

Fluoride: The Deadly Legacy

by Gary Null, Ph.D.

There's nothing like a glass of cool, clear water to quench one's thirst. But the next time you or your child reaches for one, you might want to question whether that water is in fact, too toxic to drink. If your water is fluoridated, the answer may well be yes.

For decades, we have been told a lie, a lie that has led to the deaths of hundreds of thousands of Americans and the weakening of the immune systems of tens of millions more. This lie is called fluoridation. A process we were led to believe was a safe and effective method of protecting teeth from decay is in fact a fraud.

In recent years it has been shown that fluoridation is neither essential for good health nor protective of teeth. What it *does* do is poison the body. Thus, some fundamental questions arise: 1) how is it possible that the public has all been misled? 2) why does public health policy and the American media continue to live with and perpetuate this scientific sham?

This History of Fluoride, a Toxic Waste

"We would not purposely add arsenic to the water supply. And we would not purposely add lead. But we do add fluoride. The fact is that fluoride is more toxic than lead and just slightly less toxic than arsenic."¹

These words of Dr. John Yiamouyiannis may come as a shock to you because, if you're like most Americans, you have positive associations with fluoride. You may envision tooth protection, strong bones, and a government that cares about your dental needs. What you may not know is that the fluoride added to drinking water and toothpaste is a crude industrial waste product of the aluminum and fertilizer industries, and a substance toxic enough to be used as rat poison. How is it that Americans have learned to love an environmental hazard? This phenomenon can be attributed to a carefully planned marketing program launched even before Grand Rapids, Michigan, became the first community to officially fluoridate its drinking water in 1945.² As a result of this ongoing campaign, nearly two-thirds of the nation has enthusiastically followed Grand Rapids' example. But this push for fluoridation has less to do with a concern for America's health than with industry's penchant to expand at the expense of our nation's well-being.

What is Fluoride? Many people associate fluoride with its periodic table namesake, *fluorine*. While fluorine is an element (a gas that is frequently listed as a trace mineral and human nutrient), fluoride is very different. Fluoride is a compound of fluorine, and while fluorine is one of earth's natural elements, fluoride is a chemical byproduct ("chemical byproduct" = toxic waste) of aluminum, phosphate, cement, steel, and nuclear weapons manufacturing.³ Its toxicity was recognized at the beginning of the Industrial Revolution, when, in the 1850s iron and copper factories discharged it into the air and poisoned plants, animals, and people.⁴

In the early years of the 20th Century, a young dentist named Frederick McKay settled in Colorado Springs, Colorado. There he discovered that as many as 90% of lifetime residents of the town had grotesque brown stains on their teeth, and that the tooth enamel had an irregular

surface texture described as "mottled". Locals referred to the familiar condition as Colorado Brown Stain, but no one had a clue as to its cause. Over the next two decades Dr. McKay, later with the help of dental researcher G. V. Black, proved that the cause was something contaminating the water supply. They also speculated that the affected teeth might be somewhat more resistant to decay.⁵

By the 1920's, rapid industrial growth had exacerbated the problems of industrial pollution, and fluoride was one of the biggest problems. Medical writer Joel Griffiths explains that "it was abundantly clear to both industry and government that spectacular U.S. industrial expansion -- and the economic and military power and vast profits it promised -- would necessitate releasing millions of tons of waste fluoride into the environment."⁶ Their biggest fear was that "if serious injury to people were established, lawsuits alone could prove devastating to companies, while public outcry could force industry-wide government regulations, billions in pollution-control costs, and even mandatory changes in high-fluoride raw materials and profitable technologies."⁷

In 1931, by means of photo-spectrographic analysis of McKay and Black's water samples conducted at the laboratories at the Aluminum Company of America (ALCOA), it was confirmed that the cause of the mottled teeth was fluoride in the water supply. ALCOA took a proprietary interest in this issue, since fluoride is a major waste product of aluminum production. The company wanted to know how much fluoride exposure people could tolerate without getting mottled, discolored teeth. Or, more specifically, how much fluoride could ALCOA release into the nation's earth, water, and air without the public realizing that the company was polluting the environment with a powerful toxin?⁸

That question was to be addressed later that same year, when H. Trendley Dean was sent to study water sources in 345 Texas communities. Dean, a former dental surgeon for the US Public Health Service, was then head of the Dental Hygiene Unit of the National Institute of Health. (Dean's overseer and mentor at the USPHS had been Treasury Secretary Andrew W. Mellon, a founder and major stockholder of ALCOA.) Based on his own research, Dean claimed that "fluoride levels of up to 1.0 ppm in drinking water did not cause mottled enamel; if the fluoride exceeded this level, however, fluorosis would occur."⁹

Dean, while establishing the threshold for fluoridation, also explored the idea that fluorosis victims mottled, discolored teeth were especially decay resistant. Dean suspected that 1ppm of fluoride added to the water supply would prevent tooth decay, while avoiding damage to bones and teeth.¹⁰ He recommended further studies to determine whether his hypothesis was true.

According to Griffiths, the news that adding fluoride to the water supply for improved dental health was "galvanic", particularly to the Mellon Institute (ALCOA's Pittsburgh industrial research lab). Consequently, they initiated their own research. Biochemist Gerald J. Cox immediately fluoridated some lab rats in a study and concluded that fluoride reduced cavities and that: "The case should be regarded as proved." In a historic moment in 1939, the first public proposal that the U.S. should fluoridate its water supplies was made not by a doctor, or dentist, but by Cox, an industry scientist working for a company threatened by fluoride damage claims and burdened by the odious expense of disposing of tons of toxic industrial waste. Cox began touring the country, campaigning for fluoridation.¹¹

Dean, meanwhile, continued his research and became the authority on public water fluoridation. He became the first dental scientist at the National Institute of Health, advancing to director of the dental research section in 1945. After World War II, he directed epidemiological studies for the Army in Germany. When Congress established the National Institute of Dental Research (NIDR) in 1948, Dean was appointed its director, a position he held until retiring in 1953.¹² In his post at the NIDR, oversaw the first clinical trial of fluoridation in an American city: Grand Rapids, Michigan.¹³

With Dean's impressive credentials, it is easy to assume—and many do—that his findings were scientifically sound. Unfortunately, Dean's "science", when placed under further scrutiny, is shaky, not solid; biased, not impartial, and above all, hardly a standard sound enough to launch mass fluoridation. An independent study of his results revealed that he had engaged in "selective use of data," employing figures from 21 cities that confirmed his findings, and ignoring those from 272 other localities that didn't.¹⁴ In a 1955 court case challenging fluoridation, Dean admitted under oath that his published conclusions were wrong.¹⁵ In hearings conducted by the AMA in 1957, he was forced to admit that dental fluorosis, the first sign of fluoride overdose, could be caused by water fluoridated at 1.0 ppm.¹⁶ Shockingly, these admissions were not widely publicized, and they were never acknowledged by the USPHS, the American Dental Association, or the other governmental bodies responsible for foisting fluoride on the public. Consequently, this dangerous industrial waste carcinogenic is still dumped in our water today.

At first, industry could dispose of fluoride legally only in small amounts by selling it to insecticide and rat poison manufacturers.¹⁷ But Dean's "discovery," paved the way for a commercial outlet for the toxin. Griffiths writes that this was not a scientific breakthrough, but rather part of a "public disinformation campaign" by the aluminum industry "to convince the public that fluoride was safe and good," Industry's need prompted Alcoa-funded scientist Gerald J. Cox to announce that "The present trend toward complete removal of fluoride from water may need some reversal."¹⁸ Griffiths writes:

"The big news in Cox's announcement was that this 'apparently worthless by-product' had not only been proved safe (in low doses), but actually beneficial; it might reduce cavities in children. A proposal was in the air to add fluoride to the entire nation's drinking water. While the dose to each individual would be low, 'fluoridation' on a national scale would require the annual addition of hundreds of thousands of tons of fluoride to the country's drinking water.

"Government and industry - especially Alcoa - strongly supported intentional water fluoridation... [It] made possible a master public relations stroke - one that could keep scientists and the public off fluoride's case for years to come. If the leaders of dentistry, medicine, and public health could be persuaded to endorse fluoride in the public's drinking water, proclaiming to the nation that there was a 'wide margin of safety,' how were they going to turn around later and say industry's fluoride pollution was dangerous?

"As for the public, if fluoride could be introduced as a health enhancing substance that should be added to the environment for the children's sake, those opposing it would look like quacks and lunatics....

"Back at the Mellon Institute, Alcoa's Pittsburgh Industrial research lab, this news was galvanic. Alcoa-sponsored biochemist Gerald J. Cox immediately fluoridated some lab rats in a study and concluded that fluoride reduced cavities and that 'The case should be regarded as proved.' In a historic moment in 1939, the first public proposal that the U.S. should fluoridate its water supplies was made - not by a doctor, or dentist, but by Cox, an industry scientist working for a company threatened by fluoride damage claims."¹⁹

Once the plan was put into action, industry was buoyant. They had finally found the channel for fluoride that they were looking for, and they were even cheered on by dentists, government agencies, and the public. Chemical Week, a publication for the chemical industry, described the tenor of the times when they exclaimed that: "All over the country, slide rules are getting warm as waterworks engineers figure the cost of adding fluoride to their water supplies." The article further explained that the general public quickly adhered to the new trend urged upon them by the U.S. Public Health Service, the American Dental Association, the State Dental Health Directors, various state and local health bodies, and vocal women's clubs from coast to coast. They further wrote that "[fluoridation] adds up to a nice piece of business on all sides and many firms are cheering the PHS and similar groups as they plump for increasing adoption of fluoridation."²⁰

Such overwhelming acceptance allowed government and industry to proceed hastily, albeit irresponsibly. The Grand Rapids experiment was supposed to take 15 years, during which time health benefits and hazards were to be studied. In 1946, however, just one year into the experiment, six more U.S. cities adopted the process. By 1947, 87 more communities were treated; popular demand was the official reason for this unscientific haste.

The general public and its leaders did support the cause, but only after a massive government public relations campaign spearheaded by Edward L. Bernays, (a nephew of Sigmund Freud). Bernays, a public relations pioneer who has been called "the original spin doctor,"²¹ was a masterful PR strategist. As a result of his influence, Griffiths writes, "Almost overnight...the popular image of fluoride -- which at the time was being widely sold as rat and bug poison -- became that of a beneficial provider of gleaming smiles, absolutely safe, and good for children, bestowed by a benevolent paternal government. Its opponents were permanently engraved on the public mind as crackpots..."²²

Griffiths explains that while opposition to fluoridation is usually associated with right-wingers, this picture is not totally accurate. He provides an interesting historical perspective on the anti-fluoridation stance:

"Fluoridation attracted opponents from every point on the continuum of politics and sanity. The prospect of the government mass-medicating the water supplies with a well-known rat poison to prevent a nonlethal disease flipped the switches of delusionals across the country - as well as generating concern among responsible scientists, doctors, and citizens.

"Moreover, by a fortuitous twist of circumstances, fluoride's natural opponents on the left were alienated from the rest of the opposition. Oscar Ewing, a Federal Security Agency

administrator, was a Truman "fair dealer" who pushed many progressive programs such as nationalized medicine. Fluoridation was lumped with his proposals. Inevitably, it was attacked by conservatives as a manifestation of "creeping socialism," while the left rallied to its support. Later during the McCarthy era, the left was further alienated from the opposition when extreme right-wing groups, including the John Birch Society and the Ku Klux Klan, raved that fluoridation was a plot by the Soviet Union and/or communists in the government to poison America's brain cells.

"It was a simple task for promoters, under the guidance of the 'original spin doctor,' to paint all opponents as deranged - and they played this angle to the hilt....

"Actually, many of the strongest opponents originally started out as proponents, but changed their minds after a close look at the evidence. And many opponents came to view fluoridation not as a communist plot, but simply as a capitalist-style con job of epic proportions. Some could be termed early environmentalists, such as the physicians George L. Waldbott and Frederick B. Exner, who first documented government-industry complicity in hiding the hazards of fluoride pollution from the public. Waldbott and Exner risked their careers in a clash with fluoride defenders, only to see their cause buried in toothpaste ads."²³

By 1950, fluoridation's image was a sterling one, and there was not much science could do at this point. The Public Health Service was fluoridation's main source of funding as well as its promoter, and therefore caught in a fundamental conflict of interest.²⁴ If fluoridation was found to be unsafe and ineffective, and laws were repealed, the organization feared a loss of face, since scientists, politicians, dental groups, and physicians unanimously supported it.²⁵ For this reason, studies concerning its effects were not undertaken. The Oakland Tribune noted this when it stated that "public health officials have often suppressed scientific doubts" about fluoridation.²⁶ Waldbott sums up the situation when he states that from the beginning, the controversy over fluoridating water supplies was "a political, not a scientific health issue."²⁷

The clever marketing of fluoride continued. In a 1983 letter from the Environmental Protection Agency, then Deputy Assistant Administrator for Water, Rebecca Hammer, wrote that EPA's stance on fluoridation: "[the EPA] regards [fluoridation] as an ideal environmental solution to a long-standing problem. By recovering by-product fluosilicic acid from fertilizer manufacturing, water and air pollution are minimized and water utilities have a low-cost source of fluoride available to them."²⁸ More recently, a 1992 policy statement from the Department of Health and Human Services says, "A recent comprehensive PHS review of the benefits and potential health risks of fluoride has concluded that the practice of fluoridating community water supplies is safe and effective."²⁹

Today, nearly 250 million people worldwide drink fluoridated water, including about 130 million Americans in 9600 communities. Out of the 50 largest cities in the US, 41 have fluoridated water.³⁰

To help celebrate fluoride's widespread use, the media recently reported on the 50th anniversary of fluoridation in Grand Rapids. Newspaper articles titled "Fluoridation: a shining public health

success"³¹ and "After 50 years, fluoride still works with a smile"³² painted glowing pictures of the practice. Had investigators looked more closely, though, they might have learned that children in Muskegon, Michigan, a nearby un-fluoridated "control" city, had equal drops in dental decay. Had they looked closer, they would have seen the dangerous truth behind the supposed wonder of fluoride.

