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9/10/09 - F

Fluoride's Neurological Effects: studies show there ma[illegible] Alzheimers, Dementia, Attention Deficit Disorder, reduced IQ in children

Neurotoxicity of fluoride, *Fluoride*, 1996, 29:2, 57-58 (Editorial by AWB and JC)

The August 1995 issue of this journal contained an abstract (pages 151-152) of an interesting paper by Dr Phyllis Mullenix and her collaborators.1 They recorded behavioral changes in rats after ingestion of fluoride, and found that the severity of the effect on behavior increased directly with plasma fluoride levels and fluoride concentration in specific brain regions. A reading of the full paper is well worthwhile. In their Introduction, after referring to the increase in dental fluorosis in humans after decades of water fluoridation, the authors comment:

> *"One concern that has not been fully investigated is the link between fluoride and effects an the central nervous system (CNS).... Many years of ubiquitous fluoride exposure have not resulted in obvious CNS problems such as seizures, lethargy, salivation, tremors, paralysis, or sensory deficits. Still unexplored, however, is the possibility that fluoride exposure is linked with subtle brain dysfunction."*

The carefully designed animal experiment which they report revealed subtle but very real changes in behavior patterns following fluoride ingestion: hyperactivity after prenatal exposure, and cognitive deficits after weanling and adult exposure. Fluoride accumulation in important regions of the rat brain, especially the hippocampus, was found to increase as the drinking water fluoride levels increased. These effects, and the sex differences observed, corresponded to those observed in other studies of hippocampal brain damage.

The authors point out that the plasma fluoride levels recorded in the rats were the same as those sometimes recorded in humans - for example, in children one hour after receiving topical fluoride treatment of their teeth. In their conclusion calling for further rat and human studies they state:

> *"Experience with other developmental neurotoxicants prompt expectations that changes in behavioral function will be comparable across species, especially humans and rats. Of course behaviors per se do not extrapolate, but a generic behavioral pattern disruption as found in this rat study can be indicative of a potential for motor dysfunction, IQ deficits and/or learning disabilities in humans."*

The authors draw attention to reports from Chinese investigators that high levels of fluoride in drinking water (3-11 ppm) affect the central nervous system directly without first causing the physical deformations of skeletal fluorosis.2-4 Readers of Fluoride will recall the recent (November 1995) research report from China indicating adverse neurological effects on the brain from fluoride exposure.5 This work also suggested that children with dental fluorosis are at greater risk of decreased mental acuity. One can only wonder whether the effects of fluoridated water might extend beyond the appearance of the teeth and include neurotoxicity among children afflicted with dental fluorosis.

Some of our readers may recall also pertinent early clinical findings reported by our founding editor, Dr G L Waldbott, of which Dr Mullenix and her co-workers do not appear to have been aware. These involved a wide range of reversible toxic effects of fluoridated drinking water, including diminished mental acuity and impairment of memory.6-8 In a separate report, Dr Waldbott even gave an account, supported by laboratory data, of a case of tetaniform convulsions induced by drinking fluoridated drinking water.9 For decades proponents of water fluoridation have questioned the validity of these reports without, however, offering objective evidence to refute them. But in the light of the human research in China and now the animal research in the United States, these clinical observations by Dr Waldbott on the neurotoxicity of fluoride in drinking water clearly deserve greater attention and credence. [references not scanned]

Jaqueline Calderon, Machado Blenda, Navarro Marielena, Carrizales Leticia, Ortiz Maria Deogracias, Diaz-Barriga F. Influence of Fluoride Exposure on Reaction Time and Visuospatial Organization in Children, *Epidemiology* July 2000, Volume 11, Number 4 Supplement S153.

Fluoride exposure is an important public health problem in several Mexican states. In the city of San Luis Potosi, Mexico, above 90% of the children have some degree of dental fluorosis. The main source of exposure to fluoride is tap water. The objective of the study was to evaluate the influence of chronic exposure to fluoride on neuropsychological development in children. Sixty-one children aged 6 to 8 years were included. Fluoride concentration in tap water ranged from 1.2 to 3 mg/L. Fluoride exposure was measured in urine samples by electrothermal ion selective method. Blood lead (PbB) was measured as indicator of lead exposure by atomic absorption spectrophotometry. Height for age index (HAI) was calculated as indicator of past nutritional status. Three tests were used to evaluate the neuropsychological development: (1) Wechsler Intelligence Scale for Children Revisited version for Mexico (WISC-RM), (2) Rey Osterrelth-Complex Figure test and (3) Continuos Performance Test (CPT). Mean value of fluoride in urine was 4.3 mgF/g creatinine (1.6-10.8). Mean PhB value was 6.2 ug/dl (2.0-15.6). After controlling by significant confounders, urinary fluoride correlated positively with reaction time and inversely with the scores in visuospatial organization. IQ scores were not influenced by fluoride exposure. An increase in reaction time could affect the attention process, also the low scores in visuospatial organization could be affecting the reading and writing abilities in these children.

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Guan ZZ, Wang YN, Xiao KQ, Dai DY, Chen YH, Liu JL, Sindelar P, Dallner G, Influence of chronic fluorosis on membrane lipids in rat brain. Neurotoxicol Teratol 1998 Sep-Oct;20(5):537-42

Brain membrane lipid in rats were analyzed after being fed either 30 or 100 ppm fluoride for 3, 5, and 7 months. The protein content of brain with fluorosis decreased, whereas the DNA content remained stable during the entire period of investigation. After 7 months of fluoride treatment, the total brain phospholipid content decreased by 10% and 20% in the 30 and 100 ppm fluoride groups, respectively. The main species of phospholipid influenced by fluorosis were phosphatidylethanolamine, phosphatidylcholine, and phosphatidylserine. The fatty acid and aldehyde compositions of individual phospholipid classes were unchanged. No modifications could be detected in the amounts of cholesterol and dolichol. After 3 months of fluoride treatment, ubiquinone contents in brain were lower; however, at 7 months they were obviously increased in both groups of fluoride treatment. The results demonstrate that the contents of phospholipid and ubiquinone are modified in brains affected by chronic fluorosis and these changes of membrane lipids could be involved in the pathogenesis of this disease.

Department of Pathology, Guiyang Medical College, Guizhou, China. jialiul@public.gy.gz.cn

Jope RS, Modulation of phosphoinositide hydrolysis by NaF and aluminum in rat cortical slices. *J Neurochem* 1988 Dec;51(6):1731-6

NaF stimulated phosphoinositide hydrolysis in rat cortical slices. The production of [3H]inositol monophosphate was rapid for the first 15 min of incubation with NaF, followed by a plateau. The major product detected was [3H]inositol monophosphate, although *significant* amounts of [3H]inositol bisphosphate and [3H]inositol trisphosphate were also produced. The stimulation of [3H]inositol monophosphate production by NaF was concentration dependent between 2 and 20 mM NaF. Addition of 10 or 100 microM AlCl3 or aluminum maltol did not alter the effect of NaF, whereas at 500 microM, these aluminum preparations resulted in significant inhibition. Increasing the concentration of K+ from 5 to 20 mM potentiated [3H]inositol monophosphate production induced by carbachol but not by NaF. Incubation with 1 microM phorbol 12-myristate 13-acetate, a phorbol ester, inhibited carbachol-induced, but not NaF-induced, [3H]inositol monophosphate production. These results further support the hypothesis that a guanine nucleotide binding protein that can be activated by NaF is involved in phosphoinositide hydrolysis in brain. The use of NaF provides a means to bypass receptors to study intracellular regulatory sites of phosphoinositide metabolism without disrupting cells.

