Rethinking the risks and benefits of fluoridation

By Sheldon Thomas

Among the responses to my article 'What are the long-term effects of fluoridation?', published in the September/October 2012 edition of Environmental Science & Engineering Magazine, it was correctly pointed out that I am neither an expert on public health or a medical doctor. I am, instead, a student of drinking water quality and of the infrastructure systems that deliver finished water to Canadians. I can assure you, however, that I have been a very good student for 38 years.

For 36 of those 38 years I accepted fluoridation as just another step in drinking water production. Then I viewed a tape of Dr. William Hirzy, senior scientist at the USEPA's Risk Assessment Division Office of Pollution Prevention and Toxics, addressing a U.S. Senate Committee on Environment and Public Works. Dr. Hirzy was representing the USEPA Union of Scientists, and their collective plea was for Congress to impose an immediate moratorium on water fluoridation.

Let me highlight something that is a matter of record. The USEPA administration does not condemn fluoridation, but the scientists and health professionals in its employ no - all 1,500 of them. The USEPA scientists who so strongly object to fluoridation include seasonend biochemists, pharmacologists, teratologists and toxicologists.

Dr. Hirzy pressed for a fluoridation moratorium because his research, and the studies of many others, strongly indicated that ingested fluoride ion, once entered into the bloodstream, does harm to both soft and hard tissue. I recommend that every open-minded drinking water professional watch Dr. Hirzy’s video. (http://www.youtube.com/watch?v=9RLz.A716VM)

There is an assumption that health professionals and medical doctors offer the only trustworthy opinion on the health effects of fluoridation. I suggest that the most trustworthy opinion would be one offered by a competent researcher who has made it his/her mission to understand how chronic exposure to low concentrations of fluoride ion can affect humans and animals. As a water professional, I want to hear from their person.

There is a list of well-known health organizations, the List of 90, which has been cited for years by those who promote fluoridation. The List, however, is losing membership as organizations rethink their support of fluoridation. The National Kidney Foundation, and the National Research Council are two organizations that have recently struck their names from the List. In 2011, The International Academy of Oral Medicine and Toxicology, in a letter to the CDC, stated that it would never go on the List. Even the Oral Health Division of the Centers for Disease Control and Prevention (CDC), although remaining on the List, has significantly adjusted its assessment of fluoridation. The CDC has twice conceded (in 1999 and 2001) that the best use of fluoride in preventing dental caries is to apply it directly to the teeth, via toothpastes or fluoride gels.

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Toothpaste has 25,000 times more fluoride than saliva fortified by injected fluoridated water. Since the List has been so instrumental in directing opinion on fluoridation, let's have a look at some of its signatories.

The World Health Organization (WHO) does favour fluoridation. But what is often ignored by proponents is the WHO's precautionary caveat that water fluoridation programs should not be entered into unless the municipality/water authority has conducted prior tests on residents to establish their total daily fluoride intake from all sources of food and beverage and environmental exposures. If fluoride intake is already at, or beyond, a level deemed protective of teeth, adding it to drinking water would be an excessive measure. How many fluoridating municipalities test their citizens before agreeing to start or to continue fluoridation? I am sure that the WHO would prefer that its full statement be known.

Health Canada is prominent on the List. Health Canada literature suggests that fluoridation is just a topping up of the natural fluoride that is already present in source water. That would be true if we were topping up natural calcium fluoride concentrations with additional calcium fluoride. The chemicals commonly used to deliver those additional fluoride ions are actually synthetic silicofluorides, the most favoured for use being hexadifluorosilicic and hexafluorosilicic acid. These...
chemicals are normally classified as regulated category 1 toxic wastes, but they become environmentally acceptable, and fit to ingest, the moment that they are relabeled as water treatment 'products'. Health Canada states that these, and other silicofluorides, are safe and effective for use as fluoridating agents. But upon what does Health Canada base those assurances?

In response to an information petition submitted to the Office of the Auditor General in 2008, Health Canada had to reveal that it "does no research on silicofluoride chemicals". So, Health Canada cannot speak to the safety of silicofluorides from any results of in-house testing. Health Canada relies, instead, on NSF International (NSF), a private industry consortium, to test, certify and assure that silicofluoride chemicals are safe for use in drinking water. Unfortunately, if you read its literature closely enough, you'll note that NSF does not offer that assurance at all.