The Fluoride Myth Doesn't Hold Water

The big hope for fluoride was its ability to immunize children's developing teeth against cavities. Rates of dental caries were supposed to plummet in areas where water was treated. Yet decades of experience and worldwide research have contradicted this expectation numerous times. Here are just a few examples:

- In British Columbia, only 11% of the population drinks fluoridated water, as opposed to 40-70% in other Canadian regions. Yet British Columbia has the lowest rate of tooth decay in Canada. In addition, the lowest rates of dental caries within the province are found in areas that do not have their water supplies fluoridated.³³
- According to a Sierra Club study, people in un-fluoridated developing nations have fewer dental caries than those living in industrialized nations. As a result, they conclude that "fluoride is not essential to dental health."³⁴
- In 1986-87, the largest study on fluoridation and tooth decay ever was performed. The subjects were 39,000 school children between 5 and 17 living in 84 areas around the country. A third of the places were fluoridated, a third were partially fluoridated, and a third were not. Results indicate no statistically significant differences in dental decay between fluoridated and un-fluoridated cities.³⁵ The benefit to fluoridated communities, if there is any, amounts to 0.6 fewer decayed tooth surfaces per child, which is less than one percent of the tooth surfaces in a child's mouth.³⁶
- A World Health Organization survey reports a decline of dental decay in western Europe, which is 98% un-fluoridated. They state that western Europe's declining dental decay rates are equal to and sometimes better than those in the U.S.³⁷
- A 1992 University of Arizona study yielded surprising results when they found that "the more fluoride a child drinks, the more cavities appear in the teeth."³⁸
- Although all Native American reservations are fluoridated, children living there have much higher incidences of dental decay and other oral health problems than do children living in other U.S. communities.³⁹
- A 1999 study of water fluoridation in Italy shows that parents' socioeconomic status, area of residence, and children's sweets consumption are more significant predictors of dental caries than fluoride consumption. The authors conclude that universal fluoridation is an inadequate approach and the decision to fluoridate or de-fluoridate water requires careful epidemiological consideration.⁴⁰
- A 2001 article in the Journal of the American Dental Association admits that the fluoride that is swallowed and incorporated into teeth is "insufficient to have a measurable effect" on reducing cavities.⁴¹ This is a stunning admission from the ADA, historically one of the principal supporters and defenders of water fluoridation.

- A follow-up of a study of the town of Kuopio, Finland six years after fluoridation was discontinued found no increase in dental caries. The authors conclude that fluoridation was unnecessary to begin with.⁴²
- A study comparing prevalence and incidence of caries in 2,994 life-long residents of British Columbia, Canada, in grades 5, 6, 11, 12, found that caries incidence was not different between the still-fluoridating and fluoridation-ended communities.⁴³
- In 1997, following the cessation of drinking water fluoridation in La Salud, Cuba, caries prevalence remained at a low level for the 6- to 9-year-olds and appeared to decrease for the 10/11-year-olds. In the 12/13-year-olds, there was a significant decrease while the percentage of caries-free children of this age group had increased from 4.8 (1973) and 33.3 (1982) up to 55.2%.⁴⁴
- A 1998 study conducted in New Zealand found that "when the timing of various forms of fluoride supplementation is correlated with the decline in caries, the decline continues beyond the time of maximum population coverage with fluoridated water and fluoridated toothpaste." The authors call for a "reassessment of the fluoride effect."⁴⁵
- In contrast to the anticipated increase in dental caries following the cessation of water fluoridation in the German cities Chemnitz (formerly Karl-Marx-Stadt) and Plauen, a significant fall in caries prevalence was observed. This trend corresponded to the national caries decline and appeared to be a new population-wide phenomenon.⁴⁶

A 1999 New York State Department of Health study of 3,500 7-14-year-olds shows that children in fluoridated Newburgh, New York, have no less tooth decay but significantly more dental fluorosis than children from Kingston, New York, which has never been fluoridated. Since 1945, children of the two towns have been examined periodically in order to demonstrate that fluoridation reduces tooth decay. "This new research shows the experiment has failed," the report concludes.⁴⁷ A similar comparison revealed that "In most European countries, where [water fluoridation] has never been adopted, a substantial decline [75%] in caries prevalence has been reported in the last decades".⁴⁸

In light of all the evidence, fluoride proponents now make more modest claims. For example, in 1988, the ADA professed that a 40- to 60% cavity reduction could be achieved with the help of fluoride. Now they claim an 18- to 25% reduction. Other promoters mention a 12% decline in tooth decay.

And other former supporters are even beginning to question the need for fluoridation altogether. In 1990, a National Institute for Dental Research report stated that "it is likely that if caries in children remain at low levels or decline further, the necessity of continuing the current variety and extent of fluoride-based prevention programs will be questioned."⁴⁹ This is a startling claim coming from the very same governmental organization that spearheaded the drive for compulsory water fluoridation.

A 1999 review of literature conducted by Dr. Hardy Limeback, a long-time advocate of water fluoridation in Canada, indicates that the topical effect of fluoride is its primary mechanism for the prevention of dental caries. Swallowing fluoridated water is ineffective and unnecessary. Limeback concludes that everyone working in the dental health field must examine more closely the risks and benefits of fluoride in all its delivery forms.⁵⁰ According to Dr. Limeback, head of

preventive dentistry at the University of Toronto, 'Dental decay rates in North America are so low that water fluoridation provides little to no benefit whatsoever these days. In fact, studies show that when you turn the water fluoridation taps off and look for dental decay rates, they don't move whatsoever. There is no increase in dental decay when you stop fluoridating.⁵¹ Limeback adds that what you do see is an increase in unsightly dental fluorosis.⁵² Today fluorosis occurs on two or more teeth in 30% of children in areas where the water is fluoridated, and not all in its mildest form.⁵³

In a letter published in 1999, dentist and public health official Dr. John Colquhoun, formerly one of New Zealand's most prominent pro-fluoridation advocates and educators, explains how over the course of years he came to recognize that there was no benefit in water fluoridation, and that children's dental health is slightly better in non-fluoridated areas than in fluoridated ones.⁵⁴ As another sign of the growing disillusionment with fluoridation, the National Institutes of Health conducted an intensive review of the data supporting fluoride in tap waters, looking at over 560 studies, and expressed in a 2001 news release their disappointment in "the overall quality of the clinical data that it reviewed. According to the panel, far too many studies were small, poorly described, or otherwise methodologically flawed."⁵⁵

Most government agencies, however, continue to ignore the scientific evidence and to market fluoridation by making fictional claims about its benefits and pushing for its expansion. For instance, according to the U.S. Department of Health and Human Services, "National surveys of oral health dating back several decades document continuing decreases in tooth decay in children, adults and senior citizens. Nevertheless, there are parts of the country and particular populations that remain without protection. For these reasons, the USPHS...has set a national goal for the year 2000 that 75% of persons served by community water systems will have access to optimally fluoridated drinking water; currently this figure is just about 60%. The year 2000 target goal is both desirable and yet challenging, based on past progress and continuing evidence of effectiveness and safety of this public health measure."⁵⁶

This statement is flawed on several accounts. First, as we've seen, research does not support the effectiveness of fluoridation for preventing tooth disease. Second, purported benefits are supposedly for children, not adults and senior citizens. At about age 13, any advantage fluoridation might offer comes to an end and less than 1% of the fluoridated water supply reaches this population.⁵⁷ And third, fluoridation has never been proven safe. On the contrary, numerous studies directly link fluoridation to disease, including skeletal fluorosis, dental fluorosis, thyroid disorders, brain and kidney damage, Alzheimer's disease, lead poisoning, and several rare forms of cancer. This alone should force us to reconsider its use.

Biological Safety Concerns

Only a small margin separates supposedly beneficial fluoride levels from amounts that are known to cause adverse effects. Dr. James Patrick, a former antibiotics research scientist at the National Institutes of Health, describes the predicament:

"[There is] a very low margin of safety involved in fluoridating water. A concentration of about 1 ppm is recommended. ...in several countries, severe fluorosis has been documented from water

supplies containing only 2 or 3 ppm. In the development of drugs... we generally insist on a therapeutic index (margin of safety) of the order of 100; a therapeutic index of 2 or 3 is totally unacceptable, yet that is what has been proposed for public water supplies."⁵⁸

Other countries argue that even 1 ppm is not a safe concentration. Canadian studies, for example, imply that children under three should have no fluoride whatsoever. The Journal of the Canadian Dental Association states that "fluoride supplements should not be recommended for children less than 3 years old."⁵⁹ Since these supplements contain the same amount of fluoride as water does, they are basically saying that children under the age of three shouldn't be drinking fluoridated water at all, under any circumstance. Japan has reduced the amount of fluoride in their drinking water to one-eighth of what is recommended in the U.S. Instead of 1 milligram per liter, they use less than 15 hundredths of a milligram per liter as the upper limit allowed.⁶⁰

The 1 ppm dosage recommendation for water fluoridation has a checkered past, and its present is even more so. As we have seen, the first mention of this "magic" number was made by Dr. Trendley Dean, who juggled his results to reach the conclusion that "fluoride levels of up to 1.0 ppm in drinking water did not cause mottled enamel; if the fluoride exceeded this level, however, fluorosis would occur."⁶¹

But the adoption of this dosage for water fluoridation was not Dean's brainchild. It was set in 1953 by Dr. Harold C. Hodge, Ph.D., then chairman of the US National Academy of Sciences committee on toxicology. Unfortunately, Dr. Hodge made a serious miscalculation in his estimate of the safe dosage level for fluoride. His figures err by a factor of 2.25, which means that they understate the toxicity of fluoride considerably. The story of this potentially fatal miscalculation is told in a document from the UK National Pure Water Association:

"It is important when any new drug is marketed that the dose at which it is toxic is determined. There is then a margin allowed for safety (usually a factor of 100) and a maximum dose is published. In 1953 the National Academy of Sciences published their estimate of the quantity of fluoride which produces the condition known as crippling skeletal fluorosis. The calculation was done by a famous toxicologist, Harold C. Hodge, Ph.D., who was chairman of the US National Academy of Sciences (NAS) committee on toxicology.

To arrive at his figures, Hodge cited a classic study of the effects of fluoride among cryolite workers by a European researcher, Kaj Roholm, and published in 1937. Roholm's dosage figures were presented in milligrams of fluoride per kilogram of body weight. In his study, Roholm showed that at levels of 0.2 to 0.35mg/kg some workers developed crippling skeletal fluorosis in a very short time. The first stage of the disease appeared, in general, after 2 1/2 years; Stage two was reached by 4 1/2 years; and crippling skeletal fluorosis appeared after 11 years."⁶²

Hodge wanted to apply Roholm's figures to a typical range of body weights in order to set a maximum intake level in milligrams per day. But Hodge was American and used to dealing in pounds rather than kilograms. By using a range of body weights from 100 to 229 pounds, he multiplied the 0.2 mg figure by 100 pounds, giving a figure of 20 mg/day; and 0.35 mg by 229

pounds yielded 80 mg/day. Thus the amounts of fluoride which would cause crippling skeletal fluorosis, he said, were 20mg to 80mg per day. And rather than quote Roholm's eleven year figure for crippling fluorosis, he gave a range of 10 to 20 years. These are the figures that appear in the American Dental Association's pamphlet, Fluoridation Facts, and on which many other articles are based, even today.

But Hodge made a simple but significant error. Roholm's figures were not for pounds. They were milligram per kilogram figures. Unfortunately, Hodge was the expert and no-one, apparently, checked his figures. This error, which gave a false safety margin more than double what it should have been went unnoticed for many years until anti-fluoride campaigner, Darlene Sherrell tried to duplicate Hodge's arithmetic and couldn't make it add up. She worked out that Hodge had made an error when he neglected to convert pounds to kilograms.

Correcting for this error, Sherrell reduced the amount of fluoride needed to be crippling to 10 to 25 milligrams per day, for 10 to 20 years.

But fluorides accumulate throughout our lives so a higher intake will have the same effect in a shorter time, and smaller doses will have the same effect in a longer time. If we apply Roholm's dosage figures to a lifetime of 55 to 96 years, just 1 mg per day (the amount in one liter of water) for each 55 pounds of body weight could be a crippling dosage.

The NAS Admits It Was Wrong

In 1989 Sherrell wrote to the NAS and asked on what they based their 20 to 80 mg/day figures. Two years passed before the Academy told her that they had identified Hodge's interpretation of Roholm as the data source.

Four years later the error was finally corrected by the National Research Council's Board on Environmental Studies and Toxicology in their 1993 publication, *Health Effects of Ingested Fluoride* where they changed the figure from 20-80mg/day to 10-20mg/day.⁶³

As it happens, Hodge had written a chapter in a book released in 1979 entitled *Continuing Evaluation of the Use of Fluorides*. In it Hodge had corrected his previously published figures. But nobody seemed to notice. In 1991, when the US Department of Health and Human Services published their Review of Fluoride: Benefits and Risks, they continued to use figures of 20-80 mg/day as the 'crippling daily dose of fluoride'. As, indeed does the current RDA and Dietary Reference Intakes published by the Institute of Medicine in 1997.

Myths are Very Hard to Dislodge

We can get a good idea of how much fluoride is safe by working with Roholm's figures. You will remember that after the figures had been corrected, the amount needed to cause crippling fluorosis in a 100 to 229 lb person was reckoned to be 10 to 20 mg per day for 10 to 20 years. Since fluorides accumulate in a linear fashion, the crippling dosage of 10 mg per day for 10 years is the same as 5 mg per day for 20 years, and so on. If we extrapolate this to a normal lifetime with fluoridated water this is the same as 2.5 to 5 mg per day for 40 to 80 years. But we should

note that, for persons with kidney disease, the risk is greater because less fluoride will be eliminated by their malfunctioning kidneys.

It is also important to note that these figures are for crippling fluorosis, the last stage. It will take only four years at 10 mg/day, or sixteen years at 2.5 mg per day before a 100 pound individual can expect to experience phase 2, musculo-skeletal fluorosis, with chronic joint pain and arthritic symptoms - with or without osteoporosis. That is the amount of fluoride found in just 2 1/2 liters of water. And that's without counting the extra that today is inevitably found in foods, toothpaste, et cetera

From this it is clear that the only safe limit for fluoride is *none*.

Even supposing that low concentrations are safe, there is no way to control how much fluoride different people consume, as some take in a lot more than others. For example, laborers, athletes, diabetics, and those living in hot or dry regions can all be expected to drink more water, and therefore more fluoride (in fluoridated areas) than others.⁶⁴ Due to such wide variations in water consumption, it is impossible to scientifically control what dosage of fluoride a person receives via the water supply.⁶⁵

In "50 Reasons to Oppose Fluoridation,"⁶⁶ Paul Connett, Ph.D., Professor of Chemistry at St. Lawrence University (NY) states that the supposedly safe fluoride levels in our water may pose a particular danger for any of the millions of people who suffer from thyroid disorders. He explains:

"Earlier in the 20th century, fluoride was prescribed by a number of European doctors to reduce the activity of the thyroid gland for those suffering from hyperthyroidism (over active thyroid)."⁶⁷

With water fluoridation, we are forcing people to drink a thyroid-depressing medication which could serve to promote higher levels of hypothyroidism (under active thyroid) in the population, and all the subsequent problems related to this disorder. Such problems include depression, fatigue, weight gain, muscle and joint pains, increased cholesterol levels, and heart disease.

