Response to Claims of Kennebunkport Water Treatment Superintendent

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In an op-ed piece in the October 31 edition of the *Portland Press Herald* (Maine), entitled *A 'no' vote against fluoride in water is a vote for better health (*http://www.pressherald.com/2016/10/31/maine-voices-a-no-vote-against-fluoride-in-water-is-a-vote-for-better-health/*),* Mr. Norm Labbe, Superintendent of the Kennebunkport, ME public water system, makes a number of false and misleading claims in regard to water fluoridation. His claims are reflective of those constantly made by fluoridation opponents whose source is the New York antifluoridationist faction, "Fluoride Action Network". The following is a point-by-point exposure of the fallacies, and false nature of Mr. Labbe's claims.

1. Labbe: "The upcoming local referendum will give everyone living within the communities we serve – whether on a private well or on public water – an opportunity to end water fluoridation and regain control of what they ingest at home, at school or at work."

Water fluoridation simply increases the level of existing fluoride ions in a public water system, up to that point at which prevention of significant amounts of dental decay have been observed to occur in populations served by that system. There is no loss of control by anyone over what they ingest. People are entirely free to consume the water sourced from a local water supply, or not.

"Water fluoridation is the controlled addition of a fluoride compound to a public water supply to achieve a concentration optimal for dental caries prevention" (1).

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2. Labbe: "We have several reasons for our opposition to water fluoridation for our customers. In addition to the reasons and facts presented on our website at kkw.org and at rethinkingfluoride.com"

Facts:

Rethinking Fluoride is an antifluoridation website rife with misleading and misinformation.

The official website of the Kennebunkport Water District lists antifluoridation sources, rife with misinformation about fluoridation, as if they are equal in stature and knowledge with those of the US CDC and the American Dental Association. It lists 8 antifluoridation sites, to only two which support fluoridation.

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3. Labbe: "The U.S. Centers for Disease Control and Prevention has clearly said that surface application of fluoride, not swallowing, is the way fluoride helps to protect teeth from cavities."

Facts:

This is false. The US CCD has not stated that ingesting fluoride does not prevent dental decay. It has stated that while the effect of fluoride is predominantly topical, it also acts systemically, as well. This is evidenced by the effect of mild dental fluorosis. Mild dental fluorosis is a barely detectible effect which causes no adversity on cosmetics, form, function, or health of teeth. Peer-reviewed science has demonstrated mildly fluorosed teeth to be more decay resistant. (5)

Dental fluorosis can only occur systemically on developing teeth, during the teeth developing years of 0-8.

Additionally, fluoride incorporated into saliva, provides a consistent bathing of the teeth in a low concentration of fluoride all during the day, a very effective means of decay prevention. While this bathing is topical, incorporation of fluoride into saliva occurs systemically.

From the CDC:

"Fluoride works to control early dental caries in several ways. Fluoride concentrated in plaque and saliva inhibits the demineralization of sound enamel and enhances the remineralization (i.e., recovery) of demineralized enamel. As cariogenic bacteria metabolize carbohydrates and produce acid, fluoride is released from dental plaque in response to lowered pH at the tooth-plaque interface. The released fluoride and the fluoride present in saliva are then taken up, along with calcium and phosphate, by de-mineralized enamel to establish an improved enamel crystal structure. This improved structure is more acid resistant and contains more fluoride and less carbonate.. Fluoride is more readily taken up by demineralized enamel than by sound enamel.. Cycles of demineralization and remineralization continue throughout the lifetime of the tooth." (2)

Cho, et al. concluded:

"This suggests that the systemic effect of fluoride intake through water fluoridation could be important for the prevention of dental caries." (3)

Buzlaf, et al. concluded:

“Evidence also supports fluoride’s systemic mechanism of caries inhibition in pit and fissure surfaces of permanent first molars when it is incorporated into these teeth pre-eruptively.” (4)

4. Labbe: The American Dental Association understands and agrees with this, as noted in an article by John D. Featherstone in the July 2000 Journal of the American Dental Association.

