

Fluoridation of Water

By Heidi du Preez

The controversy over fluoridation of water supplies has raged ever since fluoride was first introduced into the drinking water in the USA during the 1940's. Proponents of fluoridation say it prevents tooth decay and presents absolutely no health risks. Detractors say it causes, or may cause, serious damage to the health of some people. Many also question its effectiveness.

According to Edward Groth III, an associate technical director of Consumers Union in the USA, who wrote his Ph.D. thesis in biology on the fluoridation controversy in 1973, pro- and anti-fluoridationists approach the issue from completely different perspectives. "Proponents see it as a simple public health measure, effective and safe, which they need to 'sell' to the public, almost like a box of soap. Opponents tend to be much more concerned with risks than benefits, and view fluoridation the same way society views many other 'environmental hazards' - granting that the risks may be small and uncertain, they believe society's attitude should be 'better safe than sorry.' Since any risks fluoridation may present are imposed involuntarily when a water supply is fluoridated, those risks - even if they are tiny or unsubstantiated - tend to provoke a disproportionate amount of outrage." ¹

A perspective on the scenario

*Regarding fluoridation's benefits, proponents, such as the American Dental Association (ADA), claim it **reduces the incidence of tooth decay 40 to 65% wherever it is used.***

For many years, most dentists believed that fluoridation of water supplies reduced tooth decay about 40 to 65%. These figures were based primarily on four studies during the early years of fluoridation in the USA. But a great deal of evidence indicates that water fluoridation reduces dental caries much less. In fact, some research suggests little or no reduction at all.

One recent development that bears on the question is the widespread observation that tooth decay rates in the USA, Canada, New Zealand, Australia, and in all countries of Western Europe have declined greatly during the past 40 years. Mark Diesendorf, an applied mathematician and health researcher in the Human Sciences Program at Australian National University and an expert in research design, has found, by comparing results from about 24 studies of unfluoridated districts in eight countries, that reductions in dental caries are just as great in unfluoridated as in fluoridated areas. In Queensland, which is primarily unfluoridated, the rate of tooth decay is as low as it is in the fluoridated districts of Australia. ¹

A number of researchers in the USA have reported similar findings. Stanley B. Heifetz and coworkers at the Institute of Dental Research note in the *Journal of the American Dental Association* that "the current reported decline in caries in the USA and other Western industrialized countries has been observed in both fluoridated and unfluoridated communities, with percentage reductions in each community apparently about the same." ¹

In Graz, Austria, dental caries in children increased whilst fluoride tablets were being dispensed. The study begun in 1956, decay decreased after they stopped it in 1973. In 1998 the results of a 50-year fluoridation experiment involving two cities in New York State, USA, Kingston (unfluoridated) and Newburgh (fluoridated) were published. In summary: "There was no significant differences in rates of dental decay in children in the two cities, but children in the fluoridated city showed significantly higher rates of dental fluorosis than those in the unfluoridated city." ²

In the United States about two thirds of water is fluoridated; yet children in Uganda, with no fluoridation, have less dental cavities than children in the USA. Finland with no fluoridation has lower tooth decay than the USA. Even in South Africa researchers from the University of Stellenbosch reported that in some regions already containing fluoride naturally, dental decay rates increased with increasing dental fluorosis (mottling of teeth). ^{3,4}

Research by the UK's Safe Water Society yielded the following results:

- A US trial studying 50,000 inhabitants across 68 US cities in 1986-7 showed that fluoride increased tooth decay.
- 400,000 children were studied in India and calcium and fluoride levels were measured. The study found that fluoride increases tooth decay while calcium reduces caries.

- 21,000 Japanese children were studied in 1972. Fluoride was found to increase tooth decay.
- After 20 years of water fluoridation in Seattle, Washington State, authorities reported an unprecedented dental crisis in the north-western American city.
- In 1987, Alan S Gray, Director of the Division of Dental Health Services of the British Columbia Ministry of Health, called for a re-examination of the relevance of fluoride compounds in the Canadian public water supply when it was learned that tooth decay rates in British Columbia (where only 11% of the population use fluoridated water) were lower than those of other Canadian provinces with fluoridation rates of 40-70%.
- In December 1993, a Canadian Dental Association committee, known as the Canadian Workshop on the Evaluation of Current Recommendations Concerning Fluorides, concluded that consuming fluorides does not prevent tooth decay or reduce its incidence. The panel also found that children exposed to fluoride compounds risked dental fluorosis.⁵

