Fluoride’s Toxic Effects on Overall Health

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In last month’s newsletter, I discussed the adverse effects of the chemical compound fluoride on the brain and cognition. This article furthers that discussion and covers the physiological impact of fluoride, found in most community drinking water, on other body systems. Research has shown that fluoride intake negatively affects numerous organs and physiological processes, including the bones, thyroid, cardiovascular system, kidneys, liver, breast, and immune and reproductive function. Numerous studies indicate that fluoride affects these organs and physiological processes by inducing free radical production resulting in oxidative damage.1-3 This is also apparent in the association between cancer rates and fluoridation of water supplies. Data indicates that increased water fluoride levels are associated with increases in several types of cancer including cancer of the oral cavity, pharynx, colon, rectum, liver, gallbladder, urinary organs, brain, Hodgkin’s and Non-Hodgkin lymphoma, multiple myeloma, melanoma and leukemia.4

Thyroid, Breast, and Bones

The thyroid is one of the organs affected by fluoride intake. In one study, researchers evaluated thyroid function in rats consuming a diet with added fluoride. The rats were evaluated for serum levels of the thyroid hormones triiodothyronine (T3), free T3, thyroxine (T4) and free T4. Free T3 and free T4 are hormones not bound to proteins, and thus are biologically active. The results of the study showed that the rats fed the diet with fluoride added had significantly decreased levels of all 4 thyroid hormone measurements.5 Another study evaluated thyroid function in individuals exposed to elevated fluoride levels in drinking water. In this study, 123 subjects were evaluated for thyroid hormone levels. The results indicated that prolonged consumption of drinking water with elevated levels of fluoride caused an increase in thyroid stimulating hormone (TSH) released from the pituitary, decreased levels of T3, and a more intense absorption of radioactive iodine by the thyroid as compared to healthy individuals who consumed drinking water with the normal fluoride concentration.6

A third study evaluated the effects of long-term workplace exposure to fluorine on parameters of immune function. The researchers found that chronic fluorine exposure resulted in immune deficiencies in all workers. However, in the subset of workers with decreased thyroid function, the immune effects were more pronounced. In the subset with low thyroid function, there were increased numbers of T-lymphocytes (white blood cells); however, the functional activity of these cells was decreased, with adverse effects seen on measures of immune cell cooperation.7

Bones are just as vulnerable to fluoride’s effects. Research has shown that fluoride can cause increased bone turnover and altered mineral metabolism, which may affect bone density as well as cause exostosis formation (the growth of boney masses). Also, small doses of fluoride ingested over a long period of time with normal calcium intake can result in osteosclerosis, which is the abnormal hardening of bone.8 Studies have also demonstrated that fluoride administration results in apoptosis (programmed cell death) in osteoblasts, which are the cells that synthesize bone, as well as down-regulation of the synthesis of the collagen proteins found in bone.9 Similarly, another study showed that low dosages of fluoride result in decreased viability of osteoblasts, and increased markers of oxidative stress including increased lipid peroxidation and antioxidant enzyme activity in the osteoblasts.10
Furthermore, research has found an association between bone tumors and fluoride exposure. One study showed that serum fluoride levels were significantly higher in subjects with osteosarcomas compared to individuals with other bone tumors or healthy controls. Similarly, another study found that the incidence of osteosarcoma in males correlated with levels of fluoride in the drinking water during childhood.

Fluoride is also taken up by breast tissue. Researchers have shown that fluoride levels in breast milk parallel both serum levels of fluoride as well as fluoride levels in the drinking water.

**Heart, Pancreas, Liver, and Kidneys**

Fluorosis, or increased fluoride exposure, can damage the cardiovascular system. Researchers have shown that subjects with increased fluoride intake have global heart dysfunction and left ventricular diastolic dysfunction, meaning the heart does not relax properly. Additionally, fluoride can cause abnormalities in the elasticity of the aorta, the primary blood vessel leading from the heart.