NSF examines water treatment chemicals and additives to attest that they meet already established government health guidelines, and certifies them 'appropriate for use' if they do. An important distinction here is that NSF does not certify any chemical to be 'safe for use'. In its own carefully worded disclaimer in the foreword of 'NSF/ANSI Standard 60', NSF does not presume to tell anyone what to do with the chemicals that it certifies. Nor does it hold itself responsible for the performance of any of the chemicals that it certifies. Chemical 'safety' is a measurement of performance.

Normally, NSF requires manufacturer-supplied toxicological testing of all drinking water treatment chemicals and additives before granting Standard 60 certification. One is left to wonder why NSF, still missing the good-to-go paperwork on silicofluorides, has not pressed harder for the mandatory toxicity tests.

While awaiting those tests, NSF has adopted a different approach to its certification of silicofluoride chemicals. Using hydrofluorosilicic acid (HFSA) as an example, NSF has chosen not to examine the chemical compound as a single product. Instead, NSF simply identifies all of the combined constituents of HFSA, including the co-contaminants commonly found within the acid, and examines them separately for government guideline compliance. If none exceed the MACs or MCLs established by Health Canada or the USEPA, NSF certifies HFSA as appropriate for use.

There are some who maintain that HFSA toxicity studies are unnecessary. They subscribe to the belief that, as soon as HFSA is fed into drinking water, it 'dissociates' completely and reliably into its major components, silica and fluoride. That theory can best be described as hopeful. In 2001, the USEPA was called before Congress and, under oath, had to admit that it had no credible evidence that HFSA fully dissociated in municipal drinking water. After five decades of fluoridation, the USEPA could find nothing to defend the use of HFSA. At the same hearing the USEPA also revealed that it had "no information on the effects of silicofluorides on health and behaviour."

I'll end examination of the List by discussing the promotion of fluoridation by the Canadian Dental Association (CDA).
The CDA joins its voice to 44 other dental organizations on the List of 90 to announce that fluoridation is both safe and effective. But, unfortunately, there is nothing in dental training that positions any dentist, or dental organization, to speak authoritatively about the interaction of the fluoride ion with soft and hard tissue throughout the body.

For any dental association to claim that fluoridation is safe, it must be able to supply proof that highly-reactive ingested fluoride ions do not cause harm to any part of the complicated human organism on their way to the teeth. There are, on average, 60,000 miles of blood vessels14 and 30 trillion red blood cells that sustain every nook and cranny of the human body. The CDA is asking us to believe that the fluoride ion, a known enzyme killer15, is going to leave untouched all of those blood cells along a journey the equivalent distance of 2.5 times around the planet.

As for the benefits of fluoridation, that so out-weight the harms, the CDA could tell you about a $3.7 million study conducted by the National Dental Research Institute (NDRI) in 1986. It was designed to measure the effect of fluoridation on dental caries reduction after 40 years of drinking water fluoride ‘adjustment’. Dental researchers selected 84 different school districts, spread across the United States, comparing dental caries of children in fluoridated communities with those in non-fluoridated communities.

They compared the dental records of 39,207 school children of the same age group. The data revealed that fluoridation didn’t work. In what was anticipated to be a landslide victory for fluoridation, the data revealed that there was no statistical difference between dental caries recorded in fluoridated communities and dental caries recorded in non-fluoridated communities. There are several other large studies that reveal very similar findings to the NDRI study.17

The National Academy of Science (NAS) conducted a landmark review of all of the available literature on fluoridation, publishing a report in 2006 titled, ‘Fluoride in Drinking Water: A Review of the EPA’s Standards’. It took a balanced (not for, not against) panel of selected researchers 3.5 years to wade through and analyze the subject material. The panel concluded that there was strong evidence that linked fluoridation to a multitude of continued overleaf...

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human degenerative conditions and diseases. The panel sent a clear and urgent message to health authorities and governments to fast-track studies to further examine water fluoridation's links to cancers, hypothyroidism, Alzheimer's-like symptoms, skeletal degeneration, and childhood IQ and behavioural deficits.