*Many proponents also insist dogmatically that there is absolutely **no** evidence that fluoridation has had, or ever could have, **harmful effects** of any kind on anyone.*

Some argue that because most natural drinking water contains 0.1 to 0.2 ppm (parts per million) fluoride and nearly all food has traces of fluoride, human beings are adapted to it. However, 'nature' limits the level of fluoride for example in mother's milk to 0.01 ppm, which is 100 times less than most of the levels at which water is fluoridated. Furthermore, fluoride added to water is entirely different from organic calcium-fluoro-phosphate needed by our bodies and provided by nature to build and strengthen our bones and teeth. This organic calcium-fluoro-phosphate, derived from wholefoods (natural, unprocessed), is an edible organic salt, insoluble in water and assimilated by the human body, whereas the non-organic sodium fluoride and hydrofluorosilicic acid used in fluoridating water is instant poison to the body and fully water soluble. Hydrofluorosilicic acid, the most commonly used fluoridation additive, also contains other toxic substances including lead, beryllium, mercury, cadmium and arsenic.⁵

Fluoride compounds are so toxic, they are listed among the top 20 of 275 substances that pose the most significant threat to human health, in the list compiled by the US Agency for Toxic Substances and Disease Registry.⁵

Sodium fluoride, the same compound that is added to toothpastes under the admiring eye of the world's dental associations, is also the main ingredient in rat poison.⁵ In 1994, Dr Peter Rock of Birmingham University warned that even a pea-sized quantity of fluoride toothpaste might be too toxic for young children. The year before, a scientist at the Poison Information Center in Vienna published figures showing that there were 450 cases of fluoride poisoning in children in Austria every year and one death.² Warning labels appear on American toothpaste packaging advising that in the event of ingestion, the victim should seek a poisons control center immediately. However, you don't have to swallow poisons like fluoride for them to become absorbed, if they're even under the tongue, they're absorbed into the bloodstream.

Fluoride compounds are cumulative, systemic toxins. It is for this reason that US law requires the Surgeon General to set a maximum contaminant level for public water supplies. This is aimed at avoiding crippling skeletal fluorosis.² Skeletal fluorosis is a debilitating condition that occurs when fluoride accumulates in bones, making them extremely weak and brittle.

In India, an estimated 62 million people, including 6 million children, are afflicted with endemic fluorosis. This is such a problem in India, that far from adding fluoride to their water, former Indian Prime Minister Rajiv Gandhi set up a program to remove fluoride and other pollutants from the water supply. This is in contrast to the UK, USA, Australia, Canada, New Zealand, Ireland and other parts of the world, where governments continue to add fluoride to the public water supply, in defiance of their overwhelming body of evidence.² In France, the Chief Council of Public Health rejected fluoridation in 1980 because of doubts about whether it harms human health.¹

Pregnant women, babies and young children, the elderly, people with nutrient deficiencies, cardiovascular and kidney problems, postmenopausal women and diabetics are especially affected by fluoride's toxicity.^{4,6}

*Other proponents admit there are a number of recognized potential risks, but they believe there has been **enough research of good enough quality** to show that these risks are very remote and that the large benefits justify society's taking those risks.*

In 1939, Dr H Trendley Dean was working for the US Public Health Service. He examined water from 345 communities in Texas. Dean determined that high concentrations of fluoride in the water in these areas correspond to a high incidence of mottled teeth. He also claimed that there was a low incidence of dental cavities in communities where the water contained 1ppm of fluoride. Dean's report resulted in fluoridation being implemented at 1 ppm. When other scientists tried to verify Dean's results, they disagreed with his findings. He had engaged in the selective use of data, using findings from 21 cities that supported his case, while 272 locations were disregarded. When taken to court over his findings and put under oath, Dean admitted that his data were invalid. In 1957 he had to admit that even water containing 0.1ppm (0.1mg/l) could cause dental fluorosis.^{2,5}

Leading fluoridation opponent John R Lee MD states that the trial results that the dental and chemical industries invariably use are always misreported and techniques employed to give the public false impressions of fluoridation's supposed efficacy and harmlessness. These tactics include the 'percent reduction' method instead of 'rate of change of decay'. This data-manipulation strategy was exposed in the Rand Corporation report of 1981, in which author Craig B Foch states that fluoride studies "suffer from poor experimental design and from analysis plans that largely ignore the possible effects of other factors in tooth decay."⁵

Tooth decay is a complicated process, influenced by many factors, including diet, oral hygiene, dental care, genetic predisposition, geochemical factors, and possibly other trace elements, such as strontium, as well as added fluoride in the water supply. Additional factors that may affect decay rates are the use of fluoridated toothpastes or topical rinses and the presence of fluoride in foods. Most people whose diet includes little sugar and few processed foods have very low rates of tooth decay. In those few developing countries in which only small amounts of sucrose and refined foods are eaten, decay rates are often lower than in developing nations.

