Fluoride Position Paper
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There is a great deal of controversy about the effectiveness and the safety of fluoride, especially in the form of water fluoridation. The intent of this paper is to provide you with information you will need to make an informed decision about fluoride. This information is based on valid scientific sources, and its basic premise of is that water fluoridation is ineffective at improving dental health, and does have the potential of adverse health effects (in other words, harm).

History of fluoridation

Water fluoridation began in the late 1940’s and 50’s after some preliminary studies were done that purportedly showed that a certain “optimal” level of fluoride (stated to be one part per million – 1ppm) in the drinking water led to decreased cavities in children. The testing protocols were quite flawed, and science gave way to politics. For a detailed history of the dubious beginnings of water fluoridation in this country, see The Fluoride Deception, by Christopher Bryson¹.

The first trial took two similar sized towns in upstate New York, Kingston and Newburgh. Newburgh was to be fluoridated at 1ppm, while Kingston would remain fluoride-free. It was to be a ten year study. The data was pitifully flawed, and would never pass today’s standards of peer review. But after only five years the study was stopped and water fluoridation was proclaimed as public health policy. Interestingly, today’s data shows that Newburgh has a slightly higher decay rate than never-been-fluoridated Kingston!

Water fluoridation soon became a public health policy priority and has been heavily promoted ever since. Today, the American Dental Association (ADA) proclaims that, “Based on the overwhelming weight of peer-reviewed, credible scientific evidence, the ADA has long supported community water fluoridation as a safe, effective means of preventing tooth decay.”² Is that truly the case? If we look at science rather than “proclamations” or endorsements, the story is different. Large scale, broad based, well controlled epidemiologic studies published in peer-reviewed medical or scientific journals show no substantial statistical difference between fluoridated and non-fluoridated communities. This fact will shock some, but let’s look at the science.

The largest survey ever conducted in this country was commissioned by the National Institute of Dental Research (NIDR) in 1987. In this study, Brunelle and Carlos³ looked at 39,000 children in 84 communities. The average difference in tooth decay in children aged 5-17 years who had lived all their lives in fluoridated vs. non-fluoridated communities was not statistically significant! Using an index called DMFS, which means counting decayed, missing, and filled surfaces of teeth, the actual difference was less than
one half of one percent. Similarly, a study done in Washington State in 1996 looked at
caries prevalence in 3,000 third grade children in 39 counties throughout the state. Their
statistics were almost identical to the Brunelle study, and the investigators reported, “This
study did not find a statistically significant effect of water fluoridation.” They did find a
significant correlation between decay and economic status, which is a finding that should
be pursued.

The World Health Organization gathered data in 2001 on tooth decay trends over
the last several decades in twenty different countries. They found that there has been a
significant decline in decay in 12 year olds since about the early 1970’s. What is more
interesting is that this decline is virtually the same in countries that are fluoridated, partly
fluoridated or totally non-fluoridated.

**The mechanism of fluoride’s effects**

There are pervasive notions and assumptions about how fluoride supposedly
works that persist in the public and even in the dental profession, in spite of evidence to
the contrary. Most dentists were taught in dental school that ingested fluoride will
incorporate into the developing tooth enamel of a child and make the teeth more resistant
to decay. Furthermore, topically applied fluoride would create an enamel surface more
dense with fluoride ions and more resistant to the decay-causing acids produced by
plaque bacteria.

What does research really show? Featherstone and other prominent researchers on
fluoride have found that ingested fluoride does not significantly reduce decay, and that
fluoride’s primary effect is topical. Their studies have found that the level of fluoride
incorporated into dental mineral by systemic ingestion is insufficient to play a significant
role in caries [decay] prevention. So, if ingested fluoride doesn’t do any good, why are
we drinking it, and why are some physicians still prescribing fluoride supplements for
infants and children? One noted authority, Dr. Paul Connett, has stated that “ingesting
fluoride for cavity prevention makes about as much sense as swallowing sun block to
protect the skin form sunburn.”

