

19-10-15

# Re-Submission to Calgary Council

For Oct. 29,2019

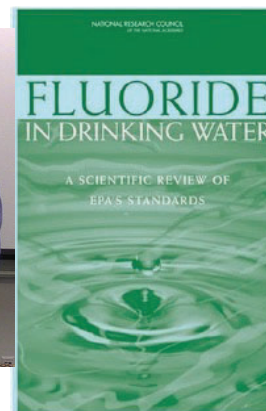
(this replaces the June 2019 submission  
which was not posted)

Dr. Hardy Limeback BSc PhD (Biochem) DDS  
Professor Emeritus, University of Toronto  
Former Head of Preventive Dentistry  
Member of the 2006 NRC Committee  
on Fluoride in Drinking Water

Dr. Limeback was a member of the  
2003-2006 Committee on Fluoride in Drinking Water  
US National Academies of Sciences (National Research Council)

**-which was completely ignored by the CADTH reports**

Jay Kumar, Tom Webster, Hardy Limeback, Judith Klotz, Bob Isaacson  
Ruby Reed, John Doull, Barb Farishian, Susan Martel,, Kim Boekelheide, Ed Puzas



“Fluoride appears to have the potential to initiate or promote cancers, particularly of the bone, but the evidence to date is tentative and mixed.” p.286

**Published  
Mar.2006**

19-10-15

**This re-submission by Dr. H. Limeback  
to Calgary Council summarizes:**

- the weak evidence of fluoridation's effectiveness
- the exaggeration of the reports that stopping fluoridation dramatically increases dental decay
- how humans react to swallowing fluoridated water
- a realistic cost-benefit estimate of fluoridation
- adverse health effect of swallowing fluoride
- how the CADTH report is biased and misleading

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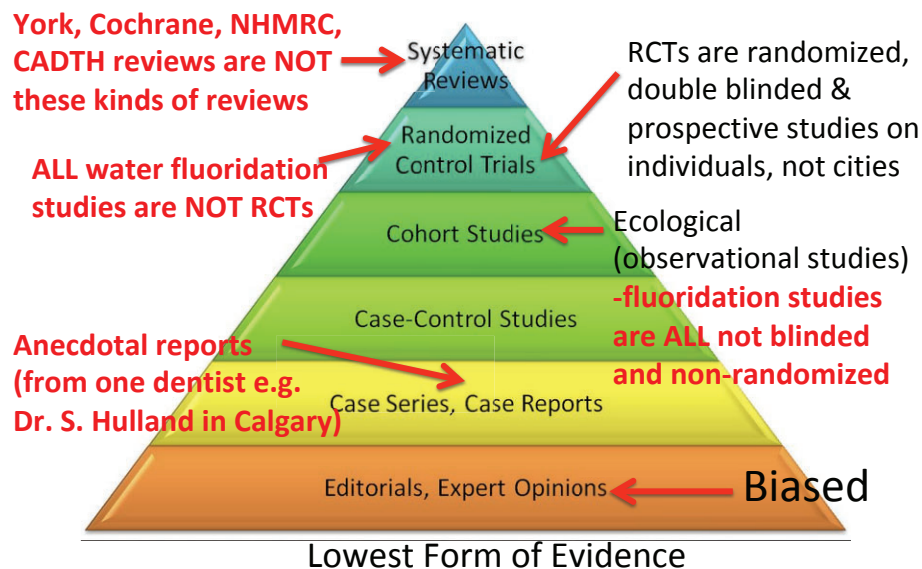
## WHAT IS THE EVIDENCE THAT FLUORIDATION IS EFFECTIVE? if there are NO RCTs?

There is **not a single** prospective randomized (double-blinded) controlled trial (RCT) on fluoridation

**-this is the usual evidence needed for approval of medications**

**-ALL the evidence of 'safe and effective' comes from weak UNBLINDED cross-sectional studies or non-randomized before and after studies**

## Pyramid of evidence for 'proof of effectiveness'



Even if there were benefits from fluoridation they are very minor

from 2012 textbook by Dr. H. Limeback

Table 16-4 A summary of recent publications on surveys of the dental decay rates in children

| Study author                 | Country   | Number of subjects | Age of subjects (years) | Surfaces saved with optimum fluoridation |
|------------------------------|-----------|--------------------|-------------------------|--|
| Heller <i>et al.</i> 1997    | US        | 18,755             | 12                      | 0.5*                                     |
| Brunelle and Carlos 1990     | US        | 16,498             | 12                      | 0.5*                                     |
| Angelillo <i>et al.</i> 1990 | Italy     | 643                | 12                      | 0.6                                      |
| Selwitz <i>et al.</i> 1998   | US        | 495                | 8–16                    | 1.2                                      |
| Ismail 1991                  | Canada    | 219                | 10–12                   | 0.7                                      |
| Clark 1991                   | Canada    | 1131               | 6–14                    | 0.8                                      |
| Slade <i>et al.</i> 1995     | Australia | 9,690 vs 10,195    | 5–15                    | 0.2<br>1.1                               |
| Jackson <i>et al.</i> 1995   | US        | 243                | 7–14                    | 2.0*                                     |
| Kumar <i>et al.</i> 1998     | US        | 1,493              | 7–14                    | -0.2                                     |
| Armfield and Spencer 2004    | Australia | 5129<br>4803       | 4–9<br>10–15            | 1.5<br>NS                                |
| Komarek <i>et al.</i> 2005   | Belgium   | 4468               | 7–12                    | NS                                       |
| Spencer <i>et al.</i> 2008   | Australia | 8183 (SA)          | 5–15                    | NS                                       |
| Nyvad <i>et al.</i> 2009     | Lithuania | 300                | 12–15                   | NS                                       |
| Ekstrand 2010                | Denmark   | 191 municipalities | 15                      | 1.0–2.0                                  |
| Armfield 2010                | Australia | 128,990            | 5–15                    | 0.5                                      |

\* Difference was statistically significant.

“They always use % reduction, but what does that really mean?”

