

Region of Peel Educational Session –  
Artificial Water Fluoridation (AWF)

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The Debate in Peel:  
Artificial Water Fluoridation (AWF)

AWF Supporters make the hypothesis that:  
**"AWF is Safe and Effective"**

"The great tragedy of Science — the slaying of a beautiful hypothesis by an ugly fact."  
(TH Huxley)

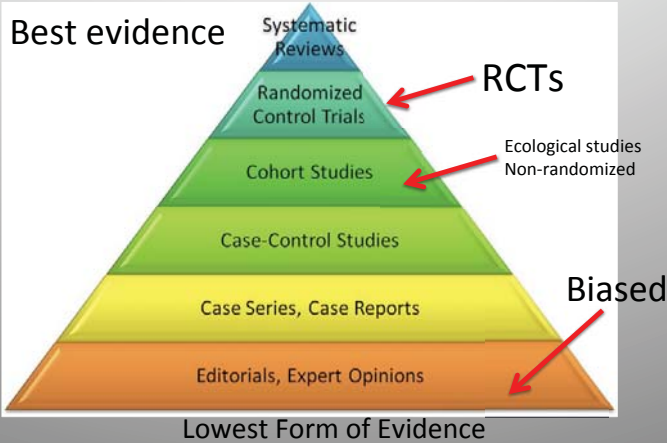
"No amount of experimentation can ever prove me right; a single experiment can prove me wrong."  
(Albert Einstein)

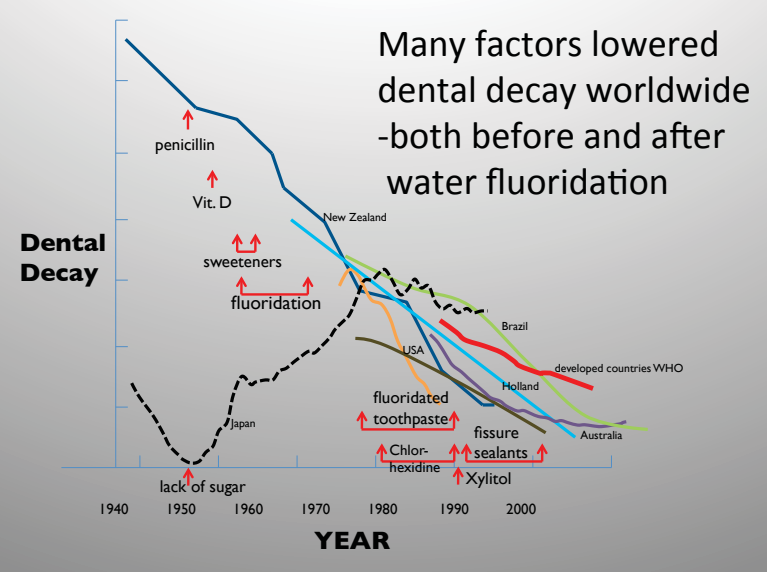
Paraphrasing Einstein and Huxley:

"No amount of evidence can ever PROVE artificial water fluoridation (AWF) to be safe and effective; a SINGLE 'ugly fact' can show it is not so."

