The Case Against Fluoridation

Joseph G. Hattersley[1]

Introduction

Four arguments are presented against fluoridation of drinking water. (1) The nerve poison[1] fluorine lowers intelligence. (2) It promotes dental caries among children in low-income families. (3) There is a very real danger of a population-threatening Y2K catastrophe. (4) Policy changes are suggested.

High Fluoride Exposure Lowers Intelligence

Two studies found exposure to high fluoride (F) lowers intelligence as measured by IQ test scores.[2,3] In the first study, two suburban villages in Shanxi Province, China, are very much alike but for the level of CaF_2 (calcium fluoride, which is known in crystal form as fluorspar) in the water supplied from underground sources. Occupations, living standards and social customs are similar.

Xinghua's water contains 0.91 parts per million (ppm, the same as milligrams per litre) of F; the rate of dental fluorosis is 14%. Evidence of fluorosis includes mottling, softening, increased porosity[4] and brittleness[1] of tooth enamel. The bone fluorosis rate is 0%. Sima has 4.12 ppm in its drinking water; 86% of the population have clearly evident dental fluorosis, and 9% have clinically diagnosed skeletal fluorosis. The study does not reveal caries rates.

In each village, 160 randomly selected children took a standard IQ test lasting 40 minutes.[5] Each child's mother had lived in the study village during pregnancy. Children whose intelligence had been affected by congenital or acquired diseases not related to F were excluded.

Mean IQ in Sima (high F) was 97.7; mean IQ in Xinghua (lower F), was 105.2—(7.5 points, or 7.7 percent higher).[6] The difference in mean IQs was statistically significant ($p<.01$). The entire range of IQs was lower in high-F Sima, and that village's typical bell shaped IQ curve was distinctly flattened.[7] Among the selected 160 in Sima the number of children with IQ of 69 or below was six times that in Xinghua. And 26% fewer in Sima had IQ scores of 120 or above.[8]

Another Chinese study of 907 children ages 8-13 years in four areas of Guizhou Province[6] confirmed those findings. The degree of fluorosis was the criterion in this study rather than F content of the water; in some study areas fluorosis is worsened by inhaled F-containing soot from burning of China's low-quality coal.

Type of area	F [c]	# of children	mean IQ
Non-fluorosis	< 0.4 ppm	n = 220	99.4* +/-10.4**
Slight fluorosis	0.8 ppm	n = 227	89.7 +/-12.7
Medium fluorosis	2.5 ppm	n = 224	79.7 +/-12.7
Severe fluorosis	3.2 ppm	n = 230	80.3 +/-12.9

(*mean **+/- SD)

The maximum IQ of low fluorosis students was 140; maximum IQ of moderate to severe fluorosis students was 110. The very large difference of 19 points in mean IQ scores between high and low fluorosis areas appears to have been caused in part by exposure to lead as well as F. A separate Chinese study in a coal-burning area found that excessive fluoride lowered mental work capacity and zinc content of the serum.[9]

How does high fluoride reduce children's intelligence? Animal studies strongly suggested that F causes "motor dysfunction, IQ deficits, learning disabilities, or both in humans" and a pattern of generic behavioral disruption. Phyllis Mullenix, PhD, while head of toxicology at Forsyth Dental Center in Boston, did major studies in the early 1990s.[10]

She employed a previously validated test system[11] with Sprague-Dawley rats, sophisticated technological and statistical techniques. The results indicated F is a

1. 7031 Glen Terra Court S.E., Olympia, WA 98503-7119

powerful central nervous system (CNS) toxin. Before Mullenix, no one considered, much less studied, subtle effects of F exposure on the developing brain. At the time, she was unaware of the cited, ongoing tests in China. (Pro-fluoridationists cite studies in rats because of their apparent far higher resistivity to toxins than other species. Rats lack a vomit reflex.[12])