It bears noting that according to the Department of Health and Human Services (1991) fluoride exposure in fluoridated communities is estimated to range from 1.58 to 6.6 mg/day, which is a range that actually overlaps the dose (2.3 - 4.5 mg/day) shown to decrease the functioning of the human thyroid.⁶⁸ This is a remarkable fact, and certainly deserves greater attention considering the rampant and increasing problem of hypothyroidism in the United States. (In 1999 the second most prescribed drug of the year was Synthroid, a hormone replacement drug, which is used to treat an under active thyroid.) More than twenty million people in the U.S. receive treatment for thyroid problems and many others are thought to go undiagnosed.⁶⁹

Today, 90% of the fluoride added to our drinking water is no longer a natural sodium fluoride compound. Today's fluoride is industrial waste that is complexed with silica or sodium. "Fluoride complexed with silica or sodium is readily ionized to free fluoride ions that are quickly absorbed in the gastrointestinal tract, whereas, when chemically bound to calcium, less of it ionizes and

less is absorbed. Calcium inhibits fluoride absorption and is, in fact, the treatment of choice for fluoride ingestion overdoses."⁷⁰

Another concern is that fluoride is not found only in drinking water; it is everywhere. Fluoride is found in foods that are processed, which, in the United States, include nearly all bottled drinks and canned foods.⁷¹ Researchers writing in *The Journal of Clinical Pediatric Dentistry* have found that fruit juices, in particular, contain significant amounts of fluoride. In a recent study, a variety of popular juices and juice blends were analyzed and it was discovered that 42% of the samples examined had more than 1 ppm of fluoride, with some brands of grape juice containing much higher levels - up to 6.8 ppm! The authors cite the common practice of using fluoride-containing insecticide in growing grapes as a factor in these high levels, and they suggest that the fluoride content of beverages be printed on their labels, as is other nutritional information.⁷² Considering how much juice some children ingest, and the fact that youngsters often insist on particular brands that they consume day after day, labeling seems like a prudent idea.

Clean water activist Jeff Green points out that fluoride is "in Wheaties at 10 ppm, 10 times the amount that you find in water. It's in Post Grape Nuts and Shredded Wheat and Fruit Loops. These are items that people are eating all the time without realizing that it has fluoride in it. Because it's a pesticide residue that's allowed to be on produce now it's taken a big jump and the EPA has allowed it to be at really high levels, 180 ppm on a head of lettuce, 55 ppm on raisins. I mean no child is going to wash all that off."⁷³

Prepared baby foods are a problem, too. A 1997 article in the *Journal of the American Dental Association*⁷⁴ warns that some baby foods contain such high levels of fluoride that babies who eat the food risk dental fluorosis. "Any infants who regularly eat more than a couple of ounces of infant foods containing high-fluoride-content chicken would be at elevated fluorosis risk," the authors conclude.⁷⁵ Infants who eat large quantities of dry infant cereals reconstituted with fluoridated water could ingest substantial quantities of fluoride from this source, this study shows. "Children should also be monitored to make sure that they do not ingest too much fluoride from other sources such as fluoride dentifrice, dietary fluoride supplements or fluoridated water...."⁷⁶

Fluoride exposure during infancy can be expected to increase risk of fluoride-related illness, since a recent study shows that the first year of life is the most critical period for fluoride exposure. Children exposed during the first year of life, and to a lesser extent in the second year, are far more likely to develop fluorosis than those whose exposure begins later. The early mineralizing teeth—the central incisors and first molars—are most likely to be affected.⁷⁷

This is confirmed by a recent study of fluorosis risk. "There is substantial evidence that fluoridated water, fluoride supplements, infant formulas, and fluoride toothpastes are risk factors for fluorosis," alone and together, reports Ohio State University researcher Dr. Ana Karina Mascarenhas.⁷⁸

A recent study of fluoridated and non-fluoridated communities in Brazil proved that fluoride toothpaste contributes to fluorosis. In the study, children who started using fluoride before the

age of three were 4.43 times more likely to have dental fluorosis than those who started using it after the age of three.⁷⁹

Dr. Connett observes that "the level of fluoride put into water (1 ppm) is 100 times higher than normally found in mothers' milk (0.01 ppm). There are no benefits, only risks, for infants ingesting this heightened level of fluoride at such an early age (this is an age where susceptibility to environmental toxins is particularly high)."⁸⁰

Fluorosis get worse as a child approaches puberty, according to study done in Norway. The study showed a significant increase in the severity of fluorosis with increasing age in a high fluoride community, whereas no change in severity with age was observed in a low fluoride community. Fluorosis resulting from high fluoride content of drinking water increases between the ages of ten and fourteen.⁸¹

But beyond this is the larger issue that this study brings up: Is it wise to subject children and others who are heavy juice drinkers to additional fluoride in their water?

Here's a little-publicized reality: Cooking can greatly increase a food's fluoride content. Peas, for example, contain 12 micrograms of fluoride when raw and 1500 micrograms after they are cooked in fluoridated water, which is a tremendous difference. Furthermore, fluoride is an ingredient in pharmaceuticals, aerosols, insecticides, and pesticides.

And of course, toothpastes. It's interesting to note that in the 1950s, fluoridated toothpastes were required to carry warnings on their labels saying that they were not to be used in areas where water was already fluoridated. Crest toothpaste went so far as to write: "Caution: Children under 6 should not use Crest." These regulations were dropped in 1958, although no new research was available to prove that the overdose hazard no longer existed. Today, common fluoride levels in toothpaste are 1000 ppm. Research chemist Woodfun Ligon notes that swallowing a small amount adds substantially to fluoride intake. Dentists say that children commonly ingest up to 0.5 mg of fluoride a day from toothpaste.⁸²

Dr. Hardy Limeback cites studies conducted by the toothpaste manufacturers showing that children under the age of six typically swallow as much as 60 percent of the toothpaste that goes into their mouths. "The warning labels, in my personal opinion, are there to get them off the hook in the next ten years. People who have been exposed to too much fluoride ingestion before the tubes were labeled have a case against the toothpaste companies. They weren't told that a lifetime of fluoride ingestion may be harmful."⁸³

Which begs the question: How safe is all this fluoride? According to scientists and informed doctors, such as Dr. John Lee, it is not safe at all. Dr. Lee first took an anti-fluoridation stance back in 1972, when as chairman of an environmental health committee for a local medical society, he was asked to state their position on the subject. He stated that after investigating the references given by both pro- and anti-fluoridationists, the group discovered three important things:

"One, the claims of benefit of fluoride, the 60% reduction of cavities, was not established by any of these studies. Two, we found that the investigations into the toxic side effects of fluoride have not been done in any way that was acceptable. And three, we discovered that the estimate of the amount of fluoride in the food chain, in the total daily fluoride intake, had been measured in 1943, and not since then. By adding the amount of fluoride that we now have in the food chain, which comes from food processing with fluoridated water, plus all the fluoridated toothpaste that was not present in 1943, we found that the daily intake of fluoride was far in excess of what was considered optimal."⁸⁴

What happens when fluoride intake exceeds the optimal? The inescapable fact is that this substance has been associated with severe health problems, ranging from skeletal and dental fluorosis to bone fractures, to fluoride poisoning, and even to cancer.

Dental Fluorosis

The publication *Health Effects of Ingested Fluoride*, put out by the National Academy of Sciences, reports that in areas with optimally fluoridated water (1 ppm, either natural or added), dental fluorosis levels in recent years ranged from 8 to 51%. Recently, a prevalence of slightly over 80% was reported in children 12-14 years old in Augusta, Georgia.⁸⁵ Other research gives higher figures. In a report entitled "Trends in Prevalence of Dental Fluorosis in North America," studies found that 35% to 60% of people living in fluoridated communities experience dental fluorosis, while non-fluoridated areas figure from 20% to 45%.⁸⁶

Fluoride is a noteworthy chemical additive in that it's officially acknowledged benefit and damage levels are about the same. Writing in *The Progressive*, science journalist Daniel Grossman elucidates this point: "Though many beneficial chemicals are dangerous when consumed at excessive levels, fluoride is unique because the amount that dentists recommend to prevent cavities is about the same as the amount that causes dental fluorosis."⁸⁷ Although the American Dental Association and the United States Government consider dental fluorosis only a cosmetic problem, the *American Journal of Public Health* says that "...brittleness of moderately and severely mottled teeth may be associated with elevated caries levels."⁸⁸ In other words, in these cases the fluoride is causing the exact problem that it's supposed to prevent. Yiamouyiannis adds, "In highly naturally-fluoridated areas, the teeth actually crumble as a result. These are the first visible symptoms of fluoride poisoning."⁸⁹

Also, when considering dental fluorosis, there are factors beyond the physical that you can't ignore - the negative psychological effects of having moderately to severely mottled teeth. These were recognized in a 1984 National Institute of Mental Health panel that looked into this problem.⁹⁰

A telling trend is that TV commercials for toothpaste, and toothpaste tubes themselves, are now downplaying fluoride content as a virtue. This was noted in an article in the *Sarasota/Florida ECO Report*,⁹¹ whose author, George Glasser, feels that manufacturers are distancing themselves from the additive because of fears of lawsuits. The climate is ripe for these and Glasser points out that such a class action suit has already been filed in England against the manufacturers of fluoride-containing products on behalf of children suffering from dental fluorosis. A major threat

when one considers that the CDC is reporting anywhere from 1/3 to 1/2 of all school children in the US suffer from fluoride overdose and sport the pitted, discoloration of dental fluorosis.⁹²

Still, certain segments of industry have yet to get the message. A recent newspaper ad campaign promotes Dannon's "Fluoride to Go" spring water "for kids who can't sit still."⁹³ Supplied in convenient kid-sized bottles with the pop-up "athletic" cap kids adore, the product perpetuates fluoride's false promise of better dental health for the new generation of kids for whom bottled water is more desirable than soda pop. The irony is that the shift from pop to water is one thing that does impact children's dental health significantly. Fluoride is totally out of place in this scenario. It makes one wonder how much fluoride might be in other brands of bottled water, including Evian and Volvic, which are owned by Dannon's parent company.

Skeletal Fluorosis

When fluoride is ingested, approximately 93% of it is absorbed into the bloodstream. A good part of the material is excreted, but the rest is deposited in the bones and teeth,⁹⁴ and is capable of causing a crippling skeletal fluorosis. This is a condition that can damage the musculoskeletal and nervous systems and result in muscle wasting, limited joint motion, spine deformities, and calcification of the ligaments, as well as neurological deficits.⁹⁵

Large numbers of people in Japan, China, India, the Middle East, and Africa have been diagnosed with skeletal fluorosis from drinking naturally fluoridated water. In India alone, nearly a million people suffer from the affliction.⁹⁶ While only a dozen cases of skeletal fluorosis have been reported in the United States, Chemical and Engineering News states that "critics of the EPA standard speculate that there probably have been many more cases of fluorosis - even crippling fluorosis - than the few reported in the literature because most doctors in the U.S. have not studied the disease and do not know how to diagnose it."⁹⁷ Because some symptoms of skeletal fluorosis mimic those of arthritis, the first two clinical phases of fluorosis can be easily misdiagnosed.⁹⁸ According to Dr. Paul Connett, the causes of most forms of osteoarthritis are unknown. It is not implausible that the high prevalence of arthritis in America (42 million Americans have it) may be related to our high levels of fluoride intake.⁹⁹

Dr. Hardy Limeback says, "We're quite concerned that fluoride accumulates through a lifetime of water fluoridation and causes the bone to become more brittle. We've started a study, and we're close to publishing it, that shows that people who have been exposed to just 20 to 30 years of water fluoridation have twice the amount of fluoride in their bones. Now there are all kinds of epidemiological studies to show that people who live in fluoridated areas have a higher risk for hip and other kinds of fractures, such as forearm fractures when they fall down. So this is quite a concern. I personally don't think that we need to be ingesting fluoride to protect our kids' teeth because they're already protected at a maximum. The rest of us are swallowing all this fluoride from the drinking water and possibly increasing the risk for bone fracture. It just doesn't make sense at all."¹⁰⁰

Radiological changes in bone occur when fluoride exposure is 5 mg/day, according to the late Dr. George Waldbott, author of *Fluoridation: The Great Dilemma*. While this 5 mg/day level is the amount of fluoride ingested by most people living in fluoridated areas,¹⁰¹ the number

increases for diabetics and laborers, who can ingest up to 20 mg of fluoride daily. In addition, a survey conducted by the Department of Agriculture shows that 3% of the U.S. population drinks 4 liters or more of water every day. If these individuals live in areas where the water contains a fluoride level of 4 ppm, allowed by the EPA, they are ingesting 16 mg/day from the consumption of water alone, and are thus at greater risk for getting skeletal fluorosis.¹⁰²

Bone Fractures

At one time, fluoride therapy was recommended for building denser bones and preventing fractures associated with osteoporosis. Because fluoride has been strongly associated with bone fragility and breakage, several articles in peer-reviewed journals now suggest that fluoride actually causes more harm than good. Three studies reported in *The Journal of the American Medical Association* showed links between hip fractures and fluoride.^{103, 104, 105} Findings here were, for instance, that there is "a small but significant increase in the risk of hip fractures in both men and women exposed to artificial fluoridation at 1 ppm."¹⁰⁶ In addition, the *New England Journal of Medicine* reports that people given fluoride to cure their osteoporosis actually wound up with an increased non-vertebral fracture rate.¹⁰⁷ Austrian researchers have also found that fluoride tablets make bones more susceptible to fractures.¹⁰⁸ The U.S. National Research Council states that the U.S. hip fracture rate is now the highest in the world.¹⁰⁹

A 2000 article in the journal *Fluoride* describes the bone effects of fluoride in detail.¹¹⁰ Fluoride may increase bone quantity (osteofluorosis, osteosclerosis) but also decrease bone quality and bone strength. It is well known that pharmacological doses of fluoride increase the risk of torsion-type fractures (such as hip fractures) despite the appearance of greater bone density. Conventional medicine interprets the observed fluoride-induced increase of serum alkaline phosphatase concentration as a sign of osteoblast activity. Actually, it is a reflection of increased mortality of osteocytes within bone. Osteocytes are rich in alkaline phosphatase, which is released when the cells are killed by fluoride. It is unlikely, therefore, that a window of fluoride-induced bone benefit exists.¹¹¹

Louis V. Avioli, professor at the Washington University School of Medicine, says in a 1987 review of the subject: "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 the propensity for hip fractures and increases the incidence of stress fractures in the extremities."¹¹²

Fluoride's deleterious effect on bone is well documented. Early experiments using large doses of fluoride as a treatment for osteoporosis had disastrous results. Dr. C. Rich warned that rather than strengthening bones, fluoride could cause osteoarthritis, as well as gastric pain, calcification of the arteries, and visual disturbances.¹¹³

Dr. Paul Connett cites two epidemiological studies suggesting a possible association with osteosarcoma, bone cancer, in young men living in fluoridated areas.¹¹⁴ One is the report of the U.S. National Toxicology Program mentioned earlier, which first uncovered the epidemiological evidence of increased osteosarcoma in boys and young men living in fluoridated areas.¹¹⁵ The second is a study conducted by the New Jersey Department of Health. Dr. Perry Cohn studied the

incidence of the rare bone cancer in seven New Jersey counties relative to water fluoridation. In fluoridated areas incidence of osteosarcoma in boys under the age of ten was 4.6 times higher than in un-fluoridated areas, 3.5 times higher in the 10 to 19 age group, and over twice as high in the 20 to 49 age group.¹¹⁶

Scientists at Yale University discovered that doses as low as 1 ppm of fluoride decrease bone strength and elasticity, making fracture more likely.¹¹⁷ Another group of researchers found that fluoride accelerated the development of osteoporosis.¹¹⁸ A 1992 study of elderly patients found 'a small but significant increase in the risk of hip fracture in both men and women exposed to artificial fluoridation at 1 part per million'. As with the bone cancer, the adverse effects of fluoride accumulation on bone strength were greater with men.¹¹⁹

Fluoride has the potential to increase skeletal mass to a greater extent than any other pharmacologic agent, yet it has proven difficult to translate this into therapeutic benefit for patients with low bone mass in diseases such as osteoporosis, according to a 1996 study by Michigan's Center for Osteoporosis Research. This apparent paradox can be explained in part by toxic actions of the ion on skeletal mineralization, impairment of the normal processes of bone re-absorption, and fluoride-induced decreases in strength per unit of bone (mass or volume).¹²⁰

Belgian arthritis researchers reviewed thirty years clinical research on fluoride in the treatment of osteoporosis. They point out that fluoride has a dual effect on osteoblasts (the cells from which bones are made). On the one hand, it increases the birthrate of osteoblasts, while on the other hand it has a toxic effect on the individual cell with mineralization impairment and reduced apposition rate resembling osteomalacia. Fluoride has a positive effect on axial bone density, they say, but the axial bone gain is not matched by similar changes in cortical bone. (The cortical bone is the hard outer part of bone where a bone's main strength lies.)¹²¹

Among the studies cited, two show an increased rate of hip fracture among patients treated with high doses of fluoride (50-75 mg per day).^{122,123}

In an experiment conducted with bovine bones, fluoride treatment reduced the mechanical strength of bone tissue by converting small amounts of bone mineral to mostly calcium fluoride. This action reduces the structurally effective bone mineral content and also possibly affects the interface bonding between the bone mineral and the organic matrix of the bone tissue.¹²⁴ A Polish study published in 1999 found that treatment with fluoridated water decreases the bending strength of the femoral neck and shaft in laboratory rats.