Department of Pharmacology and Neuropsychiatry Research Program, University of Alabama, Birmingham.

Kay AR, Miles R, Wong RK, Intracellular fluoride alters the kinetic properties of calcium currents facilitating the investigation of synaptic events in hippocampal neurons. J Neurosci 1986 Oct;6(10):2915-20

We have attempted to suppress voltage-dependent conductances in hippocampal neurons by introducing various intracellular agents. Voltage-clamp studies were carried out using acutely dissociated hippocampal neurons from adult guinea pigs. Synaptic events were examined using intracellular recordings in the slice preparation. Sodium conductance was suppressed when the quaternary lidocaine derivative QX 314 was introduced intracellularly. Potassium conductances were blocked by intracellular cesium or Tris. We also found that the anion fluoride could affect calcium conductance by an intracellular action. When anions other than fluoride were used for intracellular recordings, the voltage-dependent calcium current inactivated slowly and showed persistent activation at membrane potentials between -40 and -10 mV. In contrast, when fluoride was present intracellularly, the inactivation kinetics of the calcium current were accelerated and the persistent component of the current was largely suppressed. Intracellular recordings in the hippocampal slice showed that when electrodes contained cesium, QX 314, and fluoride, the spiking and nonlinear responses of the neuronal membrane to depolarization were blocked. In these conditions the time course and voltage-dependence of EPSPs could be examined in detail without complications due to voltage-dependent currents of the postsynaptic cell.

Li Y, Li X, Wei S, Effect of excessive fluoride intake on mental work capacity of children and a preliminary study of its mechanism, *Hua Hsi I Ko Ta Hsueh Hsueh Pao*,1994 Jun, 25 :2, 188-191 (Translated from Chinese)

We made an investigation in 157 children, aged 12-13, born and grew up in a coal burning pattern endemic fluorosis area and an experiment on excessive fluoride intake in rat. The results showed: (1) Excessive fluoride intake since early childhood would reduce mental work capacity (MWC) and hair zinc content: (2) The effect on zinc metabolism was a mechanism of influence on MWC by excessive fluoride intake; (3) Excessive fluoride intake decreased 5-hydroxy indole acetic acid and increased norepinephrine in rat brain; whether this is also a mechanism of the influence on MWC awaits confirmation.

Li XS, Zhi JL, Gao RO, Effect of Fluoride Exposure on Intelligence in Children, *Fluoride*, 1995 Nov, 28:4, pp 189-192

The intelligence was measured of 907 children aged 8-13 years living in areas which differed in the amount of fluoride present in the environment. The Intelligence Quotient (IQ) of children living in areas with a medium or severe prevalence of fluorosis was lower than that of children living in areas with only a slight fluorosis or no fluorosis. The development of intelligence appeared to be adversely affected by fluoride in the areas with a medium or severe prevalence of fluorosis but to a minor extent only in areas with only a slight prevalence of fluorosis. A high fluoride intake was associated with a lower intelligence. No correlation was found

between age and intelligence in the areas with a medium and severe prevalence of fluorosis. The effect of exposure to a high level of fluoride on intelligence may occur at an early stage of development of the embryo and infant when the differentiation of brain nerve cells is occurring and development is most rapid.

Liu WX, Experimental study of behavior and cerebral morphology of rat pups generated by fluorotic female rat, *Chung-hua Ping Li Hsueh Tsa Chih*, 1989 Dec, 18:4, 290-292 (Article in Chinese)

In order to study the effects of fluoride on the central nervous system, 33-42-day old rat pups generated by three groups of female Wistar rats, which were given distilled water containing 0, 30 and 60 ppm NaF respectively beforehand as drinking water for 85 days, were used for behavior test and cerebral morphological examination. The results of behavior test showed that the latent period of pain reaction and that of conditioned reflex in the 30 ppm F and 60 ppm F groups were longer than that in the control group (P less than 0.05 or P less than 0.01). morphological examination of the pup brains showed that the nerve cell density of the 60 ppm F group was higher than that of the control group (P less than 0.05). Electronmicroscopically, mild degeneration of organelles of the nerve cells was observed in those brains of the 60 ppm F group.

Masters RD and Coplan M, Study finds correlation between fluorides in water and lead levels, Dartmouth College News Release, and Poisoning the Well: Neurotoxic Metals, Water Treatment, and Human Behavior - Plenary Address to the Annual Conference of the Association for Politics and the Life Sciences

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Mattsson JL, Albee RR, Eisenbrandt DL Chang LW, Subchronic neurotoxicity in rats of the structural fumigant, sulfuryl fluoride, *Neurotoxicol-Teratol*, 1988 Mar-Apr, 10:2, 127-133

Inhalation exposure of male and female Fischer 344 rats to sulfuryl fluoride [Vikane (Dow Chemical Company) gas fumigant] at 300 ppm for 6 hr/day, 5 days week, for 13 weeks caused diminished wight gain, dental fluorosis, a slight decrease in grooming, decreased flicker fusion threshold, slowing of flash, auditory and somatosensory evoked potentials, mild nasal and pulmonary inflammation, mild kidney effects, and mild vacuolation in the brain. Auditory brainstem responses (ABRs) and brain histology were evaluated two months postexposure in 2 male and 2 female rats. Both the ABRs and brain histology were within normal limits at this time, indicating that these treatment effects were, to at least a great extent, reversible. Exposure to 100 ppm resulted in dental fluorosis and very minor slowing of some evoked responses; all other measures, including brain histology, were normal. No treatment effects were noted at 30 ppm.

Mullenix PJ, Denbesten PK, Schunior A, Kernan WJ, Neurotoxicity of sodium fluoride in rats, *Neurotoxicology Teratology*, 1995 March,17(2):169-177.

Fluoride (F) is known to affect mineralizing tissues, but effects upon the developing brain have not been previously considered. This study in Sprague-Dawley rats compares behavior, body weight, plasma and brain F levels after sodium fluoride (NaF) exposures during late gestation, at weaning or in adults. For prenatal exposures, dams received injections (SC) of 0.13 mg/kg NaF or saline on gestational days 14-18 or 17-19. Weanlings received drinking water containing 0, 75, 100, or 125 ppm F for 6 or 20 weeks, and 3 month-old adults received water containing 100 ppm F for 6 weeks. Behavior was tested in a computer pattern recognition system that classified acts in a novel environment and quantified act initiations, total times and time structures. Fluoride exposures caused sex- and dose-specific behavioral deficits with a common pattern. Males were most sensitive to prenatal day 17-19 exposure, whereas females were more sensitive to weanling and adult exposures. After fluoride ingestion, the severity of the effect on behavior increased directly with plasma F levels and F concentrations in specific brain regions. Such association is important considering that **plasma levels in this rat model (0.059 to 0.640 ppm F) are similar to those reported in humans exposed to high levels of fluoride**. [emphasis added]

See also brain2.htm by Dr. P.J. Mullenix

Spittle B, Psychopharmacology of fluoride: a review, Int Clin Psychopharmacol, 9:2, 1994 Summer, 79-82

Although the blood-brain barrier is relatively impermeable to fluoride, it does not pose an absolute barrier and fluoride has the ability to enter the brain. The literature was examined to assess the quality of the evidence for cerebral impairment occurring due to exposure to fluoride from therapeutic or environmental sources. Several surveys of persons chronically exposed to industrial fluoride pollution reported symptoms related to impaired central nervous system functioning with impaired cognition and memory. Examination of individual case reports showed the evidence for aetiological relationships between symptoms and fluoride exposure to be of variable quality. The evidence was seen as being suggestive of a relationship rather than being definitive. The difficulties with concentration and memory described in relation to exposure to fluoride did not occur in isolation but were accompanied by other symptoms of which general malaise and fatigue were central. Possible mechanisms whereby fluoride could affect brain function include influencing calcium currents, altering enzyme configuration by forming strong hydrogen bonds with amide groups, inhibiting cortical adenylyl cyclase activity and increasing phosphoinositide hydrolysis.