- *IF* fluoridation reduces dental decay by 25% how many teeth are saved per person from decay?
- recent studies suggest that **at most** 40 years of fluoridation saves *maybe* 1 tooth from dental decay (Slade, 2014; Do, 2017; Slade, 2018)

The 'benefit' of fluoridation can be explained  
almost entirely by biased *un-blinded* examiners

Holman L, Head ML, Lanfear R, Jennions MD (2015) Evidence of Experimental Bias in the Life Sciences: Why We Need Blind Data Recording. PLoS Biol 13(7): e1002190. doi:10.1371/journal.pbio.1002190

"Our meta-analysis thus shows that a lack of blindness is associated with an increase in effect size of approximately 27%.... This figure is comparable to estimates from all past meta-analyses on clinical trials of which we are aware. These meta-analyses suggested that a lack of blinding exaggerates the measured benefits of clinical intervention by 22% [11], 25% [12], 27% [10], 36% [8], and even 68% [9]."

8. Hróbjartsson A, et al (2012). BMJ 344: e1119.
9. Hróbjartsson A, et al. (2013) CMA Journal 185: E201–E211.
10. Hróbjartsson A, et al. (2014) Int J Epidemiol 43: 937–948.
11. Savović J, et al. (2012) Ann Intern Med 157: 429–438.
12. Wood L, et al. (2008) BMJ 336: 601–605.

- the weak evidence of fluoridation's effectiveness
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**Global NEWS** **Calgary** **News & Radio Programs**

World Canada Local Politics Smart Living Money Entertainment Health Video Podcast

**HEALTH** June 1, 2019 4:40 pm **Reports exaggerating the benefits of fluoridation** Updated: June 2, 2019 12:03 pm

## Should Calgary bring fluoridated water back? Council expected to review new study this month

By Carolyn Kury de Castillo  
Reporter Global News

“[The] money that it will save people is about \$64 for every dollar invested. So it’s a minor budget matter that will promote and protect the health of Calgarians,” Guichon said.

## 2014: Anecdotal reports (no studies) of increase in dental decay after Calgary ended fluoridation makes national news

**CBC** | MENU

news Top Stories Local The National Opinion World Canada Politics

**Reports exaggerating the benefits of fluoridation**

Calgary

### Dental decay rampant in Calgary children, pediatric dentist says

[f](#) [t](#) [e](#) [r](#) [i](#)

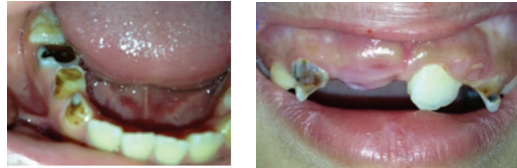
Dentist says cavities in kids on the rise 3 years after Calgary stopped adding fluoride to drinking water

CBC News · Posted: Dec 08, 2014 11:19 AM MT | Last Updated: December 8, 2014

## News reports showing rampant dental decay unrelated to lack of fluoride was irresponsible

### Reports exaggerating the benefits of fluoridation

These pictures provided to the CBC are designed to instill fear: no amount of fluoride in the the drinking water can stop rampant dental decay like this.



CBC News  
Dec. 8, 2014

### CBC Journalist failed to uphold standards

“ In matters of human health we will take particular care to avoid arousing unfounded hopes or fears in persons living with or close to those living with serious illnesses. **We will also avoid suggesting unproven benefits or risks to health related to changes in habits of consumption of food or pharmaceutical products.**” CBD Journalistic Standards and Practices.

## Scaremongering re: lack of fluoridation -used by Medical Officers of Health across Canada

### The great fluoride debate

By Denis Langlois, Sun Times, Owen Sound  
Friday, January 31, 2014 10:18:40 EST AM

Dr. Hazel Lynn,  
Medical officer of health  
Owen Sound, Ontario

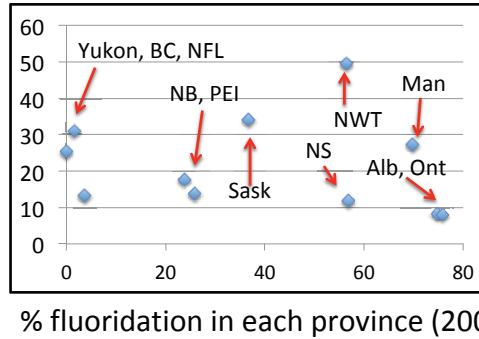


This kind of dental decay is not caused by a “fluoride deficiency” in the drinking water.

This is scaremongering!

## Fluoridation in Canada DOES NOT reduce day surgeries required to treat rampant dental decay

Day surgeries per 1000 (2011)

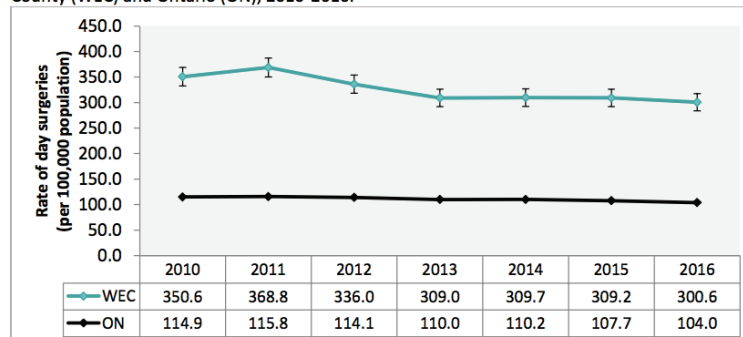


[http://www.hc-sc.gc.ca/ahc-asc/alt\\_formats/pacrb-dgapcr/pdf/branch-dirgen/wfc-efc-eng.pdf](http://www.hc-sc.gc.ca/ahc-asc/alt_formats/pacrb-dgapcr/pdf/branch-dirgen/wfc-efc-eng.pdf)  
<https://www.cihi.ca/en/access-data-reports/results?query=surgeries%2C+dental%2C+province&Search+Submit=>

## Day surgeries in Windsor for oral health issues related to dental decay actually declined when fluoridation stopped

from the Windsor Essex County 2018 Oral Health report

**Figure 8.** The rate of day surgeries for oral health (caries-related) issues in Windsor-Essex County (WEC) and Ontario (ON), 2010-2016.



Source: Ambulatory Emergency External Cause [2010-2016], Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO, Date Extracted: [March 19, 2018].



## O'Brien's Institute Lindsay McLaren's Study: What was claimed? What was actually shown?

**Huffington Post Feb. 17, 2016**

**Bold  
claim**

"We systematically considered a number of other factors ... and in the end, everything pointed to fluoridation cessation being the most important factor," she said.

**O'Brien Institute for Public Health website:**

**Bold  
claim**

"This study points to the conclusion that tooth decay has worsened following removal of fluoride from drinking water, especially in primary teeth, and it will be important to continue monitoring these trends," says Lindsay McLaren, PhD, from the University of Calgary's Cumming School of Medicine, and O'Brien Institute for Public Health.