A New Zealand review of recent scientific literature reveals a consistent pattern of evidence--hip fractures, skeletal fluorosis, the effect of fluoride on bone structure, fluoride levels in bones and osteosarcomas--pointing to the existence of causal mechanisms by which fluoride damages bones. Public health authorities in Australia and New Zealand have appeared reluctant to consider openly and frankly the implications of this and earlier scientific evidence unfavorable to the continuation of the fluoridation of drinking water supplies.¹²⁵

Dr. Connett reports that, of eighteen studies conducted since 1990, ten have found an association between water fluoridation and hip fractures in the elderly.¹²⁶ "One study found a dose-related

increase in hip fracture as the concentration of fluoride rose from 1 ppm to 8 ppm (Li et al, 1999, to be published). Hip fracture is a very serious issue for the elderly, as a quarter of those who have a hip fracture die within a year of the operation, while 50 percent never regain an independent existence."¹²⁷

Fluoride Poisoning

In May 1992, 260 people were poisoned, and one man died, in Hooper Bay, Alaska, after drinking water contaminated with 150 ppm of fluoride. The accident was attributed to poor equipment and an unqualified operator.¹²⁸ Was this a fluke? Not at all. Over the years, the CDC has recorded several incidents of excessive fluoride permeating the water supply and sickening or killing people. We don't usually hear about these occurrences in news reports, but interested citizens have learned the truth from data obtained under the Freedom of Information Act. Here is a partial list of toxic spills we have not been told about:

- July 1993 -Chicago, Illinois: Three dialysis patients died and five experienced toxic reactions to the fluoridated water used in the treatment process. The CDC was asked to investigate, but to date there have been no press releases.
- May 1993 - Kodiak, Alaska (Old Harbor): The population was warned not to consume water due to high fluoride levels. They were also cautioned against boiling the water, since this concentrates the substance and worsens the danger. Although equipment appeared to be functioning normally, 22-24 ppm of fluoride was found in a sample.
- July 1992 -Marin County, California: A pump malfunction allowed too much fluoride into the Bon Tempe treatment plant. Two million gallons of fluoridated water were diverted to Phoenix Lake, elevating the lake surface by more than two inches and forcing some water over the spillway.
- December 1991 - Benton Harbor, Michigan: A faulty pump allowed approximately 900 gallons of hydrofluosilicic acid to leak into a chemical storage building at the water plant. City engineer Roland Klockow stated, "The concentrated hydrofluosilicic acid was so corrosive that it ate through more than two inches of concrete in the storage building." This water did not reach water consumers, but fluoridation was stopped until June 1993. The original equipment was only two years old.
- July 1991 - Porgate, Michigan: After a fluoride injector pump failed, fluoride levels reached 92 ppm and resulted in approximately 40 children developing abdominal pains, sickness, vomiting, and diarrhea at a school arts and crafts show.
- November 1979 - Annapolis, Maryland: One patient died and eight became ill after renal dialysis treatment. Symptoms included cardiac arrest (resuscitated), hypotension, chest pain, difficulty breathing, and a whole gamut of intestinal problems. Patients not on dialysis also reported nausea, headaches, cramps, diarrhea, and dizziness. The fluoride level was later found to be 35 ppm; the problem was traced to a valve at a water plant that had been left open all night.¹²⁹

Instead of addressing fluoridation's problematic safety record, officials have chosen to cover it up. For example, the ADA says in one booklet distributed to health agencies that "Fluoride feeders are designed to stop operating when a malfunction occurs... so prolonged over-fluoridation becomes a mechanical impossibility."¹³⁰ In addition, the information that does reach

the population after an accident is woefully inaccurate. A spill in Annapolis, Maryland, placed thousands at risk, but official reports reduced the number to eight.¹³¹ Perhaps officials are afraid they will invite more lawsuits like the one for \$480 million by the wife of a dialysis patient who became brain-injured as the result of fluoride poisoning.

Not all fluoride poisoning is accidental. For decades, industry has knowingly released massive quantities of fluoride into the air and water. Disenfranchised communities, with people least able to fight back, are often the victims. Medical writer Joel Griffiths relays this description of what industrial pollution can do, in this case to a devastatingly poisoned Indian reservation:

"Cows crawled around the pasture on their bellies, inching along like giant snails. So crippled by bone disease they could not stand up, this was the only way they could graze. Some died kneeling, after giving birth to stunted calves. Others kept on crawling until, no longer able to chew because their teeth had crumbled down to the nerves, they began to starve...." They were the cattle of the Mohawk Indians on the New York-Canadian St. Regis Reservation during the period 1960-1975, when industrial pollution devastated the herd - and along with it, the Mohawks' way of life. ...Mohawk children, too, have shown signs of damage to bones and teeth."¹³²

Mohawks filed suit against the Reynolds Metals Company and the Aluminum Company of America (Alcoa) in 1960, but ended up settling out of court, where they received \$650,000 for their cows.¹³³

Cancer

Numerous studies demonstrate links between fluoridation and cancer; however, agencies promoting fluoride consistently refute or cover up these findings.

Even in the earliest days of fluoridation there were clear indications of the fluoride-cancer link. In the early 1950s Dr. Alfred Taylor, a biochemist at the University of Texas conducted a series of experiments in which cancer-prone mice consuming water treated with sodium fluoride were found to have shorter life spans than similar mice drinking distilled water.¹³⁴ Taylor's studies were carried out twice, because after the first run the scientist himself discovered that the chow that his mice had eaten had itself contained fluoride, thus clouding the results. On his own initiative, Taylor ran the whole experiment a second time. The second run, with mice fed fluoride-free chow, was conclusive. Clearly fluoride could no longer be considered a harmless additive to drinking water.¹³⁵

John Remington Graham and Pierre-Jean Morin, in their exhaustive survey of fluoridation litigation¹³⁶ observe that "Taylor's work was published at a politically sensitive time, because the last stages of the much-boasted surveys at Newburgh and Kingston were underway. The obvious meaning of Dr. Taylor's results was that a possible danger to human health had been overlooked, and that widespread fluoridation should be delayed until the situation had been clarified. However, the ADA and the USPHS had already endorsed and begun the drive to promote fluoridation."¹³⁷

What happened next is a classic study in denial. The Final Report published by the authors of the Newburgh-Kingston study refers only to the results of Taylor's first round of tests, even though his second, conclusive round had been peer-reviewed and published over two years before. They wrote:

"The reports by Alfred Taylor, a biochemist at the University of Texas, on the increased incidence of cancer in mice drinking fluoride treated water have been shown to be unfounded, since the food he was giving the mice had many times the fluoride content of drinking water, and the food was supplied to both the control and the experimental groups. Subsequent tests did not confirm the differences."¹³⁸

And this same denial has been repeated over and over for the succeeding 45 years by the United States Public Health Service and its affiliates. Graham and Morin cite a standard history of the National Institute of Dental Research, published over 35 years later, alleging that Dr. Taylor refrained from publishing his findings "because he was unable to confirm those results in a second experiment."¹³⁹ The author of this fabrication goes on to say that "a literature search of scientific journals failed to show any publication of this work by Taylor..."¹⁴⁰ Legal scholars Graham and Morin comment: "The most powerful forensic evidence of the importance of Dr. Taylor's work is that the USPHS officials have done so much to conceal it."¹⁴¹

That was not to be the last study to reveal carcinogenic effects for fluoride, and it was not to be the last fluoride-related cover-up. In 1977, Dr. John Yiamouyiannis and Dr. Dean Burk, former chief chemist at the National Cancer Institute, released a study that linked fluoridation to 10,000 cancer deaths per year in the U.S. Their inquiry, which compared cancer deaths in the ten largest fluoridated American cities to those in the ten largest un-fluoridated cities between 1940 and 1950, discovered a 5% greater rate in the fluoridated areas.¹⁴² The NCI disputed these findings, since an earlier analysis of theirs apparently failed to pick up these extra deaths. Federal authorities claimed that Yiamouyiannis and Burk were in error, and that any increase was caused by statistical changes over the years in age, gender, and racial composition.¹⁴³

In order to settle the question of whether or not fluoride is a carcinogen, a Congressional subcommittee instructed the National Toxicology Program (NTP) to perform another investigation.¹⁴⁴ That study, due in 1980, was not released until 1990. However, in 1986, while the study was delayed, the EPA raised the standard fluoride level in drinking water from 2.4 to 4 ppm.¹⁴⁵ After this step, some of the government's own employees in NFFE Local 2050 took what the Oakland Tribune termed the "remarkable step of denouncing that action as political."¹⁴⁶

When the NTP study results became known in early 1990, union president Dr. Robert Carton, who works in the EPA's Toxic Substances Division, published a statement. It read, in part:

"Four years ago, NFFE Local 2050, which represents all 1100 professionals at EPA headquarters, alerted then Administrator Lee Thomas to the fact that the scientific support documents for the fluoride in drinking water standard were fatally flawed. The fluoride juggernaut proceeded as it apparently had for the last 40 years - without any regard for the facts or concern for public health.

EPA raised the allowed level of fluoride before the results of the rat/mouse study ordered by Congress in 1977 was complete. Today, we find out how irresponsible that decision was. The results reported by NTP, and explained today by Dr. Yiamouyiannis, are, as he notes, not surprising considering the vast amount of data that caused the animal study to be conducted in the first place. The results are not surprising to NFFE Local 2050 either. Four years ago we realized that the claim that there was no evidence that fluoride could cause genetic effects or cancer could not be supported by the shoddy document thrown together by the EPA contractor.

It was apparent to us that EPA bowed to political pressure without having done an in-depth, independent analysis, using in-house experts, of the currently existing data that show fluoride causes genetic effects, promotes the growth of cancerous tissue, and is likely to cause cancer in humans. If EPA had done so, it would have been readily apparent - as it was to Congress in 1977 - that there were serious reasons to believe in a cancer threat.

The behavior by EPA in this affair raises questions about the integrity of science at EPA and the role of professional scientists, lawyers and engineers who provide the interpretation of the available data and the judgments necessary to protect the public health and the environment. Are scientists at EPA there to arrange facts to fit preconceived conclusions? Does the Agency have a responsibility to develop world-class experts in the risks posed by chemicals we are exposed to every day, or is it permissible for EPA to cynically shop around for contractors who will provide them the 'correct' answers?"¹⁴⁷

What were the NTP study results? Out of 130 male rats that ingested 45 to 79 ppm of fluoride, 5 developed osteosarcoma, a rare bone cancer. There were cases, in both males and females at those doses, of squamous cell carcinoma in the mouth.¹⁴⁸ Both rats and mice had dose-related fluorosis of the teeth, and female rats suffered osteosclerosis of the long bones.¹⁴⁹

When Yiamouyiannis analyzed the same data, he found mice with a particularly rare form of liver cancer, known as hepatocholangiocarcinoma. This cancer is so rare, according to Yiamouyiannis, that the odds of its appearance in this study by chance are 1 in 2 million in male mice and 1 in 100,000 in female mice.¹⁵⁰ He also found precancerous changes in oral squamous cells, an increase in squamous cell tumors and cancers, and thyroid follicular cell tumors as a result of increasing levels of fluoride in drinking water.¹⁵¹

A March 13, 1990, New York Times article commented on the NTP findings:

"Previous animal tests suggesting that water fluoridation might pose risks to humans have been widely discounted as technically flawed, but the latest investigation carefully weeded out sources of experimental or statistical error, many scientists say, and cannot be discounted."¹⁵²

In the same article, biologist Dr. Edward Groth notes: "The importance of this study...is that it is the first fluoride bioassay giving positive results in which the latest state-of-the-art procedures have been rigorously applied... It has to be taken seriously."¹⁵³

On February 22, 1990, the Medical Tribune, an international medical news weekly received by 125,000 doctors, offered the opinion of a federal scientist who preferred to remain anonymous:

"It is difficult to see how EPA can fail to regulate fluoride as a carcinogen in light of what NTP has found. Osteosarcomas are an extremely unusual result in rat carcinogenicity tests. Toxicologists tell me that the only other substance that has produced this is radium....The fact that this is a highly atypical form of cancer implicates fluoride as the cause. Also, the osteosarcomas appeared to be dose-related, and did not occur in controls, making it a clean study."¹⁵⁴

Public health officials were quick to assure a concerned public that there was nothing to worry about. The ADA said the occurrence of cancers in the lab may not be relevant to humans since the level of fluoridation in the experimental animals' water was so high. But the Federal Register, which is the handbook of government practices, disagrees: "The high exposure of experimental animals to toxic agents is a necessary and valid method of discovering possible carcinogenic hazards in man. To disavow the findings of this test would be to disavow those of all such tests, since they are all conducted according to this standard."¹⁵⁵

As a February 5, 1990, Newsweek article pointed out, "such mega dosing is standard toxicological practice. It's the only way to detect an effect without using an impossibly large number of test animals to stand in for the humans exposed to the substance."¹⁵⁶ And as the Safer Water Foundation explains, higher doses are generally administered to test animals to compensate for the animals' shorter life span and because humans are generally more vulnerable than test animals on a body-weight basis.¹⁵⁷

Several other studies link fluoride to genetic damage and cancer. An article in Mutation Research says that a study by Proctor and Gamble, the very company that makes Crest toothpaste, did research showing that 1 ppm fluoride causes genetic damage.¹⁵⁸ Results were never published but Proctor and Gamble called them "clean," meaning animals were supposedly free of malignant tumors. Not so, according to scientists who believe some of the changes observed in test animals could be interpreted as precancerous.¹⁵⁹ Yiamouyiannis says the Public Health Service sat on the data, which were finally released via a Freedom of Information Act request in 1989." Since they are biased, they have tried to cover up harmful effects," he says. "But the data speaks for itself. Half the amount of fluoride that is found in the New York City drinking water causes genetic damage."¹⁶⁰