Therefore, comparisons between fluoridated and unfluoridated districts that don't adequately take such factors into account can be readily confounded. Non of the early epidemiological studies controlled very well for most nonfluoride variables, so many scientists today have come to regard them as only part of the evidence one must consider to assess the size of fluoridation's benefits.

If one part per million is optimum, it begs the question as to why the majority of toothpastes contain in excess of 15 ppm. Ordinary black tea contains 4.57mg per liter, diet coke 1.12mg/l and the average apple 1 mg of fluoride.² However, we need to consider the total amount of fluoride ingested from all sources. According to Dr Paul Connett, a Professor of Chemistry: "If 1 ppm was considered to be optimum for drinking water in 1945, it cannot be considered optimum for today, because there are far more sources of fluoride available and unavoidable. To claim that 1 ppm is optimum for today is to underline the unscientific nature of the pro-fluoride lobby."²

Fluoride compounds used in toothpastes and the water supply have never received approval by the American Food & Drug Administration and are officially classified as an unapproved new drug. Research uncovered that neither the FDA nor the Institute of Dental Research nor the American Academy of Pediatric Dentistry could furnish any proof of fluoride compound safety or effectiveness, as required by law as part of the FDA drug approval process.⁵

*For many years, proponents also claimed that fluoridation **may reduce the incidence and severity of osteoporosis.***

In a 1987 review of fluoride therapy for osteoporosis, Louis V. Avioli, professor at the Washington University School of Medicine, concludes: "Sodium fluoride therapy is accompanied by so many medical complications and side effects that it is hardly worth exploring in depth as a therapeutic mode for postmenopausal osteoporosis, since it fails to decrease propensity toward hip fractures and increases the incidence of stress fractures in the extremities." FDA has not approved the use of fluoride for osteoporosis.¹ According to major research studies, fluoridation is actually contributing to osteoporosis and hip fracture.⁴

*For many opponents of fluoridation, the overriding **issue is a moral one of personal rights.*** These critics oppose fluoridation for ethical reasons. They view it as a form of mass medication, imposed on the public in

violation of individual choice. Given that there are several other ways for people who want fluoride to consume it (for instance, in pills, mouthwashes, toothpaste, fluoridated bottled water), those who place a high value on freedom of choice argue that the state has no right to force them to consume fluoride.

For ten years, the Netherlands tried fluoridation and gave it up in 1976 for legal reasons. (Many citizens claimed that the government had no right to add fluoride, which they considered a medicine, to the water supply. Furthermore, a number of doctors observed strong hypersensitivity reactions to fluoridated water in some people). It also was tried and then abandoned in a few towns in West Germany for legal and health reasons.¹

The decision to fluoridate a community's water or not, boils down to a matter of values. Scientific evidence can make the choice more clear-cut, more rational, but the choice can't be made purely on the basis of scientific evidence. As long as there is uncertainty about risk from fluoridation, some people would not want to accept that risk. And others who favour fluoridation will demand proof of harm beyond reasonable doubt before they reject it. According to Groth, "A scientific assessment cannot say what degree of adverse effects is acceptable in return for the expected benefits.... It cannot say how much uncertainty we should tolerate in estimates of hazards when more than 100 million people are exposed to lifelong ingestion of fluoridated water. Those decisions are value judgements, and scientists' values are no better than everyone else's."¹

*Other opponents of fluoridation claim that **fluoridation causes cancer, birth defects, and a large number of other illnesses**, apart from the known dental and skeletal fluorosis.*

Fluoridation proponents like to claim that dental fluorosis (which they love to call a "cosmetic effect") is the only possible adverse effect of fluoridation. However, 50% of the fluoride we ingest each day accumulates in our bones and a recent study from Mexico indicates that the severity of dental fluorosis correlates well with the frequency of bone fractures in children.⁴ There is also scientific evidence that fluoride disrupts the formation of collagen and fluoride mineralizes tendons, muscles and ligaments, causing arthritis-like symptoms.⁴