Animal models suggest that fluoride also affects insulin secretion from the pancreas. One study showed that mice exposed to fluoride in the drinking water for 4 weeks resulted in elevated blood glucose levels, impaired glucose tolerance and decreased insulin secretion from the beta cells in the pancreas. The researchers also showed that these changes were related to an increase in markers of oxidative stress and free radical generation. Another study using mice revealed that fluoride exposure resulted in a reduction of insulin secretion by 85 percent compared to the control mice not exposed to fluoride.

Research also indicates that fluoride impacts liver and kidney function. Using animal models, researchers showed that fluoride in the drinking water (15 mg/L) resulted in severe alterations in both the liver and kidney architecture. In another study, 332 middle-aged healthy subjects were evaluated for serum ionic fluoride concentrations and measurements of kidney function. The study found that serum ionic fluoride concentrations correlated to the estimated glomerular filtration rate, which is a measurement of kidney health, indicating an association between fluoride and age-related degeneration in kidney function. Researchers have also shown that varying levels of fluoride in the drinking water influences kidney health in children. In this study, the researchers showed that over 2.0 mg/L fluoride in drinking water can cause kidney damage in children, and the degree of damage increases with the drinking water fluoride content.

**Reproduction**

Several studies have shown that fluoride is a key factor in reduced fertility and declining health of spermatozoa. In one study, spermatozoa from mice treated with fluoride in the drinking water were compared to spermatozoa from mice without fluoride exposure. The study demonstrated that fluoride exposure resulted in increased measurements of oxidative stress in the sperm. Furthermore, the percent of spermatozoa that were capable of fertilizing an egg in the fluoride-treated group was 34 percent, compared to 55 percent of the spermatozoa from mice in the control group. Another study showed that fluoride exposure resulted in decreased sperm count, motility and density.

Data also shows that fluoride exposure in the drinking water influences fertility rates in humans. Using a database of drinking water fluoridation in 30 regions in the U.S., researchers showed that the
annual total fertility rate was negatively associated with water fluoridation, meaning that as fluoride levels increased, the total fertility rate for that region decreased.24

Fluoride, Other Halogens, and Health

Fluorine belongs to the halogen family of elements, a group of highly reactive non-metals including iodine, chlorine, bromine (found in most commercial, non-organic breads) and astatine. This is important as the halogens can displace each other in physiologic reaction and compete for uptake from the intestines. Organs such as the thyroid and breast tissue utilize iodine for physiological processes, and excessive fluoride intake can interfere with these reactions.

Thus, supplementation with another halogen, such as iodine, can compete with fluoride uptake by cells in the body. Research has shown that iodine supplementation can decrease fluoride uptake in cells. In one study, researchers showed that increased fluoride or chloride intake reduced the effectiveness of iodine administration in rats with hypothyroidism to improve hormone and lipid levels.25 It is important to optimize iodine intake to reduce the impact of fluoride on the body.

Iodoral® is an oral iodine supplement that contains 5 mg iodine and 7.5 mg iodide as the potassium salt and is an ideal way to replenish body stores of this important mineral. An iodine sufficiency test can also be taken prior to supplementation in order to establish how much iodine is needed.

In addition to iodine supplementation, intake of riboflavin and niacin (as found in ATP Cofactors), should also be considered as these vitamins are important in the oxidation and incorporation of iodide into cells and hormones.26 These B vitamins also support cellular energy (ATP) production, and riboflavin has been shown to increase fluoride excretion in the feces.27

In addition, Celtic Sea Salt®, a natural form of salt, can be used to optimize intake of sodium, chloride and trace minerals including calcium, magnesium, potassium, iron and zinc. Chloride, which couples with such minerals as sodium, sodium chloride (NaCl), and potassium (KCl), is a critical mineral and friendly halide that can help one’s body cope with the balancing act of dealing with high fluoride and bromide levels, in the environment and diet. Salt has sustained humanity for millennia, yet the form of salt is critical. Celtic Sea Salt is vital for proper body mineralization and cellular function, including electro-gradients of cell membranes.

Conclusion

Fluoride is an ubiquitous chemical compound, which has both beneficial and adverse effects on health, with a narrow range between the intakes at which this occurs.28 Supplementation with iodine and other trace minerals can compete with fluoride and reduce the impact of excessive fluoridation on physiological processes in the body.

References: