Fluoridation and Cancer  
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Is there reason for concern that fluoridation might contribute to cancer death rates?

Is it correct to say that fluoride causes cancer? Are there mechanisms of action of fluoride that are known to be related to the development of cancer?

What causes cancer?

There are two primary differences between cancer cells and normal cells. The first is an accelerated rate of cell multiplication. The second is loss of cell differentiation.

Except for nerve cells and muscle cells, all of our cells continually re-create themselves; skin cells, lining cells of respiratory system, gastro-intestinal system, glandular cells, etc. This process of re-creation is so coordinated that our tissues remain in proper size and quality. When a cell loses this proper coordination and multiplies excessively, it becomes a tumor. When that tumor develops the capability of growing into and replacing normal tissue, or spreading to areas of the body where it is not appropriate, it is then a cancer.

Each of our millions of cells differentiates into a specific cell for a specific function; it becomes, for example, a fingernail, a mucous cell lining the interior of our nose or bronchi, a stomach cell, a pancreas cell, etc., etc. Looking through his microscope, the histologist can tell one cell from another. Cancer cells lose this differentiation; cancers can be graded by the degree of loss of differentiation. The worst cancers are so undifferentiated that the histologist cannot tell what tissue or gland it started from.

What controls the rate of multiplication and the specificity of cell differentiation? The answer is the chromosomes. All the inherent functions of every cell in our body are the result of each cell's chromosomes. Within the nucleus of each cell (except ova and sperm) are 23 pairs of chromosomes. Each chromosome is a long filament-like molecule comprised of a chain of segments held together by subtle connections called hydrogen bonds. A model of a chromosome constructed so that the width is as large as our wrist would turn out to be 100 miles long! It is invisible to a light microscope. When the cell approaches the time for a cell division, the chromosomes contract greatly and thicken. It is at this point when they can be seen. By looking through the microscope at a sheet of cells from any given tissue, it is possible to count those cells that are in the process of re-creating themselves. If this number is greater than expected, you might be looking at a cancer.

Various locations along the length of the chromosome are specific sites for some specific action of the chromosome. These sites are called genes. One site or set of sites may be responsible for the creation of an enzyme, or a hormone, or a building block of the body. Given the extraordinary length and complexity of the chromosome, it should not be surprising that scientists' present knowledge of various gene sites includes only 2% of the chromosome material. At present there is a concerted national effort to "map" all the chromosomes, an effort that may take another generation. The discovery of a gene site is technically very complicated and expensive but the process is underway and is accelerating.

Where does fluoride fit in? The hydrogen bond that holds the segments of chromosome molecules (and enzymes) together is a sort of electro-magnetic attraction between hydrogen and certain (limited) atoms. Nitrogen is one. Fluoride is another. It turns out that proper
function of both chromosomes and enzymes is dependent on very precise molecular configuration; the configurations depend on the hydrogen bonds. When fluoride is present it substitutes itself at the point of the hydrogen bond and the resulting configuration is changed; thus, the functioning is improper. That is why fluoride is called an enzyme poison it inhibits proper enzyme function. Similarly, it also damages chromosomes. How is this related to cancer?

The prevailing hypothesis for the cause of cancer is chromosome damage. The Ames test, for instance, is a bacterial test for mutagenicity; the theory is that what is mutagenic is also carcinogenic. (The defect with the Ames test is that bacteria may not be the right organism to test for mutagenicity in humans). There are a number of things that can damage chromosomes: X-ray, carbon monoxide, fat-soluble pesticides, viruses, even sunlight, hypoxia, nitrosamines, and, yes, fluoride. The longer one lives, the more chances there are for one or another of these toxic events to occur. Some damage to the chromosome can be repaired by specific enzymes built into our systems. One of the known victims of fluoride toxicity is the chromosome repair enzyme. When sufficient specific damage has been done to a chromosome, it loses its control over the rate of cell reproduction; it is then on the way to become a cancer. It is the accumulation of damaging events over time that leads to this condition. That is why cancer incidence increases with age. The fluoride dose that damages a chromosome or enzyme during the time of youth will have little or no effect; however, with the accumulation of other chromosome-damaging vents over time, the fluoride effect may be that additional burden that switches a normal cell into a cancer cell; the proverbial hair that breaks the camel's back.

To sum up: fluoride interferes with the hydrogen bonds that maintain molecular specificity in both chromosomes and enzymes; it can interfere, therefore, with energy utilization and with replication; and it poisons the repair enzyme for chromosome damage. It is a prime suspect as an "enabler" of the process that lead to cancer.