**McLaren  
admission  
of what  
was  
actually  
shown**

**cheminst.ca/magazine/article/the-great-fluoride-debate/**

"We were not able to answer the question, 'what has happened since cessation?' We were able to answer the question, 'what has happened between 2004-05 and 2013-14?' when cessation happened in one community and not the other." (McLaren)

**Calgary Herald, Licia Corbella: The science is not settled -Oct.12, 2017**

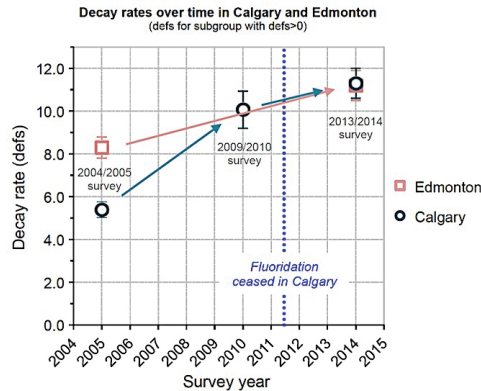
"For all tooth surfaces among permanent teeth, there was a statistically significant **decrease** in Calgary . . . which was not observed in Edmonton." (study)

## Admissions in an article McLaren wrote for the Canadian Association of Public Health Dentistry 2017 Fall Newsletter



McLaren: " Some of the coverage was positive and accurate, but in other cases the study findings were misrepresented and the conclusions overstated; for example, suggesting that 'cavities spiked since fluoridation was stopped'. There was no spike but rather a gradual increase, **and the trend observed was not since fluoridation was stopped, but rather over a time period during which cessation occurred: 2004/05 to 2013/14 (cessation occurred in 2011).**"

## What was actually shown by McLaren



**FIGURE 2** Dental decay rates for subgroup of those children with at least one defs (defs>0). Data for 2004/2005 and 2013/2014 from CDOE paper. Data for 2009/2010 from IJEH paper, but converted from deft to defs using conversion method described in text. Error bars indicate 95% CIs.

Neurath C, Beck JS, Limeback H, et al. Limitations of fluoridation effectiveness studies: Lessons from Alberta, Canada. *Community Dent Oral Epidemiol.* 2017;00:1–7

Neurath: “In summary due to the omission of key data that contradict the authors’ conclusion, inadequate control of confounding factors, and limitations in the design of the study that were largely unacknowledged, we believe that the claim by McLaren et al that their study supports the hypothesis that fluoridation cessation causes an increase in decay, is unjustified.”

## What Calgary’s Juliet Guichon (a lawyer who admitted she doesn’t understand the science)

is willing to say to see fluoridation reinstated

“Decayed primary tooth surfaces had risen 145% 3 years after fluoridation cessation.”

**-The McLaren study was debunked by Neurath et al, 2017**

“\$1 spent on fluoridation (including capital equipment and annual operating costs) saves between \$68 and \$140 in dental care”

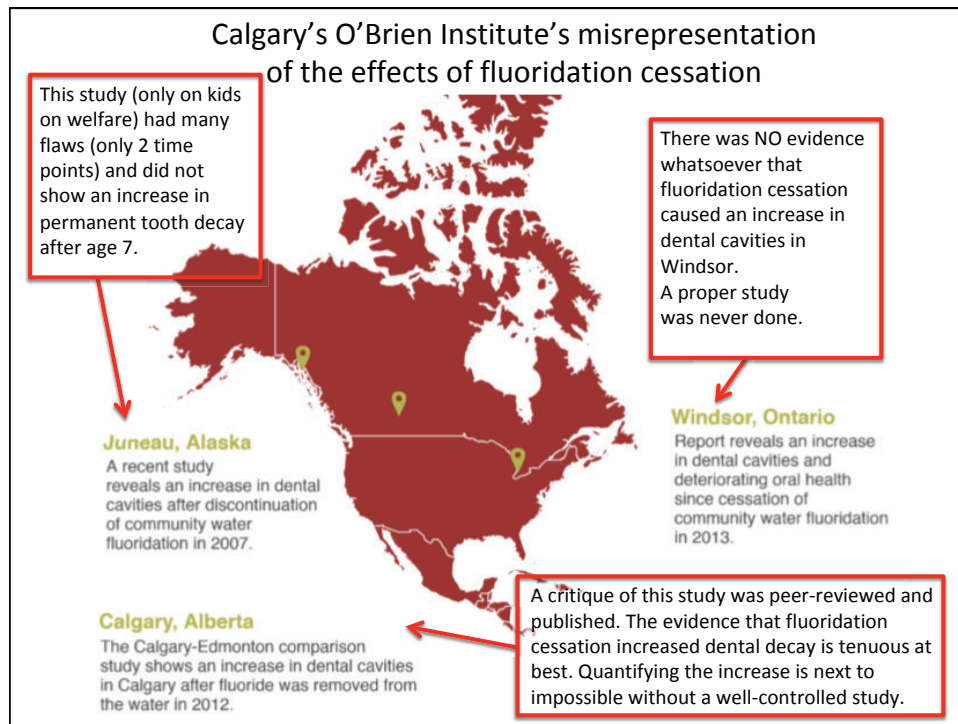
**-that’s impossible –that’s up to \$4700 saved per tooth**

“No evidence of harm at 4.0 ppm (fluoride) and below”

**- complete fabrication and does not reflect our 2006 NRC report**

“Dental fluorosis produced from water fluoridation is seen as mild while flecks on teeth that can only be seen by the dentist. It does not affect the form and function of the tooth”

**-this FALSE and it is an insult to those families who can clearly see the dental fluorosis damage from fluoridation**



### Why the Juneau AK Medicaid study failed to show effect of fluoridation cessation

- only 2 time points chosen; before (2003) and after (2012) the year fluoridation ended (2006)
- almost a decade between points: too long (anything could have happened)
- year to year variation was not known –the increase seen could have occurred during fluoridation
- 6 yrs of fluoridation cessation did not affect > 7 yr olds. That was plenty of time to see an effect
- other explanations:
  - dentists were NOT blinded to fluoridation status and could have treated more aggressively because fluoridation halted
  - dentists could have been maximizing dental treatment in Medicaid patients to maintain income and Medicaid reimbursement could have increased
  - decline in oral home care in the younger children (older children not affected)
  - worsening of sugar abuse (this seems to be worldwide trend)
  - there could have been more Medicaid fraud (it happened in Anchorage)