[editor's note: this review was published before Mullenix et al., completed their ground-breaking study. The blood-brain barrier is penetrated by fluoride]

Strunecká A, Patočka J, Pharmacological implications of aluminofluoride complexes, a review of the evidence for pathophysiological effects of aluminium and fluoride on living organism

Varner JA, Jensen KF, Horvath W, Isaacson RL, Chronic administration of aluminum-fluoride or sodium-fluoride to rats in drinking water: alterations in neuronal and cerebrovascular integrity. *Brain Res* 1998 Feb 16;784(1-2):284-98

This study describes alterations in the nervous system resulting from chronic administration of the fluoroaluminum complex (AlF3) or equivalent levels of fluoride (F) in the form of sodium-fluoride (NaF). Twenty seven adult male Long-Evans rats were administered one of three treatments for 52 weeks: the control group was administered double distilled deionized drinking water (ddw). The aluminum-treated group received ddw with 0.5 ppm AlF3 and the NaF group received ddw with 2.1 ppm NaF containing the equivalent amount of F as in the AlF3 ddw. Tissue aluminum (Al) levels of brain, liver and kidney were assessed with the Direct Current Plasma (DCP) technique and its distribution assessed with Morin histochemistry. Histological sections of brain were stained with hematoxylin & eosin (H&E), Cresyl violet, Bielschowsky silver stain, or immunohistochemically for beta-amyloid, amyloid A, and IgM. No differences were found between the body weights of rats in the different treatment groups although more rats died in the AlF3 group than in the control group. The Al levels in samples of brain and kidney were higher in both the AlF3 and NaF groups relative to controls. The effects of the two treatments on cerebrovascular and neuronal integrity were qualitatively and quantitatively different. These alterations were greater in animals in the AlF3 group than in the NaF group and greater in the NaF group than in controls. Copyright 1998 Elsevier Science B.V.

Psychology Department, Binghamton University, Binghamton, NY, USA.

Varner JA, Jensen KF, Horvath W, Issacson RL, The Neurotoxicological Evaluation Of The Chronic Administration Of Aluminum-Fluoride and Sodium-Fluoride, Society for Neuroscience Annual Meeting; San Diego, CA, 1995 Nov, abstract.

This study examined the neurotoxic consequences of the chronic ingestion of AlF_3 and the equivalent fluoride concentration given as low doses of NaF in drinking water. Twenty seven male LE rats, 3.5 - 4.5 months of age, were studied. The animals were divided into 3 groups based on the contents of the drinking water: control, NaF, or AlF_3. Water was available ad libium for 52 weeks. Significantly more rats died in the AlF_3 group than the control group during the study. Histological examinations involved the following stains: Cresy Violet, Bielschowsky silver, H&E, Morin Aluminum fluorescence, Beta Amyloid, Amyloid A, and IgM. Overall, neuronal loss was more prominent in the AlF_3 group than the NaF and control groups in the left hemisphere and in the dentate gyrus of both hemispheres. Toxin-induced abnormalities in the AlF_3 group were more apparent in the left hemisphere cortex but changes were found in the right hemisphere hippocampus. Hippocampal argentophillic reactions were common in both treated groups. Beta amyloid reaction product was enhanced in the thalamus in both toxin groups. More IgM antibody reaction product was found in the right hemisphere cortices of rats in both treated groups. Overall brain and kidney Al content was higher in both toxin groups relative to controls. Indications of glomerular disease were found in both treated groups. This reduction and/or abnormal appearance of cells, the presence of beta-amyloid, IgM, and Al indicate that AlF_3 is neurotoxic when chronically administered in the drinking water of rats. The abnormal appearance of cells and the presence of beta-amyloid, IgM, and Al suggest that NaF also induces neurotoxicity, although somewhat different than that found after AlF_3.

Varner JA, Huie C, Horvath W, Jensen KF, Issacson RL, Chronic AlF_3 Administration: II. Selected Histological Observations, *Neuroscience Research Communications*, 1993, 13:2, 99-104.

[editor's note: this study shows that the bioavailability of Al from drinking water is increased in the presence of fluoride. The Al content in the brain doubled in treated animals. According to an October 28, 1992 *Wall Street Journal Article*: "Rats fed the highest doses developed irregular mincing steps characteristic of senile animals.... Post mortem examination of the rat brains disclosed 'substantial cell loss in structures associated with dementia -- the neo-cortex and hippocampus'."]

Yang Y, Wang X, Guo X, Effects of high iodine and high fluorine on children's intelligence and the metabolism of iodine and fluorine, *Chung Hua Liu Hsing Ping Hsueh Tsa Chih*, 1994 Oct, 15 (5), 296-298 (Translated from Chinese).

An investigation on children's intelligence and the metabolism of iodine and fluorine in high iodine and fluorine regions was carried out. The results were as follows. In high iodine and high fluorine areas, the thyroid enlargement prevalence rate among inhabitants and that among children were 3.8% and 29.8%, respectively. The dental fluorosis prevalence rate among inhabitants and that among children was 35.48% and 72.9%, respectively. The pupils' average intelligence quotient (IQ) was 76.67 ± 7.75, slightly lower than the control point, but that of low intelligent pupils was 16.7%. The urinary iodine and urinary fluoride were 816.25 ± 1.80 micrograms/L and 2.08 ± 1.03 mg/L, respectively, markedly higher than the control point. The thyroid iodine-131 (131I) uptake rate

was markedly lower than the control point. The values at 3 h and 24 h were 9.36 ± 1.55% and 9.26 ± 4.63%, respectively. The serum TSH was obviously higher than the control point. These results indicate that high iodine and high fluorine exert severe damage to human body.

Zhao LB, Liang GH, Zhang DN, Wu XR, Effect of a high fluoride water supply on children's intelligence, *Fluoride*, 1996, 29:4, 190-192

Abstract: In Shanxi Province, China, children living in the endemic fluoride village of Sima (water supply F=4.12 mg/L) located near Xiaoyi City had average IQ (97.69) significantly lower ($p < 0.02$) mg/L; average IQ = 105.21). These differences were not associated with gender, but the IQ scores were directly related to educational level of the parents.

Introduction: It has been reported that fluoride can penetrate the fetal blood-brain barrier and accumulate in cerebral tissue before birth,[1] thereby apparently affecting children's intelligence.[2] In the present study, conducted in April 1993, this hypothesis was further investigated by comparing the performance on IQ tests administered to 320 randomly selected children, age 7 to 14, residing in central Shanxi Province, China, in two suburban villages with significantly different fluoride content in drinking water. [...]

Discussion: The results of this study indicated that intake of high-fluoride drinking water from before birth has a significant deleterious influence on children's IQ in on of two similar villages. No real differences were found for gender. In the high-fluoride village of Sima the number of children with IQ of 69 or below was six times that in the healthier low-fluoride village of Xinghua. There were also fewer children (20) in Sima with superior IQ scores of 120 or higher than the number (27) in Xinghua. Moreover, the fact that the IQ scores increased more slowly with age in Sima than in Xinghua supports the view that exposure to high levels of fluoride *in utero* exerts a cumulative adverse effect that is not overcome with increasing age in a high-fluoride community.