What, then, about the topical effect? Some have postulated that drinking
fluoridated water will lead to fluoride in the saliva continually bathing the teeth and
protecting them. Research has shown that there is, in fact, a higher amount of fluoride in
the saliva where water is fluoridated vs. non-fluoridated areas, but in both cases the
concentration is very low: 0.016ppm vs. 0.006ppm. Researchers have concluded that
“This concentration of fluoride is not likely to affect cariogenic [cavity-causing]
activity.” What about topically applied fluoride in the dental office, or with fluoride
rinses, in order to create a more fluoride-dense enamel surface (a goal that dentists have
always strived for)? In Fluorides in Dentistry, Clarkson, Fejerskov and others state that
“The prevalence of dental caries in a population is not inversely related to the
concentration of fluoride in enamel.” In other words, higher fluoride level on the
enamel surface does not equate with fewer cavities. Other researchers have found “a
higher concentration of enamel fluoride is not necessarily more efficacious in preventing
dental caries.” These studies are cited in the Centers for Disease Control (CDC) report of August, 2001. Featherstone reports in a cover story for the Journal of the ADA in July of 2000: “Even when the outer enamel has higher fluoride levels, such as 1000 ppm, it does not measurably withstand acid-induced dissolution any better than enamel with lower levels of fluoride.”

Good, credible research, then, blows these old myths apart. Science, it seems, rather than providing an explanation of how fluoride works, actually provides a pretty good explanation of why fluoride doesn’t work. Why, then, do these old assumptions about fluoride still persist?

What about the safety of fluoridation?

“[Fluoridation as a health policy] is against all principles of modern pharmacology. It’s really obsolete ... I think those nations that are using it should be ashamed of themselves. It’s against science.”

Dr. Arvid Carlsson, Nobel Laureate in Medicine/Physiology (2000)

“Over the past ten years, a large body of peer-reviewed science has raised concerns that fluoride may present unreasonable health risks particularly among children, at levels routinely added to tap water in American cities.”

Environmental Working Group, July, 2005

“The whole thing is politics. You’re not talking science at all.”

Dr. Robert Carton, President of the Union of EPA professional workers headquartered in Washington, DC. This Union has called for a moratorium on all water fluoridation due to safety concerns.

There have been studies linking fluoride exposure with a number of health concerns. Disruption of thyroid function, increased hip fracture in the elderly, early stages of skeletal fluorosis, decreased IQ level in children (in some recent studies in China), disfiguring dental fluorosis, suspicion of increased incidence of bone cancer in young males, all have found their way into the scientific literature. Can any of these health effects occur at levels of fluoride exposure one would get from drinking fluoridated water? This is a crucial question, and one that is at the center of a recent report from the National Research Council (NRC). Below is the story of how the highest authorities in science in this country cast serious doubt on the safety of water fluoridation.

The National Research Council (NRC) report of 2006 and the U.S. Environmental Protection Agency (USEPA)

The USEPA does not oversee or regulate water fluoridation programs. It is, however, responsible for setting and monitoring “maximum contaminant levels” of substances in our drinking water. To protect public health and safety, EPA standards dictate the maximum allowable limit of lead, arsenic, fluoride, etc. that drinking water can contain. Above those levels (called MCLG or “maximum contaminant level guidelines”), these are known to have adverse health effects. Such contaminants have to
be removed from water to keep them below the MCLG levels. Fluoride is considered by toxicologists to be more toxic than lead and only slightly less toxic than arsenic.\textsuperscript{16} The MCLG’s for lead and arsenic, interestingly, are listed in a few parts per \textit{billion}. For fluoride, the MCLG has been 4,000 parts per billion (or 4ppm)! It’s important to note that the MCLG of 4ppm is uncomfortably close to the “optimal” level recommended of 1ppm.