Study: Meyer J, et al. BMC Oral Health. 2018 Dec 13;18(1):215

### Why the Windsor-Essex County Health Unit report failed to show fluoridation cessation increased dental decay

- hygienists were not trained to properly measure dental decay rates (10- 30 sec., no-touch exam –mouth mirror and a light source at school)
- survey was unscientific, no adjustments for confounders like socio-economic status (the population of poor increased during the time of no fluoridation)
- before and after fluoridation based only on % caries free with no statistical analysis
- report was not peer-reviewed or published in a journal
- numerous mistakes were found including reporting of zero fluorosis where no permanent teeth existed

### Calgary's O'Brien Institute's misrepresentation of the effects of fluoridation cessation

"we are aware of two other North American studies on cessation of water fluoridation" (referring to the Juneau study and the Windsor survey)

**This is evidence of *bias* ("cherry picking" only helpful studies)**

#### **Why did they miss these fluoridation cessation studies?**

##### **1. Comox/Courtney and Campbell River BC**

"The prevalence of caries (assessed in 5,927 children, grades 2, 3, 8, 9) *decreased* over time in the fluoridation-ended community while remaining unchanged in the fluoridated community."

**-cavities DROPPED after fluoridation cessation**

Maupomé et al. CDOE, 2001, 29(1):37-47.

##### **2. Durham NC**

"It was concluded that *while the break had little effect on caries*, dental fluorosis is sensitive to even small changes in fluoride exposure from drinking water, and this sensitivity is greater at 1 to 3 years of age than at 4 or 5 years."

**-fluorosis dropped but cavities did not change after fluoridation cessation**

Burt et al. J Dent Res. 2000,79(2):761-9.

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## The O'Brien report to Calgary incorrectly states that fluoridation benefits adults

“Again, drawing most heavily from the CADTH Report (Sub-Report on Dental Caries and Other Health Outcomes) we find evidence that community water fluoridation is also beneficial to adult populations. The extent of research evidence is somewhat less than for children, but studies of adults still show benefit:

♣ Systematic reviews suggest a 35% relative reduction in the number of teeth affected by decay and cavities.”

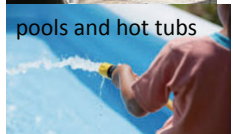
### **More “cherry picking” (the CADTH report ignored the conclusion of the Cochrane systematic review in 2015)**

“Within the ‘before and after’ studies we were looking for, we *did not find any on the benefits* of fluoridated water for adults.”

- the weak evidence of fluoridation’s effectiveness
- the exaggeration of the reports that stopping fluoridation dramatically increases dental decay
- **how humans react to swallowing fluoridated water**
- a realistic cost-benefit estimate of fluoridation
- adverse health effect of swallowing fluoride
- how the CADTH report is biased and misleading

## Where does fluoridated water go?

outdoor uses  
 (storm runoff added to sewage?)



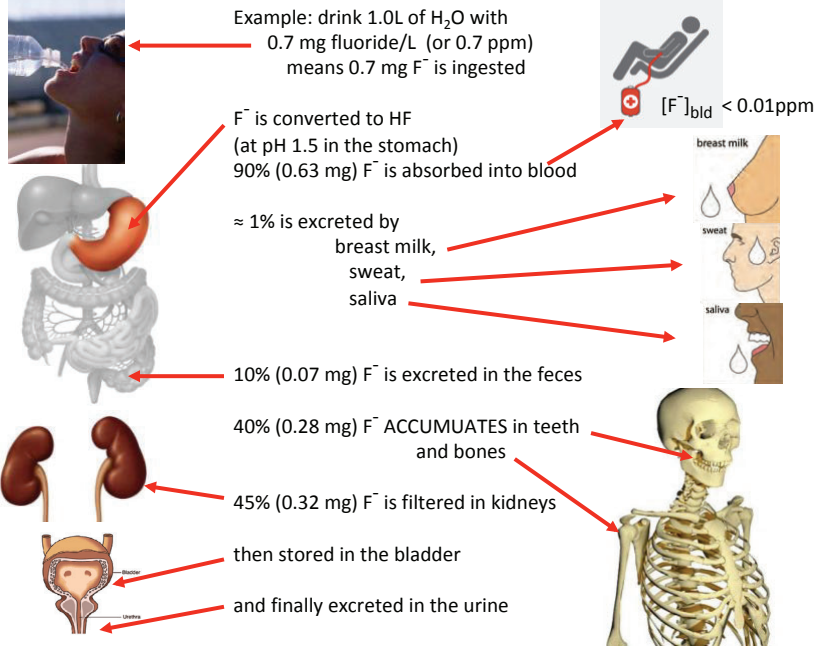
personal hygiene  
 (added to sewage)



drinking, cooking =  
 only 1% of fluoridated  
 household water

( a VERY small  
 amount is filtered  
 through humans but  
 eventually ends  
 up in the environment)

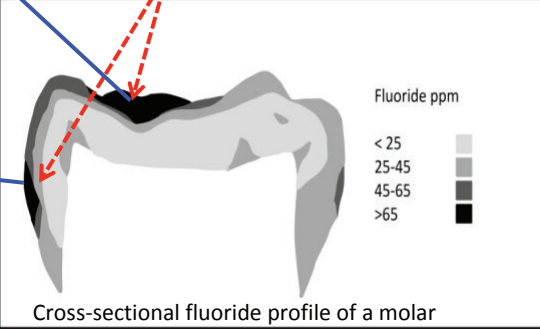
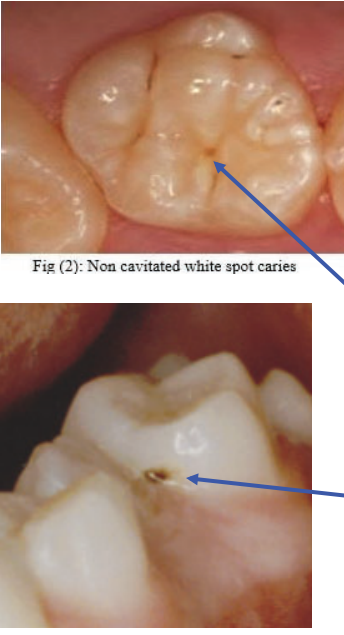
## How humans deal with fluoride



**How fluoride works (it's topical !!)**  
*Fluorapatite builds up in areas of demineralization-remineralization*  
**-swallowing fluoride only causes tissue damage**

$\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$  (hydroxyapatite) +  $2\text{F}^-$   
↓  
 $\text{Ca}_{10}(\text{PO}_4)_6(\text{F})_2$  (fluorapatite) +  $2(\text{OH}^-)$

Fig (2): Non cavitated white spot caries






Cross-sectional fluoride profile of a molar

**Fluoridation does not protect babies fed infant formula made with tap water!**

The Canadian Dental Association recommends “the total daily fluoride intake from all sources should not exceed 0.05 -0.07 mg/kg/day”

infant formula 0.5 ppm + Fluoridated water 0.7 ppm = **400% higher** 0.20 mg/kg/day



Who monitors my fluoride intake?