Exposure of test rats prenatally or during weanling or adult phases caused subtle but very real sex- and dose-specific behavioural deficits with a common pattern. F accumulation in important regions of the rat brain, especially the hippocampus, increased with rising drinking water F. "The hippocampus is considered to be the central processor which integrates inputs from the environment, memory, and motivational stimuli to produce behavioral decisions and modify memory."[13] F accumulates in brain tissue, and younger animals/people are more vulnerable than older ones;[10] children excrete fluoride less efficiently than adults and retain more of it.[14]

F caused behavioral problems not unlike hyperactivity, as well as learning deficits;[10] brain effects were measurable at a lower level of exposure than required to damage bones. These and the observed sex differences corresponded to those found in other studies of hippocampal brain damage. Males were most sensitive to prenatal day 17-19 exposure; females, to weanling and adult exposures. Hyperactivity followed prenatal contact; cognitive deficits were seen after weanling and adult exposure. Plasma levels in this rat model (0.059 to 0.640 ppm F) were similar to those reported in children one hour after receiving topical F treatment of their teeth.

The human nervous system develops throughout gestation and in the early postnatal period; higher cognitive functions develop toward the end of gestation when brain nerve cells are differentiating and brain development is most rapid,[15] and soon after delivery. Slowly and with some difficulty, F penetrates the fetal blood-brain barrier[16,17] and accumulates in cerebral tissue.[18] A mean brain F level of 1.8 ppm, range 0.3-6.1, was found in adults exposed to F air pollution; the mean for those not so exposed was 1.5, range 0.4-3.6 (other added exposures to F were not shown).[19]

Elevated F was found in embryonic brain tissue obtained from required abortions in areas where fluorosis due to coal burning was prevalent. Stereological and ultramicroscopic studies showed poor differentiation of brain nerve cells and delayed brain development.[20]

F's effects on intelligence *in utero* happen at levels that are not toxic to the mother. Early studies found that diminished mental acuity and memory impairment may be partly reversible if a person stops fluoride exposure.[21] But that is difficult to do (see below). Once an embryo/fetus gets this poison bath, the Chinese studies show that children's mental ability does not recover during life in high-F area. The F concentration was higher in a typical mother's placenta than in her blood.[22] Umbilical cord levels did not accurately reflect fetal F status, suggesting placental sequestration of F,[23] an innate protective measure. Placental transfer of F fluoridates the newborn and reduces available F binding sites.[24]

Will IQs drop still lower if exposure to high F continues? Studies do not answer this directly but, as we shall see, continuation of contact worsens mental problems for adults.

United States drinking water standards now allow 4.0 ppm, which leads to crippling bone disease and ankylosing spondylitis in China.[25] The Public Health Service reported in 1991 that millions of women in "optimally" fluoridated cities ingest from all sources–and expose their embryos and fetuses to–as much as 6.6 mg of F per day.[26,27]

Where does all that fluoride come from? Besides fluoridation of water at about 1 ppm (but at 5 ppm in many Ameri-

can schools[28]), F comes from crops grown with fluoridated water, foods canned and drinks processed with such water, from F-containing OTC and prescribed medicines such as Prozac®, vaccines, even dental floss. It comes from pesticides, fertilizers, solvents, fuels, auto exhausts. F is increasing in our food chain;[29,30] fast foods and "health foods" contain F.[31] We inhale it in air humidified with fluoridated water. (See Appendix, p. 193.)

155,000 tons of F are released annually into America's air for winds to circulate worldwide; airborne SO_2 worsens F-caused problems.[32] 500,000 tons a year goes into fresh waters and the sea. About 143,000 tons are pumped yearly into drinking water supplies.[33]

Increasing consumption of beverages instead of water makes their F content an important issue. U.S. teens now drink twice as much soda as milk, a reverse of figures noted 20 years ago. Many males 13 to 18 drink three or more cans a day, and 10% drink seven or more cans a day. Among 13- to 18-year-old girls the average intake is more than two cans a day and 10% guzzle more than five cans a day.[34]