Facts:

Featherstone stated in July 2000:

"Fluoride works primarily via topical mechanisms which include (1) inhibition of demineralization at the crystal surfaces inside the tooth, (2) enhancement of remineralization at the crystal surfaces (the resulting remineralized layer is very resistant to acid attack), and (3) inhibition of bacterial enzymes. Fluoride in drinking water and in fluoride-containing products reduces tooth decay via these mechanisms. Low but slightly elevated levels of fluoride in saliva and plaque provided from these sources help prevent and reverse caries by inhibiting demineralization and enhancing remineralization." (1)

Incorporation of fluoride into saliva occurs systemically.

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5. Labbe: It is now known in all scientific circles that we are now ingesting fluoride from a variety of sources, to the point that dental fluorosis (white blotches on the teeth), an indicator of childhood overexposure to fluoride, has affected over 40 percent of American adolescents. We already have naturally occurring fluoride in our water supply, about one third of the optimal amount. With overexposure to fluoride being a proven fact, why add more?

Facts*:*

The "over 40%" which Labbe notes is in reference to a 2010 CDC study by Beltran-Aguilar in which 41% of adolescents they examined were found to have signs of dental fluorosis. This 41% was composed of 37.1% with mild to very mild dental fluorosis, both of which are barely detectable, benign effects requiring no treatment, and which have no effect on cosmetics, form, function, or health of teeth....with the other 3.8% being those with moderate dental fluorosis, attributable to improper ingestion of toothpaste and/or exposure to abnormally high levels of environmental or well-water fluoride during the teeth forming years of 0-8. (6)

The hypocrisy of this argument is clearly evident by the attempt by fluoridation opponents to induce unwarranted fear about benign, barely detectable mild dental fluorosis while ignoring the lifetimes of extreme pain, debilitation, development of serious medical conditions, black discoloration and loss of teeth, and life-threatening infection directly resultant of untreated dental decay which can be, and is, prevented by water fluoridation.

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6. Labbe: A mounting body of evidence suggests that this overexposure to fluoride carries with it a variety of health-related consequences. More and more studies show fluoride as a concern in bone, endocrine, kidney and brain health.

Facts:

There is no "mounting body of evidence" which provides any valid, peer-reviewed scientific evidence of any adverse effects of fluoride at the optimal level at which water is fluoridated. The recent 40 page EPA denial of a petition from the "fluoride action network" and other activist groups, clearly demonstrates the fallacies, irrelevance, and misrepresentation, of studies claimed by fluoridation opponents to be their "mounting evidence". (7)

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7. Labbe: "In 2009, the Environmental Protection Agency listed fluoride as a neurotoxin, with 'substantial evidence of developmental neurotoxicity,' which is their highest rating. This may be why on all over-the-counter fluoridated toothpaste and fluoride rinses, there are clear instructions to immediately call the Poison Control Center if swallowed."

Facts:

A. Yes, fluoride has been on the EPA list of neurotoxins for years. However, also on that list are commonly ingested substances such as aspartame (sweetener), ethanol (beer and other alcoholic beverages), salicylate (aspirin), caffeine, and nicotine. Optimal level fluoride is no more neurotoxic than are any of these substances at their proper use levels. Singling fluoride because it is toxic at improper levels is an argument that can be made for every known substance, including plain water. (8)

B. The warning on tubes of fluoridated toothpastes is due to the fact that toothpaste contains 1200-1500 times the fluoride concentration as does optimally fluoridated water.

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8. Labbe: "And what about choice? Shouldn't the public choose, on an individual basis, whether they want to ingest fluoride? With the many economical options available for topical application (toothpaste and rinses), why force everyone to ingest fluoride while drinking water – the most critically important substance they need in their diet to sustain life?"

Facts:

The public does indeed, choose, on an individual basis, whether it wants to ingest fluoride. No one is forced to drink a glass of fluoridated water, or consume food made with fluoridated water. Those that do so, do so by their own choice.

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9. Labbe: The vast majority of fluoridated water makes its way into the environment. On average, around 1 percent of the water we produce gets consumed. That means that over 1 billion gallons of fluoridated water enters the environment (lakes, streams, rivers and groundwater) on an annual basis.