References

1. He H, Chen ZS, Liu XM, The effects of fluoride on the human embryo, *Chinese Journal of Control of Epidemic Diseases*, 1989, 4, 136-137.
2. Cheng YX, IQ of children in areas of high fluorine content, *Chinese Journal of Control of Endemic Diseases*, Supplement 1991.

RELATED ARTICLES

- **Ding LI**, The nervous systemic complications of chronic fluorosis. *Chinese Journal of Endemiology*, 1983, 2, 97-98.
- **Hu YH**, Direct damage on nervous system by fluorosis. Compilation of First Conference on Neuropsychiatric Diseases in Xinjian, (1982), 86-88.
- **Shung-Guan CM**, et al., The non-skeletal lesions of endemic fluorosis, *Chinese Journal of Internal Medicine*, 1982, 21, 217-219.
- **Du L**, Wan CW, Cao XM, The influence of chronic fluorosis on the development of the brain of the human embryo, *Journal of Fluorosis Research Communications*, 1991, 138

Home

Fluoride: Protected Pollutant or Panacea?
Are the claimed benefits of ingesting fluoride over-rated
and the risks to our health and eco-system under-reported?

Abstracts

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Fluoride's Proven Effects

(Text from Dr. Kennedy's Powerpoint presentation...)

Slide #1
This Power Point Presentation has been prepared to help others talk about the effects of water fluoridation on the health of their local community. Scientific references from the peer-reviewed literature to support the basis of these graphics are provided below.

Although some have called artificial fluoridation controversial, I find that it can be a very easy subject to understand. It is as easy as 1, 2, 3.
1) Does fluoride work to reduce tooth decay if swallowed? No
2) Is it safe for babies or the handicap? No
3) Is ingested fluoride for the purpose of reducing tooth decay FDA approved? No
A simple as 1,2,3.

Slide #2 & 3 Point 1
There is almost unanimous agreement in the scientific community today that if fluoride has an impact of tooth decay it is by topical mechanisms and not via systemic ingestion as was once believed. Dr. Featherstone in his July 2000 article about on fluoride and tooth decay reminded every dentist and reader of the American Dental Association Journal that the level of fluoride in saliva or incorporated into the enamel from ingesting fluoridated water is insufficient to have a measurable impact on tooth decay. The fact that fluoride has only a topical effect is recognized on the United States Department of Agriculture (USDA) web page. Like sun block. You put it on the skin's surface and there is no point in drinking it.

Proponents of fluoridation now contend that the fluoride in drinking water has a topical effect on the enamel. Dr. Hardy Limeback, Professor of Preventive Dentistry in Toronto suggests that the appropriate use for fluoridated water would therefore be to swish it around tour mouth and then spit it out.

(Footnote: Discussed in detail in Colquhoun J. Flawed foundation: A re-examination of the scientific basis for a dental benefit from fluoridation. Community Health Studies 14 288-296 1990)

Slide #5 & 6 Fluoridation causes dental fluorosis
This child has severe dental fluorosis. It is a structural defect in the enamel that weakens the tooth makes it crack, break and wear out prematurely. It is caused only by ingested fluoride in children. Adults do not develop dental fluorosis. They develop skeletal fluorosis. http://www.inter-view.net/~sherrell

Fluoridation causes dental fluorosis and all sources of fluoride intake are cumulative. However, water fluoridation causes dental fluorosis more often than toothpaste and all the other fluoride exposures combined. The graph displayed here is from the 1987 National Institute of Dental Research survey of 39,000 children in 84 communities. As you can see the amount of dental fluorosis this very profluoridation government research body found went up directly proportional to the amount of fluoride in the drinking water.

The raw data found 66% of the children in the fluoridated communities had at least one tooth with dental fluorosis. So they decided to not count the children with only one tooth scarred by fluoride. They then took the classification of the second most severely

damaged tooth to claim that most of the children suffered only mild or very mild dental fluorosis. Still 29.9% of the children raised in a fluoridated community have two or more teeth showing visible scaring of the enamel.

Slides 7 & 8 (mild and very mild dental fluorosis)
Fluoride appears to impact some subsets of the population more severely especially the African American and Hispanic. Early studies of fluoridation found twice as much dental fluorosis in African American children than their Caucasian counterparts. That fact alone makes water fluoridation a racist policy.

The proponents of fluoridation contend that dental fluorosis is merely a cosmetic defect. This argument fails for many reasons. Dentists are paid to fix cosmetic defects therefore cosmetic damage is by definition also economic harm. For example if I spilled a bucket of paint on your new BMW, would you agree that a mere cosmetic defect was of no concern? Or would you demand that I pay for the damage to the appearance of your vehicle? In California the Department of Health has determined that dental fluorosis could also damage the child's self image and thus would be psychological harm as well.

Slide 9 Point 2
"Infants receiving substantial quantities of infant formula generally should not use powder or liquid concentrate if water fluoride levels are near optimal or above, since the water fluoride alone might exceed total, recommended daily levels."
The English translation for the rest of us; Don't make up fluoridated tap water formula for babies. They will get dental fluorosis. Breast milk has virtually no fluoride and thus the longer an infant is breast fed the less likely they are to develop dental fluorosis.

It the Wall Street journal the CDC fluoride promoters took the dental fluorosis rate for the fluoridated areas and averaged that with the dental fluorosis rate from the non-fluoridated areas to claim that only 22% of the children now suffer from dental fluorosis.

Slide 10
Did you read about this in your local newspaper? Of course not. Newspapers seldom print articles about the negative side effects of ingested fluoride but the manufacturers liability is clear. The child in this case swallowed the Colgate toothpaste. Now toothpaste in the United States contains the following warning, "KEEP OUT OF REACH OF CHILDREN UNDER THE AGE OF 6. Use only a pea sized amount. If the amount used in brushing is swallowed seek professional help or contact a poison control center immediately"

Slide 11
When confronted by Wall Street Journal reporter Tara Parker-Hope the fluoridation promoters made an astounding admission, "There probably is excess exposure,"

Slide 12
"A recent national study found that 22% of U.S. children have some form of fluorosis. Bleaching can't fix it. Dentists often use expensive veneers to cover the teeth."

You might ask how they arrived at just 22% since I just showed you evidence of a much higher level of dental fluorosis in fluoridated communities. They averaged the amount of dental fluorosis from unfluoridated communities with that found in fluoridated communities to reduce the amount to 22% or slightly more than one out of five.

Slide 13 & 14 Point 3.
By 1975 the Food and Drug Administration had rejected 35 new drug applications for

fluoride/vitamin combinations because "There is no substantial evidence of drug effectiveness as prescribed, recommended, or suggested in labeling."

Slide 15 & 16
"At the present time there are no new drug applications on file."

Slide 17 & 18
American Academy of Pediatrics
A) Now recommends no prescription fluoride before age of 6 months.
B) After 6 mo. To 3 yr. when all other sources are considered deficient, only 0.25 mg/day. Equivalent to just one cup of fluoridated water.
C) Human breast milk contains almost no fluoride or less than 0.05 PPM
D) Research shows that breast-fed infants are smarter and healthier than bottle-fed.