Scientists believe that interference with enzyme activity is the mechanism by which fluoride exerts its harmful impact. Effects on enzymes are some of the first detectable biological changes when an organism is exposed to a toxic agent. Enzymes mediate most of our biological processes, so any agent that affects a wide range of enzymes will have wide effects on our health. Changes in certain enzyme activity are the first signs of more serious alterations that are taking place with continued exposure to fluoride.⁶ There is speculation that just as the fluoride ion may disrupt enzymes with its ability to form strong hydrogen bonds, it may also disrupt DNA by interfering with its hydrogen bonding.¹

Hans Moolenburgh, a Dutch physician who has studied hypersensitive reactions to fluoride, believes the reactions can be explained as effects to a toxic agent rather than as allergies. In large doses everyone reacts to fluoride. A small fraction of the population, he says, react to much lower levels of fluoride. The late George L. Waldbott, founder and chief of allergy clinics in four Detroit hospitals and noted anti-fluoridation activist and author, reported treating at least 500 patients who he concluded reacted negatively to fluoridated water. The symptoms included muscular weakness, chronic fatigue, excessive thirst, headaches, skin rashes, joint pains, digestive upsets, tingling in the extremities, and loss of mental acuity.¹ The 1983 edition of the "Physicians Desk Reference" states: "In hypersensitive individuals, fluorides occasionally cause skin eruptions, such as atopic dermatitis, eczema, or urticaria. Gastric distress, headache, and weakness have also been reported. These hypersensitivity reactions usually disappear promptly after discontinuation of the fluoride." (This information was omitted from later editions of the reference).¹

Dr Dean Burk, co-founder of the US National Cancer Institute, states: "Fluoride causes more human cancer deaths and causes it faster than any other chemical."² In 1977 a monumental research project was conducted in which they compared cancer death rates in 10 fluoridated and 10 non-fluoridated USA cities between 1940 and 1970. For the first 10 years (1940 - 1950), when none of the 20 cities fluoridated, the average cancer deaths were virtually identical. But after 1950, there is a significant major increase in cancer deaths in every single one of the fluoridated cities, while the non-fluoridated cities had a much lower level of cancer deaths.⁴ The New Jersey State Department of Health published in 1992 the results of a trial in which six times the incidence of bone cancers were being found in fluoridated communities.⁵

The Journal of the American Medical Association published an editorial stating that the use of drinking water containing 1.2 to 3 ppm of fluoride will cause developmental disturbances in bones such as osteosclerosis, spondylosis and osteoporosis, as well as goitre.² Furthermore, fluoride is more toxic than lead and accumulates in the body causing brain damage of children. Fluoride exposure is now linked to lower than normal IQ ratings in children.⁶

In summary, more harmful effects of fluoride on the human body:

Inactivates 62 enzymes^{4,7}

Increases the aging process^{4,7}

Increases the incidence of cancer and tumour growth^{4,7}

Disrupts the immune system^{1,7}

Causes genetic damage^{1,7}

Interrupts DNA repair-enzyme activity⁷

Increases arthritis and is a systemic poison^{6,7}

Causes hypothyroidism (fluoride induce iodine deficiency)^{2,4}

Fluoridation is linked to Alzheimer disease (fluoride increases the absorption of aluminum)^{4,6}

Impairs kidney function⁴

Voices of opposition have been suppressed since early days of fluoridation.

Ever since the Public Health Service (PHS) in the USA endorsed fluoridation in 1950, detractors have charged that PHS and the medical and dental establishment, such as the American Medical Association and the American Dental Association, have suppressed adverse scientific information about its effects. Some of those who generally support fluoridation make similar charges. For example, Zev Remba, the Washington Bureau editor of *AGD Impact*, the monthly publication of the Academy of General Dentistry, wrote in 1987 that supporters of fluoridation have had an "unwillingness to release any information that would cast fluorides in a negative light," and that organized dentistry has lost "its objectivity - the ability to consider varying viewpoints together with scientific data to reach a sensible conclusion."¹

It is easy to understand why research on risks of fluoridation has never been more vigorously pursued. Most of the individuals and agencies involved have been promoting fluoridation publicly for nearly 40 years. Research that suggests possible harm threatens them with a loss of face. For example, PHS has historically been the principal source of funds for fluoride research: but ever since June 1950, PHS has been officially committed to and responsible for promoting fluoridation. Thus, the agency has a fundamental conflict of interest.¹

Colquhoun, lecturer in the history of education at the University of Auckland, offered another explanation for what appears to be the suppression of research. He notes that the editorial policy of scientific journals has "generally been not to publish material which overtly opposes the fluoridation paradigm." Scientific journals employ a referee system to peer review. But when the overwhelming majority of experts in an area from which the referees are selected are committed to the shared paradigm of fluoridation, Colquhoun notes, the system lend itself to preservation and continuation of the traditional belief that fluoridation is safe and effective. This results in "single-minded promotion, but poor-quality research, and an apparent inability to flexibly reassess in the presence of unexpected new data," he says. "They bend over backwards to explain away new evidence and keep their own reputations and theories intact!"¹

Are politics and money at play?