## Fluoride from tap water

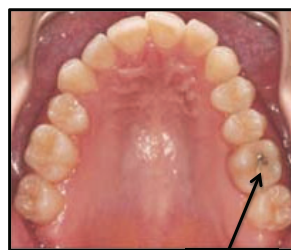
-babies fed formula made with fluoridated tap water are overdosed on fluoride

| subject  | volume fluid intake | fluoride concentration in liquid consumed | fluoride DOSAGE* (µg/ kg per day) |
|--|---------------------|---|-----------------------------------|
| 5 kg baby fed breast milk                        | up to 1 L           | ≈ 0.005 ppm                               | 1                                 |
| 70 kg adult                                      | 1 L                 | 0.7 ppm                                   | 10                                |
| 70 kg adult                                      | 4 L                 | 0.7 ppm                                   | 40                                |
| 70 kg adult                                      | 2 L                 | 2.0 ppm                                   | 57                                |
| 70 kg adult                                      | 1 L                 | 4.0 ppm                                   | 57                                |
| 5 kg baby fed infant formula made with tap water | up to 1 L           | 0.7 ppm                                   | 140                               |

\*A **dose** refers to a specified amount of medication taken at one time. By contrast, **dosage** is the prescribed administration of a specific amount, number, and frequency of doses over a specific period of time. AMA Manual of Style

### Fluoridation- a poor tradeoff from 40 years of exposure

One tooth might have been saved from dental decay  
 .....but look at the dental fluorosis that children have to deal with



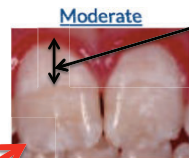
A lifetime of fluoridation MIGHT save one tooth from dental decay

10%  
 -if only front scored



Mild

This is ONLY from excess fluoride during first 6 mo. -NOT added toothpaste exposure



Moderate

This is where F-toothpaste swallowing starts to show up (age 1.5 - 3 yrs) -it's additive



Severe

This is from excess fluoride that was in the child's bone from birth and from external sources (water, toothpaste, supplements, pollution)

Cochrane Review, 2015



### Published studies (Canada vs elsewhere): prevalence of fluorosis of esthetic concern

| Study          | fluoridated    | % esthetically objectionable dental fluorosis | non-fluoridated | % esthetically objectionable dental fluorosis |
|----------------|----------------|---|-----------------|---|
| Clark 1997     | BC cities      | up to 5%                                      |                 |   |
| Brothwell 1999 | Ontario towns  | 19%   | Ontario towns   | 5%  |
| Leake 2002     | Toronto        | 14%   |                 |   |
| Ito 2007       | Brampton       | 9%  | Caledon         | 3.6%  |
| Cochrane 2015  | worldwide data | 12%   |                 |   |
| Neurath 2019   | NHANES (US)    | 10%   |                 |   |

CADTH: “the prevalence of dental fluorosis of “any level” at 0.7 ppm and 1.0 ppm was 40% and 48%, respectively, while the prevalence of dental fluorosis of “aesthetic concern” was 12.0% and 12.5%, respectively.”

**The cost to treat dental fluorosis was not considered by CADTH**

### Many studies show fluoridation increases the risk of getting porcelain veneers at the dentist

Mild **fluorosis** appears as barely noticeable white spots or white streaks in the tooth's enamel. These spots or blotches become more noticeable in cases of moderate **fluorosis** and they are especially noticeable as the teeth become dry as may happen during exercise or any prolonged period of mouth breathing.

© JGillisDDS  
Fluorosis stains prior to treatment.

© JGillisDDS  
A much more attractive smile after treatment of fluorosis with porcelain veneers.

1190 BOOKCLIFF AVENUE #201, GRAND JUNCTION, CO 81501



*Julie M Gillis*  
 DDS PC

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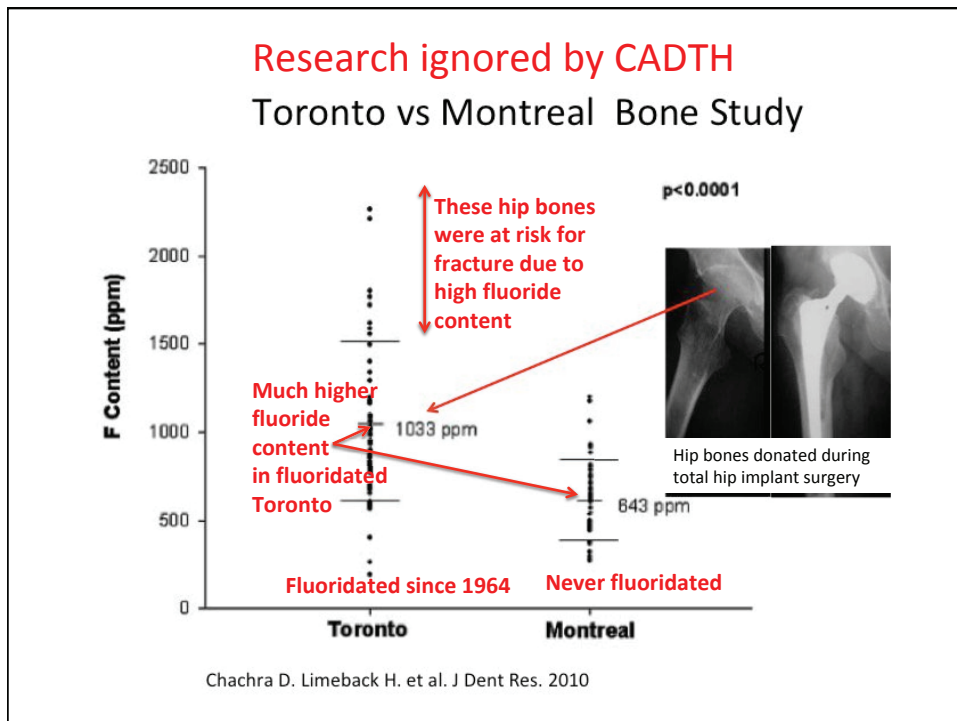
**Research ignored by CADTH  
 ...may induce malignant tumours!**

**[AREA OF CONCERN]**

**IS FLUORIDE WEAKENING BONE?**

Scientists have focused on fluoride's effects on bone because so much of the chemical is stored there. Studies have shown that high doses of fluoride can stimulate the proliferation of bone-building osteoblast cells, raising fears that the chemical may induce malignant tumors. Fluoride also appears to alter the crystalline structure of bone, possibly increasing the risk of fractures.