Forty-three ready-to-drink fruit juices and frozen concentrates reconstituted with distilled water were tested for F ion concentration; 42% had more than one ppm.[35] "Pure" grape juices contained up to 6.8 ppm, probably from contamination by the insecticide cryolite;[36] washing grapes yields measurable amounts of F.[37] Fruit juice can destroy enamel on teeth, the hardest surfaces in the body, if it contains too much F, reports the Academy of General Dentistry.[38] The concentration in outer enamel of the teeth of 6-10 year olds sometimes reaches 10,000 ppm.[39] The CDC is calling for manufacturers to list a product's F content.[40]

A typical soft drink contains 200-300 mg of phosphate, a buffer to prevent the acidity of the drink from dissolving the teeth. Phosphate saps needed calcium from the bones by stimulating the bone-destroying osteoclasts. Also, phosphates and sulfates in food and soft drinks increase absorption of fluorides.[41]

Whereas aluminum ion with its high charge and hydrated character could not get through the blood brain barrier, fluoridated water is an excellent medium for migrating aluminum into the brain, making the Al more bio-available.[42] (After six months' storage in aluminum cans, the concentration of Al may reach 6,000 ppm.[43])

High fluoride exposure appears to weaken mental function in a dose-related manner among adults, as well as children. Declassified 1944 documents show that one year before U.S. Public Health Service epidemiological "testing" of fluoridation was to start in Grand Rapids, MI and Newburgh, NY, the military/industrial complex already had evidence that fluorides affect memory and cognitive skills. The Manhattan Uranium Project found: "Clinical evidence suggests mental confusion, drowsiness and lassitude as the conspicuous features. It seems most likely that the F component is the causative factor."[44] Much evidence of adverse F effects was censored out, and later related documents are "missing" or were "disappeared" by the U.S. government.[45]

Dr. Bruce Spittle cited examples of fluoride affecting adult mental function.[46] "The late George L. Waldbott, MD, in 1979 studied 23 persons living within three miles of an enamel factory that emitted hydrogen fluoride into the air. Symptoms included a distinct decline in mental acuity, poorer memory, inability to coordinate thoughts and reduced ability to write. Those living further away from the factory were less affected and had lower urinary F."[47] He found after an F overfeed in 1981 in Annapolis, MD, "Six [among 112 who suffered ill effects] reported deterioration of their mental acuity, lethargy, loss of memory."[48]

"As founder and chief of allergy clinics in four Detroit hospitals, Dr. Waldbott used double-blind tests to determine whether F

caused symptoms. These always disappeared when F was taken away without the patient's knowledge and reappeared when it was given again, but not with other possible agents. Hans Moolenburgh, G.W. Grimbergen and others, also using double-blind experiments, confirmed the discovery.[49] Czerwinski and Lankosz studied 60 aluminium smelter workers: 97% had skeletal fluorosis, and 23% had psychiatric disturbances including depression, mental sluggishness and forgetfulness.[50]

"Petraborg described a 36-year-old who became unwell shortly after his water supply was fluoridated. His symptoms settled with non-fluoridated water and returned when he again used fluoridated water."[51] "General malaise and fatigue commonly accompanied these mental symptoms; others involved joints, the GI system, urinary tract, peripheral nerves and muscles. These are reminiscent of the chronic fatigue syndrome."

Dr. Spittle concludes, "there is suggestive rather than definitive evidence that chronic toxicity affecting cerebral functioning can follow exposure to F."[52] But in light of the cited findings in China, the conclusion now appears to me to be definitive.

Fluoride's harm to intelligence could be worse in America than in China. Millions of embryos and infants are receiving a F intake in mg/kg/day that equals the dose known to cause crippling skeletal fluorosis in adults if maintained.[53] NaF and the other synergistic industrial waste products put in 62% of Americans' drinking water are far more toxic than the CaF_2 in China[54] (some underground waters contain a little NaF).[55] Also, NaF is more bioavailable than CaF_2, virtually 100% with an aqueous solution.[56,57]

Intakes of F may increase two to four-fold or more during hard physical work in a hot climate–even greater if the water used in cooking and in beverages is taken into account." About 3% of the U.S. population drink four liters or more water per day, particularly in hot climates. Boiling water evaporates chlorine but concentrates F. If the water contains 4 ppm of F, a person may ingest 16 mg of F daily or more, plus F from other sources such as toothpaste, food and air. That is a high enough level to yield crippling skeletal fluorosis in a few years.