Facts*:*

Countless peer-reviewed scientific studies clearly demonstrate the effectiveness of water fluoridation in the prevention of dental decay in entire populations. A list of such studies is provided at the end of this document. In the entire 72 year history of fluoridation, there have been no proven adverse effects. At a cost of less than $1 per person, per year for fluoridation, there is no more cost-effective means of dental decay prevention available. Peer-reviewed science has demonstrated there to be no adverse effects on the environment from optimally fluoridated water. (9)

Given these facts, it makes no difference how much fluoridated water gets consumed. Fluoridation works as it is supposed to work, in the most cost-efficient manner possible, with no adverse effects.

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10. Labbe: As your drinking water provider, licensed by the Maine Department of Health and Human Services to operate your public water supply, and whose mission is to provide the safest possible drinking water to our customers, adding fluoride to your water seems to us to be unnecessary, unsafe and inappropriate.

Facts:

Being a "drinking water provider, licensed by the Maine Department of Health and Human Services to operate your public water supply" does not qualify, or credential Mr. Labbe to make any credible recommendations on the safety and effectiveness of a public healthcare initiative such as water fluoridation. It authorizes him to "operate your public water supply". His personal opinions on fluoridation are based on misinformation sourced directly from antifluoridationist groups. Decisions on healthcare issues must rely upon the peer-reviewed science and on the recommendations of those most qualified to render appropriate ones.

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11. Labbe: Why? We are adding fluoride with an acute toxicity greater than lead and only slightly less than arsenic, which does nothing to improve the quality and safety of drinking water.

Facts:

Relative toxicities of different substances is based on the amount required to be ingested to reach the threshold of toxicity. As water fluoridation strictly maintains the fluoride level at a level far below US EPA mandated maximum levels of safety, such comparative toxicities are entirely irrelevant.

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12. Labbe: Considering that our fluoridation chemical comes from the scrubbed smokestack residues of a phosphate fertilizer plant, we honestly believe we are negatively impacting the quality of our customers' drinking water.

Facts:

This is false, and indicative of a profound lack of understanding of even the basics of fluoridation science.

Fluoridation substances are produced for specific purposes, fluoridation being one. There nothing involved with fluoridation which "comes from the scrubbed smokestack residues of a phosphate fertilizer plant"

The substance most widely utilized to fluoridate water systems is hydrofluorosilic acid (HFA). HFA is a co-product of the process which extracts the other co-product, phosphoric acid, from naturally occurring phosphorite rock. Phosphoric acid is used in soft drinks we consume and in fertilizers which become incorporated into foods that we eat. The HFA co-product is diluted to a 23% aqueous solution which is utilized to fluoridate water systems. To irrationally fear one co-product of this process is to irrationally fear the other.

Once introduced into drinking water, due to the pH of that water (~7), the HFA is immediately and completely hydrolyzed (dissociated). The products of this hydrolysis are fluoride ions identical to those which have always existed in water, and trace contaminants in barely detectable amounts that are so far below US EPA mandated maximum allowable levels of safety that it is not even a certainly that those detected aren't that already exist in water naturally. After this point, HFA no longer exists in that water. It does not reach the tap. It is not ingested.

A complete list of the contents of fluoridated water at the tap including precise amounts of any detected contaminants and the EPA maximum allowable level for each may be found in the "Fact Sheet on Fluoridation Chemicals" on the website of the National Sanitary 'Foundation.(10)

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13. Labbe: "For us, obviously doubt in our minds as to the "safe and effective" dogma we have all been taught to believe.

Facts:

That fluoridation is safe and effectiveness is not "dogma". It is established scientific fact, as demonstrated by the peer-reviewed science on its effectiveness, the lack of any valid evidence of adverse effects, and the peer-reviewed studies which disprove all claims of adverse effects made by fluoridation opponents.

References follow

References

(1) Featherstone JD. Prevention and reversal of dental caries: role of low level fluoride. Community
Dent Oral Epidemiol. 1999;27:30-40.