Fagan, D. Second thoughts about fluoride. *Sci. Amer* Jan, 2008, 74-81.



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### Realistic Cost-Benefit analysis of fluoridation in Calgary for 40 years

Equipment upgrade = \$6 million

Cost to fluoridate for 40 years (assuming equipment lasts)  
≈ \$50 million

Claimed savings ≈ \$50 million X **\$64** ≈ \$3.2 BILLION

Population of Calgary = 1.2 million

Claimed savings ≈ \$2,670/person

If one tooth is saved by fluoridation, then \$2670 to fix  
ONE tooth in EVERY SINGLE Calgarian is CLEARLY

**FALSE**

One must deduct the cost to treat dental fluorosis, and  
the costs of the OTHER ill-health consequences of fluoridation  
(brain problems, endocrine effects, side effects in kidney  
patients etc.)

## The cost of treating dental fluorosis if Calgary re-instates fluoridation

1. in 40 yrs., 650,000 children under age 6 will be exposed to fluoridated water
2. 1 in 10 (65,000) will end up with objectionable dental fluorosis
3. if half (32,500) get microabrasion and or bleaching, this will cost \$32.5 - \$50 million
4. if 40% (26,000) get bleaching/microabrasion PLUS some cosmetic fillings, this will cost up to \$75 million
5. if the remaining 10% elect to have porcelain veneers the cost is up to \$130 million

Total cost to treat dental fluorosis = \$255million

6. The ACTUAL cost savings of fluoridation is (AT MOST) is one tooth saved from dental decay/person after 40 yrs  
-this costs \$175 to repair, so the total dental cost savings is 1.2 M X \$175 = \$263 Million

## It is cost prohibitive to fluoridate especially when dental fluorosis is considered

- Sources:
1. [www12.statcan.gc.ca/census](http://www12.statcan.gc.ca/census)
  2. [www.cochranelibrary.com](http://www.cochranelibrary.com), CDC
  - 3, 4, 5. [www.alberta.ca/dental-fees.aspx](http://www.alberta.ca/dental-fees.aspx)
  6. Slade et al, 2013 J Dent Res

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## CADTH Dismisses ALL Non-dental Side Effects of Ingested Fluoride

**The evidence for EVERY side effect was dismissed by the un-named CADTH authors**

- |   |  |
|---|--|
| <p><b>Mortality</b><br/> <b>Atherosclerosis</b><br/> <b>Hypertension</b><br/> <b>Cancer</b><br/> <b>Hip Fracture</b><br/> <b>Osteoporosis</b><br/> <b>Musculoskeletal Pain</b><br/> <b>Neonatal Height and Weight</b><br/> <b>Down Syndrome</b></p> | <p><b>IQ and Cognitive Function</b><br/> <b>Thyroid Function</b><br/> <b>Kidney Stones</b><br/> <b>Chronic Kidney Disease</b><br/> <b>Gastric Discomfort</b><br/> <b>Headache</b><br/> <b>Insomnia</b><br/> <b>Reproduction</b><br/> <b>Refractive Errors</b><br/> <b>Diabetes</b><br/> <b>Myocardial Infarction</b></p> |
|---|--|

**SUMMARY**

“There was **insufficient evidence** for an association between water fluoridation at the current Canadian levels and all-cause mortality, atherosclerosis, hypertension, skeletal fluorosis, osteoporosis, musculoskeletal pain, newborns’ height and weight, thyroid function, CKD, self-reported health outcomes (gastric discomfort, headache, insomnia), reproduction (fertility, abortion), refractory errors, diabetes, and myocardial infarction.”

**CADTH completely ignored the 2006 NRC Report and studies that were published after it**

| Effects of low dose chronic fluoride exposure | what was reported in the 2006 NRC Report   | examples of studies published since the 2006 NRC Report                                 |
|---|--|---|
| contributing to skeletal fluorosis            | -stage II skeletal fluorosis (arthritis) at < 2 ppm fluoride in drinking water   | Chachra 2010  |
| negative brain effects                        | “..IQ deficits in children exposed to fluoride at 2.5 to 4 mg/L in drinking water....the consistency of the results appears significant enough to warrant additional research on the effects of fluoride on intelligence.” | Bashash 2017, 2018<br>NTP review 2018<br>Yu 2018<br>Russ 2018<br>Cao 2019<br>Green 2019 |
| negative endocrine effects                    | -decreased thyroid activity,<br>-impaired glucose metabolism,<br>-increased Calcitonin, PTH,<br>-changes in sexual maturity  | Malin 2018<br>Liu 2019  |
| cancer  | “Fluoride appears to have the potential to initiate or promote cancers, particularly of the bone, but the evidence to date is tentative and mixed”   | Bassin 2006<br>Alarcón-Herrera, 2019  |

This slide from J. Johnson of the America Fluoridation Society, is a falsification. The CDATH reports did not bother to look at the original literature and relied on reviews since 2006

Was there evidence at 4.0 ppm showing that fluoride had an effect on...?

