My Fluoride Position

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In 2003 when I accepted the invitation to join the National Research Council’s Committee on the evaluation of the EPA standards for the amount of fluoride that should be in our drinking water, I had no fixed opinion on the matter. I had organized a series of experiments (1993-98) using rats to study the effects of chronic administration of aluminum fluoride in their drinking water. At that time my primary interest was in the effects of aluminum on the brain and behavior. We only used aluminum fluoride because it facilitates the passage of aluminum into brain tissue. At the time, aluminum was considered by a number of scientists to be an important factor in Alzheimer’s disease. The role of this metal in dementias is still being investigated and the jury is still out on its importance in the production of dementia. Our studies had to include the investigation of the effects of the fluoride since the aluminum and the fluoride dissociate after ingestion. In essence we had to know the effects of the aluminum, the fluoride and the aluminum-fluoride complex individually.

In my more than three years working on the National Research Council Committee, I learned a good deal about many aspects of fluoride including, the ways in which people became exposed to it and the work that had been done in trying to determine its potential as a hazard to human health and well being. Slowly, I came to the conclusion that there were strong experimental and clinical indications that fluorides likely present hazards to people in many ways. The more I learned the firmer my convictions became. Accordingly, I decided to share my conclusions with others who might wish to know them.

Fluorine-containing compounds can affect every living animal and person. Exposure to fluorides can come from the air, the water, and the foods we eat. Fluoride compounds have long been used as insecticides especially effective for ants and roaches. Their containers were clearly marked as a poison and parents were warned on the labels to keep them well away from children. This is mentioned only to note that fluorides have been considered as major health hazards for a long time.

In regard to health it is the total amount of fluorine intake that matters. This total is determined by exposure levels, duration of exposure, and individual’s tolerance level for fluorides. Each person has some degree of tolerance to fluorides but the degree of tolerance varies greatly among people. Once this level is exceeded, dysfunctions of body and/or brain will occur. The fact that people vary in their sensitivity to this toxin makes determination of a uniform “safe” level of exposure impossible.

Adding to the difficulties in determining if an ailment is due to fluoride toxicity is the fact that different people exhibit different types of reactions. Some people being affected by fluorides complain of general weakness and chronic fatigue, others complain of cramp-like pains in the abdomen, or nausea.
Still others express the toxin-induced effects by diminished vision, headaches, migraine attacks, or pains in muscles and joints. These fluoride effects have been described in books by Leo Spira (1950, 1959) and George Waldbott and his associates (1978). Determining whether or not a given set of symptoms is the consequence of fluoride intake in a particular patient is difficult because it is necessary to rule out the presence of other diseases that could produce the observed symptoms. A correct diagnosis of illness from fluoride is best shown by the repeated observations of the individual when drinking water contaminated with fluoride and when drinking water without the fluoride under conditions in which the patient doesn’t know which water is being consumed. If the symptoms disappear when the person is drinking pure water and return with the resumption of drinking the fluoride-treated water, this is good evidence that the problems arise from this contaminant. This is the experimental approach taken both by Spira and by Waldbott and his associates in their research.

Furthering the scope of problems that can be induced by fluorine in its different forms is its ability to enhance the effects of other toxins to which we are exposed. As one example, fluorides in the drinking water accelerate the absorption of lead and aluminum into the body and brain.

The toxic effects of lead have been known for hundreds of years. In recent years the focus of attention has been on the learning deficits lead produces in children. The mechanisms proposed for the induction of this effect are not known entirely but there is evidence that many of the most important neurotransmitters of the brain are being affected. These include alterations in dopaminergic, cholinergic, and glutaminergic systems as well as “supportive” cells (glia) in the brain. There is suggestive evidence that lead toxicity may go beyond impairments of intelligence and produce behavioral changes that include loss of control and increased violence.