(2) Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States
United States Centers for Disease Control
Recommendations and Reports
August 17, 2001/50(RR14);1-42

(3) Systemic effect of water fluoridation on dental caries prevalence
Cho HJ, Jin BH, Park DY, Jung SH, Lee HS, Paik DI, Bae KH.
Community Dent Oral Epidemiol 2014; 42: 341–348. © 2014 John Wiley & Sons A/S.
Published by John Wiley & Sons Ltd

(4) Buzalaf MAR (ed): Fluoride and the Oral Environment. Monogr Oral Sci. Basel, Karger, 2011, vol 22, pp 97–114. (DOI:10.1159/000325151)

(5) The Association Between Enamel Fluorosis and Dental Caries in U.S. Schoolchildren
Hiroko Iida, DDS, MPH and Jayanth V. Kumar, DDS, MPH
http://jada.ada.org/content/140/7/855.long

(6) Prevalence and Severity of Dental Fluorosis in the United States, 1999-2004
Eugenio D. Beltrán-Aguilar, D.M.D., M.S., Dr.P.H.; Laurie Ba

(7) Fluoride Chemicals in Drinking Water; TSCA Section 21 Petition; Reasons for Agency Response
https://www.federalregister.gov/documents/2017/02/27/2017-03829/fluoride-chemicals-in-drinking-water-tsca-section-21-petition-reasons-for-agency-response

(8) Building a Database of Developmental Neurotoxicants: Evidence from Human and Animal Studies
Mundy, S. Padilla, T., et al.
http://americanfluoridationsociety.org/wp-content/uploads/2016/04/epa_mundy.pdf

(9) Water Fluoridation and the Environment: Current Perspective in the United States
Howard F. Pollick, BDS, MPH
Int J Occup Environ Health 2004;10:343–350

(10) Fact Sheet on Fluoridation Chemicals
NSF International
http://www.nsf.org/newsroom/nsf-fact-sheet-on-fluoridation-chemicals

Effectiveness Studies Follow

Effectiveness Studies

1) 2015

Results

In the 3 areas the proportion of children who received a dental examination varied; 77.5% (n= 825) for the fluoridated area, 80.1% (n=781) for the pre-fluoridated area and 55.3% (n=523) for the non-fluoridated area. The mean dmft was 1.40 for the fluoridated area, 2.02 for the pre-fluoridated area and 2.09 for the non-fluoridated area. These differences were statistically significant ($p<0.01$). Differences were also noted in the proportion of children who were caries free, 62.6% fluoridated area, 50.8% for the pre-fluoride area and 48.6% for the non-fluoride location.

Conclusion

The children living in the well-established fluoridated area had less dental caries and a higher proportion free from disease when compared with the other two areas which were not fluoridated. Fluoridation demonstrated a clear benefit in terms of better oral health for young children.

---The Dental Health of primary school children living in fluoridated, pre-fluoridated and non-fluoridated communities in New South Wales, Australia

Anthony S Blinkhorn, Roy Byun, George Johnson, Pathik Metha, Meredith Kay, and Peter Lewis
BMC Oral Health 2015, 15:9 doi:10.1186/1472-6831-15-9http://www.biomedcentral.com/1472-6831/15/9

2) 2000

RESULTS:

The prevalence of dental caries was inversely related and the prevalence of fluorosis was directly related to the concentration of fluoride in the drinking water. The mean DMFS in the communities with 0.8 to 1.4 ppm fluoride was 53.9 percent to 62.4 percent lower than that in communities with negligible amounts of fluoride. Multivariate analysis showed that water fluoride level was the strongest factor influencing DMFS scores. The prevalence of fluorosis ranged from 1.7 percent to 15.4 percent, and the increase in fluorosis with increasing fluoride exposure was limited entirely to the milder forms.

-----J Public Health Dent. 2000 Summer;60(3):147-53.

The prevalence of dental caries and fluorosis in Japanese communities with up to 1.4 ppm of naturally occurring fluoride.