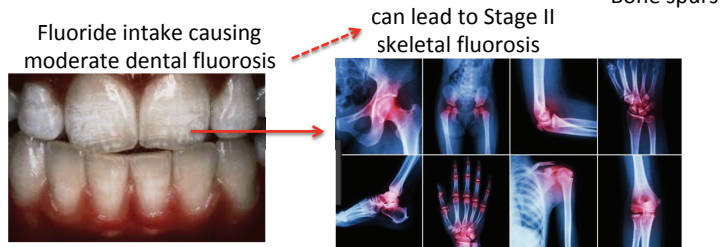
- Tooth enamel ✓
- Liver ✗
- Kidneys ✗
- Endocrine system ✗
- Gastrointestinal system ✗
- Immune system ✗
- Cancer ✗
- Musculoskeletal system ✗
- Reproduction and development ✗
- Neurotoxicity and neurobehavioral ✗
- Genetic damage ✗



(Source: "Fluoride in Drinking Water: A Scientific Review of EPA's Standards," National Research Council of the National Academies Press, 2006)  
PAGE 439 OF 462

### Conclusions of the 2006 NRC Report re: fluoride and stage II skeletal fluorosis

"The current MCLG (4 mg/L) was designed to protect against stage III skeletal fluorosis. As discussed above, the committee judges that stage II is also an adverse health effect, as it is associated with sporadic pain, stiffening of joints, and occasional osteophyte formation on articular joint surfaces. The committee found that bone fluoride concentrations estimated to be achieved from lifetime exposure to fluoride at 2 mg/L (4,000 to 5,000 mg/kg ash) ... fall within or exceed the ranges historically associated with (stage) II... skeletal fluorosis. This suggests that fluoride at 2 mg/L ... might not protect all individuals from the adverse stages of the condition."



**Research ignored by CADTH**  
 Low level fluoride exposure can  
 affect sexual development in humans

| Study                    | subjects                       | fluoride exposure          | effect on sexual development                            |
|--------------------------|--------------------------------|----------------------------|---|
| Schlessinger et al, 1956 | girls 7-18 yrs. (Newburgh NY)  | 1.2 ppm in drinking water  | earlier menarche by 5 mo.                               |
| Farkas et al, 1983       | girls 10-19 yrs. (Hungary)     | 1.09 ppm in drinking water | no significant difference                               |
| Liu et al, 2019          | girls 10-17 yrs. (Mexico City) | mean urine F = 0.59 ppm    | trend is earlier menarche but no significant difference |
| Liu et al, 2019          | boys 10-17 yrs. (Mexico City)  | mean urine F = 0.59 ppm    | later pubertal development                              |

**Research ignored by CADTH**

Studies shows teeth are more yellow in fluoridated areas

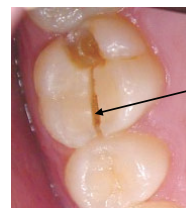
AND more prone to catastrophic fractures

**Perceptions of desirable tooth color among parents, dentists and children**

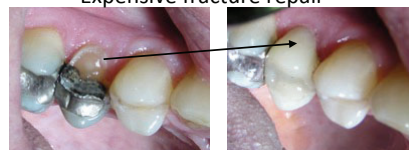
JAY D. SHULMAN, D.M.D., M.A., M.S.P.H.;  
 GERARDO MAUPOMÉ, C.D., M.Sc., Ph.D.;  
 D. CHRISTOPHER CLARK, D.D.S., M.P.H.;  
 STEVEN M. LEVY, D.D.S., M.P.H.

(31.6 percent) were dissatisfied with their tooth color, and of those subjects, 552 (70.0 percent) felt that their teeth were too yellow.

JADA, Vol. 135, May 2004 595



vertical fracture of the 1<sup>st</sup> molar in a 14 yr. old

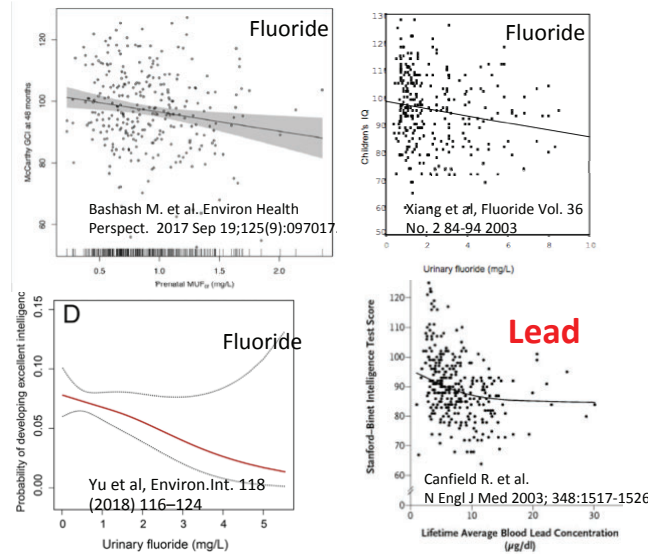


Expensive fracture repair

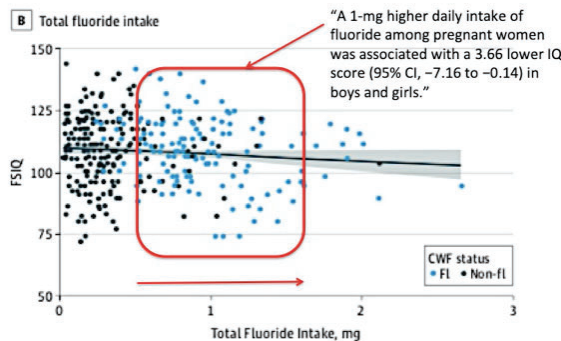
Vieira A et al. J. Dent Res. 2005, 84(10):951



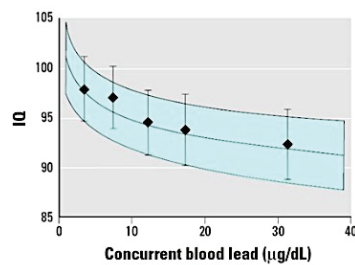
Fluoride & IQ studies: **these studies were NOT reviewed by CADTH** (compare to the Lead-IQ studies that contributed to the banning of lead in drinking water, paint, gasoline etc.)



Fluoride is just as neurotoxic as lead according to recent studies



**Prenatal Fluoride (from fluoridated water) = lowered IQ by 3.7 points (Green et al, JAMA Ped-2019)**



- Low level lead exposure (<5 µg/L) has a more severe effect.
- The loss of about 5 to 10 IQ points has been attributed to the adverse effects of exposure to environmental lead during early childhood.