Many ‘ugly facts’ have been published

Levels of CLINICAL Evidence





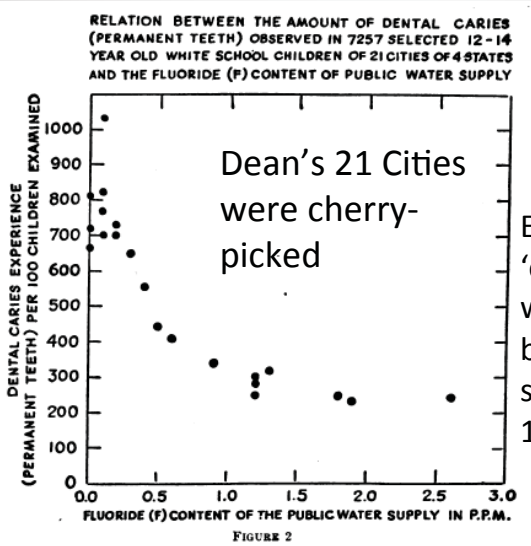
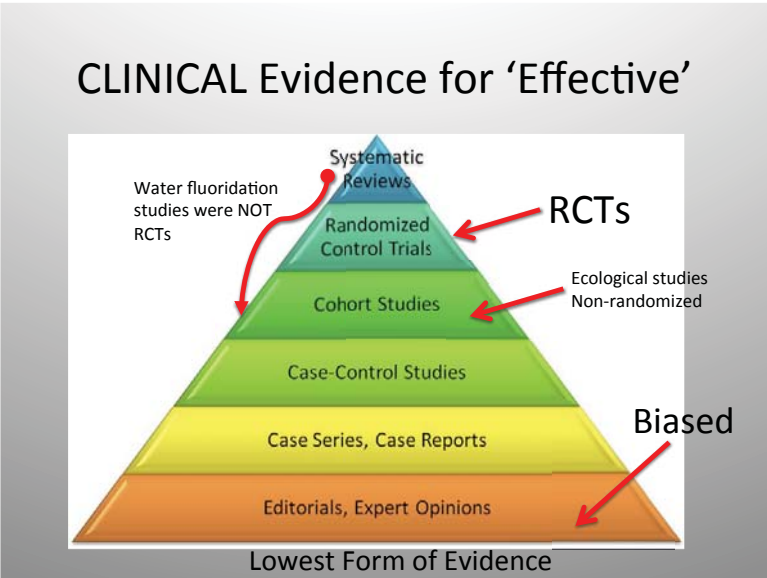
**Cochrane** Trusted evidence. Informed decisions. Better health.

Our evidence About us Get involved News

Water fluoridation to prevent tooth decay

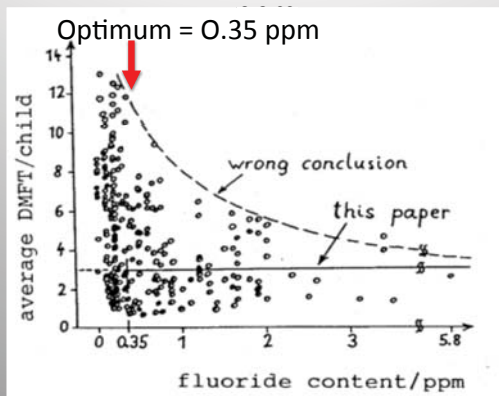
Iheozor-Ejiofor Z. et al. 2015

- Biased: Funded by the CDC, conducted by oral health epidemiologists
- NOT ONE randomized, double blinded clinical study
- Used weaker studies (non-randomized before and after controlled studies)
- Only 3 studies after 1975 (when fluoridated toothpaste gained widespread use)
- Studies did not control for many confounders (especially delayed tooth eruption)
- Marginal benefit if any at all



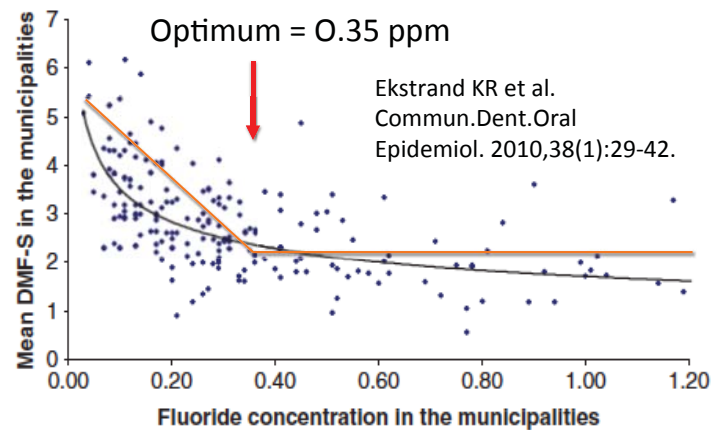
Evidence for ‘effective’ is weak and still based on Dean’s studies in the 1940s

When ALL cities were examined,  
the optimum was closer to 0.35

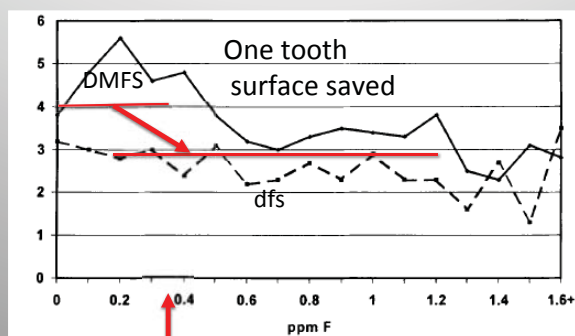


Ziegelbecker R, Ziegelbecker R C. WHO Data on Dental Caries and Natural Water Fluoride Levels. *Fluoride* 26 263-266 1993.

