of these began in January 1945 in Grand Rapids, Mich. By 1948, it was evident that the children of Grand Rapids were developing 60% fewer decayed, missing, and filled teeth compared to their cohorts in Muskegon, the "control" city that did not adjust its water fluoride levels.

Today, the presence of additional fluoride modalities, in particular the ubiquitous use of fluoride toothpastes, has diminished the difference in caries rates between optimally-fluoridated and fluoride-deficient communities to around 20%. This fluoride "halo effect," coupled with the general decline in caries rates in the United States, means that a 20% caries reduction today is not what it would have been 60 years ago. Still, given that the cost of water fluoridation is between $.31 to $2.12 per person per year (1988 dollars),[1] this is cheap, cost-effective prevention.

Throughout its history, fluoridation has provoked strong opposition from critics who have used pseudoscientific and frankly emotional means to convince the public that fluoridation leads to higher rates of heart disease, birth defects, cancer, and a litany of other health woes. Good science has generally held these naysayers at bay, though it is difficult for good science to prove that a preventive or therapeutic agent (including chlorine) added to the water supply has no adverse effect. The scientific method is not well equipped to prove a negative.

The most pesky fly in the fluoridation ointment has been the question of whether fluoride causes osteosarcoma. This disease is diagnosed in about 400 individuals per year in the United States. The question about a link between osteosarcoma and fluoride has arisen in the past in human and animal studies, but the data have been deemed inconclusive. The most recent iteration of this debate was sparked by a grant report from a Harvard dental researcher to the National Institutes of Environmental Health Sciences last year. The researcher concluded that there is no evidence of a link between water fluoridation and osteosarcoma. Cited in his report, however, was an unpublished study conducted by one of his former doctoral students, wherein a significant association was found between fluoride and osteosarcomas in boys. A portion of the study's methodology, but not its core findings, has been published.[2] The researchers were careful to assess all locales in which their subjects lived and the fluoride status of the water at each location. They also focused on boys, the group at higher risk for osteosarcoma. The study appears to have been carefully crafted, but epidemiology alone cannot provide all the answers.

The American Dental Association has cautioned "...against drawing conclusions based on a lone researcher's unpublished study."[3] While this may be sound advice, it should not be interpreted as a call to ignore the study. The researchers should be encouraged to bring forth the study for peer review and, if warranted, publication so that the implications of the research can be debated in scientific forums. The evidence for the safety and efficacy of water fluoridation has, to date, been overwhelmingly positive. Dentistry should have the courage to face these new data, evaluate them on their merits, and proceed accordingly.

References

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