**Evidence of Fluoride/Cancer Link**

Thirty years ago, the renowned geneticist, H. J. fluoride Muller, included fluoride in the number of substances that injure genetic material of cells. In 1968, A. H. Mohamed showed that hydrogen fluoride, even at doses too low to produce visible tissue injury, induces significant mitotic and meiotic chromosome alterations in tomato plants and maize. In that same year, R. N. Mukherjee and F. H. Sobels showed that fluoride enhances the production of recessive mutations by X-radiation in Drosophila (fruit flies). In 1970 and 1971, A. H. Mohamed and R. A. Getides respectively, independently showed that fluoride increases lethal and sub lethal genetic damage to Drosophila. In 1975, Gileva et al demonstrated the mutagenic activity of inorganic fluoride compounds in female white rats. Here in the U.S. in 1974 Jagiello and Lin found sodium fluoride induces utagenic damage to mammalian ova from sheep and cows, affecting meiosis drastically. In 1976, Mohamed found highly significant increases in the frequency of chromosomal changes in bone marrow Lens and spermatocytes of male adult mice given sodium fluoride in their drinking water. The evidence of chromosome damage by fluoride seems clear.

Circumstantial evidence linking fluoride to cancer is found in the increased lung cancer that occurs among flHr spar miners. Similarly, increased cancer mortality among aluminum plant pot-room workers, especially for cancers of the lungs, pancreas, and lymph glands. Cancer death rates are higher among those living close to large aluminum plants when compared to persons living 4-5 miles away. In Japan, scientists found increased stomach cancer mortality in areas with high-fluoride levels in rice.
Experimental evidence clearly demonstrates the cancer-enhancing effect of fluoride. In rats, G. W. H. Schepers showed that beryllium fluoride was carcinogenic at a dose only 1/10th that of beryllium phosphate. In 1963, I. H. Herskowitz and I. L. Norton observed that sodium fluoride increased the incidence of melanotic tumors in Drosophila. As early as 1954, A. Taylor reported that mammary cancer-prone mice fed fluoridated water succumbed earlier than did similar rats fed un-fluoridated water. He later (1956) confirmed this finding using 360 mice fed a special low-fluoride grain diet. In 1965, Taylor and Taylor found that low-dose fluoride stimulated growth of implanted tumors, using 991 mice and 1,817 embroicated chicken eggs. At much higher doses, tumor growth paradoxically decreased.

Epidemiologic evidence is also impressive. In 1974, a British study reported higher stomach cancer mortality in high-fluoride areas. An Italian study in 1964 had reported higher cancer deaths in four volcanic (high fluoride) areas than in neighboring low-fluoride ones. In 1975, L. Kinlen of Oxford claimed he found no significant differences in age-adjusted incidence of cancer between fluoridated and non-fluoridated areas. However, when the fluoridated cities of Anglesey, Watford, and Birmingham-Solihull were compared with nearby unfluoridated areas, the incidence was appreciably higher in six of nine cancer categories. We are all familiar with the famous Burk-Yiamouyiannis cancer death rate study comparing the rising rate in the 10 largest fluoridated U.S. cities with that of the 10 largest non-fluoridated U.S. cities. Their data showed that fluoridation increased the cancer death rates by approximately 15%. Subsequently, Erickson of the Center for Disease Control (CDC) published data derived from death certificates which, after adjustment for age-sex-race, revealed an increase in cancer death rates in fluoridated cities of approximately 8-10%. Erickson, however, claimed that these extra deaths correlated with a factor he created from education level and housing density. To my knowledge, no other investigator lists this factor as a cause of cancer. It is unclear why Erickson prefers this explanation over fluoride.

Conclusion

We must remember that water-borne fluoride is only one source of our daily fluoride intake. You know that our food chain is now carrying a heavy load of absorbable fluoride, mainly from food processed with fluoridated water. You also know that fluoridated toothpaste, at 1000-1500 ppm, causes the absorption of at least 1 mg fluoride (a day's worth of fluoridated water) with each brushing. There are also fluoride mouth washes and some people are given high-dose fluoride for treatment of osteoporosis. It is also now clear that the supposed dental benefits of fluoridation are not evident, in any study of the past 20 years. In this regard, you should know that a report being circulated by the New York State Department of Health contains the conclusion that the dental effect of fluoride is topical and not systemic, as was once thought. This is highly relevant as it means the very reason for adding fluoride to our water is no longer operative.

Therefore, if the information concerning the link between fluoride and cancer has any importance to you, then get to work and convince the authorities that our public drinking water should not continue to be contaminated with fluoride. The cancer link risk of fluoride is real; let's turn off the fluoridation equipment and allow our water agency folks to get back to their job of providing clean, healthy water for us all.