In some studies, including those dealing with the interactions of lead with fluorides, the fluoride studied was a silicofluoride in which fluorine is coupled with a silicon complex. Silicofluorides are the most commonly used fluoride being added to the drinking water throughout the country. There is reason to believe that this complex may have different effects than the addition of simpler fluorides such as sodium fluoride. (Curiously, sodium fluoride does not enhance the absorption of lead into the body.) The silicon portion of the complex may contribute its own toxic effects in many situations, possibly including anti-social behavioral actions and violence. Recently data from 327 towns and cities, some having fluoridated water and others not, have been compared in terms of crime rates. The results indicate that the communities with fluoridated water have substantially higher rates than do those with non-fluoridated water. In this study some fluoridated towns used silicofluorides and others used sodium fluoride. Those using the latter compound had higher crime rates than those using the silicofluorides. This suggests that any tendency for violence may not be entirely due to the increase in brain lead.
The impairment of intelligence reported after lead toxicity is now well established and this has stimulated a number of changes in the country, the elimination of lead from gasoline and from household paint being two examples. There has been some concern over the possibility that fluoride, itself, may have negative effects on intelligence. In this regard the country that has devoted greatest attention to this possibility is China. As of February 2007, Chinese investigators on this topic have published over 20 scientific papers. Many different areas of China have been studied and the children studied varied in age from 4 to 14. The results from the many different locations and investigators have been uniform, namely those from fluoridated communities have fewer children with high scores and more with very low scores on China's standardized IQ test, relative to children exposed to little or no fluoride. Fluoride seems to shift the distribution of IQ scores to the lower end of the scale.

China does not artificially fluoridate the drinking water (except for Hong Kong). All of the Chinese studies compare towns and school areas that differ in the amount of fluoride naturally present in their water supplies. In many cases the fluoride amounts are quite high and generally are from areas that are mountainous. This makes epidemiological studies more difficult than they would otherwise be. Still such a large number of such studies from different areas of China and by different investigators, all producing the same fundamental results, makes the negative effect of fluoride on intelligence seem to be a strong possibility. In addition, there is biochemical evidence based on the interactions of fluoride and trace amounts of aluminum and with lead that seem certain to interfere with the normal operation of the many systems of the brain needed for higher level mental activity.[ix]

Other studies in China have indicated that fluoride in the drinking water of mothers can produce anatomical changes in the brains of embryos in the 6th to 8th months of pregnancy.[x] In addition other investigators have reported impaired responsiveness to visual and auditory stimulation in babies in the first three days after birth induced by the intake of fluoridated water by young mothers.[xi]

As mentioned above, fluoride tends to increase the uptake of lead but it also increases the uptake of aluminum in the brain.[xii] The increase in aluminum in the brains of rats was not a function of the amount of aluminum fluoride given the animals in my laboratory. The smallest dose produced about the same additional amount of aluminum as a doses 10 or even a 100 times larger. Some small amount of the fluoride seems able to open pathways into the brain to their largest degree. The effect was organ specific, i.e., the aluminum contents of the kidneys or the liver were not changed in the fluoride-exposed animals.

The interaction of aluminum and the fluorides is complex and not entirely understood. While the fluorides allow more aluminum in, aluminum within the brain tends to reduce the uptake of fluorides.[xiii]

In any case the chronic administration of fluorides in rats produces changes in the microscopic structure of the brain. There were significant losses of cells in areas of the hippocampus and many of the
cells remaining in that structure and in the neocortex showed signs of what are called neurofibrillary tangles. Also found were areas called plaques, areas in which there are a number of substances surrounded by a border of aberrant materials similar to the tangles found inside deformed nerve cells. These “plaques and tangles” are considered by many pathologists to be signs of Alzheimer’s dementia. Other investigators have replicated our observations about "Alzheimers-like anatomical changes after chronic fluoride exposure. [xiv].

The traditional signs of Alzheimer’s disease, i.e. the "plaques" and "tangles," could be a function of aging and not of the disease state underlying the symptoms of the disease. A common and, perhaps universal, characteristic of dementia is a reduction of aerobic metabolism of the brain due to impaired blood flow. Reductions in this sole source of brain energy can be due to a number of physical or chemical changes. When the amount of aluminum increased in the brains of animals chronically administered aluminum fluoride or sodium fluoride, deposits of aluminum-based crystals were found along the walls of both large and small blood vessels in the brain. These deposits undoubtedly decreased the normal transfer of oxygen from the red blood cells to the brain. This is shown in the first figure. It is a microscopic picture of a portion of the brain of a rat chronically exposed to aluminum fluoride, the white spots inside blood vessels are aluminum crystals. The composition of these crystals as determined by X-ray microanalysis in a transmission electron microscope is show in the figure to the left. In it, Al refers to aluminum, S to sulfur and Cl to chlorine. Indeed, in some blood vessels small pieces of aluminum were found suspended by collagen fibers in the middle of the artery. It is of historical interest that Alois Alzheimer, the man for whom a type of dementia was named, noted that most patients with this disorder
suffered from atherosclerosis in addition to other brain anomalies.