China is sensibly building the intelligence of its children yet to be born by defluoridating its water supply.[58] How is America to compete on an intellectual plane with China when we keep dumbing down our future generations?

Possible mechanisms have been identified whereby F could affect brain function. These include influencing calcium currents, altering enzyme configuration by forming strong hydrogen bonds with amide groups, inhibiting cortical adenyl cyclase activity and increasing phosphoinositide hydrolysis."[75] In guinea pigs, intracellular F alters the time course of calcium currents from hippocampal neurons.[76]

"In rats, F showed the greatest regional differences in the brain, the highest levels occurring in the midbrain, pons and medulla. The amide-fluoride hydrogen bond was the second strongest hydrogen bond known, and it seemed certain that the F ion was able to compete successfully for the N-H bond in amide systems such as occur in proteins. This was seen as an explanation of how F could disrupt key sites in biological systems."[77]

"Edwards et al. found that fluoride binding induced significant perturbances in the enzyme structure of cytochrome C peroxidase. "NaF is used in many in-vitro studies to block the action of enzymes, in part because it can interfere with so many different ones."[78] Over 100 enzymes are inhibited or activated by F through binding to enzyme cofactors such as magnesium, manganese and phosphate, preventing the coenzyme from activating the enzyme.[79] F from any type of exposure destroys 66 out of 83 known enzymes[1] *in vivo*. F switches off an enzyme by attacking its weakest links–the delicately balanced network of

hydrogen bonds surrounding the active site. For every enzyme inhibited or destroyed, an important metabolic process is stopped; in fact, enzymes make possible every body process.[79]

"An active-site arginine residue was considered to move in order to optimize hydrogen-bonded interactions with the fluorine atom, thus altering the shape of the active site and the enzyme's activity.[80] In reviewing the subcellular effects of F, Elsair and Khelfat noted that protein synthesis, the membrane sodium pump, glycolysis, Krebs cycle and oxygen consumption could be affected.[81] Jope found that NaF stimulated the hydrolysis of phosphoinositides in rat cortical slices. It was considered that this occurred through the formation of AlF_3 activating a G protein that served as a transducer between receptors and phospholipase C. It, in turn, catalysed the hydrolysis of phospho-inositides to produce two second messengers, inositol triphosphate and diacyl-glycerol."[82]

Fluoridation Promotes Dental Caries in Children of Low-Income Families

Fluoridation of drinking water was intended to give poor kids rich teeth. It has done the opposite. Two and one-half years after the start of Tacoma, WA's fluoridation, the News-Tribune reported that the teeth of many children of low-income families in Tacoma and fluoridated Seattle were decayed to the gums; their parents couldn't afford dental care.[83] Third-grade children of low-income families in fluoridated Seattle have more caries than third-grade children of low-income families in unfluoridated Thurston County. Among such families, in both Seattle and Tacoma, children's cavity rates are well above the state average.[84] In Harlem, NY, which has been fluoridated for 32 years, the American Dental Association reported, "There's more dental decay among these kids; we see the beginning of inflamed gingivitis in their mouths."[85] The picture in Pittsburgh[86] and the North Slope of Alaska,[87] where fluoridation has continued as long as 33 years, is equally egregious. Native Americans on reservations have been forcibly fluoridated (with free dentistry) for 50 years; they have four times worse dental decay than the average of Americans.[88]

Dental fluorosis softens the teeth. George Meinig, DDS, in the Air Force, 1943-1946, found that he could readily "burr" through the teeth of airmen from parts of Colorado where the water is naturally fluoridated. Other dentists confirmed the discovery. The steel burrs then available wore out quickly on nonfluoridated teeth.

