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Opinion Article
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Fluoride in Tap Water: Danger to Our Health

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It just came to my attention that our town still adds fluoride to our water system. In fact, it is American Water that serves our area and follows the city council's decisions. Although we have installed a whole-house water filter system, a simple online search shows that it cannot remove fluoride from water at all. I have to act immediately: find another water filter system to remove fluoride from the drinking water in our home, and meanwhile call the city council and wish that they could change this hazardous decision, as I am really concerned about the toxicity of fluoride to our health.

A few years ago, a small group of friends talked about how harmful fluoride is to our bodies.

In fact, fluoride is an active ingredient in many pesticides and rodenticides. It is more poisonous than lead. An overdose can lead to serious toxic symptoms. Some research showed that water fluoridation can lead to cancer (due to gene mutation), diabetes, thyroid and neurological disorders, heart disease, arthritis, and osteoporosis [1]. So, my family has chosen to use fluoride-free toothpaste in the past few years. One important observation is that my teeth have been getting better since then, without any white spots. And even the hygiene lady who was cleaning my teeth noticed the difference. I also installed a whole-house water filter system and thought that fluoride was out of my life completely, until I heard that this filter system didn't block fluoride a few days ago.

Fluoride is a naturally occurring mineral found in soil, rocks, plants, and groundwater. Although it is widely broadcast in public health for tooth decay prevention, chronic exposure to any level poses documented health hazards. A substantial fraction of absorbed fluoride is retained in the body, particularly in calcified tissues such as bone and teeth. In healthy adults, approximately 50% of absorbed fluoride is retained in calcified tissues, while the remainder is

primarily excreted in urine [2,3]. Fluoride acts as a systemic toxicant. The U.S. Department of Health and Human Services' Agency for Toxic Substances and Disease Registry describes fluoride as accumulating in bone, with bone fluoride concentrations tending to increase with age [4]. Long-term cumulative intake can lead to dental fluorosis and crippling skeletal fluorosis, characterized by osteosclerosis, joint pain, and structural bone deformities [5-9]. Additionally, a 2024 systematic review published by the U.S. National Toxicology Program (NTP) identified a moderate-confidence association between drinking water fluoride levels exceeding 1.5 mg/L (more than double standard fluoridation targets) and reduced cognitive performance/IQ in children. Some people argue that low-dose exposure may serve a preventative dental role, but the cumulative nature of fluoride makes it more dangerous than beneficial, and any intake carries clear musculoskeletal and neurodevelopmental risks.

Once ingested, fluoride rapidly enters the systemic circulation and undergoes marked bioaccumulation, primarily within mineralized tissues [1]. In healthy adults, approximately 50% of absorbed fluoride is excreted by the kidneys, while the remaining 50%, and up to 80% in growing children, is retained and sequestered into bone and tooth enamel due to fluoride's strong ionic affinity for calcium hydroxyapatite [1,6]. Because fluoride replaces hydroxyl ions in the bone matrix to form fluorapatite, it becomes structurally incorporated into the mineral crystal lattice [6]. Consequently, clearance of accumulated bone fluoride relies on slow physiological osteoclastic remodeling rather than rapid renal excretion, giving skeletal fluoride a biological elimination half-life estimated in years [1,2]. Over extended periods, this systemic accumulation can lead to altered bone architecture, cellular stress, and chronic tissue retention [2,6].

Because fluoride is sequestered into calcified tissues with an elimination half-life estimated at up to twenty years, long-term bioaccumulation presents a critical toxicological challenge [5,6]. As fluoride continuously replaces hydroxyl ions in bone mineral to form stable fluorapatite crystals, cumulative burden alters standard osteoblast and osteoclast signaling, compromising the structural integrity of the skeleton over time [7]. Chronic retention leads to progressive skeletal fluorosis, characterized by osteosclerosis, reduced bone elasticity, joint stiffness, and an elevated risk of bone fractures [2,9]. Beyond the musculoskeletal system, prolonged systemic accumulation in soft tissues and pineal gland calcification can disrupt thyroid signaling and cellular energy metabolism via oxidative stress and mitochondrial inhibition [6-8]. Consequently, the physiological persistence of fluoride transforms continuous low-to-moderate exposure into a long-range risk factor for systemic toxicity.

I searched online for ways to remove fluoride from tap water and found that specialized treatment systems, such as Reverse Osmosis (RO) filters, are typically needed. Fortunately, there are quite a few companies that manufacture these systems, with prices ranging from around $200 to more than $1,000.

I find it ironic that, on one hand, our local government adds fluoride to our tap water, while on the other hand, we have to spend additional money to remove it. What about low-income families who cannot afford an expensive RO filtration system? I honestly don't know.

However, I do know that I intend to contact the city council and share my concerns about the potential health risks associated with fluoride in our drinking water. I believe residents deserve to have an open and informed discussion about what is being added to their water and what options are available to those who may not want it.

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