Slide 19
Water fluoridation delivers a drug to infants at a level that is malpractice if prescribed by a physician!
It is as easy as 1,2,3
Not effective swallowed. Not FDA approved and Not safe for the baby.
Slide 20
Now for the really bad news. When fluoride is in drinking water, it is in everything! Fluoride is in so many water supplies and used so widely as a pesticide that it is found virtually in every product and beverage found on the grocery store shelves. The higher level found in grape juice and grape juice sweetened products is most likely pesticide residue. The lower levels we've measured in soft drinks and reconstituted juices is probably from fluoridated drinking water used to prepare those drinks.
http://www.nofluoride.com/consumption.htm

Slide 21
It is physically impossible to suffer from a fluoride deficiency since fluoride is not an essential element. That is there is no known use for fluoride in any human system. But even if you think fluoride is good you are getting more than the alleged beneficial amount of 1 mg/day already. <http://www.nofluoride.com/juice_content.htm>
<http://www.zerowasteamerica.org/Fluoride.htm>

Slide 22-27 Fluoride is a pesticide
These are the new higher permissible fluoride pesticide residue levels allowed in our food. They are going to include fluoride as an "organic" pesticide so that even organic produce will have fluoride residue.
Slide 28
These are the measured amounts that we've found in food from the grocery store shelves.

Slide 29
The baby food chicken was the highest at 8 ppm. A child frequently consuming this product daily dose of fluoride would clearly exceed the threshold for dental fluorosis and bone pathology.

Slide 30
Because fluoride is widely used as a pesticide by many U.S. wineries it is found in high levels in some wines. European wines generally have much lower levels of pesticide since the European standard (EU) is for no more than 0.5 ppm of all pesticides combined including fluoride.

Slide 31
The fluoride in the pet food can cripple the dog. If the pet food contains ground bone meal then it will be high in fluoride since the animal stores the fluoride in the bones over a lifetime. Therefore the secret to the dietary treatment for arthritis in animals is "no ground bone meal."

Slide 32 - 34
"Existing data indicate that subsets of the population may be unusually susceptible to the toxic effects of fluoride and its compounds."
Who is saying making this kind of statement? The Agency for Toxic Substances and Disease Registry a division of the Center for Disease Control formed by the Super fund Legislation several years ago.

"These populations include the elderly, people with deficiencies of calcium, magnesium, and/or vitamin C, and people with cardiovascular and kidney problems." Elderly is defined as over 50 years old.

Slide 35
The scientists at the EPA have formed a labor union over the issue of ethics. They contend that fluoride is a protected pollutant. All other toxic substances in drinking water such as arsenic, lead, cadmium, chromium, mercury, selenium are regulated at a much lower level than fluoride which has a permissible level in states other than California of 4 ppm. California is 2 ppm. Cal/EPA refused to adopt the federal level of 4 ppm because 100% of the children would suffer from dental fluorosis much of it severe.
http://www.senate.gov/~epw/hir_0629.htm

Slide 36 - 38
Fluoride is more toxic than lead and slightly less toxic than arsenic and just like lead accumulates in and is linked to damage of brain/mind development in children, i.e. produces abnormal behavior and reduces IQ.

Slides 39
Fluoride affects IQ

This study conducted in China published in the peer-reviewed journal Fluoride shows a dramatic drop in the IQ if children affected by dental fluorosis.

Slide 40
This study conducted in China published in the peer-reviewed journal Fluoride shows a dramatic drop in IQ where high fluoride water is consumed versus moderate fluoride 4.12 vs. 0.91. <http://www.fluoride-journal.com>

Slide 41
The very first study of fluoridation found a five-month drop in the age of onset of puberty. That has steadily increased as our children's exposure to fluoride has grown. The mechanism of fluoride's action on the pineal gland has now been confirmed in animal studies showing a 1/3 drop in the onset of estrus in animals dosed with fluoride. We've seen this happen in endemic fluorosis areas of India and China also.

Slide 42 & 43
Fluoride Cripples People
When you ingest fluoride only about 50% comes out and the remainder is stored in the bone so that the amount in bone accumulates over a lifetime. This young man has bent

knee and has not walked since age 18. He inhaled fluoride from burning coal indoors.

Slide 44 & 45
This 49-year-old man drank water that was about 5-ppm natural fluoride. The U. S. National Academy of Science has established an upper tolerable intake for fluoride that is 2 1/2 times higher than has been shown to cripple people in other countries.

Slide 46
This x-ray of the white fluoride poisoned spine was taken in the endemic fluorosis areas of China. Although not as severe x-ray surveys of women living in artificially fluoridated areas of the U.S. have also shown increased radio-opacity. Low-level skeletal fluorosis is often misdiagnosed as arthritis and old age. The symptoms may be somewhat reversible if the patient is given fluoride-free water and fluoride exposure eliminated.

Slide 47
Our scientific advisors at the EPA have stated that Fluoride/Fluoridation increases risk of hip fractures Research supports that view.

Slide 48
This graph shows a doubling of the hip fracture rate for 75 years old women who were first exposed to fluoridated drinking water at age 49. The majority of the people in this study lived in a Mormon community. That religion prohibits drinking and smoking so two of the major risk factors for hip fracture were greatly reduced. Note that older women did not suffer the same increase but men did. This is perhaps due to the differences in bone turn over rates between the two sexes.

Slide 49 & 50
There were 4 studies in the 1990's published in the Journal of the American Medical Association linking fluoride in drinking water to increased risk of hip fracture. At last count there were about 8 studies from both US and Europe linking fluoride in drinking water to higher risk of hip fracture.

The enormous medical costs of treating hip fractures and the 25% mortality rate makes the risk of drinking water fluoridation far greater than the alleged dental benefit.

Proponents of fluoridation call this research "junk science" and claim that fluoride is used to treat osteoporosis and that their studies have found fluoridation safe. To be fair lets take a brief look at some of those studies.

Slide 51 Fluoride is NOT FDA approved for osteoporosis
The case controlled clinical trials found no benefit and if they were over 4 years of taking fluoride as a drug they actually found an increased risk of hip fracture. Consequently the drug was never approved.

Slide 52

Other studies like this one that found no increase are highly touted by the fluoride promoters. This study is transparently flawed.

No increase from smoking, drinking or low calcium intake
No increase in cortical bone fluoride
No significant increase in trabecular bone
Combined data for men and women

Long time supporters of fluoridation

Slide 54

Cauley JA, Murphy PA, Riley T, and Black D. Public health bonus of water fluoridation: Does fluoridation prevent osteoporosis and its related fractures Am J Epidemiol 1991; 134:768

1) Mean exposure time of only 6 years
2) 27% not exposed to fluoridated water
3) Does not address long-term impact

Slide 54
1992 M. E. Suarez-Almazor Canada Edmonton vs. Calgary found

1) No increased hip fracture in women
2) Did show an increase in men

Slide 55-56

Fluoride causes cancer NTP

Hepatocholangiocarcinomas
Osteosarcomas
Thyroid adenomas
Oral dysplasias
Fluorosis
Osteosclerosis

Slide 57
Dr. William Marcus who was senior science advisor at the Environmental Protection Agency Office of Drinking Water won his whistle blower lawsuit over the cancer production in rats and mice given sodium fluoride in their drinking water. <http://www.nofluoride.com/three.htm> During his trial the EPA witness tampered by threatening his witnesses with reprisals if they testified on his behalf and the justice department shredded evidence when the trial judge asked to see the original documents. As a result the judge not only found DR. Marcus innocent of any wrong doing but awarded him all back pay, promotions, and punitive damages of $50,000. He says that the study clearly shows that fluoride caused a rare form of live r cancer, (hepatocolangioma) and that cancer is enough to require the removal of fluoride from all drinking water systems. His May Day Memo from 1990, which precipitated his dismissal, called for an independent review of the pathology slides by the EPA. This memo details his reasons for the review in his own words is available at <http://www.sonic.net/kryptox/medicine /cancer/ifin19.txt>

The text of his May Day Memo is below.