Dental journals record a great increase in 1mm-4 mm gum pockets, where the gums have severed from the teeth.[89] These pockets become harbors for bacteria, viruses and other organisms, leading to inflammation and infection known as gingivitis[1] or gum disease. It in turn is a leading, although commonly overlooked, cause of heart attacks and strokes.[90-92]

How can "optimal" fluoridation bring about these seemingly anomalous results? The largest, most comprehensive epidemiological study on dental caries in the world examined endemic fluorosis in villages throughout non-urban areas of the 14 states of India from 1963 to 1993.[93] The total population surveyed was over 800,000; more than 400,000 children volunteered to take part in detailed studies. Each child had lived in the same village all his or her life.

All had matched socioeconomic and education backgrounds, similar dietary and food patterns; calcium intake varied. Habits in respect to oral health and hygiene, and facilities for health and dental clinics were similar. A thorough history was taken, clinical examination, nutritional assessment and dietary evaluation made, in particular for calcium intake.[94] Radiological and laboratory investigations of plasma and urine were done where found necessary.[95] The authors participated throughout the 30 years. Among agencies involved in

the study were Department of Environment, Department of Science and Technology and Indian Council of Medical Research, Government of India, New Delhi and the International Development Research Centre, Canada.

Their findings fully confirm results of the Teotias' earlier studies.[96] Non-endemic areas had F in drinking water 1.0 ppm or less; the average was 0.50+/-0.24 ppm. Among children with adequate calcium nutrition (dietary Ca > 800 mg/day), 7% showed dental fluorosis, 2% had dental caries. Among children with inadequate Ca nutrition (intake <300 mg/day), 14.2% had dental fluorosis and 31.4% had dental caries.

Endemic areas had drinking water F >1.0 ppm; the average was 4.19+/-2.03 ppm. Of children with adequate Ca intake, 59% had dental fluorosis and 10% had dental caries. In the Ca-inadequate group in these high-fluoride areas, virtually 100% had dental fluorosis and 74% had dental caries.

Just as IQ scores declined linearly with increasing F, the incidence of dental fluorosis and caries increased linearly with fluoride intakes and dietary calcium deficiency. Analysis by Student's "t" Test showed highly significant differences between children in non-endemic and endemic areas, and between those with adequate and inadequate calcium intakes ($p < 0.0001$). "The decreased levels of serum calcium in the fluorotic individuals confirm that F is a strong antagonist of calcium and inhibits its intestinal absorption[97,98] by producing insoluble complexes with it."[99] Hypocalcemia is produced when F binds with serum calcium; the mechanism is not fully known;[100] F appears to cause calcium loss from tooth enamel.[101]

A F-resistant form of *Streptococcus Mutans* can lower the pH of the medium to about 5.5, the level where enamel demineralization begins *in vivo*. This form may also have the ability to colonize the tooth surface and initiate dental caries.[102]

A separate study of 3-5 year old rural Chinese children found that hypoplasia of enamel in the deciduous teeth was most common in families of low socioeconomic status; it was a predisposing factor for initiation and progression of caries development.[103]

"Together, the correlation and dose-response relationship in the Teotias' study suggest a causal connection. These structural changes–immature and hypo-mineralized matrix, increased porosity and possible effects on dental calcium homeostasis–markedly increase the vulnerability of the teeth to bacterial invasion, and to formation of plaque which contains microorganisms."[93]

F promoted hyperparathyroidism.[104] The parathyroid glands, which help regulate calcium and phosphorus metabolism, are extremely sensitive to fluoride;[105-106] hyperparathyroidism increases secretion of those glands, generalized osteitis fibrosa cystica, elevated serum Ca, decreased serum phosphorus, increased excretion of Ca and phosphorus.[107]

"The interaction of fluoride and parathyroid hormone in Ca-deficient children may increase the porosity of the enamel and resorption of the tooth, and thus may aggravate the risk of dental caries." "The effects of F on enamel formation lead to insufficient closure of intercrystalline spaces, the process responsible for the drainage of water and inorganic materials."[93] "Even marginally high intakes of F (> 2.5 mg/d) continuously for more than six months in Ca-deficient children may cause severe dental fluorosis and caries."[108] In all areas, decayed teeth per hundred children were maximum in the 5-10 year olds and minimum in the 1-5 year olds.