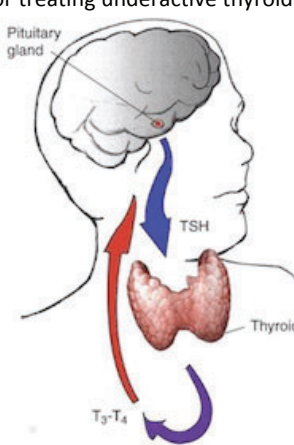
**Environmental lead = lowered IQ by 5 to 10 points (Lanphear et al, EnvHealthPersp.2005)**

Figure 1: Full IQ vs Concurrent blood lead level (Lanphear et al., 2005)



### Canadian Fluoride and Thyroid Study: “Fluoride exposure among adults with moderate-to-severe iodine deficiencies living in Canada may **increase risk for underactive thyroid gland activity.**”

Synthroid (levothyroxin) is the most prescribed drug in the US (for treating underactive thyroid)



Underactive thyroid leads to



- higher cholesterol
- depression
- fatigue
- hair loss
- weight gain
- memory loss
- sensitivity to cold

In children:

- delayed puberty,
- delayed growth,
- delayed tooth development

**Study:** Malin AJ, Riddell J, McCague H, Till C. Fluoride exposure and thyroid function among adults living in Canada: Effect modification by iodine status. *Environ Int.* 2018 Dec;121(Pt 1): 667-674. **Not reviewed by CADTH**

### Prenatal exposure from fluoridated water is now linked to increased ADHD in children

  **UNIVERSITY OF TORONTO**  
DALLA LANA SCHOOL OF PUBLIC HEALTH

[FACULTY DATABASE](#) [GET THE BULLETIN](#) [SUPPORT/CAMPAIGN](#)

**Not reviewed by CADTH**

#### Higher levels of urinary fluoride associated with Attention Deficit Hyperactivity Disorder (ADHD) in children

October 10/2018

Higher levels of urinary fluoride during pregnancy are associated with more ADHD-like symptoms in school-age children, according to University of Toronto and York University researchers.

**Study:** Bashash M, Marchand M, Hu H, Till C, Martinez-Mier EA, Sanchez BN, Basu N, Peterson KE, Green R, Schnaas L, Mercado-García A, Hernández-Avila M, Téllez-Rojo MM. Prenatal fluoride exposure and attention deficit hyperactivity disorder (ADHD) symptoms in children at 6-12 years of age in Mexico City. *Environ Int.* 2018 Dec;121(Pt 1):658-666. doi: 10.1016/j.envint.2018.09.017.

BJPsych

The British Journal of Psychiatry (2018)  
Page 1 of 6. doi: 10.1192/bjp.2018.287

**Not reviewed by CADTH**

## Aluminium and fluoride in drinking water in relation to later dementia risk

Tom C. Russ, Lewis O. J. Killin, Jean Hannah, G. David Batty, Ian J. Deary and John M. Starr

“our findings suggest that even these relatively low levels of aluminium and fluoride are associated with deleterious effects on dementia risk, which should be weighed against their beneficial uses.”

**Fluoride is neurotoxic. So is Aluminum  
Together they are associated with dementia!**

## New Study Links Low Fluoride Exposure to Alzheimer’s Disease

“Fluoride raised the numbers of  
senile plaque in (brains of) mice carrying  
APP/PS1 double-transgenic mutation”

“long-term exposure to fluoride may be considered a risk  
factor in the development of Alzheimer’s Disease.”

...the doses of fluoride exposed to mice were equivalent to 1.5 ppm  
(close to the drinking water standard set by WHO) and 15 ppm,  
respectively, in drinking water for humans.

**CADTH did not review ANY animal research**

open access paper

<https://alzres.biomedcentral.com/articles/10.1186/s13195-019-0490-3>

Cao K, et al. Exposure to fluoride aggravates the impairment in learning and memory and neuropathological lesions in mice carrying the APP/PS1 double-transgenic mutation.

Alzheimers Res Ther. 2019 Apr 22;11(1):35


- the weak evidence of fluoridation's effectiveness
- the exaggeration of the reports that stopping fluoridation dramatically increases dental decay
- how humans react to swallowing fluoridated water
- a realistic cost-benefit estimate of fluoridation
- adverse health effect of swallowing fluoride
- how the CADTH report is biased and misleading

**CADTH** Evidence Driven.

Posted on CADTH.ca Apr. 2019

**EVIDENCE HIGHLIGHTS** | Highlighting the Evidence

## Community Water Fluoridation Programs



**Bottom Line**

There is consistent evidence to support CWF's benefits in reducing dental caries, and insufficient or no evidence to suggest that it leads to adverse health outcomes.

**This is more of a political statement than a scientific one since so much science was ignored.**

**CADTH's fluoridation report cannot be trusted. It DOES NOT protect Canadians.**

## Promotion of fluoridation but advising to limit fluoride swallowing from toothpaste makes no sense

Advice: **Limit fluoride toothpaste to avoid swallowing fluoride.**

But encourage toddlers to drink fluoridated water?

**What kind of a mixed message is that?**



## Summary

### Why the CADTH reports are biased and not scientific

- the authors (still un-named) relied heavily on previous biased government reviews
- they “cherry picked” studies that only focused on showing safety (e.g. citing Broadbent IQ study as high quality without citing the published critique showing that it was not)
- when the studies were claimed irrelevant to the Canadian setting they were ignored but when they deemed important (e.g. hospital admissions in the UK due to dental decay) they were included
- rigorous studies on fluoride and lowered IQ were ignored (see IQ studies in previous slides of this submission)
- CADTH completely ignored the 2006 NRC report and ALL animal evidence
- CADTH authors made numerous serious errors (e.g. claiming the Peckham study did not cover the entire country when it did, or misinterpreting the results of the Choi fluoride and IQ studies.)
- when there were studies of concern (e.g. 2 studies showing a link to diabetes) they were dismissed as not providing enough proof
- the CADTH’s entire cost analysis was based on ONE weak study in Australia (Arrow et al, 2016) and did not include the cost to treat dental fluorosis
- **In my opinion, the CADTH reports are biased and designed to promote fluoridation, not look at the fluoride science rigorously**

19-10-15

## Bottom Line for Calgary Council

- the CADTH reports (and the O'Brien Institute report which is based on CADTH reports) are biased and flawed to promote fluoridation
- the evidence for fluoridation benefit is very weak, and the benefit is incredibly minor if there is one
- it will cost Calgary a lot of money to restart fluoridation and continue it for years; that will NOT be cost effective
- the evidence is mounting that children will be harmed by fluoridation
- if the O'Brien Institute for Public Health wants to protect Calgarians, it should recommend the status quo (no fluoridation). This would mean Calgary will continue to stand with BC, Quebec and most of the rest of the world outside of the US (+ New Zealand, Ireland & Australia) in NOT adding industrial waste fluoride to drinking water