The NRC, which is a branch of the National Institutes of Health, was commissioned by the EPA in 2003 to review current scientific research and determine whether the current MCLG standard of 4ppm is still appropriate. After three years, the expert panel of the NRC released its 450 page report (March, 2006).\textsuperscript{17} They stated quite clearly that the current level of 4ppm is too high and should be lowered to protect public health. It was not the panel’s job to look at effectiveness of fluoride, nor was it given the job of stating what this new level of MCLG should be. They referred it back to the EPA to do a risk assessment and come out with a new, lower MCLG level consistent with current research. The panel’s review of current science (the health concerns mentioned above and more) concluded that adverse health effects can indeed happen at 4ppm.

One of the panelists, Dr. Kathleen Thiessen, stated in a later interview that “I personally do not think that a responsibly set MCLG would be high enough to allow for water fluoridation . . . information presented in the report indicates a safe MCLG for fluoride would be less than 1ppm.” She also stated that she is not the only one on the panel with doubts about the safety of water fluoridation. An MCLG set at 1ppm would, of course, mean that public water fluoridation programs are set at a level known by the U.S. government to be harmful! As you might guess, this is going to be a very politically charged issue. As of early 2008 (nearly two years after the release of the NRC report), the EPA has yet to change the MCLG level. Unfortunately, where science and politics conflict, sometimes science loses out. It will be very interesting to see when and how the EPA comes out with its revised MCLG value.

\textit{In light of the above information and the yet to be released new MCLG level, it would seem prudent to halt any new fluoridation programs until the USEPA releases its findings. To knowingly continue to promote fluoridation when the “jury is still out” about a safe maximum contaminant level is scientifically and morally unsound.}

Where is the FDA in all of this?

This will be a shocker to some: the substance used in over 90\% of fluoridation programs in the U.S. is not and never has been approved by the FDA! Nor does the USEPA oversee fluoridation products, safety or purity. In fact, no governmental agency oversees this product, and no long term toxicology studies have ever been submitted on it.

\textit{It seems a reasonable request of our governing officials in the Health Department not to allow any substance be added to our drinking water for the purpose of having a health effect unless it has been approved by the FDA as being safe and effective. This has not been the case with water fluoridation.}
What is it? It is not pharmaceutical grade sodium fluoride as one might expect. It is a waste product of the phosphate fertilizer industry, primarily hydrofluosilicic acid. This industry uses “scrubbers” in their processing to reduce environmental emissions. The result is a waste liquid (called a “liquor” in the industry) containing hydrofluosilicic acid. Industrial sources describe it as 26% hydrofluosilicic acid and 76% waste water containing varying amounts of heavy metals. This material is too toxic to discard legally, and too expensive to dispose of as hazardous waste. Yet, this same material, unchanged, is shipped to municipalities all over the country to dump into our drinking water. No processing or purification occurs, and there is no oversight except by industry itself. Is this really acceptable to you?

Dental Fluorosis

Dental fluorosis appears as a pattern of subtle whitish spots on the tooth enamel in its mildest form. Moderate to severe dental fluorosis ranges from prominent white and brownish spots to pitted enamel that requires restoring by a dentist. It is the result of a disruption in the formation process of the enamel while the tooth is developing before it erupts into the mouth. The cause is excessive fluoride. Ingested fluoride, at a high enough level in a child, causes this toxic effect. Although the ADA downplays it as just a mild cosmetic effect, it can actually result in very expensive dental treatment. And, since the enamel formation process is so similar to bone formation, one cannot rule out that similar processes are occurring unseen in the bone. In fact, skeletal fluorosis can be a severely crippling disease and is seen in high numbers of people in China and India in rural areas where ground water has very high levels of fluoride.

The NRC report referred to above stated, “The damage to teeth caused by severe enamel fluorosis is a toxic effect that is consistent with prevailing risk assessment definitions of adverse health effects.” So, in spite of the ADA’s claims that “even the more advanced forms of dental fluorosis [is a] cosmetic effect rather than a functional adverse effect,”18 the nation’s highest scientific body says otherwise.