In a separate study of more than 23,000 children getting <0.5 mg dietary Ca/day, giving one gram daily supplement of Ca yielded fewer caries and improved alveolar bone density. This was caused, they believe, by increasing retention of Ca during the pubertal growth spurt. Throughout, vita-

min D deficiency/rickets worsened caries risk. One of the authors made similar observations in 1990 in F-endemic villages in Zilin Province of China.

The Teotias call for better nutrition, including adequate Ca and minimization of dietary refined carbohydrates.[93] Protein-rich diet could mitigate the F-induced health hazards in endemic areas the world over; a high-quality multivitamin/mineral supplement is also obligatory.[1] The amino acids glycine and glutamine, individually and in combination, helped to maintain the status quo in mice that were given NaF.[109] About 98% of DNA sequences in mice and in people are identical.

Chemist Gerard F. Judd, PhD, shows in detail why re-enamelization (remineralization) of the tooth requires the enzyme adenosine diphosphatase, perhaps other enzymes, and supplemented phosphate, as well as 1.3 g/day Ca. The Ca supplement must include vitamin D to enable its full utilization. As a source of phosphate he suggests 1,500 mg/day of powdered lecithin (lowered to 1,000 mg after teeth have recovered). By blocking or destroying 66 out of 83 known enzymes, F blocks this needed re-enamelization.[1]

In the few developing countries where people consume only small amounts of sucrose and refined foods, decay rates are often lower than in the developed nations.[78] "In several developing countries tooth decay is increasing together with rising dietary sugar and other fermentable carbohydrates. That was also the case with Australian aborigines, even where their water came from bores containing F at close to the 'optimal' concentration for the local climate."[110] Yet tribesmen with bad teeth from consuming Western food developed strong, non-decaying teeth after returning to their "native" diet.[111]

The Teotias conclude, "Dental caries are a disorder of high fluoride and low dietary Ca, both separately and through their interactions. The only practical and effective public health measure for the prevention and control of dental caries is limitation of the F content of drinking water to <0.5 ppm, together with Ca nutrition > 1 gram daily."[93] Even Xinghua, China's 0.91 ppm is too high for optimum oral health among poorly nourished children in low-income families. Mightn't still lower F, (i.e. 0.5 ppm as advocated by the Teotias), yield even higher IQ scores?

Changing levels of immune system strength can affect caries development.[110] F weakens the immune system in a dose-dependent manner with as little as 10% of the amount used in fluoridation of drinking water[112]–i.e. at only 0.1 ppm,[113, 114] showing that toxic effects of F are not dose-related.[115] Steadily rising F levels then partly account for the disastrous continuing decline in children's immune systems–their greater susceptibility to colds and ear infections. Weakening immunity appears to harm children's behavior and learning ability as well. Altered brain chemistry from deficiency of even one nutrient can give rise to diminished mental capacity, also to mental/emotional disturbances and behavior disorders,[116] even autism.[117]

A study of F toxicity in mice given F at 5.2 mg/kg of body weight daily (one-tenth of the LD50 but recently classified as the "probably toxic dose" or PTD for humans) found a significant decrease in red blood cell counts and an increase in white blood cell counts. Those changes corroborate findings that F weakens immunity by several identified mechanisms. There is a very narrow range between injurious and supposedly helpful intakes.

The World Health Organization, like the ADA, promotes fluoridation of drinking water. The WHO warned in 1994 that "dentists and public health administrators should be aware of the *total* fluoride exposure of the population before introducing any additional F programs for caries prevention."

