From:	Julie Borodin
To:	Water
Subject:	For Oct.28 Board meeting
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Dear members of the Water Utility Board,

Please submit this citizen document to Public Records and the fluoridation review process which will be discussed at the October 28, 2014 Water Board meeting. I oppose the fluoridation of Madison drinking water. An immense body of scientific literature spanning decades provides compelling disclosure of the toxic and bioaccumulative effects of fluoride, both within the body and environment. This literature concerns *the actual physico-chemical properties of fluoride* which determine its toxicity and action. It can not be denied that fluoride is one of the most reactive halogens and as such can disrupt fundamental cell chemistry. Epidemiological studies and surveys, which are frequently cited by public health departments, **indirectly** examine the chemistry of fluoride, if at all.

Low doses of fluoride interact with cellular systems

This is a common finding of recent scientific literature dedicated to the study of the **actual physico-chemical properties of fluoride.** Fluoride has been found to alter key metabolic enzymes even at low levels. Municipal water utility fluoride dosing rates, however, appear to have been established using fluorosis as a crude indicator of toxicity. The pharma-kinetic potential of low-dose fluoride has been extensively researched and demonstrated (particularly in the brain)--indeed, the molecular mechanisms of fluoride-based pharmaceuticals targeting the CNS have to be understood before they are approved.

This journal article from **Chemico-Biological Interactions** describes observed fluoride toxicity which includes the ability to alter gene expression:

"**Molecular Mechanisms of Fluoride Toxicity"**

"This element interacts with cellular systems even at low doses. In recent years, several investigations demonstrated that fluoride can induce oxidative stress and modulate intracellular redox homeostasis, lipid peroxidation and protein carbonyl content, as well as alter gene expression and cause apoptosis. **Genes modulated by fluoride include those related to the stress response, metabolic enzymes, the cell cycle, and cell-cell communications transduction.**" ("Molecular mechanisms of fluoride toxicity," **Barbier O.. Chemico-Biological Interactions: 188, 2010**).

Bioaccumulation of fluoride in the environment and humans

There is abundant evidence of bioaccumulation in the environment and in humans. Fluoride ions are described in this journal article as **"enzymatic poisons."**

"In aquatic animals, fluoride tends to be accumulated in the exoskeleton of invertebrates and in the bone tissue of fishes. **The toxic action of fluoride resides in the fact that fluoride ions act as enzymatic poisons, inhibiting enzyme activity and, ultimately, interrupting metabolic processes such as glycolysis and synthesis of proteins.** Fluoride Toxicity to Aquatic Organisms: a Review, Julio a. Camargo, Chemosphere"

The human Pineal Gland is a target of fluoride calcification. Calcification of this gland is so common that on CT scans it often appears as an opaque area and is used as a marker (The Effect on the Physiology of the Pineal Gland. Jennifer Anne Luke"). Concentrations of fluoride have been found to be higher in the human pineal gland than in teeth and bones. This information has more scientific value than an epidemiological survey as it examines the actual physiology of tissues exposed to fluoride.

QUESTIONS FOR THE BOARD:

1. **Will your review of fluoridation of Madison's water encompass:**

   ~ study of the actual physico-chemical properties of fluoride?

~ consideration of the uptake of metals facilitated by fluoride (Fluoride has been found to increase the uptake of many heavy metals and metals into tissues, notably mercury. *This is a neglected area of study when public health officials consider the toxicity of fluoride. The capacity for fluoride to bind to toxic metals and invade tissues greatly increases its toxicological effects.*

2. **Please provide the name of the source(s) of Madison's fluoride used for fluoridation.**

   ~ Is this industrial or pharmaceutical grade? Can it be also classified as industrial waste?

   ~ What is its country of origin?

   ~Define chemically the types of fluoride used

   ~ Are chemical assays performed on it by the water department or independent laboratories? How often?

   ~ Are other forms of fluoride species identified in the assay, beside the ones our water utility employs for fluoridation of our municipal water? Since fluoride is a reactive halogen it can form many types of fluoride species when in a solution containing heavy metals and metals. Are these fluoride species also evaluated for their toxicological effects when determining the dosing rates of fluoridation? Are any radioactive "impurities" measured? These can bind to fluoride.

3. **How does the Board and Council propose to monitor bioaccumulative effects of fluoride in the environment?**

4. **Has the Board or Council factored in the bioaccumulative toxicity of fluoride in humans when determining or approving fluoride dosing rates?**

5. **The Water Board has been aware of the toxic impacts of fluoride to some individuals (apparently since 2009), yet did not disclose this to Madisonians. Why?**

I encourage the Board to review fluoride literature which deals with actual physico-chemical properties of fluoride. Increasingly, imaging and quantification of fluoride's toxic effects on a cellular, molecular and genetic level are possible. This scientific literature is more demonstrative of fluoride's toxicity than indirect epidemiological studies and will surely be employed to prove causality in legal settings. Public Health department fluoridation position papers often cite the CDC, WHO or dental association literature. Our Public Health Department fluoride position paper cites the American Dental Association (ADA), a source which should be questioned as the ADA has persistently approved the used of mercury amalgams despite the proven neuro and geno-toxicology of mercury. A comprehensive assessment of fluoride must include foreign scientific

journals and literature concerning imaging techniques, like radiology journals (The calcified pineal gland "lights up" in radiological imaging.). Also consult journals dealing with histopathology—the study of actual diseased tissue. It is frequently burdened with xenotoxics (fluoride, for example) and metals. Full-text journal articles at the University of Wisconsin Medical library can be readily obtained.

The cellular toxicity of fluoride and its ability to target deep levels of cellular function involving DNA and RNA should be used to determine toxicity thresholds, not gross evidence of fluorosis. The dosing rates of fluoride in municipal water are an artifact of "municipal utility science" (often dating from the fifties).

Though the above questions are vital to a proper examination of the toxicological impacts of fluoridation, what SHOULD PREVAIL IS MY CHOICE NOT TO BE PHARMACOLOGICALLY MEDICATED. If the Board feels that underprivileged classes must be fluoridated it can certainly distribute pharmaceutical-grade dental fluoride products at less cost than continuously dumping this reactive halogen into our environment.

Regards,

Julie Borodin