New research confirms a lower optimum

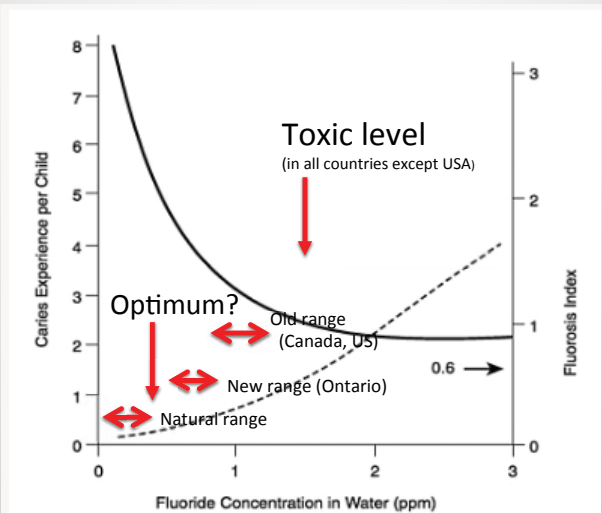


Health Canada looked at only 2 studies

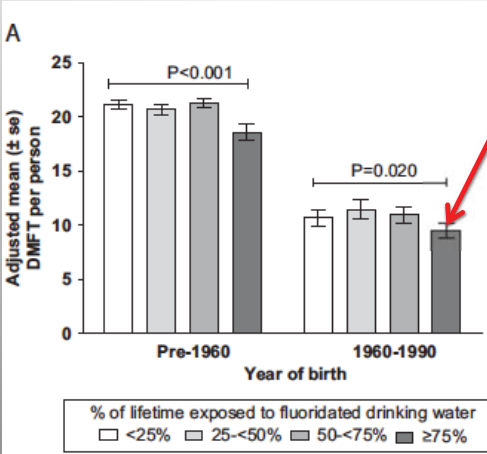


Heller, K.E., Eklund, S.A. and Burt, B.A. (1997) *J. Public Health Dent.*, 57: 136-143.

Therapeutic and toxic DOSES overlap



Fluoridation's benefit is NOT cost effective



Slade G. et al. (2013) J Dent Res

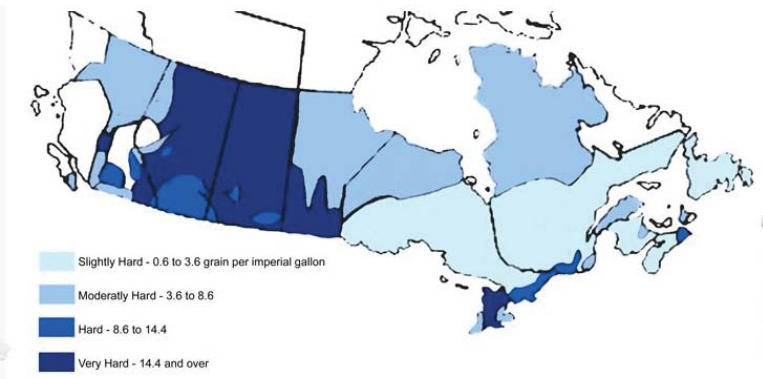
A lifetime (40 years) of fluoridation saves maybe ONE dental filling/person

The benefit of fluoride in drinking water cannot be demonstrated without taking into account other trace minerals

Associated with decreased caries	Associated with increased caries
Calcium Magnesium Molybdenum Vanadium Strontium	Copper Iron Manganese