“It is illogical to assume that tooth enamel is the only tissue affected by low daily doses of fluoride ingestion.” -- Dr. Hardy Limeback, University of Toronto (2000)

“[Dental fluorosis] raises concerns about similar damage that may be occurring in the bones.” -- Environmental Working Group (2006)

“Commons sense should tell us that if a poison circulating in a child’s body can damage the tooth-forming cells, then other harm is also likely.” -- Dr. John Colquhoun (1997)
How prevalent is dental fluorosis? Back in the early days of the first trials of water fluoridation, Dr. Trendley Dean, considered by many the “father” of fluoridation (a dubious distinction) stated that at an “optimal” level of 1ppm in the drinking water, and in the absence of exposure to fluoride from other sources, one could expect about 10% of children would have at least some mild fluorosis.\textsuperscript{19} Today, kids and adults are exposed to fluoride ingestion in many other ways than drinking water. Virtually every reconstituted beverage and many foods contain significant fluoride levels. A child can easily get far more than the “recommended” or “optimal” level of fluoride ingestion without ever drinking a single glass of tap water. Still, one can see a direct correlation between level of fluoride in the drinking water and the level or incidence of dental fluorosis.

In fact, the Centers for Disease Control reported in 2005 that \textbf{32\%} of American children now have some form of dental fluorosis, with 2 to 4\% having the moderate to severe stages. This survey averaged together communities that are and are not fluoridated. This shows that even unfluoridated communities are exposed to fluoride ingestion from sources other than tap water. Other reports have stated that the incidence in fluoridated areas ranges from 20\% to 80\%.\textsuperscript{20}

All of this leads to another recommendation that is scientifically reasonable. Since the level of dental fluorosis correlates in a linear fashion with the level of fluoride in drinking water, the rate of dental fluorosis in the child population can be a predictor of fluoride exposure. And, since the so called “optimal” level of fluoride exposure should result in about 10\% dental fluorosis, then:

\textbf{[Opinion]}: Any community that is fluoridated or considering fluoridation should first do a survey of the incidence of dental fluorosis of the children in that community. If the incidence is greater than 10\%, then they are already exceeding the so called “optimal” dose promoted by fluoride advocates. This community should not adopt a water fluoridation program. An arbitrary level could be set at, say, 20\%, above which water fluoridation should be halted in a community where fluoridation is already present.

From a scientific point of view, water fluoridation makes no sense. There are other issues to look at as well, such as economic costs, sociological considerations (“mass medication” without informed consent), and health freedom issues. Fluoride cannot be easily removed from tap water with home filters. Elaborate and expensive filters including reverse osmosis are about the only effective means. The best way to get fluoride out of the water is to eliminate the source. The solution to the decay problem in this country doesn’t involve the use of a toxic, ineffective substance. Dental decay can be prevented in a safe and effective way by good oral hygiene and healthy diet choices. At the same time, these healthy habits are also effective at preventing gum disease (fluoride isn’t effective at that, either). This isn’t always easy to implement, but good health choices aren’t always easy. They do, however, work.
Resources:

The following resources are recommended for additional information about all aspects of fluoride and fluoridation.

www.fluoridealert.org – the website for Fluoride Action Network, directed by Paul Connett, PhD

www.iaomt.org – the International Academy of Oral Medicine and Toxicology strongly opposes water fluoridation, and has produced a Position Paper on Fluoridation that can be downloaded from this site.

The Fluoride Deception, (book) by Christopher Bryson

www.sw4sc.org – another excellent source, including video clips and PowerPoint slides

www.ada.org – the ADA is included here, and you are encouraged to look at their side of this issue, see how well it is supported by science, and make your own decision.

References:

2. www.ada.org
5. World Health Organization Oral Health Country/Area Profile Programme, October 200 and August 2001
6. Featherstone, JD, “Prevention and reversal of dental caries: role of low level fluoride,” Community Dental and Oral Epidemiology, 1999
15. see www.fluoridealert.org/health/
19. Dean, HT, “Chronic endemic dental fluorosis,” JAMA, 1936