A National Institutes of Environmental Health Sciences publication, Environmental and Molecular Mutagenesis, also linked fluoride to genetic toxicity when it stated that "in cultured human and rodent cells, the weight of evidence leads to the conclusion that fluoride exposure results in increased chromosome aberrations."¹⁶¹ The result of this is not only birth defects but the mutation of normal cells into cancer cells. The Journal of Carcinogenesis further states that "fluoride not only has the ability to transform normal cells into cancer cells but also to enhance the cancer-causing properties of other chemicals."¹⁶²

Surprisingly, the PHS put out a report called "Review of fluoride: benefits and risks," in which they showed a substantially higher incidence of bone cancer in young men exposed to fluoridated

water compared to those who were not. The New Jersey Department of Health also found that the risk of bone cancer was about three times as high in fluoridated areas as in non-fluoridated areas.¹⁶³

Despite cover-up attempts, the light of knowledge is filtering through to some enlightened scientists. Regarding animal test results, the director of the U.S. National Institute of Environmental Health Sciences, James Huff, does say that "the reason these animals got a few osteosarcomas was because they were given fluoride...Bone is the target organ for fluoride."¹⁶⁴ Toxicologist William Marcus adds that "fluoride is a carcinogen by any standard we use. I believe EPA should act immediately to protect the public, not just on the cancer data, but on the evidence of bone fractures, arthritis, mutagenicity, and other effects."¹⁶⁵

One group working to illuminate the fluoride cover up is The Environmental Working Group (EWG) out of Washington-DC. In a letter referring to a 2005 Harvard University study, EWG's Sr. Vice President Richard Wiles requested that the National Toxicology Program declared fluoride in tap water a known or probable cancer cause.¹⁶⁶ Expressing a similar sentiment to British newspaper The Observer, Wiles stated "I've spent 20 years in public health trying to protect kids from toxic exposure. Even with DDT, you don't have the consistently strong data that the compound can cause cancer as you now have with fluoride".¹⁶⁷ The study that got the EWG talking became available in 2001 and clearly linked fluoride in tap water, at levels common in most of America, to a rare form of bone cancer called osteosarcoma.¹⁶⁸

Paul Connett notes that "some of the earliest opponents of fluoride were biochemists and at least 14 Nobel Prize winners are among numerous scientists who have expressed their reservations about the practice of fluoridation."¹⁶⁹ He cites Dr. James Sumner, who won the Nobel Prize for his work on enzyme chemistry, who says, "We ought to go slowly. Everybody knows fluorine and fluoride are very poisonous substances...We use them in enzyme chemistry to poison enzymes, those vital agents in the body. That is the reason things are poisoned; because the enzymes are poisoned and that is why animals and plants die."¹⁷⁰

It is instructive to note that the fluoride compounds that are added to our drinking water are not pharmaceuticals. They are direct, unfiltered waste products of the aluminum and fertilizer industries.

Fluoride and Lead

Fluoride and its various compounds are toxic all by themselves, but its interaction with other toxic metals is of increasing concern. Research published in the December 2000 issue of the journal *NeuroToxicology* warns that public drinking water treated with sodium silicofluoride or fluosilicic acid, known silicofluorides (SiFs), is linked to higher uptake of lead in children.¹⁷¹ Less than 10% of fluoridation systems in the US use sodium fluoride, the substance first used to fluoridate public drinking water in 1945. SiF's are now used to treat drinking water for 140 million Americans. Yet the safety of SiFs has never been tested, nor have they been approved by the FDA.

The research was conducted by a team led by Roger D. Masters, Dartmouth College Research Professor and Nelson A. Rockefeller Professor of Government Emeritus, and Myron J. Coplan, a consulting chemical engineer, formerly Vice President of Albany International Corporation. The team has now studied the blood lead levels in over 400,000 children in three different samples. In each case, they found a significant link between SiF-treated water and elevated blood lead levels. The researchers found that the greatest likelihood of children having elevated blood lead levels occurs when they are exposed both to known risk factors, such as old house paint and lead in soil or water, and to SiF-treated drinking water.¹⁷²

"Our research needs further laboratory testing," said Masters. "This should have the highest priority because our preliminary findings show correlations between SiF use and more behavior problems due to known effects of lead on brain chemistry." Also requiring further examination is German research that shows SiFs inhibit cholinesterase, an enzyme that plays an important role in regulating neurotransmitters.¹⁷³

"If SiFs are cholinesterase inhibitors, this means that SiFs have effects like the chemical agents linked to Gulf War Syndrome, chronic fatigue syndrome and other puzzling conditions that plague millions of Americans," said Masters. "We need a better understanding of how SiFs behave chemically and physiologically."¹⁷⁴

"We should stop using silicofluorides in our public water supply until we know what they do," says Masters.¹⁷⁵

Fluoride and Aluminum

Lead isn't the only metal that interacts with fluoride in a toxic combination. Aluminum is another.

In 1976, Dr. D. Allman and coworkers from Indiana University School of Medicine fed animals 1 part-per-million (ppm) fluoride and found that in the presence of aluminum, in a concentration as small as 20 parts per billion, fluoride is able to cause an even larger increase in cyclic AMP levels. Cyclic AMP inhibits the migration rate of white blood cells, as well as the ability of the white blood cell to destroy pathogenic (disease-causing) organisms. The fact that fluoride toothpastes and school based mouth rinses are packaged in aluminum accentuates the effect on the body.¹⁷⁶

Research conducted by Mullenix and colleagues in 1995 indicated that rats treated with low doses of fluoride cause sex- and dose-specific behavioral aberrations with a common pattern.¹⁷⁷ Prenatal rats exposed became hyperactive, while those exposed post-natal became hypoactive. This effect was confirmed by a 2001 study in which administration of sodium fluoride with drinking water produced both behavioral and dental toxicities. A suppression of spontaneous motor activity, a shortening of Rota-rod endurance time, a decreased body weight gain and food intake, a suppression of total cholinesterase and acetyl cholinesterase activities and dental lesion were observed in test animals. Serum fluoride concentration was raised markedly and that of calcium was decreased in the animals.¹⁷⁸

A 1998 study by Julie A. Varner and colleagues at the Psychology Department of Binghamton University (NY) shows that neurotoxic effects like these are enhanced by the synergetic action of fluoride and aluminum.¹⁷⁹ Varner describes "alterations in the nervous system resulting from chronic administration of the fluoroaluminum complex or equivalent levels of fluoride in the form of sodium-fluoride. The rats were given fluoride in drinking water at the same level deemed "optimal" by pro-fluoridation groups, namely 1 part per million (1 ppm). Most pronounced damage was seen in animals that got the fluoride in conjunction with aluminum. The pathological changes found in the brain tissue of the animals were similar to the alterations found in the brains of people with Alzheimer's disease and dementia. The authors speculate that fluoride enables aluminum to cross the blood-brain barrier. These results are especially disturbing because of the low dose level of fluoride that shows the toxic effect in rats - rats are more resistant to fluoride than humans."¹⁸⁰

Another study done in Czechoslovakia adds force to the idea that aluminum may act synergistically with fluoride to trigger the mechanisms of Alzheimer's disease. The study shows that some of pathologic changes associated with AD are not induced by aluminum alone, but by the aluminofluoride complexes. These complexes may act as the initial signal stimulating impairment of homeostasis, degeneration and death of the cells. By influencing energy metabolism these complexes can accelerate the aging and impair the functions of the nervous system. "In respect to the etiology of AD, the long term action of aluminofluoride complexes may represent a serious and powerful risk factor for the development of AD," the authors conclude.¹⁸¹

Those who are under the belief that fluoride would rarely interact with aluminum have been misled. Fluoride is, in fact, a direct byproduct of aluminum production. Aluminum is often added to drinking water as a flocculating agent, by the same local water authorities who oversee the fluoridation of water. Aluminum and fluoride form a number of complexes, the most deadly of these being aluminum tetra fluoride.¹⁸² Czech researchers have shown that the body reacts to aluminum tetra fluoride as if it were a phosphate ion capable of triggering G proteins. G-proteins are water-soluble substances (i.e. hormones, neurotransmitters, and growth factors) that transmit messages from the outside to the inside of a cell.¹⁸³ Aluminum tetra-fluoride is capable of switching on G proteins without hormones, neurotransmitters, or growth factors present.¹⁸⁴ "This, notes Paul Connett, 'is the most worrisome aspect of fluoride subtle biochemistry."¹⁸⁵

Fluoride and the Pineal Gland

Another concern is fluoride's effect on the pineal gland, a small but powerful structure located between the right and left hemispheres of the brain. The pineal gland secretes melatonin, a hormone that affects such functions as sleep cycles, jet lag, hibernation in animals, immunity, and the onset of puberty. Jennifer Luke, Ph.D., found that the pineal gland attracts fluoride, and, thereby, interferes with melatonin's functions.¹⁸⁶ In autopsy studies she discovered extremely high concentrations of fluoride in the gland, averaging 9,000 ppm, and going up to 21,000 ppm in some cases.¹⁸⁷ And in an accompanying study of fluoride-treated Mongolian gerbils (the animal considered most favorable for studying effects on the pineal gland) Luke found lower levels of melatonin and earlier onset of puberty.

This research is highly suggestive. People with insomnia could be suffering as a result of fluoride's interference with melatonin production. Currently more than half the population of the United States suffers from some form of sleep disturbance.¹⁸⁸ Sleep deprivation promotes reduced immunity. Sleep-challenged people are more likely to suffer depression, stroke, or heart disease than their well-rested peers. Numerous studies have correlated insufficient melatonin production with an earlier-than-usual onset of puberty.^{189, 190}

This recalls the 1955 Newburgh-Kingston study, which produced some extremely puzzling results that scientists have yet to explain. One was the finding that girls in fluoridated Newberg were reaching menstruation five months earlier on average than the girls in un-fluoridated Kingston. This raises the question; does fluoride contribute to the alarming rates of early puberty that we are seeing?¹⁹¹ Premature menstruation is associated with a variety of ills, including breast cancer and obesity. A 2001 study published in the American Journal of Public Health reveals that early maturation nearly doubled the odds of being obese.¹⁹²

Reproductive Effects

Fluoride has long been known to undermine fertility in animals and man.¹⁹³ In 1951 commercial chinchilla breeder named W.R. Cox reported reproductive anomalies in commercially raised chinchillas fed with a high-fluoride animal feed.¹⁹⁴ When Cox changed to a low-fluoride feed, "there were increases in the number of offspring born; the number of litters, and the numbers born alive. The adult mortality rate decreased from 14.6% in 1951 to 3.3% in 1952. A number of abnormalities associated with fluoride-contaminated feed were passed on through multiple generations."¹⁹⁵

Cox, a layman, studied the scientific literature, and found more than 1400 studies indicating fluoride's adverse effect on animals, especially soft tissue damage. Cox was surprised to find that the scientists advocating public water fluoridation at the time showed no interest in these studies or their possible implications for human health.¹⁹⁶

SC Freni participated in a 1991 USPHS review of the toxicity of fluoride. Searching for studies that correlated fluoride exposure with reproductive effects in humans, he discovered that in almost 50 years of fluoridation, no one had ever study fluoride's effect on the human fetus.¹⁹⁷

Freni's 1994 review of fluoride toxicity the National Center for Toxicological Research showed decreased fertility in most animal species studied. Freni then investigated whether fluoride would also affect human birth rates. He studied counties in which the water had a fluoride content of more than 3 ppm. Most regions he studied showed an association of decreasing total fertility rates (TFR) with increasing fluoride levels. There was no evidence that this outcome resulted from selection bias, inaccurate data, or improper analytical methods.¹⁹⁸ Freni speculated that fluoride might lower protein synthesis in osteoblasts or that it inhibits the adenylyl cyclase system in human spermatozoa.¹⁹⁹

In a 1994 study of mature rats treated with sodium fluoride, Narayana and Chinoy²⁰⁰ found that fluoride interferes with androgenesis and damaged the testes by inhibiting the action of testosterone. Another study by the same team studied human spermatozoa treated with 25, 50,

and 250 mm of fluoride for 5, 10, and 20 minutes. Silver nitrate staining of fluoride-treated sperm revealed elongated heads, de-flagellation, and loss of the acrosome together with coiling of the tail. Sperm glutathione levels also showed a time-dependent decrease with complete depletion after 20 minutes, indicating rapid glutathione oxidation in detoxification of the NaF. The altered lysosomal enzyme activity and glutathione levels together with morphologic anomalies resulted in a significant decline in sperm motility with an effective dose of 250 mm.²⁰¹

Fluoride and Intelligence

Several other studies link fluoride exposure to adverse effects on intelligence.

As far back as April 1944, as part of the secret Manhattan Project, there was a memo passed around stating, "Clinical evidence suggests that C616 [uranium hydrofluoride] may have a rather marked central nervous system effect with mental confusion, drowsiness and lassitude."²⁰²

Through the following decades, numerous scientific studies determined the same thing: Fluorosis affects the nervous system and membrane lipids.

One investigation conducted in China measured the intelligence of children aged 8 to 13 with non, slight, medium, and serious fluorosis. It demonstrated a 15-19 point decrease in IQ among children in the fluorosis area as compared with the non-fluorosis area.²⁰³ Another study of children's intelligence and the metabolism of iodine and fluorine, also in China, revealed that exposure to high levels of fluoride produced increased prevalence of thyroid enlargement (29.8%) and dental fluorosis (72.9%), and a slightly lower average IQ as compared to control areas. The IQ differential was more pronounced (16.8%) when lower intelligence children were studied separately.²⁰⁴ Paul Connett cites a recent review by the Greater Boston Physicians for Social Responsibility which found that fluoride interferes with brain function in young animals and children.²⁰⁵

Enzyme Toxicity and Genetic Damage

Fluoride is a potent enzyme poison. Enzymes are special types of proteins, known as catalysts, which trigger thousands of chemical reactions in the body. Enzymes are vital to our very existence, writes Dr. Anthony Cichoke: 'During every moment of our lives, enzymes keep us going. At this very instant, millions of tiny enzymes are working throughout your body causing reactions to take place. You couldn't breathe, hold or turn the pages of this book, read its words, eat a meal, taste the food, or hear a telephone ring without enzymes. Even minute doses of 1 ppm of fluoride could prevent essential biological reactions from taking place.'²⁰⁶

While the mechanisms of enzyme destruction were not well understood in the 1940's and 50's, scientists now believe that it could be due to fluoride's interference with magnesium, a vital cofactor needed by many enzymes to perform catalytic functions. Another reason could be fluoride's ability to form strong bonds with hydrogen. Hydrogen, a strongly positive element, binds easily with the strong negatively-charged fluoride. Dr. Paul Connett explains: "Hydrogen bonding is at the very heart and soul of biochemistry. Protein structure and function revolve around hydrogen bonds. Hydrogen gives shape, and that shape can be easily manipulated with little energy. Enzymes usually catalyze around hydrogen bonds. In addition, the two strands of

DNA are held together with hydrogen bonds. So, you're striking at the very heart of biology. It's a huge red flag to be extremely careful about introducing fluoride to any living system."²⁰⁷

While critics argue that only high doses cause such effects, studies suggest that even a supposedly "safe" concentration of 1 ppm of fluoride added to drinking water is able to interfere with critical biological functions. This was demonstrated in 1977 at Austria's Siebersdorf Research Center by Dr. W. Klein and colleagues, who found that even this low dose inhibited DNA repair enzyme activity by 50 percent and caused genetic and chromosome damage.²⁰⁸ A similar study conducted at the University of Missouri confirmed these results.²⁰⁹ Scientists at Poland's Pomeranian Medical Academy found that as little as 0.6 ppm of fluoride produced chromosomal damage to human white blood cells.²¹⁰ And most recently, in January of 2008, after 3 years of investigating hundreds of studies, an NRC expert panel "concluded that fluoride can subtly alter endocrine function, especially in the thyroid – the gland that produces hormones regulation growth and metabolism".²¹¹

Sperm cells displayed "a highly significant increase in mutation" after being treated with fluoride at Holland's Leiden University.²¹² And studies at Germany's Central Laboratory for Mutagenicity Testing²¹³ and by Drs. Yiamouyannis and Burk at Columbia University²¹⁴ showed that it also caused genetic damage to eggs in both insects and laboratory animals.