In spite of the findings of the NAS (a health advisor to governments for 150 years), Health Canada still maintains that there is no credible evidence that water fluoridation causes any harm other than mild dental fluorosis, something that it classifies as a ‘cosmetic condition’. Let's talk a little more about the chemicals at the heart of all of this. Health Canada appears to struggle to properly classify fluoridating chemicals. It has tried to brand fluoride as an essential nutrient when in fact the body ticks along quite nicely without it. In 1979, the US FDA found the nutrient claim so absurd that it ordered government documents to cease making the statement. Then Health Canada tried to convince us that fluoride was a ‘dietary fortification’. That doesn’t fly either, as a body with no biological need for fluoride does not need to be fortified with more. Health Canada seems to have settled on classifying silicofluoride chemicals as water treatment chemicals.

I have real difficulty accepting silicofluorides to be treatment chemicals. There is no apparent role for fluoride in the conversion of raw water into finished drinking water. We produce drinking water that meets all of the requirements of the Safe Drinking Water Act in Ontario without having to add a drop or a crystal of silicofluoride chemical. So, in the treatment of drinking water, how do fluoridation chemicals ‘treat’, exactly?

The answer (and not a very good one) is found in the AWWA ‘Water Dictionary’, Second Edition, page 670. Look up ‘water treatment’, and you will find: (1) The act of removing contaminants from source water by the addition of chemicals, filtration and other processes, thereby making the water safe for human consumption. (2) The act of adjusting water quality to satisfy the requirements of any end use.

Fluoridation chemicals do nothing to fulfill the first part of the definition, but they slip nicely into the second part. Silicofluorides are added to drinking water singularly for their alleged ability to reduce dental caries. They are used in an attempt to suppress the disease of dental caries. They serve as a medication. They act as a drug. That is their end use.

Water professionals should be asking themselves what, if anything, part (2) of the definition has to do with part (1). Part (2) appears to have been inserted into the definition to add credibility to the use of chemicals that have no role in the production of potable water. Also, “to satisfy the requirements of any end use” is language that calls for some serious explanation. How many end uses do authorities envision for the drinking water supply?
Water professionals should also be reminded that NSF states that as many as 15 different contaminants could be in any shipment of HFSA. It's noteworthy that NSF does not require the removal of any contaminant. It just requires that they not exceed anyone's MAC, or MCL. Shipments of HFSA are accompanied by a manufacturer-supplied Certificate of Analysis that frequently lists lead and arsenic as present in the acid, along with their concentrations. Lead is a probable carcinogen, and arsenic is an established carcinogen.

Ontario Drinking Water Quality Standards require that the concentration of arsenic in finished water not exceed 1 ppb. Health Canada stated, in 2006, that every effort should be made to keep arsenic out of drinking water. Unfortunately, adding HFSA after treatment often introduces arsenic, contrary to the Health Canada recommendation. But, with arsenic getting diluted in drinking water by about 240,000 to 1, is it really that big of a deal? Let's look.

NSF states that arsenic is five times more common than any other contaminant of HFSA. And it's usually there in the highest concentration of any. NSF calculates that the arsenic typically found in HFSA will dilute down to just under 0.5 ppb in drinking water. So, clearly, the use of HFSA can add approximately .5 ppb of arsenic.

So, how scary is half a part per billion of arsenic? That's enough to cause a fatal cancer in 1 out of 10,000 who drink fluoridated water. The cancer estimates are the work of the National Resources Defense Council (NRDC) using data provided by the National Academy of Science, data which the NAS earlier extracted from the USEPA's own database. I found these estimates disturbing enough to contact the NRDC directly last summer to learn more about its February 2000 Report, "Arsenic and Old Laws". The NRDC still stands firmly behind its report, and the cancer estimates are based upon a standard, scientifically-accepted modeling methodology.

How do drinking water professionals react to this kind of information? Do we dismiss it because it's too shocking to possibly be true? Do we dismiss it because all of those on the List claim such things cannot be so?

Faced with continuing debate over the merits of water fluoridation, civic-minded councilors struggle to identify the right path. Water treatment operators and managers are highly-skilled, licensed and dedicated to the provision of high quality drinking water. They are the stewards of safe drinking water, working at the very start of the process. Trained as they are, they are also less likely to be influenced by the old, and dangerous, fluoridation promotions that crumble in the light of emerging evidence and modern scientific methodology. Councilors hear regularly from the List. They need to hear more from the Water Stewards.

Sheldon Thomas is the founder of Clear Water Legacy (www.clearwaterlegacy.com) and a former Manager of Water Distribution for the City of Hamilton, Ontario. References are available on request E-mail: shelthomas@cogeco.ca