India[118] and especially China have a better answer, in line with the Teotias' rec-

ommendation. "Defluoridation is being applied extensively in many regions of China where fluorosis is endemic. By 1983, communities had implemented 9,018 such projects. Many of these involve community defluoridation plants using activated alumina."[58]

Similarly, a municipal treatment plant in Gila Bend, AZ uses selective adsorption with activated alumina to reduce the excess fluoride in its drinking water.[78] Many people in nearby Buckeye and Yuma, AZ have black, crumbling teeth from ingestion of high-F water.[1] The cost of removing F from drinking water can be as much as $10 per month per household;[178] in large-scale production the cost should be lower. Fluoridation equipment is expensive to maintain, replacing corroded pipes, and costs an average of $1,000 for every $5 worth of F delivered.[119]

A Y2K Fluoridation Catastrophe is Possible

There is an ever-present danger of F poisoning from accidental overfeeds[120] and highway spills of extremely corrosive silicofluoride.[121] Not everyone knows about the great Donora Fluoride Fog: A Secret History of America's Worst Air Pollution Disaster.[122]

Clinical research used to promote safety and efficacy of water fluoridation uses distilled/deionized water, 99.7%-pure reagent/-pharmaceutical grades of NaF with a specific species of F, and regulated diets. Actual fluoridation, we saw, uses scrubbing operations contaminated with lead, mercury, arsenic and radionuclides. No clinical research has been performed with these products.[123]

Water Fluoridation: A Manual for Engineers and Technicians[124] contains 119 pages of do's, don'ts, cautions, admissions and warnings. That fluoridation is an occupational hazard for water plant operators is made very clear.

Non-allergic reactions to F as used in fluoridation include abdominal pain, headaches, scotomata, personality change, muscular weakness, painful numbness in extremities, joint pain, migraine headaches, mouth dryness, oral ulcers, convulsions, mental deterioration, colitis, pelvic hemorrhage, urticaria, nasal congestion, skin rashes, epigastric distress and hematemesis.[125]

In 1995 there were two F spills at Kelowna, BC, Canada; the acid ate through pipes and concrete barriers, then seeped into Lake Okanagan.[126] F has been spilled in several other communities; in at least one, multiple lawsuits have been filed.[127] As the truth about fluoridation becomes more widely known, litigation could come in from people afflicted with F-aggravated multiple chemical sensitivity.[128]

On November 11, 1979, an employee of the municipal waterworks at Annapolis, MD, failed to close a control valve on equipment that meters hydrofluosilicic acid to the water supply at 1 ppm. For 18 hours about 30 ppm of F escaped into the drinking water. G.L. Waldbott, MD, interviewed 112 residents of Annapolis who suffered health consequences for several hours to two or more days; four were still sick 19 days later.

"Results included distinct aggravation of existing illnesses including diabetes, respiratory disease, urticaria, convulsion, bilateral headaches involving the entire skull, muscular fibrillation and chest pains." The case of convulsion probably resulted from F destruction of the enzymes cytochrome oxidase, cholinesterase and possibly others involved in respiration and nervous system function.[129] F breaks the hydrogen bonds of these enzyme structures thus ruining their function."[1] "Six reported deterioration of their mental acuity, lethargy, and loss of memory."[148] One nursing mother experienced nausea and vomiting and her baby had diarrhea at the same time. The overdose of F contributed to one fatal cardiac arrest.[130] So overfeeds can happen in water supply systems that should possess good procedures and well-trained personnel.

Fluoridation can be particularly haz-

ardous, The Manual warns, in small water systems lacking sufficient safety controls and procedures, or run by poorly trained operators, or both.[28] How many thousands of small water supply systems exist in America is not known. "The lack of good monitoring and surveillance programs in states with fluoridated communities has been a concern of state dental directors and CDC for some time."

On May 21-23, 1992, after fluoridation plant failure, one Alaska Native died and 296 were poisoned (in a population of 470 served by the affected well) in Hooper Bay, Alaska. F levels in the water supply reached 150 ppm. Symptoms were mostly gastrointestinal; the man who died drank many glasses of water. Seven days after the failure, F was lower in urine of non-cases than in cases, but higher in their serum.[28]

Three kidney dialysis patients died and six other patients suffered acute reactions at the University of Chicago Hospitals when the F removal system failed.[131] Encrustation on inner surfaces of pipes in Seattle, WA, revealed 1,044 ppm of F, which can break away to block filter systems.[132]

Dr. David Williams warned of potentially disastrous water pollution at the start of year 2000. American illnesses caused by drinking water total over one million a year (some estimate seven times that many), and are increasing exponentially; deaths are estimated at 9,000 every year.[133] Deaths and illnesses increase after temporary breakdowns of water-system regulation.