1) Sodium Fluoride: individual animal tumor pathology table [rats], Battelle Memorial Institute, February 23, 1989
2) Sodium Fluoride: individual animal tumor pathology table [mice], Battelle Memorial Institute, April 11, 1989

3) Dr. Wm. Marcus' May Day Memo discussed in Lancet 36, page 737 (1990)

Slide 57
Grandjean P; Olsen JH; Jensen OM; Juel K.
Cancer incidence and mortality in workers exposed to fluoride.
Journal of the National Cancer Institute,
1992 Dec 16, 84(24):1903-9
Grandjean's research has found excess lung cancers in Cryolite workers that could not be explained by smoking alone.

Slide 59
In 1992 the Department of Health in New Jersey found a dramatic increase in a rare form of bone cancers in young men living in the fluoridated areas of New Jersey. Other research has confirmed this link.
Fluoride causes cancer
Cohn, PD Association of Drinking Water Fluoridation and the Incidence of Osteosarcoma Among Young Males

Environmental Health Services New Jersey Nov 8, 1992

Slide 60-61

The largest North American Study of tooth decay by the National Institute of Dental Health in 1986-87 found no significant difference in tooth decay rates regardless of the level of fluoride. Water fluoridation does not reduce decay
NIDR 1987 Fluoridation Survey 39,000 Children in 84 areas found NO difference

Slide 62

Water fluoridation does not reduce decay. The effects if any are topical and not systemic. The ADA Journal reported in 2000 that the level of fluoride incorporated into dental mineral by systemic ingestion is insufficient to play a significant role in caries prevention. 1, 2
1) Featherstone JD. Prevention and reversal of dental caries: role of low-level fluoride. Community Dent Oral Epidemiol 1999
2) Featherstone, John M.Sc, Ph.D. The Science and Practice of Caries Prevention JADA Vol. 131 pp.887-899 July 2000

Slide 63
WHO data shows that fluoridation does not reduce decay. Many countries that do not allow fluoridation have had a steeper decline in tooth decay that where fluoridation has been promoted or required. For example Ireland is the only European country with substantial fluoridation and has some of the worst teeth. They are sixth in the list of cavities. England, which has about 10%-fluoridated water, was 5th. The four top countries have no fluoridation. http://www.nofluoride.com/eight.htm

Slide 64
Water fluoridation
does not reduce decay
Canada's lowest tooth decay rate is found in the least fluoridated areas
New Zealand 80,000: children found no difference in decay

Tucson, AZ 25,000 children: over 50 years, "slight" increase in Hispanic
India 400K children: highest tooth decay with high fluoride low calcium and the lowest tooth decay rate with high calcium and low fluoride. Poverty and malnutrition is the root cause of tooth decay.

Slide 65-66
Our scientific advisors are the members of the Union that represents all of the scientists, toxicologists, and other professionals at the EPA headquarters in Washington, DC. Dr Hirzy confirmed their endorsement of our efforts to keep fluoride out of the public drinking water in a letter to Jeff Green dated 7/2/97 and stated that,

NFFE/NTEU Union
Dr. Wm Hirzy, Senior Vice-Pres. NFFE/NTEU The union which represents all of the scientists, toxicologists, and other professionals at the EPA headquarters in Washington, DC http://www.nofluoride.com/hirzy_senate.htm

7/2/97 in an open letter to Jeff Green and Citizens for Safe Drinking Water
"Our members review of the body of evidence over the last eleven years, including animal and human epidemiological studies, indicate a causal link between fluoride/fluoridation and cancer, genetic damage, neurological impairment and bone pathology. Of particular concern are recent epidemiological studies linking fluoride exposures to lower I.Q. in children."

The reason that he said 11 years is because in 1986 the Union filed an Amicus Curiae suit against the EPA over the new higher Maximum Contaminant Level for fluoride (MCL) of 4,000 ppb (4 ppm). At this level 100% of the children will have dental fluorosis and much of it severe. Later in life many will have Stage I and II crippling skeletal fluorosis. It is not protective at all of the most vulnerable subsets of the population.
http://www.fluoridation.com/epa2.htm

Slide 67

The most difficult question to answer is why are they promoting fluoridation so vigorously. The old axiom of "follow the money" seems to apply. 90% of the communities that add fluoride to their drinking water use raw untreated hazardous waste directly from the pollution scrubbers of the phosphate fertilizer industry. <http://fluoridealert.org /f-pollution.htm> Most of it from Florida. The new spelling for that state's name is Fluorida. The substances are called silico fluoride and can be either a powder or liquid. Hydrofluosilic acid is the liquid form and is about 23% fluoride. The rest is the elixir from the scrubber that contains numerous toxic elements including heavy metals like lead, arsenic, even radionucleotides. http://www.nofluoride.com/chemical_analysis.htm

This waste cannot legally be disposed of in a river or the ocean the air or buried in the ground. It must by law be sent to the highest rated hazardous waste disposal landfill where it is detoxified with calcium (lime) and buried. This costs $150 a gallon and they sell it to cities to "fluoridate their water at as much as $2.00 per gallon. Considering there are billions of gallons disposed of this way it is not difficult to see the economic motivation behind the promotion of fluoridation.

68-69 Fluoridation with silico fluorides causes a significant increase in blood lead levels in children. http://www.fluoridation.com/lead.htm

When Director Carol Browner of the EPA was specifically asked by Congressman Ken Calvert, she was unable to identify any safety studies of silico-fluoride used to fluoridate our drinking water. <http://www.citizens.org/Food_Water_Safety/Fluoridation /fluoridebackgr>.htm

Slide70
According to the EPA there is no safe exposure level to lead. Numerous problems are related to early childhood exposure to lead including lower IQ, violent behavior, and learning disorders. http://www.nofluoride.com/lead.htm
<http://www.msnbc.com/modules/exports/ct_email.asp?/news/566692.asp>

Slide 71
Utilizing data collected in three different states for the NHANES III child health protocols where blood lead levels are measured Roger Masters and Myron Coplan have identified silico-fluoride as a risk factor for increased blood lead in children. They did not find the same increased risk if the water had no fluoride, natural fluoride or was fluoridated with sodium fluoride. What they also found was that there are extreme racial differences in the amount of lead children accumulate with the Hispanic and African-American children much more susceptible to high blood lead levels. African-Americans have been shown to be at greater risk of developing dental fluorosis than Caucasian children. These factors make the continued fluoridation of drinking water a racist policy.

Slide 72 Masters and Coplan also found a significant increase in crime in the areas that fluoridated their waters with silico-fluorides.

Slide 73 Fluoridation: A house of cards based upon scientific fraud

When serious specific questions are asked of fluoridation promoters they have repeatedly failed to respond with cogent answers. For example, all of the broad based blinded studies of tooth decay find no significant difference in decay rates whether or not the water contains fluoride at one part per million yet, promoters claim otherwise. As the International Academy of Oral Medicine and Toxicology mantra says, "Where is your Science" or in the case of fluoridation and the numerous adverse health effects that have been documented "Where is your conscience." One of the ways to sort out differences of opinion is what "experts" say under oath in court. http://www.nofluoride.com/legal.htm

Slide 74

The ADA would seek to portray itself as a public servant however they are not a disinterested party. <http://www.nofluoride.com/50k_vote.htm> The income of dentists appears to go up after a community fluoridates its water supply so dentists have suffered no economic harm and in fact have prospered with the advent of fluoridation. What are all those dentists doing do you suppose. The American Academy of Cosmetic dentistry says demands for cosmetic procedures are skyrocketing. We could add the same comment for the children who suffer from crooked teeth due to the delayed growth of the arches and malpositioning of teeth due to excessive fluoride intake.