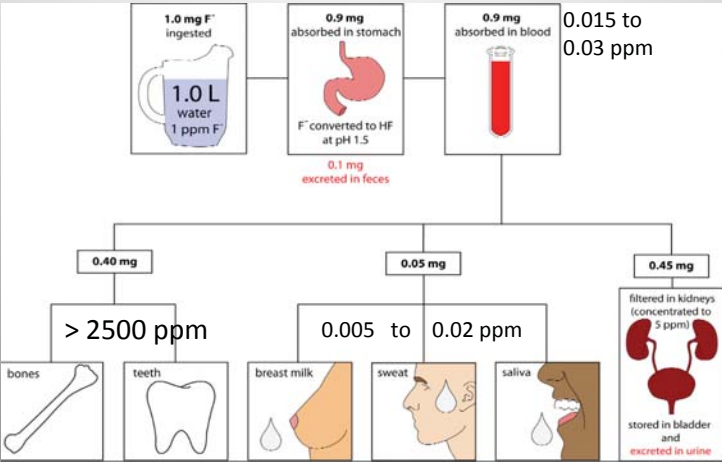
Glass RL et al. *Arch Oral Biol.* 1973 Sep;18(9):1099-104.  
Lippert & Hara. *Caries Res.* 2013;47(1):34-49.

Water hardness could affect caries AND fluorosis depending on WHERE you live in Canada

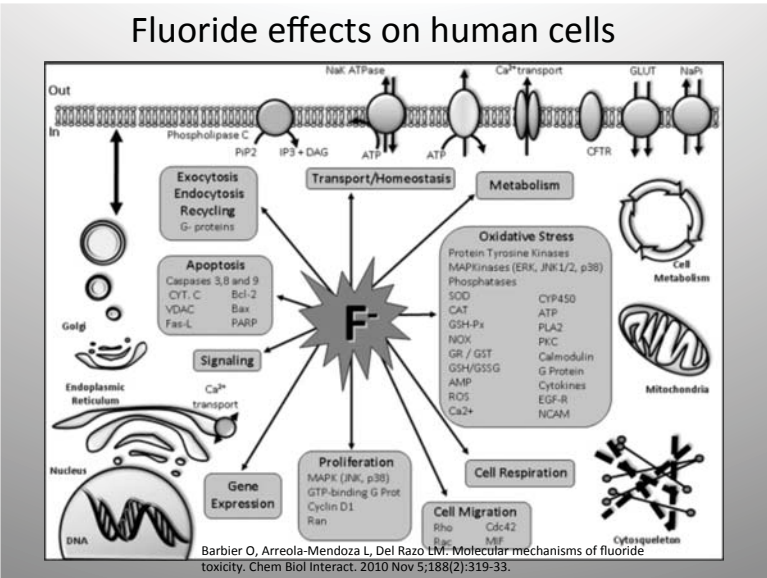


Siftocanada.com  
<http://www.water-research.net/hardness.htm>

Human fluoride Metabolism



Fluoride effects on human cells



Dental fluorosis DOES get worse with time

Limeback H, Vieira AP, Lawrence H. Improving esthetically objectionable human enamel fluorosis with a simple microabrasion technique. Eur J Oral Sci. 2006 May;114 Suppl 1:123-6;



-teeth erupt chalky white

-then lose surface enamel and pick up stain

Appearance after microabrasion

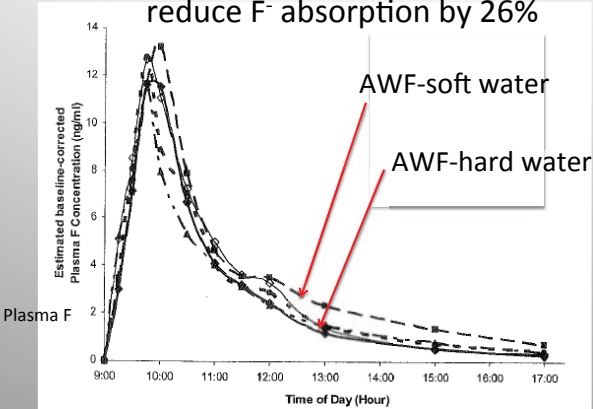
Fluorosis in Canada

- Every 10<sup>th</sup> child has ‘objectionable’ fluorosis
- >40% have some signs of fluorosis



Clark DC et al. Community Dent Oral Epidemiol. 2006  
Limeback H et al. Eur J Oral Sci. 2006  
Ito, D. (2007) MSc Thesis

Calcium and magnesium (hard water) reduce F<sup>-</sup> absorption by 26%



Maguire A. et al. Bioavailability of fluoride in drinking water: a human experimental study. J Dent Res. 2005 Nov;84(11):989-93.