The Challenge of Eliminating Fluoride

Given all the scientific challenges to the idea of the safety of fluoride, why does it remain a protected contaminant? As Susan Pare of the Center for Health Action asks, "...even if fluoride in the water did reduce tooth decay, which it does not, how can the EPA allow a substance more toxic than Alar, red dye #3, and vinyl chloride to be injected purposely into drinking water?"²¹⁵

This is certainly a logical question and, with all the significant, solid science that exists on the subject, you would think that there would be a great deal of interest in getting fluoride out of our water supply. Unfortunately, that hasn't been the case. As Dr. William Marcus, a senior science advisor in the EPA's Office of Drinking Water, has found, the top governmental priority has been to sweep the facts under the rug and, if need be, to suppress truth-tellers. Marcus explains that fluoride is one of the chemicals the EPA specifically regulates, and that he was following the data coming in on fluoride very carefully when a determination was going to be made on whether the levels should be changed. He discovered that the data were not being heeded. But that was only the beginning of the story for him. Marcus recounts what happened:

"The studies that were done by Botel Northwest showed that there was an increased level of bone cancer and other types of cancer in animals....in that same study, there were very rare liver cancers, according to the board-certified veterinary pathologists at the contractor, Botel. Those really were very upsetting because they were hepatocholangial carcinomas, very rare liver cancers....Then there were several other kinds of cancers that were found in the jaw and other places.

I felt at that time that the reports were alarming. They showed that the levels of fluoride that can cause cancers in animals are actually lower than those levels ingested in people (who take lower amounts but for longer periods of time).

I went to a meeting that was held in Research Triangle Park, in April 1990, in which the National Toxicology Program was presenting their review of the study. I went with several colleagues of mine, one of whom was a board-certified veterinary pathologist who originally reported hepatocholangial carcinoma as a separate entity in rats and mice. I asked him if he would look at the slides to see if that really was a tumor or if the pathologists at Botel had made an error. He told me after looking at the slides that, in fact, it was correct.

At the meeting, every one of the cancers reported by the contractor had been downgraded by the National Toxicology Program. I have been in the toxicology business looking at studies of this nature for nearly 25 years and I have never before seen every single cancer endpoint downgraded.... I found that very suspicious and went to see an investigator in the Congress at the suggestion of my friend, Bob Carton. This gentleman and his staff investigated very thoroughly and found out that the scientists at the National Toxicology Program down at Research Triangle Park had been coerced by their superiors to change their findings."²¹⁶

Once Dr. Marcus acted on his findings, something ominous started to happen in his life:

"...I wrote an internal memorandum and gave it to my supervisors. I waited for a month without hearing anything. Usually, you get a feedback in a week or so. I wrote another memorandum to a person who was my second-line supervisor explaining that if there was even a slight chance of increased cancer in the general population, since 140 million people were potentially ingesting this material that the deaths could be in the many thousands. Then I gave a copy of the memorandum to the Fluoride Work Group, who waited some time and then released it to the press.

Once it got into the press all sorts of things started happening at EPA -- I was getting disciplinary threats, being isolated, and all kinds of things which ultimately resulted in them firing me on March 15, 1992."²¹⁷

In order to be reinstated at work, Dr. Marcus took his case to court. In the process, he learned that the government had engaged in various illegal activities, including 70 felony counts, in order to get him fired. At the same time, those who committed perjury were not held accountable for it. In fact, they were rewarded for their efforts:

When we finally got the EPA to the courtroom...they admitted to doing several things to get me fired. We had notes of a meeting...that showed that fluoride was one of the main topics discussed and that it was agreed that they would fire me with the help of the Inspector General. When we got them on the stand and showed them the memoranda, they finally remembered and said, oh yes, we lied about that in our previous statements.

Then...they admitted to shredding more than 70 documents that they had in hand - Freedom of Information requests. That's a felony.... In addition, they charged me with stealing time from the government. They...tried to show...that I had been doing private work on government time and getting paid for it. When we came to court, I was able to show that the time cards they produced were forged, and forged by the Inspector General's staff...."²¹⁸

For all his efforts, Dr. Marcus was rehired, but nothing else has changed: "The EPA was ordered to rehire me, which they did. They were given a whole series of requirements to be met, such as paying me my back pay, restoring my leave, privileges, and sick leave and annual leave. The only thing they've done is put me back to work. They haven't given me any of those things that they were required to do."²¹⁹

What is at the core of such ruthless tactics? John Yiamouyiannis feels that the central concern of government is to protect industry, and that the motivating force behind fluoride use is the need of certain businesses to dump their toxic waste products somewhere. They try to be inconspicuous in the disposal process and not make waves. "As is normal, the solution to pollution is dilution. You poison everyone a little bit rather than poison a few people a lot. This way, people don't know what's going on."²²⁰ Since the Public Health Service has promoted the fluoride myth for over 50 years, they're concerned about protecting their reputation. So scientists like Dr. Marcus, who know about the dangers, are intimidated into keeping silent. Otherwise, they jeopardize their careers.

Dr. John Lee elaborates: "Back in 1943, the PHS staked their professional careers on the benefits and safety of fluoride. It has since become bureaucratized. Any public health official who criticizes fluoride, or even hints that perhaps it was an unwise decision, is at risk of losing his career entirely. This has happened time and time again. Public health officials such as Dr. Gray in British Columbia and Dr. Colquhoun in New Zealand found no benefit from fluoridation. When they reported these results, they immediately lost their careers.... This is what happens - the public health officials who speak out against fluoride are at great risk of losing their careers on the spot."²²¹

Yiamouyiannis adds that for the authorities to admit that they're wrong would be devastating. "It would show that their reputations really don't mean that much.... They don't have the scientific background. As Ralph Nader once said, if they admit they're wrong on fluoridation, people would ask, and legitimately so, what else have they not told us right?"²²²

Accompanying a loss in status would be a tremendous loss in revenue. Yiamouyiannis points out that "the indiscriminate careless handling of fluoride has a lot of companies, such as Exxon, U.S. Steel, and Alcoa, making tens of billions of dollars in extra profits at our expense.... For them to go ahead now and admit that this is bad, this presents a problem, a threat, would mean tens of billions of dollars in lost profit because they would have to handle fluoride properly. Fluoride is present in everything from phosphate fertilizers to cracking agents for the petroleum industry."²²³

Fluoride could only be legally disposed of at a great cost to industry. As Dr. Bill Marcus explains, "There are prescribed methods for disposal and they're very expensive. Fluoride is a very potent poison. It's a registered pesticide, used for killing rats or mice.... If it were to be disposed of, it would require a class-one landfill. That would cost the people who are producing aluminum or fertilizer about \$7000+ per 5000- to 6000-gallon truckload to dispose of it. It's highly corrosive."²²⁴

Another problem is that the U.S. judicial system, even when convinced of the dangers, is powerless to change policy. Yiamouyiannis tells of his involvement in court cases in Pennsylvania and Texas in which, while the judges were convinced that fluoride was a health hazard, they did not have the jurisdiction to grant relief from fluoridation. That would have to be done, it was ultimately found, through the legislative process.²²⁵

Dr. Hirzy, vice president of the union that represents the scientists who work for the EPA, cites three landmark cases in which judges with "no interest except in the finding of fact and administering justice"²²⁶ ruled against fluoridation. In November, 1978, Judge John Flaherty, now Chief Justice of the Supreme Court of Pennsylvania, issued findings in the case, *Aitkenhead v. Borough of West View*, tried before him in the Allegheny Court of Common Pleas.

He summarized his findings as follows.

"In my view, the evidence is quite convincing that the addition of sodium fluoride to the public water supply at one part per million is extremely deleterious to the human body, and, a review of the evidence will disclose that there was no convincing evidence to the contrary..."²²⁷

"Prior to hearing this case, I gave the matter of fluoridation little, if any, thought, but I received quite an education, and noted that the proponents of fluoridation do nothing more than try to impugn the objectivity of those who oppose fluoridation."²²⁸

In an Illinois decision, Judge Ronald Niemann concludes: "This record is barren of any credible and reputable scientific epidemiological studies and or analysis of statistical data which would support the Illinois Legislature's determination that fluoridation of the water supplies is both a safe and effective means of promoting public health."²²⁹

Judge Anthony Farris in Texas found: "[That] the artificial fluoridation of public water supplies, such as contemplated by {Houston} City ordinance No. 80-2530 may cause or contribute to the cause of cancer, genetic damage, intolerant reactions, and chronic toxicity, including dental mottling, in man; that the said artificial fluoridation may aggravate malnutrition and existing illness in man; and that the value of said artificial fluoridation is in some doubt as to reduction of tooth decay in man."

Dr. Hirzy, himself a toxicologist and an expert in environmental management and risk assessment, comments: "The significance of Judge Flaherty's statement and his and the other two judges' findings of fact is this: proponents of fluoridation are fond of reciting endorsement statements by authorities, such as those by CDC and the American Dental Association, both of which have long-standing commitments that are hard if not impossible to recant, on the safety

and efficacy of fluoridation. Now come three truly independent servants of justice, the judges in these three cases, and they find that fluoridation of water supplies is not justified."²³⁰

Interestingly, the judiciary seems to have more power to effect change in other countries. Yiamouyiannis states that when he presented the same technical evidence in Scotland, the Scottish court outlawed fluoridation based on the evidence.²³¹

Indeed, most of Western Europe has rejected fluoridation on the grounds that it is unsafe. In 1971, after 11 years of testing, Sweden's Nobel Medical Institute recommended against fluoridation, and the process was banned. The Netherlands outlawed the practice in 1976, after 23 years of tests. France decided against it after consulting with its Pasteur Institute²³² and Germany rejected the practice because the recommended dosage of 1 ppm was "too close to the dose at which long-term damage to the human body is to be expected."²³³ Dr. Lee sums it up: "All of western Europe, except one or two test towns in Spain, has abandoned fluoride as a public health plan. It is not put in the water anywhere. They all established test cities and found that the benefits did not occur and the toxicity was evident."²³⁴

But Europe is not the sole bastion of sanity in the fluoridation arena. Several municipalities in the United States have taken an enlightened stance on the issue. In 1997, the Natick (MA) Fluoridation Study Committee submitted a comprehensive report to the Town and the Board of Selectmen, overwhelmingly recommending rejection of fluoridation of the town's water. The committee consisted of scientists, academics, and citizens of the town of Natick. The committee summarized its findings as follows:

- Recent studies of the incidence of cavities in children show little to no difference between fluoridated and non-fluoridated communities.
- Ten to thirty percent (10-30%) of Natick's children will have very mild to mild dental fluorosis if Natick fluoridates its water (up from probably 6% now). Approximately 1% of Natick's children will have moderate or severe dental fluorosis. Dental fluorosis can cause great concern for the affected family and may result in additional dental bills. It should not be dismissed as a "cosmetic" effect.
- Fluoride adversely affects the central nervous system, causing behavioral changes and cognitive deficits. These effects are observed at fluoride doses that some people in the US actually receive.
- There is good evidence that fluoride is a developmental neurotoxicant, meaning that fluoride affects the nervous system of the developing fetus at doses that are not toxic to the mother. The developmental neurotoxicity would be manifest as lower IQ and behavioral changes.
- Water fluoridation shows a positive correlation with increased hip fracture rates in persons 65 years of age and older, based on two recent epidemiology studies.
- Some adults are hypersensitive to even small quantities of fluoride, including that contained in fluoridated water. At least one such person is a Natick resident.
- The impact of fluoride on human reproduction at the levels received from environmental exposures is a serious concern. A recent epidemiology study shows a correlation between decreasing annual fertility rate in humans and increasing levels of fluoride in drinking water.

- Animal bioassays suggest that fluoride is a carcinogen, especially for tissues such as bone (osteosarcoma) and liver. The potential for carcinogenicity is supported by fluoride's genotoxicity and pharmacokinetic properties. Human epidemiology studies to date are inconclusive, but no appropriate major study has been conducted.
- Fluoride inhibits or otherwise alters the actions of a long list of enzymes important to metabolism, growth, and cell regulation.
- Sodium fluorosilicate and fluorosilicic acid, the two chemicals Natick intends to use to fluoridate the water supply, have been associated with increased concentrations of lead in tap water and increased blood lead levels in children, based on case reports and a new, as-yet-unpublished study.
- If Natick fluoridates its water supply at the proposed level, most children under the age of three will daily receive more fluoride than is recommended for them.

The scientific literature supporting these findings is summarized in the full report which also discusses a variety of non-health related concerns that have been raised about water fluoridation.

The Committee reached the firm conclusion that the risks of overexposure to fluoride far outweigh any current benefit of water fluoridation.