Slide 75
The ADA is paid for their "Seal of Approval" and only approves fluoridated toothpastes. They also receive tax free gifts to their non-profit and are paid large sums of money for rent of booths at their conventions and for advertising in their widely read trade journals that are only open to companies that have products that received the "Seal of Approval."

Fluoride has proven very lucrative for the dental trade industry, the ADA and the 100,000 dentists it represents. They are far from disinterested parties.

Slide 76
The dentist claim that ingested fluoride is safe yet according to the California Department of Consumer Affairs Dental Board a dentist may not diagnose or treat or provide a medical opinion regarding the systemic effects of ingested fluoride. In fact they may not even study the subject for continuing education credit. It is not in the purview of dentists. Therefore, one may not rely upon the dentist's opinion. By law they quite simply are not licensed or qualified to render this judgment. http://www.nofluoride.com /cal_dental_examiners.htm

Slide 77-79

The public is often swayed by very simple public relations techniques that have been used for years to sell products. When research turns up some bad news about a certain product is the first job of the PR experts is to deny everything and admit nothing. Second they criticize the research as flawed and being junk science and make counter claims against the reporting scientists. Lastly they cite authority for example, It is recommended by the ADA, the US PHS and the American Water Works Association. The latter approach is called prestige endorsement.

80 Slide
We can say for certain that fluoride causes truth decay.

81 Slide
Call Jeff Green and Citizens for Safe Drinking Water at 800-728-3833.
<http://www.saveteeth.org> 1010 University Ave.#52 San Diego, Ca 92103

82 Miscellaneous slides.

Science: by endorsement and bureaucratic protection

The proponents are frequently seen holding up a placard of many organizations that supposedly support fluoridation. The list of organizations that do not support fluoridation or have had their name removed from the list of supporters and many who never gave permission for their name to be placed upon that list is considerably larger than the list as it appears today. Those familiar with the list still find numerous discrepancies between the list shown public officials and the corrected version. "Maureen Jones mocjones@msn.com <mailto:mocjones@msn.com>
In just one year between August 1995 and August 1996 these organizations were removed from the list of fluoridation supporters.
* American Cancer Society
* American Heart Association
* National Kidney Foundation
* American Academy of Allergy and Immunology
* American Diabetes Association
* Society of Toxicology
* Chronic Fatigue Syndrome Activation Network
* American Psychiatric Association
* American Chiropractic Association
* American Civil Liberties Union
* National Institute of Law Municipal Officers

http://www.nofluoride.com/

Slide 83
This photo is of a 10 year old child who had only 2 months of the recommended fluoride vitamins in 1985. His sister had 2.5 years. He was fortunate enough to cease the prescription fluoride before major damage occurred. Peebles found that 67% of the children given fluoride tablets as directed permanent teeth suffered from dental fluorosis.

Slide 84 Dental Fluorosis fluoridated water
"It costs a lot more to cover-up dental fluorosis than fix cavities" according to Hardy Limeback, DDS, PhD former advisor to CDA on fluoridation, Professor Toronto Dental School
Slide 85 Dental Fluorosis is Expensive to Fix
2 porcelain veneers @ $833 each replace average 10 years $1,666 X 6 = $10,000 Lifetime cost

Slide 86 David C. Kennedy, DDS CV or make up your own

Slide 87 Fluoride's anticaries effects are topical (If desired this goes before the ADA Featherstone article slide #3)
Slide 88 Duplicate of Slide #47. Title slide duplicates are for the summary and closing

NEW
Slide 89-90 Toothpaste Warning

The following warning is required on all fluoridated toothpaste by the FDA Since April of 1997 due to the large number of calls to the Poison Control Centers for children who became acutely ill from ingested fluoride. There is approximately 1 milligram of fluoride in a pea-sized drop of toothpaste.

WARNING: Keep out of reach of children under 6 years of age. In case of accidental overdose, seek professional assistance or contact a poison control center immediately.

Slide 91-92 Fluoride causes iodine deficiency which can result in hypothyroidism and frequently in hyperthyroidism. Fluorides were prescribed to patients suffering from hyperthyroidism as anti-thyroid medication prior to 1950. Fluoride exposure may exacerbate iodine deficiency. During pregnancy, when iodine requirements are at their peak, the fetus is especially vulnerable. Even a slightly underfunctioning thyroid gland can result in loss of IQ in the newborn.

A Brief Account of the Fluoridation And Hip Fracture Problem

by
John R. Lee, M.D.*

June 30, 1995

The costs and health effects of osteoporotic fractures in the US are enormous. A study by the Department of Preventive Medicine and Environmental Health, U. of Iowa, recently calculated that the life time risk of any fracture of the hip, spine or distal forearm is almost 40% in white women and 13% of men from age 50 years onward. Hip fractures account for 67-79% of fracture-related dependent functioning, 87-100% of fracture-related nursing home placements, and 87-96% of short-term fracture costs. [1] The total cost of fracture care is now about $9 billion/year. It is estimated that about 350,000 hip fractures occur per year and the incidence is rising.

In an effort to treat osteoporosis and prevent hip fracture, four US studies have examined effect of "therapeutic" doses of fluoride. [2-5] All of them found that, even though bone density appeared to increase in the treated group, hip fracture rates increased within 3 years of treatment. In addition, all of them report significant periarticular joint pain and gastrointestinal side effects in the treated subjects. Dr. Avioli, Shoenberg Professor of Medicine and director, division of endocrinology and mineral metabolism, Washington University School of Medicine, concluded that "sodium fluoride is accompanied by so many medical complications and side effects that it is hardly worth exploring in depth as a therapeutic mode for post-menopausal osteoporosis." [6] Dr. Saul Genuth, chairman of the the FDA advisory committee analyzing these fluoride/fracture findings, was quoted in the Medical World News of 13 November 1989, pg 25, saying the FDA "should quietly forget about fluoride."

More recently, attention has shifted to lower dosages of fluoride, such as found in fluoridated water. There are now at least eight studies that showed an increase of hip fracture incidence in fluoridated compared to unfluoridated communities. They are summarized here:

1. In 1986, M.R. Sowers et al, in a retrospective study, found an increased fracture rate in both pre- and postmenopausal women relative to their water fluoride exposure. [7]
2. In 1991, M.R. Sowers et al completed a prospective study again showing that water fluoride was correlated with more than double the unfluoridated fracture rates. [8]
3. In 1991, Jacobsen et al showed a positive correlation of hip fracture to fluoridation; the P value was < .009, i.e., very strong correlation. [9] The increase in hip fracture incidence could not be calculated from the data given.
4. Later in 1991, C. Cooper et al showed a statistically significant increase of hip fracture incidence in England relative to fluoride content of drinking water ranging from 0 to 1 mg/L [ppm]. [10]
5. Also in 1991, C. Keller compared hip fracture rates in 216 US counties with low or higher *natural* fluoride concentrations in drinking water and found significantly higher fracture rates in counties with fluoride > 1.2 ppm. [11]
6. At the same meeting, D.S. May and M.G. Wilson reported their finding that, as the percentage of persons exposed to fluoride in water increased, the hip fracture rate generally increased. [12]