Sodium fluoride, hydrofluorosilicic acid (fluoride) and sodium silicofluoride are all hazardous-waste by-products from the manufacture of aluminum and phosphate fertilizers. It has historically been expensive to properly dispose of, until some aluminum industries with an overabundance of the chemicals sold the public on the terrifically insane but highly profitable idea of buying it at a 20,000% markup and then injecting it into their water supplies at 1ppm. But since we only drink not even 1% of the total water supply, the rest literally goes down the drain as a free hazardous-waste disposal for the chemical industry. Thus, we pay them so that we can flush their expensive hazardous waste down our toilets.⁴

Fluoridation in South Africa

The fluoridation of water is mandatory in South Africa, but it has not yet been implemented. The old regulation of the Health Act of 1977 is being re-written. The proposed level of fluoride addition is 0.4 - 0.7 ppm in the form of sodium fluoride, hydrofluorosilicic acid and sodium silicofluoride. The South African drinking water standard is 1.5 ppm.⁸ According to the Department of Water Affairs, impact studies first need to be done to determine the effects fluoridated water would have on our environment. *What about human health studies?* Oral Health at the Department of Health is basing its position of fluoridation on data that is 60 years old, and questionable at best. Even well-intentioned dentists are simply following 60 years of misinformation from public health and the dental associations.

The Pelindaba nuclear and chemical complex is to become the major supplier of fluoride, which will be added to drinking water in South Africa. Though aluminum smelting and fertilizer companies in South Africa produce large quantities of fluoride as a waste-product, Pelchem is believed to be the major local company able to supply enough fluoride for the nationwide water-dosing campaign. Pelchem is a subsidiary of the Nuclear Energy Corporation of South Africa (NECSA), located in the Pelindaba nuclear complex. Pelchem said that they could profitably get rid of what's already a costly waste to handle for the Nuclear Industry. The company's ability to provide this highly-corrosive chemical stems from its long history of producing and handling vast quantities of hydrofluoric acid needed for the enrichment of uranium nuclear fuel. Fluoride, in acid form, was a raw material, which helped Armscor and the old Atomic Energy Corporation produce highly-enriched uranium for its top-secret atomic weapon program. To get additives for water, the Pelchem acid stocks would be treated with silica sand to produce fluorosilicic acid - which would be added to water at a diluted concentration of 0.7 ppm. Pelchem stands to boost annual revenue of about R130 million by at least 10% if it corners the local water fluoridation market.^{3,4} With billions of rand at play, the chemical industry can afford to choreograph its two most willing marionettes: the media and the medical profession.

Conclusion

The risks of fluoridating our water supply are significant and the benefits are negligible. It imposes unnecessary and dangerous risks on the health of the population, especially the poor who are more vulnerable to fluoride's toxic effects, because of malnutrition.

From the beginning, the movement to fluoridate water was conducted more like a political campaign than a scientific enterprise. Perhaps the best approach is not to make the issue whether to fluoridate public water supplies or not. A better question for policy makers, scientists and citizens to address is: "What is the best way to promote dental health?"

Fluoridation is becoming more of an issue in developing nations as their tooth decay rates rise with the increasing use of refined sugar and processed food. However, the answer is not fluoride but good nutrition. If sucrose causes tooth decay, then it makes sense to reduce it, not add fluoride. There are enough alternative sources of natural fluoride in our diet and environment without needing it in our toothpaste and water systems.

Are we attempting to improve dental health at the expense of general health? It would appear so, just by virtue of the fact that there is still consideration being given to fluoridating our water supplies. If there is any question about the safety of fluoride, it must be up to the individual to make a personal choice. We must have the right to choose and not allow the government to enforce mass medication through water fluoridation. Wouldn't it be better for government to rather focus on the many other challenges in our country that really need attention?

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For more information on fluoridation:

"50 reasons to oppose fluoride" compiled by the international Fluoride Action Network (<http://www.fluoridealert.org/50reasons.htm>). Also see (<http://www.fluoride-journal.com>)