Their Recommendations:

1. The Natick Fluoridation Study Committee unanimously and emphatically recommends that the town of Natick NOT fluoridate the town water supply.
2. The Natick Fluoridation Study Committee unanimously and emphatically recommends that the Board of Selectmen take appropriate action to ensure that fluoridation of the town water supply does not take place.²³⁵

Conclusion

Natick is not an isolated case. The town of Bishopville, SC recently voted to discontinue fluoridation. Eureka Springs, Arkansas decided not to begin a proposed fluoridation program. "The citizens of Eureka Springs don't want to be medicated against their will," Mayor Beau Satori said. "They just want fine-tasting water."²³⁶ In fact, the Fluoride Action Network list over 100 municipalities in the US and Canada that have rejected or discontinued fluoride since 1990.²³⁷

Isn't it time the United States as a whole followed this example? While the answer is obvious, it is also apparent that government policy is unlikely to change without public support. We therefore must communicate with legislators, and insist on one of our most precious resources - pure, unadulterated drinking water. Yiamouyiannis urges all American people to do so. He emphasizes the immediacy of the problem:

"There is no question with regard to fluoridation of public water supplies. It is absolutely unsafe...and should be stopped immediately. This is causing more destruction to human health than any other single substance added purposely or inadvertently to the water

supply. We're talking about 35,000 excess deaths a year...10,000 cancer deaths a year...130 million people who are being chronically poisoned. We're not talking about dropping dead after drinking a glass of fluoridated water.... It takes its toll on human health and life, glass after glass."²³⁸

Dr. Hirzy points to the absurdity of government policy on fluoride. The phosphate fertilizer industry captures hydrofluosilicic acid and uses what would otherwise be an air or water pollutant as a low-cost source of fluoride for water authorities. 'If this material comes out of a smoke stack it's an air pollutant; if it goes out the drain pipe into the river it's a water pollutant. But it is magically converted into some sort of beneficial agent when put in a tank wagon and bled into the drinking water. It's a remarkable transformation."²³⁹

There is a major moral issue in the fluoridation debate that has largely escaped notice. The first is that, as columnist James Kilpatrick observes, it is "the right of each person to control the drugs he or she takes." Kilpatrick calls fluoridation compulsory mass medication, a procedure that violates the principles of medical ethics.²⁴⁰ A New York Times editorial agrees:

"In light of the uncertainty, critics [of fluoridation] argue that administrative bodies are unjustified in imposing fluoridation on communities without obtaining public consent.... The real issue here is not just the scientific debate. The question is whether any establishment has the right to decide that benefits outweigh risks and impose involuntary medication on an entire population. In the case of fluoridation, the dental establishment has made opposition to fluoridation seem intellectually disreputable. Some people regard that as tyranny."²⁴¹

The time to act is now. We have a responsibility to stand up against political influence and corruption, and do what is really best for us, our health, and the planet. The issue is no longer whether there is adequate science to make us question fluoride's safety. There is more than enough scientific evidence to support a total ban on fluoride. But industry and the our legislative bodies that are dominated by special interest groups may never get around to admitting the obvious danger, unless we demand it.

The official stance on the fluoride issue reflects a consistent pattern of denial that begins in the earliest years of the twentieth century, with industry's initial support and encouragement for water fluoridation and continues to this day with propaganda campaigns, scientific disinformation, and out and out attacks on those who have attempted to let the truth be known.

We must speak out now, and let our leaders know that we want the truth to come out. If not for us, for future generations to have the choice, the option, the opportunity (after all, are we not a country that rallies behind freedom?) to drink water -- the liquid of life -- without risking their vitality.

Endnotes

- ¹ Dr. John Yiamouyiannis, in interview with Gary Null, 3/10/95. His statement is referenced in the Clinical Toxicology of Commercial Products, Fifth Ed., Williams and Wilkins.
- ² Joel Griffiths, "Fluoride: Commie Plot or Capitalist Ploy," Covert Action, Fall 1992, Vol. 42, p. 30.
- ³ O'Shea, Tim. "Fluoride and Cancer", accessed from www.thedoctorwithin.com/articles/water.html.
- ⁴ Ibid., p. 27.
- ⁵ The Fluoride Story. National Institute of Dental Research.
- ⁶ Griffiths, p. 28.
- ⁷ Ibid.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Ibid.
- ¹¹ Griffiths, op. cit.
- ¹² "H. Trendley Dean." MWWR Weekly. October 22, 1999 / 48(41);935.
- ¹³ The Fluoride Story, National Institute of Dental Research
- ¹⁴ J.Colquhoun, Chief Dental Officer, NZ, International Symposium on Fluoridation, Porte Alegre, Brazil, September, 1988.
- ¹⁵ Proceedings, City of Orville Vs. Public Utilities Commission of the State of California, Orville, CA, October 20-21 (1955)
- ¹⁶ AMA Council Hearing, Chicago, August 7, 1957
- ¹⁷ McNeil, The Fight for Fluoridation, 1957, p. 37.
- ¹⁸ Griffiths, op. cit., p. 28.
- ¹⁹ Griffiths, op. cit.
- ²⁰ G.L. Waldbott et al., Fluoridation: The Great Dilemma, Lawrence, KS, Coronado Press, 1978, p. 295.
- ²¹ Paul Farhi, Washington Post, 11/23/91.
- ²² Griffiths, op. cit., p. 63.
- ²³ Ibid.
- ²⁴ Longevity Magazine, pp. 7-89.
- ²⁵ The Morning Call, 2/7/90
- ²⁶ Science, 1/90.
- ²⁷ Waldbott, op. cit., p. 255.
- ²⁸ Letter, Rebecca Hammer, 3/83.
- ²⁹ U.S. Dept. of Health and Human Services, "Policy statement on community water fluoridation," July 22, 1992, Washington, D.C.
- ³⁰ Chemical and Engineering News, 8/1/88, p. 29; Amer. J. Pub. Health, editorial, 5/89, p. 561; J.A. Brunelle and J.P. Carlos, "Recent trends in dental caries in U.S. children and the effect of water fluoridation," 2/90, p. 276.
- ³¹ Los Angeles Times. 1/ 26/95.
- ³² The Chicago Tribune, 1/26/95
- ³³ A.S. Gray, Canadian Dental Association Journal, October 1987, pp. 76-83.
- ³⁴ Letter, Sierra Club to Wm. K. Reilly, EPA, 7/21/89.
- ³⁵ John Yiamouyiannis, Fluoride, 1990, Vol. 23, pp. 55-67.
- ³⁶ J.A. Brunelle and J.P. Carlos, "Recent Trends in Dental Caries in U.S. Children and the Effect of Water Fluoridation," *Journal of Dental Research*, Vol. 69, Special Issue (February 1990), pgs. 723-727 and discussion pgs. 820-823.
- ³⁷ Center for Health Action, 3/30/90.
- ³⁸ Clinical Pediatrics, Nov. 1991.
- ³⁹ ADA News, 10/17/94.
- ⁴⁰ Angelillo IF, Torre I, Nobile CG, Villari P. Caries and fluorosis prevalence in communities with different concentrations of fluoride in the water. *Caries Res* 1999;33(2):114-22.
- ⁴¹ The Science and Practice of Caries Prevention. Featherstone, J.D.B. *Journal of the American Dental Association* 2001 131, 887-899.
- ⁴² Seppa L, Karkkainen S, Hausen H. Caries trends 1992-1998 in two low-fluoride Finnish towns formerly with and without fluoridation. *Caries Res* 2000 Nov-Dec;34(6):462-8.

-
- ⁴³ Maupome G, Clark DC, Levy SM, Berkowitz J. Patterns of dental caries following the cessation of water fluoridation. *Community Dent Oral Epidemiol* 2001 Feb;29(1):37-47
- ⁴⁴ Kunzel W, Fischer T. Caries prevalence after cessation of water fluoridation in La Salud, Cuba. *Caries Res* 2000 Jan-Feb;34(1):20-5
- ⁴⁵ de Liefde B. The decline of caries in New Zealand over the past 40 years. *N Z Dent J* 1998 Sep;94(417):109-13.
- ⁴⁶ Kunzel W, Fischer T, Lorenz R, Bruhmann S. Decline of caries prevalence after the cessation of water fluoridation in the former East Germany. *Community Dent Oral Epidemiol* 2000 Oct;28(5):382-9
- ⁴⁷ Kumar JV, Swango PA. *Community Dent Oral Epidemiol* 1999 Jun;27(3):171-80.
- ⁴⁸ "Community Water Fluoridation and Caries Prevention: A Critical Review," *Clinical Oral Investigations*, by Giuseppe Pizzo & Maria R. Piscopo & Ignazio Pizzo & Giovanna Giuliana 2007 Feb 27. Accessed from: <http://www.newmediaexplorer.org/chris/Pizzo-2007.pdf>.
- ⁴⁹ *Chemical and Engineering News*, 8/1/88, p.31.
- ⁵⁰ Limeback H. A re-examination of the pre-eruptive and post-eruptive mechanism of the anti-caries effects of fluoride: is there any anti-caries benefit from swallowing fluoride? *Community Dent Oral Epidemiol* 1999 Feb;27(1):62-71
- ⁵¹ Gary Null interview with Dr. Harvey Limeback, 1/30/01.
- ⁵² Gary Null interview.
- ⁵³ Keith E. Heller and others, "Dental Caries and Dental Fluorosis at Varying Water Fluoride Concentrations," *Journal of Public Health and Dentistry*, Vol. 57, No. 3 (Summer 1997), pgs. 136-143.
- ⁵⁴ John Colquhoun. Why I Changed My Mind About Water Fluoridation. *Perspectives in Biology and Medicine*, 41, 1, Autumn 1997.
- ⁵⁵ National Institutes of Health, News Release concerning Consensus statement regarding Diagnosis and Management of Dental Caries Throughout Life, March 26-28, 2001, Vol. 18, No. 1 accessed from: http://consensus.nih.gov/news/releases/115_release.htm.
- ⁵⁶ Waldbott, op. cit., p. xvii.
- ⁵⁷ Statement by Dr. James Patrick before Congressional Subcommittee, 8/4/82.
- ⁵⁸ *Journal of the Canadian Dental Association*, Vol. 59, Apr. 1993, p. 334.
- ⁵⁹ Gary Null interview with Dr. John Lee, 3/10/95.
- ⁶⁰ Ibid.
- ⁶¹ Roholm K. Fluorine Intoxication. A Clinical-Hygienic Study. *Nyt Nordisk*, Copenhagen and H K Lewis, London 1937 pp 281-282.
- ⁶² *Health Effects of Ingested Fluoride*. National Academy of Sciences, USA 1993: p 59.
- ⁶³ F. Exner and G. Waldbott, *The American fluoridation*
- ⁶⁴ *Federal Register*, 12/24/75
- ⁶⁵ See <http://www.fluoridealert.com/>
- ⁶⁶ Pierre-M. Galletti and Gustave Joyet, "Effect of fluorine on thyroidal iodine metabolism in hyperthyroidism," *Journal of Clinical Endocrinology*, Vol. 18 (October 1958), pgs. 1102-1110.
- ⁶⁷ *Merck Index*, 1960, p. 952; Waldbott, et al., 1978, p. 163.
- ⁶⁸ Beth Ann Ditkoff and Paul Lo Gerfo, *THE THYROID GUIDE* [ISBN 0060952601] (New York: Harper, 2000), cover notes.
- ⁶⁹ HIP FRACTURES & FLUORIDE REVISITED: A CRITIQUE. *Fluoride* Vol. 33 No. 1 1-5 2000 Editorial 1.
- ⁷⁰ *Chemical and Engineering News*, 8/1/88, p. 33.
- ⁷¹ Jan G. Stannard et al., "Fluoride levels and fluoride contamination of fruit juices," *The Journal of Clinical Pediatric Dentistry*, Vol. 16, No. 1, 1991, pp. 38-40.
- ⁷² Gary Null interview.
- ⁷³ Heilman, et al., *JADA*, July 1997.
- ⁷⁴ Ibid.
- ⁷⁵ Ibid.
- ⁷⁶ Bardsen A, Bjorvatn K. Risk periods in the development of dental fluorosis. *Clin Oral Investig* 1998 Dec;2(4):155-60
- ⁷⁷ Mascarenhas, Ana Karina. Risk factors for Dental Fluorosis: A review of the recent literature. [Pediatric Dentistry](#), 4/22/2000.
- ⁷⁸ Pereira AC, Da Cunha FL, Meneghim M de C, Werner CW. *Dental caries and fluorosis prevalence study in a nonfluoridated Brazilian community: trend analysis and toothpaste association*. *Fluoride* 33 (2) 2000.

-
- ⁷⁹ Institute of Medicine (1997). Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride. Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board. National Academy Press, Washington, DC. Cited in "50 Reasons to Oppose Fluoridation."
- ⁸⁰ Ibid.
- ⁸¹ Rwenyonyi CM, Birkeland JM, Haugejorden O, Bjorvatn K. Age as a determinant of severity of dental fluorosis in children residing in areas with 0.5 and 2.5 mg fluoride per liter in drinking water. *Clin Oral Investig* 2000 Sep;4(3):157-61
- ⁸² Waldbott, op. cit., pp. 307-308.
- ⁸³ Gary Null interview.
- ⁸⁴ Gary Null interview with Dr. John Lee, 3/10/95.
- ⁸⁵ Schenectady Gazette Star, 8/5/89.
- ⁸⁶ Community Dental Oral Epidemiology, June 1994
- ⁸⁷ Daniel Grossman, "Fluoride's Revenge," *The Progressive*, Dec. 1990, pp. 29-31
- ⁸⁸ *American Journal of Public Health*, 12/85.
- ⁸⁹ Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.
- ⁹⁰ Daniel Grossman. Op. cit.
- ⁹¹ George Glasser, "Dental Fluorosis - A Legal Time Bomb!" *Sarasota/Florida ECO Report*, Vol. 5, No. 2, Feb. 1995, pp. 1-5.
- ⁹² <http://www.cdc.gov/mmwr/preview/mmwrhtml/figures/s403a1t23.gif>
- ⁹³ *New York Times*, Sunday, June 10, 2001.
- ⁹⁴ *Chemical and Engineering News*, 8/1/88, p. 49.
- ⁹⁵ *New York State Coalition Opposed to Fluoridation*, release, 11/89.
- ⁹⁶ Gary Null interview with Dr. John Yiamouyiannis 4/28/90.
- ⁹⁷ *Chemical and Engineering News*, 8/1/88, p. 36.
- ⁹⁸ Hileman, Bette. Fluoridation of Water. Questions about Health Risks and Benefits Remain After 40 Years. *Chemical & Engineering News* Vol. 66 (August 1, 1988).
- ⁹⁹ Connett P. 50 Reasons to Oppose Fluoridation.
- ¹⁰⁰ Gary Null interview.
- ¹⁰¹ Waldbott, op. cit., p. 38.
- ¹⁰² F. Exner and G. Waldbott, op. cit., pp. 42-43.
- ¹⁰³ *JAMA*, Vol. 264, July 25, 1990, pp. 500.
- ¹⁰⁴ Cooper et al., *JAMA*, Vol. 266, July 24, 1991, pp. 513-14.
- ¹⁰⁵ Christa Danielson et al., "Hip fractures and fluoridation in Utah's elderly population," *JAMA*, Vol. 268, Aug. 12, 1992, pp. 746-48.
- ¹⁰⁶ Ibid., p. 746.
- ¹⁰⁷ *New England Journal of Medicine*, Vol. 322, pp. 802-809.
- ¹⁰⁸ *Journal of Bone and Mineral Research*, 11/94.
- ¹⁰⁹ U.S. National Research Council, *Diet and Health*, Washington, D.C., National Academy Press, 1989, p. 121.
- ¹¹⁰ Hip Fractures And Fluoride Revisited: A Critique. *Fluoride* Vol. 33 No. 1 1-5 2000 Editorial 1.
- ¹¹¹ Ibid.
- ¹¹² U.S. National Research Council, *Diet and Health*, Washington, D.C., National Academy Press, 1989, p. 121.
- ¹¹³ Waldbott GL, Burgstahler A, McKinney HL. *Fluoridation: The Great Dilemma*. Coronado Press Inc, Kansas, 1978. pp81-4.
- ¹¹⁴ 50 reasons to oppose fluoridation.
- ¹¹⁵ National Cancer Institute (1989). *Cancer Statistics Review, 1973-1987*, Bethesda, MD: National Institutes of Health. Publication No.90-2789.
- ¹¹⁶ Cohn, P.D. (1992). *An Epidemiologic Report on Drinking Water and Fluoridation*. New Jersey Department of Health, Trenton, NJ.
- ¹¹⁷ Albright JA. The effect of fluoride on the mechanical properties of bone. *Transactions of the Annual Meeting of the Orthopedics Research Society*. 1978; 240 (15): 1630-1.
- ¹¹⁸ Robin JC, et al. Studies on osteoporosis III. Effect of estrogens and fluoride. *J Med*. 1980; II (1): 1-14
- ¹¹⁹ Danielson C, et al. Hip fractures and fluoridation in Utah's elderly. *JAMA* 1992; 268: 746-8.
- ¹²⁰ Kleerekoper M. Fluoride and the skeleton. *Crit Rev Clin Lab Sci* 1996 Apr;33(2):139-61
- ¹²¹ Dequeker J, Declerck K. *Schweiz Med Wochenschr* 1993 Nov 27;123(47):2228-34 Fluor in the treatment of osteoporosis. An overview of thirty years clinical research.