7. In 1992, C. Danielson et al reported that the risk of hip fracture was approximately 30% higher for women and 40% higher for men in fluoridated compared to unfluoridated communities. [13] Among women at age 75, the risk was about twice as high in fluoridated communities, compared to unfluoridated communities.
8. In 1995, H. Jaqmin-Gedda et al, scientists from the University of Bordeaux, France, studied hip fracture rates in 75 civil parishes in southwestern France and found, after adjustment for multiple alternative variables, an increased risk [odds ratio] for hip fracture of 1.86, i.e., 86% more likely, in parishes with water fluoride higher than 0.11 ppm. [14]

In addition, a number of studies showing fluoride induces pathologically mineralized bone and a deterioration in the overall mechanical ability (strength) of bone. A recent example is the 1994 report by P. Fratzl et al in the Journal of Bone & Mineral Research describing abnormal bone mineralization after fluoride treatments. [15] Also in 1994, C.H. Sogaard et al reported a marked decrease in trabecular bone quality after just five years of sodium fluoride therapy. [16] Pediatric orthopedists are finding that, here in the US, sports injuries to the young are rising sharply, ranging from stress fractures of the lower spine in young gymnasts to tendonitis in swimmers. In 1992, Dr. Carl L. Stanitski, chief of orthopedic surgery, said, "We are seeing more and more stress fractures in children and more and more injuries caused by repetitive use." [17] Some might argue that overuse and too much training are the cause, but others are concerned that something is causing defective bone and connective tissue of US kids, and that something might well be fluoridation.

Conclusion: All studies of fracture rates relative to long term fluoridation exposure indicate a significant increase in fracture risk from fluoridation. The increased fracture risk due to fluoridation appears to range from 40-100%, depending on the age of the subjects studied. For women in their seventh decade who have been exposed to life-long fluoridation, the risk of hip fracture is approximately doubled. The risk increases with increasing fluoride concentration at all levels over 0.11 ppm. Increased bone and connective tissue injuries of US youngsters, reported to be rising sharply, should alert us to the probability that our high fluoride environment is adversely affecting our youngsters as well as our elderly.

References

1. Chrischilles E, Shireman T, Wallace R. Costs and health effects of osteoporotic fractures. Bone 1994;15:377-386.
2. Dambacher MA, Ittner J, Ruegsegger P. Long-term fluoride therapy of postmenopausal osteoporosis. Bone 1986;7:199-205.
3. Riggs BL, Hodson SF, O'Fallon WM, et al. Effect of fluoride treatment on the fracture rate in postmenopausal women with osteoporosis. NEJM 1990;322:802-809.
4. Kleerkoper ME, Peterson E, Phillips E, et al. Continuous sodium fluoride therapy does not reduce vertebral fracture rate in postmenopausal osteoporosis (abstract) J Bone Miner Res 1989; Res 4 [Suppl]:S376.
5. Hedlund LR, Gallagher JC. Increased incidence of hip fracture in osteoporotic women treated with sodium fluoride. J Bone Miner Res 1989;4:223-225.
6. Avioli LV. Fluoride treatment of osteoporosis. Postgrad Med: a special report, 14 Sept 1987:26-27.
7. Sowers MR, Wallace RB, Lemke JH. The relationship of bone mass and fracture history to fluoride and calcium intake: a study of three communities. Am J Clin Nutr 1986;44:889-898.
8. Sowers MR, Clark MK, Jannausch ML, et al. A prospective study of bone mineral content and fracture in communities with differential fluoride exposure. Am J Epidem 1991;133:649-660.
9. Jacobsen SG, Goldberg J, Miles TP, et al. Regional variation in the incidence of hip fracture.

JAMA 1991;264:500-502.
10. Cooper C, Wickham CAC, Barker DJR, et al. (Letter) JAMA 1991;266:513-514.
11. Keller C. Fluorides in Drinking Water. Paper presented at the Workship on Drinking Water Fluoride Influence on Hip Fractures and Bone Health. April 10, 1991, Bethesda, MD.
12. May DS, Wilson MG. Hip fractures in relation to water fluoridation: an ecologic analysis. Presented at the Workship of Drinking Water Fluoride Influence on Hip Fractures and Bone Health. April 10, 1991, Bethesda, MD.
13. Danielson C, et al. Hip fractures and fluoridation in Utah's elderly population. JAMA 1992;268:746-748.
14. Jacmin-Gedda H, Commenges D, Dartigues JF. Fluorine concentration in drinking water and fractures in the elderly. (Letter) JAMA 1995;273:775-776.
15. Fratzl P, Roschger F, Eschberger J, et al. Abnormal bone mineralization after fluoride treatment in osteoporosis: a small-angle X-ray-scattering study. J of Bone & Mineral Research 1994, 9:1541-1549.
16. Sogaard Ch, Mosekilde Li, Richards A, Mosikilde Le. Marked Decrease in Trabecular Bone Quality after five years of sodium fluoride therapy - assessed by biomechanical testing of iliac crest bone biopsies in osteoporotic patients. Bone 1994;15:393-399.
17. Reported by Elisabeth Rosenthal in the New York Times of 28 October 1992.

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TITLE:
Neurotoxicity of sodium fluoride in rats

SOURCE
Neurotoxicol Teratol (NAT), 1995 Mar-Apr; 17 (2): 169-77

ABSTRACT:
Fluoride (F) is known to affect mineralizing tissues, but effects upon the developing brain have not been previously considered. This study in Sprague-Dawley rats compares behavior, body weight, plasma and brain F levels after sodium fluoride (NaF) exposures during late gestation, at weaning or in adults. For prenatal exposures, dams received injections (SC) of 0.13 mg/kg NaF or saline on gestational days 14-18 or 17-19. Weanlings received drinking water containing 0, 75, 100, or 125 ppm F for 6 or 20 weeks, and 3 month-old adults received water containing 100 ppm F for 6 weeks. Behavior was tested in a computer pattern recognition system that classified acts in a novel environment and quantified act initiations, total times and time structures. Fluoride exposures caused sex- and dose-specific behavioral deficits with a common pattern. Males were most sensitive to prenatal day 17-19 exposure, whereas females were more sensitive to weanling and adult exposures. After fluoride ingestion, the severity of the effect on behavior increased directly with plasma F levels and F concentrations in specific brain regions. Such association is important considering that plasma levels in this rat model (0.059 to 0.640 ppm F) are similar to those reported in humans exposed to high levels of fluoride.

NOTES:
Comment in: Neurotoxicol Teratol, 1995 Nov-Dec;17(6):685-8

These were potentially disturbing findings. Andrew Thomas, consultant surgeon at Birmingham's Royal Orthopaedic Hospital, commented that there was a need for further and more specific research. `What we need to do,' he explained, `is to look at patients with osteoporosis, to look at the levels of fluoride in their bone so that we can assess whether there really is a problem or not.' The urgent need for further investigation was made even plainer by the publication of a fresh and more alarming study by the University of Bordeaux, published in the Journal Of The American Medical Association. This measured rates of hip fracture among elderly citizens in 75 parishes of south-western France, and compared the concentrations of fluoride in the water (which, in this case, was naturally fluoridated). The study found that people living their lives in fluoridated areas suffered 86 per cent more fractures than those living in non-fluoridated parts.

One irony of this research is that those who lobby in favour of fluoridation always refer to the savings to the National Health Service in costs of dental care - however, if fluoridation does indeed lead to an increased incidence of hip fracture, then the overall costs to the NHS would be far greater than these projected savings. Hip fracture, a serious and sometimes life-threatening condition, is one of the most expensive items on the NHS budget.