The computers that control thousands of water systems may not be prepared for Y2K. When double zero is entered for the year 2000, computers could go berserk and cause multiple malfunctions countrywide.[134] That would end the scourge of fluoridation but at a terrible cost. A simulation in Coffs Harbour, Australia, showed that the arrival of year 2000 would have released enough F and other toxic chemicals to kill the city's entire population of 58,600. Engineers set the controller clock forward to just before midnight, December 31, 1999 and then waited. When double-0 came up, the device told the equipment to dump the entire chemical holdings into the water in one hit. Another simulation brought a double-zero failure of chlorination in a non-F community in Utah. Details are being kept secret.[135] The sewer system in Los Angeles spilled several million gallons of raw sewage into city streets during a recent Y2K test.[136]

Policy Recommendations

1. Make all suppliers of fluoridated water Y2K ready. If some basic controller computer chips are buried in cement, short of digging up the dam or other structure containing the chip, immediately stopping fluoridation before the end of 1999 would be obligatory.

2. Stop fluoridating baby formula, drinking water, toothpaste, fruit juices, vitamin supplements, the atmosphere, fresh waters—and the oceans.

3, Launch a nationwide program for defluoridation of drinking water in areas where water supplied contains more than 0.3 to 0.5 ppm. If dentists truly want to improve dental health, let them pitch into this multi-faceted defluoridation effort; join other professionals in promoting better calcium- and general nutrition.

Appendix

Nearly all toothpaste sold in the U.S. contains fluoride, typically 1,000 to 1,500 ppm. Commonly used mouth rinses contain 230 to 900 ppm.[59] F products used to prevent tooth decay may contain 9,000 ppm.[60] Researchers at Madras Dental College and elsewhere found that F in fluoridated toothpaste, even if not swallowed, is quickly absorbed through the lining of the mouth and the gums into the general circulation.[61] Toothpaste and vitamin preparations–and presumably baby formulas–containing F cause allergic reactions in some children, toxic reactions in others.[62]

Resulting mouth ulcers are refractory to antibiotic and local medication, but clear up promptly when non-F toothpaste is substituted.[63]

"Fejerskov showed in 1990 that fluoride ingested by children during the preeruptive phase [as in fluoridated baby formulas] results in improper calcification of enamel and makes teeth more susceptible to caries."[59,64] Yet a warning about overdosing formula-fed babies with F was refused publication.[65]

Toothpaste ads on TV show generous amounts squeezed onto a brush, and some parents put a large glob of toothpaste on a child's toothbrush rather than the "pea-sized" amount recommended. Small children do not have complete control of the swallowing reflex. In a test, most preschool children did not expectorate or rinse after brushing with F toothpaste.[66]

"F ingestion by children from mouthrinses, candy-flavored treatments and dentifrices is extremely hazardous not only to their intellectual ability, but can cause heart failure. It harms their biological development, life span and general health."[67-69] Much the same results follow use of supplemented F in some multivitamin/mineral tablets.[70] Twenty-five percent of American children take F supplements;[71] some prescribing physicians fail to consider total intake without the supplements.[72] If the water, too, is fluoridated, a child's exposure can be eight times greater than established U.S. safety levels.[73]

In 1979, formula manufacturers reduced fluoride in their products to a "low" level. But years later, Riordan reported a 2.8-fold increase in risk of fluorosis associated with early cessation of breast-feeding.[74] The mother's body appears to filter some F out before nourishing her baby. Pendrys and colleagues reported a 3.3-fold increase in risk of fluorosis associated with infant formula based on pasteurized, homogenized cow milk. They also noted a sevenfold increase in risk of fluorosis with soy-based infant formula.[72]

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