-
- ¹²² L.R. Hedlund and J.C. Gallagher, "Increased incidence of hip fracture in osteoporotic women treated with sodium fluoride," *Journal of Bone Mineral Research*, Vol. 4, No. 2 (April 1989), pgs. 223-225.
- ¹²³ B.L. Riggs and others, "Effect of fluoride treatment on the fracture rates in postmenopausal women with osteoporosis," *New England Journal of Medicine*, Vol. 322, No. 12 (March 22 1990), pgs. 802-809.
- ¹²⁴ Kotha SP, Walsh WR, Pan Y, Guzelsu N. Varying the mechanical properties of bone tissue by changing the amount of its structurally effective bone mineral content. *Biomed Mater Eng* 1998;8(5-6):321-34
- ¹²⁵ Colquhoun. Op. Cit.
- ¹²⁶ See Connett P. 50 Reasons to Oppose Fluoridation.
- ¹²⁷ Li, Y., C. Liang, et al. (1999). "Effect of Long-Term Exposure to Fluoride in Drinking Water on Risks of Bone Fractures." Submitted for publication. Contact details: Dr. Yiming Li, Loma Linda School of Dentistry, Loma Linda, California, Phone 1-909-558-8069, Fax 1-909-558-0328 and e-mail, Yli@sd.llu.edu.
- ¹²⁸ "Middletown, Maryland latest city to receive toxic spill of fluoride in their drinking water," report by Truth About Fluoride, Inc., in *Townsend Letter for Doctors*, 10/15/94, p. 1124.
- ¹²⁹ "Middletown, Maryland latest city to receive toxic spill of fluoride in their drinking water," report by Truth About Fluoride, Inc., in *Townsend Letter for Doctors*, 10/15/94, p. 1124.
- ¹³⁰ Reprinted by M. Bevis, "Morbidity associated with ingestion/dialysis of community water fluoride," CDC, Dental Div., 6/11/92, distributed by Safe Water Foundation of Texas.
- ¹³¹ *Townsend Letter for Doctors*, 10/94, p. 1125.
- ¹³² Janet Raloff, "The St. Regis Syndrome," *Science News*, July 19, 1980, pp. 42-43; reprinted in Griffiths, op. cit., p. 26.
- ¹³³ Robert Tomalin, "Dumping grounds," *Wall Street Journal*, Nov. 29, 1990; reprinted in Griffiths, op. cit.
- ¹³⁴ G.L. Waldbott et al., *Fluoridation: The Great Dilemma*, Lawrence, KS, Coronado Press, 1978, p. 222.
- ¹³⁵ Ibid.
- ¹³⁶ Graham, JR and Morin PJ. Highlights of North American Litigation During the Twentieth Century on Fluoridation of Public Water Supplies. *Journal of Land Use and Environmental Law*.
- ¹³⁷ Ibid.
- ¹³⁸ Hilleboe HE, et al. Newburgh-Kingston Caries Fluorine Study: Final Report, 52. *JADA* 290 (1956).
- ¹³⁹ Harris RR. *Dental Science in a New Age*, History of the National Institute of Dental Research (1989)
- ¹⁴⁰ Ibid.
- ¹⁴¹ Graham and Morin. Op. Cit.
- ¹⁴² John Yiamouyiannis and Dean Burk, "Fluoridation of public water systems and cancer death rates in humans," presented at the 57th annual meeting of the American Society of Biological Chemists, and published in *Fluoride*, Vol. 10, No. 3, 1977, pp. 102-103.
- ¹⁴³ National Institute of Dental Research, "Fluoridation of water and cancer: a review of the epidemiological efficiency," 1985, pp. 10-13.
- ¹⁴⁴ New York State Coalition Opposed to Fluoridation.
- ¹⁴⁵ *Newsday*, 2/27/90.
- ¹⁴⁶ *Oakland Tribune*, 2/16/90.
- ¹⁴⁷ *NFFE Local 2050*, 3/90.
- ¹⁴⁸ *Washington Post*, 2/20/90.
- ¹⁴⁹ *The Lancet*, 2/3/90.
- ¹⁵⁰ Gary Null interview with Dr. John Yiamouyiannis 4/28/90.
- ¹⁵¹ Center for Health Action.
- ¹⁵² M.W. Browne, *The New York Times*, 3/13/90.
- ¹⁵³ Ibid.
- ¹⁵⁴ *Medical Tribune*, 2/22/90.
- ¹⁵⁵ *New York State Medical News*, 3/90.
- ¹⁵⁶ S. Begley, *Newsweek*, 2/5/90.
- ¹⁵⁷ *Safe Water Foundation*, 3/4/90
- ¹⁵⁸ *Mutation Research*, Vol. 223, pp. 191-203.
- ¹⁵⁹ Joel Griffiths, *Medical Tribune*, 2/22/90.
- ¹⁶⁰ Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.
- ¹⁶¹ *Environmental and Molecular Mutagenesis*, Vol. 21, pp. 309-318.
- ¹⁶² *Journal of Carcinogenesis*, Vol. 9, pp. 2279-2284.

-
- ¹⁶³ "Summary review of health effects associated with hydrogen fluoride acid related compounds," EPA Report Number 600/8-29/002F, Dec. 1988, pp. 1- .
- ¹⁶⁴ Mark Lowey, "Scientists question health risks of fluoride," Calgary Herald, Calgary, Alberta, Canada, Feb. 28, 1992;
- ¹⁶⁵ Griffiths, op. cit., p. 66.
- ¹⁶⁶ June 6, 2005 letter from Richard Wiles, Sr. Vice President, Environmental Working Group to Dr. CW Jameson, National Toxicology Program, Report on Carcinogens accessed at: <http://www.ewg.org/issues/fluoride/20050606/petition.php>.
- ¹⁶⁷ "Fluoride water 'causes cancer'," by Bob Woffinden, June 12, 2005, The Observer, accessed at: http://observer.guardian.co.uk/uk_news/story/0,6903,1504672,00.html.
- ¹⁶⁸ "Association Between Fluoride in Drinking Water During Growth and Development and the Incidence of Osteosarcoma for Children and Adolescents," A Thesis Presented by Elise Beth Bassin, April 2001 <http://www.fluoridealert.org/health/cancer/bassin-2001.pdf>.
- ¹⁶⁹ Connett. 50 Reasons to Oppose Fluoridation.
- ¹⁷⁰ Ibid.
- ¹⁷¹ Masters RD, Coplan MJ, Hone BT, Dykes JE. Association of silicofluoride treated water with elevated blood lead. *Neurotoxicology* 2000 Dec;21(6):1091-100
- ¹⁷² Trustees of Dartmouth College. Dartmouth Researcher Warns of Chemicals Added to Drinking Water. 15 March 2001. Accessed at: www.dartmouth.edu/~news.
- ¹⁷³ Ibid.
- ¹⁷⁴ Ibid.
- ¹⁷⁵ Ibid.
- ¹⁷⁶ *Journal of Dental Research*, Vol. 55, Sup B, p. 523, 1976, "Effect of Inorganic Fluoride Salts on Urine and Tissue Cyclic AMP Concentration in Vivo".
- ¹⁷⁷ Mullenix PJ, Denbesten PK, Schunior A, Kernan WJ. Neurotoxicity of sodium fluoride in rats. *Neurotoxicol Teratol* 1995 Mar-Apr;17(2):169-77
- ¹⁷⁸ Ekambaram P, Paul V. Environ. Calcium preventing locomotor behavioral and dental toxicities of fluoride by decreasing serum fluoride level in rats. *Toxicol. Pharmacol.* 2001 Mar;9(4):141-146
- ¹⁷⁹ Varner JA, Jensen KF, Horvath W, Isaacson RL. *Brain Res* 1998 Feb 16;784(1-2):284-98 Chronic administration of aluminum-fluoride or sodium-fluoride to rats in drinking water: alterations in neuronal and cerebrovascular integrity
- ¹⁸⁰ Ibid.
- ¹⁸¹ Strunecka A, Patocka J. Reassessment of the role of aluminum in the development of Alzheimer's disease. *Cesk Fysiol* 1999 Feb;48(1):9-15
- ¹⁸² Gary Null interview with Paul Connett, Ph.D.
- ¹⁸³ Strunecka A and Patocka J. Pharmacological and toxicological effects of aluminofluoride complexes. *Fluoride*, vol. 32, No. 4 (November 1999).
- ¹⁸⁴ Ibid.
- ¹⁸⁵ Ibid.
- ¹⁸⁶ Luke JA. The Effect of Fluoride on the Physiology of the Pineal Gland.
- ¹⁸⁷ Ibid.
- ¹⁸⁸ National Sleep Foundation. Sleep in America poll. 2001.
- ¹⁸⁹ Luboshitzky R, Lavie P. Melatonin and sex hormone interrelationships--a review. *J Pediatr Endocrinol Metab* 1999 May-Jun;12(3):355-62
- ¹⁹⁰ Genazzani AR, Bernardi F, Monteleone P, Luisi S, Luisi M. Neuropeptides, neurotransmitters, neurosteroids, and the onset of puberty. *Ann N Y Acad Sci* 2000;900:1-9
- ¹⁹¹ Okasha M, McCarron P, McEwen J, Smith GD. Age at menarche: secular trends and association with adult anthropometric measures. *Ann Hum Biol* 2001 Jan-Feb;28(1):68-78
- ¹⁹² Adair LS, Gordon-Larsen P. Maturational timing and overweight prevalence in US adolescent girls. *Am J Public Health* 2001 Apr;91(4):642-4
- ¹⁹³ Foulkes R. The Fluoride Connection: Fluoride and the Placental Barrier. *Townsend Letter for Doctors and Patients*. Issue #177.
- ¹⁹⁴ Cox WR. Hello Test Animals or You and Your Grandchildren. Olsen Publishing Co., Milwaukee, WI 1951. Cited in Foulkes, op. cit.
- ¹⁹⁵ Ibid.

-
- ¹⁹⁶ Ibid.
- ¹⁹⁷ Ibid.
- ¹⁹⁸ Freni SC. Exposure to high fluoride concentrations in drinking water is associated with decreased birth rates. *J Toxicol Environ Health* 1994 May;42(1):109-21
- ¹⁹⁹ Foulkes. Op. Cit.
- ²⁰⁰ Narayana MV and Chinoy NJ. Effects of fluoride on rat testicular steroidogenesis. *Fluoride*, 27; 1; 7-12, 1994.
- ²⁰¹ Chinoy NJ, Narayana MV. In vitro fluoride toxicity in human spermatozoa. *Reprod Toxicol* 1994 Mar-Apr;8(2):155-9.
- ²⁰² O'Shea, Tim. "Fluoride and Cancer (and other illnesses). Accessed from www.thedoctorwithin.com/articles/water.html.
- ²⁰³ Li XS et al. Effect of fluoride exposure in intelligence in children. *Fluoride* 1995; 28 (4).
- ²⁰⁴ Yang Y, Wang X, Guo X. Effects of high iodine and high fluorine on children's intelligence and the metabolism of iodine and fluorine. *Zhonghua Liu Xing Bing Xue Za Zhi* 1994 Oct;15(5):296-8.
- ²⁰⁵ Shettler T, et al. In *Harm's Way: Toxic Threats to Child Development*. (Cambridge MA: Greater Boston Physicians for Social Responsibility, May 2000).
- ²⁰⁶ Gary Null interview.
- ²⁰⁷ Gary Null interview with Dr. Paul Connett, 1/30/01.
- ²⁰⁸ Klein W et al. DNA repair and environmental substances. *Zeitschrift fur Angewandte Bader-und Klimaheilkunde*, 1977; 24 (3).
- ²⁰⁹ Mohamed A, Chandler ME. Cytological effects of sodium fluoride on mice. *Fluoride*. 1982; 15 (3): 110-18.
- ²¹⁰ Jachimczak D, Skotarczak B. The effect of fluorine and lead ions on the chromosomes of human leucocytes in vitro. *Genetica Polonica* . 1978; 19 (3): 353-7.
- ²¹¹ Scientific American article, by Dan Fagin, January 2008.
- ²¹² Mukerjee RN, Sobels FH. The effect of sodium fluoride and idoacetamide on mutation induction by X-irradiation in mature spermatozoa of drosophila.
- ²¹³ Jagiello G, Lin J-S. Sodium fluoride as potential mutagen in mammalian eggs. *Arch Environ Hlth* . 1974; 29: 230-5.
- ²¹⁴ Yiamouyiannis JA, Burk D. Fluoridation of public water systems and the cancer death rate in humans. Presented at the 67th Annual Meeting of the American Society of Biologists and Chemists and the American Society of Experimental Biologists. June 1976.
- ²¹⁵ Center for Health Action, 3/90.
- ²¹⁶ Gary Null interview with Dr. William Marcus, 3/10/95.
- ²¹⁷ Ibid.
- ²¹⁸ Ibid.
- ²¹⁹ Ibid.
- ²²⁰ Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.
- ²²¹ Gary Null interview with Dr. John Lee, 3/10/95.
- ²²² Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.
- ²²³ Ibid.
- ²²⁴ Gary Null interview with Dr. William Marcus, 3/10/95.
- ²²⁵ Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.
- ²²⁶ Hirzy. Op. cit.
- ²²⁷ Ibid.
- ²²⁸ Ibid.
- ²²⁹ Ibid.
- ²³⁰ Ibid.
- ²³¹ Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.
- ²³² New York State Coalition Opposed to Fluoridation.
- ²³³ Longevity Magazine, 7/89.
- ²³⁴ Gary Null interview with Dr. John Lee, 3/10/95.
- ²³⁵ Should Natick Fluoridate? A Report to the Town and the Board of Selectmen Prepared by the Natick Fluoridation Study Committee 13 E. Central Street, Town of Natick, MA October 23, 1997
- ²³⁶ Arkansas Democrat-Gazette, June 13, 2001.
- ²³⁷ <http://www.fluoridealert.org>
- ²³⁸ Gary Null interview with Dr. John Yiamouyiannis, 3/10/95.

²³⁹ Ibid.

²⁴⁰ The Morning Call, 2/7/90

²⁴¹ The New York Times, 3/13/90.