Brain functions are entirely dependent on the availability of oxygen. The brain itself consumes 20% of all the oxygen used by the entire body. The brain area most affected by the reduction in oxygen supply is the forebrain. The lower centers of the brain, the midbrain and hindbrain are more resistant to oxygen deprivation. This is why the higher functions of the brain are most affected by oxygen deprivation while basic motor and visceral functions are often spared.

A number of chemical changes are induced by the presence of fluorides. Many are known and have been carefully studied but almost certainly many more will be found in the future.

One of the best-known chemical alterations produced by fluorides is the reduction in the effective levels of acetylcholine in the brain. It is one of the most important neurotransmitters the brain has. Fluorides also directly affect the actions of many other important neurotransmitters in the brain. However, fluorides seem to have a special attraction to acetylcholine. Nerve cells that synthesize this transmitter have extremely strong projections to many forebrain areas, including the neocortex and deeper areas of the brain that provide information to the neocortex.

Not only do the fluorides reduce the amount of acetylcholine in the brain, they selectively block certain receptors that respond to this transmitter. Fluoride reduces the number of one type of the “nicotinic receptors” for acetylcholine. Some other nicotinic subtypes were not affected. Add to all of the other alterations in structure and function of the brain caused by fluorides, the opportunity for mental and behavioral changes are almost limitless.

During the period from 1956 to 1963 an endocrinologist, Ionel Rapaport, presented evidence of a link between fluoride and the numbers of babies born with Down’s syndrome, Trisomy 21. For a number of years the only followup to his work was in the form of epidemiological comparisons between the percentage of births of such children both from mothers living in fluorided or non-fluorided drinking water areas. The demographics of the two or more areas compared were not taken into account in most of the studies. Maternal ages were also not taken into consideration. Furthermore, a determination of any fluoride effects using standard epidemiological procedures is virtually impossible for several reasons, including finding populations to compare that are almost the same except for the fluoride in the drinking water. Another problem for such studies arises from the difficulties in determining the accurate numbers of Down’s syndrome children actually born.

Probably the best collection of relevant data comes from a study of births of children born in two areas of Atlanta, Georgia, as reported by Erickson et al. in 1976. Two different estimates of the number of Down’s children and normal children were presented in that paper. One estimate of Down’s syndrome
births was made by the examination of copies of birth certificates and the other was based on hospital records. This is an important matter since the hospital records are more accurate than the birth certificates. Physicians seldom enter the nature of possible deformities like Down’s syndrome on the certificates. A more careful analysis of Erickson’s data by Burgstahler[xvii] showed an overall enhancement of births of Down's syndrome babies to mothers from the fluoridated area. In 1998 Takahashi[xviii] did a further analysis of data from a number of sources that included the corrected numbers from the 1966 Erickson report. (Burgstahler noted some inconsistencies in the numbers and was able to obtain the correct ones from Erickson.) In the Takahashi article a clear cut relationship between fluoride exposure and the number of affected children was found in mothers 30 years of age and younger. Recently, professor Juan C. Molina and I have found the same age-fluoride-Down’s syndrome birth effect using somewhat different statistics. The graph showing the incidence rates for Down's syndrome births for mothers of different age ranges and in terms of whether they lived in fluoridated communities or not is given in this last figure. Takahashi extended his calculations by a regression analysis in order to determine the relationship of fluoride dose levels to the likelihood of having a Down’s syndrome child. In this way he thought that a dose level might be found that did not enhance the probability of having such a child. The result was, however, that any dose above zero would enhance the likelihood of such an occurrence.

In essence this means that any level of fluoride increases the chances of young mothers having children suffering this unfortunate defect. To me taking any chance, however small, of having a child with this disorder over-rides all other real or likely dangers of fluoride intake mentioned previously in this note. In short, I believe the addition of fluoride to the drinking water must be abolished. This recommendation is supported, if any is needed, by the health hazards due to anatomical, physiological, and chemical changes induced by fluorides that were mentioned before, as well as ones I have not even touched upon. These include a number of changes in the endocrine systems. There is no way to add all of these hazards together to gain a meaningful “no risk” level. Taking fluoride out of the drinking water is the only rational decision.

Endnotes


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