Canadian Dental Association Recommendation to prevent dental fluorosis

the total daily fluoride intake from all sources should not exceed 0.05-0.07 mg/kg/d

400% higher:

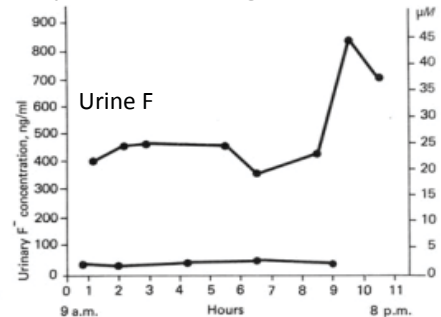
(in order to minimize the risk of dental fluorosis)

= 0.2 mg/kg/day



Clifford H, Olszowy H, Young M, Hegarty J, Cross M. Fluoride content of powdered infant formula meets Australian Food Safety Standards. *Aust N Z J Public Health*. 2009 Dec;33(6):573-6.

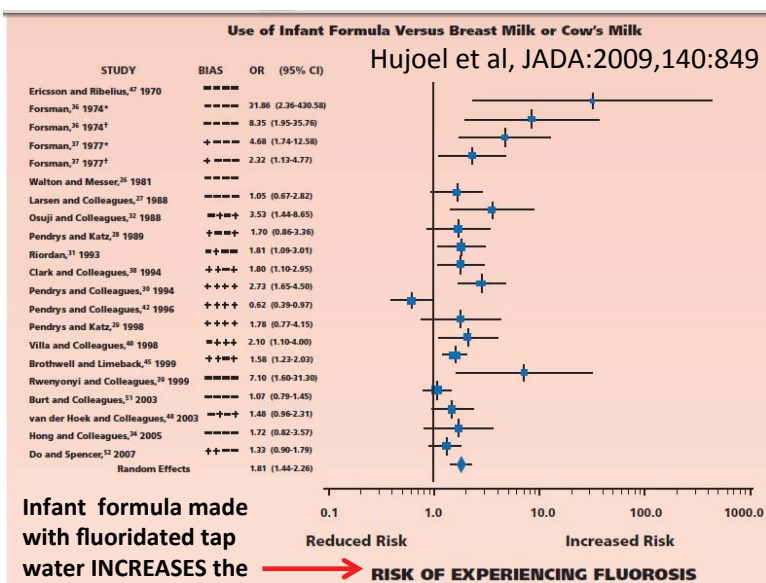
Infant formula calcium provides no protection against fluoride in tap water



**Fig. 2.** Urine concentration of fluoride ng/ml ( $\mu M$ ) in a bottle-fed infant (upper curve) and in a breast-fed infant (same subjects as in fig. 1).

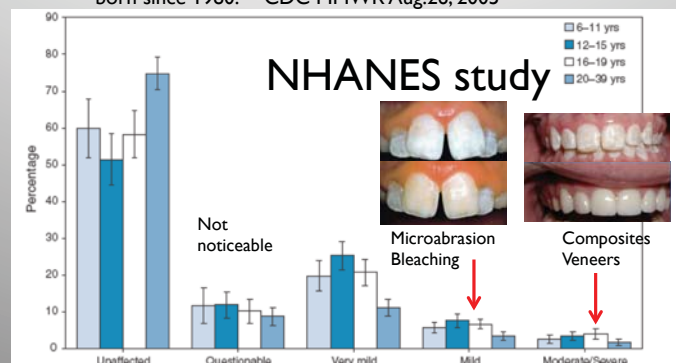
Ekstrand J, Hardell LI, Spak CJ. Fluoride balance studies on infants in a 1-ppm-water-fluoride area. *Caries Res.* 1984;18(1):87-92.

At 1 ppm,  
bottle fed  
infants have  
100X higher  
intake of  
fluoride  
than breast  
fed infants

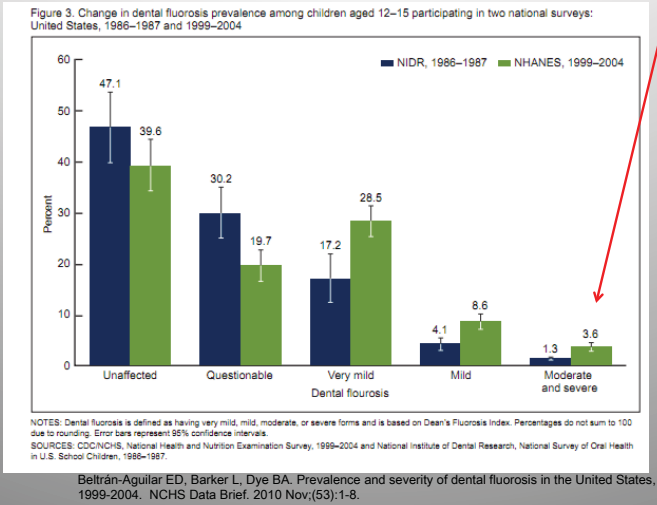


Largest Study in the US- 10% have objectionable fluorosis

“Prevalence of enamel fluorosis has increased in cohorts born since 1980.” CDC MMWR Aug.26, 2005



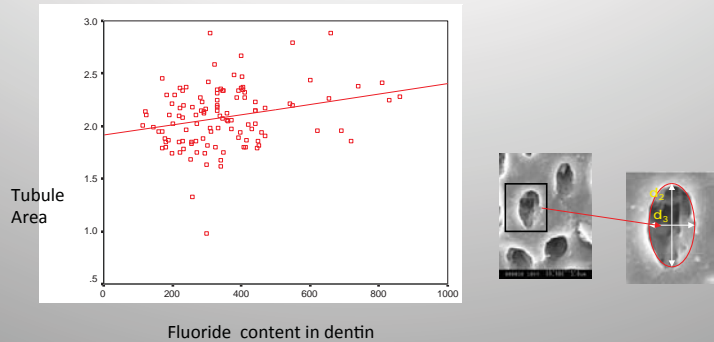
Moderate/Severe fluorosis has been increasing



“Minimal correction reduced the savings to \$3 per person per year (PPPY) for a best-case scenario, but this savings is eliminated by the estimated cost of treating dental fluorosis.”

Ko L, Thiessen K. A critique of recent economic evaluations of community water fluoridation. Internat J Occup Environ Health 2015 VOL. 21 NO. 2: 91–120.

Fluoride affects tooth dentin tubules



Viera AP, Hancock R, Dumitriu M, Limeback H, Grynblas MD. Fluoride's effect on human dentin ultrasound velocity (elastic modulus) and tubule size. Eur J Oral Sci. 2006 Feb;114(1):83–8.

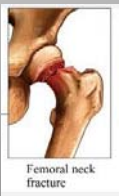
Effect of Fluoride on Tooth Dentin

EFFECT	RESULT
<microhardness	Increased tooth fractures
-larger tubules	more rapid caries
-crystal growth disturbance	Mechanical problems and more severe caries



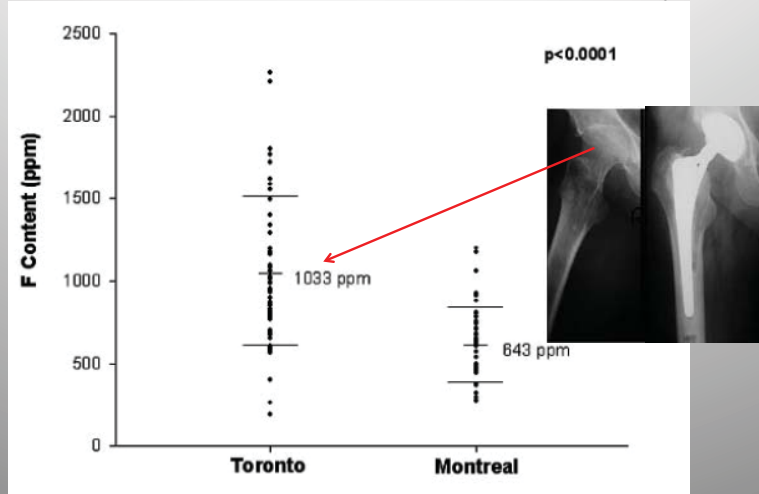
Dentmat.com

Dentin fractures are like bone fractures



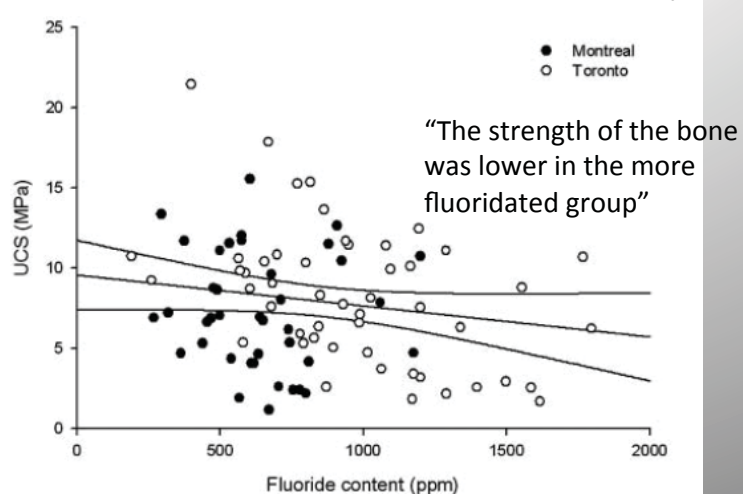
Femoral neck fracture

Toronto vs Montreal Bone Study



Chachra D. Limeback H. et al. J Dent Res. 2010

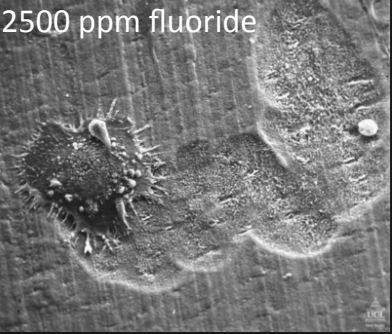
Toronto vs Montreal Bone Study



Chachra D. Limeback H. et al. J Dent Res. 2010

Effect of fluoride accumulation in bone on bone cells

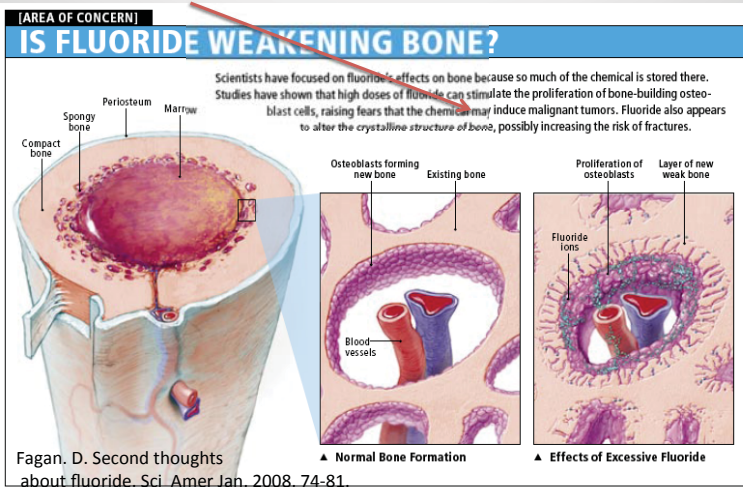
Osteoclast resorbing bone



- early bone cell death
- release of high F- levels to immune cells
- change in bone architecture

NRC Report 2006

...may induce malignant tumours!





Age-specific fluoride exposure in drinking water and osteosarcoma (United States)

Elise B. Bassin · David Wypij · Roger B. Davis · Murray A. Mittleman

546% increased risk to bone cancer !!!!  
“Our exploratory analysis found an association between fluoride exposure in drinking water during childhood and the incidence of osteosarcoma among males but not consistently among females”

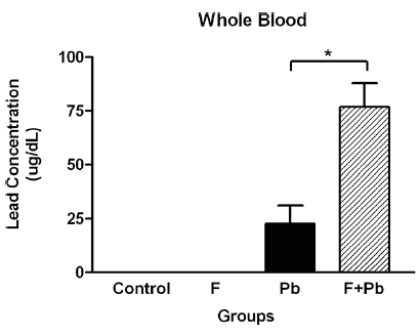


Confirmation of and explanations for elevated blood lead and other disorders in children exposed to water disinfection and fluoridation chemicals

Myron J. Coplan<sup>a,\*</sup>, Steven C. Patch<sup>b</sup>, Roger D. Masters<sup>c</sup>, Marcia S. Bachman<sup>a</sup>

Using H<sub>2</sub>SiF<sub>6</sub> as a fluoridation chemical increases blood lead levels more than NaF

ANY fluoride intake increases lead uptake



“...co-exposure to fluoride increases lead concentrations in the blood and in calcified tissues in animals exposed to lead from the beginning of gestation. These findings suggest that a biological effect not recognized so far may underlie the epidemiological association between increased BPb levels in children and water fluoridation.”

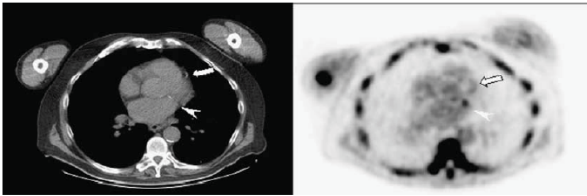
Sawan RM, Leite GA, Saraiva MC, Barbosa F Jr, Tanus-Santos JE, Gerlach RF. Fluoride increases lead concentrations in whole blood and in calcified tissues from lead-exposed rats. Toxicology. 2010 Apr 30;271(1-2):21-6.

Original article

Association of vascular fluoride uptake with vascular calcification and coronary artery disease

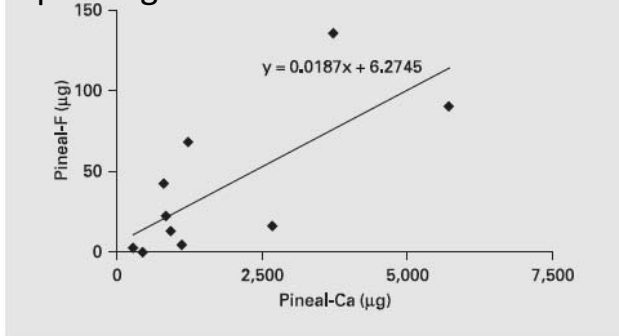
Yuxin Li<sup>a</sup>, Gholam R. Berenji<sup>a</sup>, Wisam F. Shaba<sup>a</sup>, Bashir Tafti<sup>a</sup>, Ella Yevdayev<sup>a</sup> and Simin Dadparvar<sup>b</sup> Nuclear Medicine Communications 2012, 33:14–20

Fluoride accumulates in coronary arteries where they are calcifying



Computed tomography (left) and positron emission tomography (right) images show coronary calcification and fluoride uptake in the left anterior descending coronary artery (arrow) and the circumflex coronary artery (arrow head).

### Fluoride accumulates in human pineal glands and lowers melatonin



**Fig. 1.** The relationship between the calcium and fluoride contents of ten aged human pineal glands.

Luke J. Fluoride deposition in the aged human pineal gland. Caries Res. 2001;35(2):125-8.

### Fluoride from water fluoridation accumulates over a lifetime in:

- **Bones** (making them more brittle and increasing lead uptake)
- **Teeth** (decreasing strength and increasing dentin caries)
- **Calcifying atherosclerotic plaque** (increasing the risk for heart attacks and stroke)
- **Pineal glands** (lowering melatonin)

## Conclusions

- AWF toxicity is well supported by science
- Because of these 'ugly facts' as outlined, 'Safe and Effective' claim for artificial water fluoridation must be altered or completely abandoned