Tsutsui A, Yagi M, Horowitz AM.
Department of Preventive Dentistry, Fukuoka Dental College, Fukuoka, Japan.
tutuia@college.fdcnet.ac.jp

http://www.ncbi.nlm.nih.gov/pubmed/11109211

3) 2000

CONCLUSIONS:
Caries levels are lower among children with fluoridated domestic water supplies. Decay levels are much lower in 2002 than they were in 1984 and in the 1960s. The oral health of the less well off is worse than that of the rest of the population. The prevalence of dental fluorosis is higher amongst children and adolescents with fluoridated water supplies. Comparisons with 1984 data show an increase in the prevalence of fluorosis since that time.

----Community Dent Health. 2004 Mar;21(1):37-44.
Dental caries and enamel fluorosis among the fluoridated and non-fluoridated populations in the Republic of Ireland in 2002.
Whelton H, Crowley E, O'Mullane D, Donaldson M, Kelleher V, Cronin M.
Source
Oral Health Services Research Centre, University Dental School and Hospital, Wilton, Cork, Ireland.

4) 1995

http://www.ncbi.nlm.nih.gov/pubmed/7643331

CONCLUSIONS:
The ingestion of water containing 1 ppm or less fluoride during the time of tooth development may result in dental fluorosis, albeit in its milder forms. However, in these times of numerous products containing fluoride being available, children ingesting water containing 1 ppm fluoride continue to derive caries protection compared to children ingesting water with negligible amounts of fluoride. Thus, the potential for developing a relatively minor unesthetic condition must be weighed against the potential for reducing dental disease.

-----J Public Health Dent. 1995 Spring;55(2):79-84.
Dental fluorosis and caries prevalence in children residing in communities with different levels of fluoride in the water.
Jackson RD, Kelly SA, Katz BP, Hull JR, Stookey GK.
Source
Oral Health Research Institute, Indianapolis, IN 46202-2876, USA.

http://www.ncbi.nlm.nih.gov/pubmed/15074871

5) 2004

Conclusions:
The results of this study support existing work suggesting water fluoridation together with the use of fluoridated dentifrice provides improved caries prevention over the use of fluoridated dentifrice alone. The social gradient between caries and deprivation appears to be lower in the fluoridated population compared to the non-fluoridated population, particularly when considering caries into dentine, demonstrating a reduction in inequalities of oral health for the most deprived individuals in the population.

----The association between social deprivation and the prevalence and severity of dental caries and fluorosis in populations with and without water fluoridation
Michael G McGrady, Roger P Ellwood, [...], and Iain A Pretty

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3543717/

6) 2012

CONCLUSIONS:
Fewer studies have been published recently. More of these have investigated effect at the multi-community, state or even national level. The dmf/DMF index remains the most widely used measure of effect. % CR were lower in recent studies, and the 'halo' effect was discussed frequently. Nevertheless, reductions were still substantial. Statistical control for confounding factors is now routine, although the effect on per cent reductions tended to be small. Further thought is needed about the purpose of evaluation and whether measures of effect and study design are appropriate for that purpose.

-----Community Dent Oral Epidemiol. 2012 Oct;40 Suppl 2:55-64. doi: 10.1111/j.1600-0528.2012.00721.x.
Effectiveness of water fluoridation in caries prevention.
Rugg-Gunn AJ, Do L.
Source
Newcastle University, UK. andrew@rugg-gunn.net

http://www.ncbi.nlm.nih.gov/pubmed/22998306

7) 2012

CONCLUSIONS:
Data showed a significant decrease in dental caries across the entire country, with an average reduction of 25% occurring every 5 years. General trends indicated that a reduction in DMFT index values occurred over time, that a further reduction in DMFT index values occurred when a municipality fluoridated its water supply, and mean DMFT index values were lower in larger than in smaller municipalities.

----Int Dent J. 2012 Dec;62(6):308-14. doi: 10.1111/j.1875-595x.2012.00124.x.
Decline in dental caries among 12-year-old children in Brazil, 1980-2005.
Lauris JR, da Silva Bastos R, de Magalhaes Bastos JR.
Source
Department of Paediatric Dentistry, University of São Paulo, Bauru, São Paulo, Brazil. jrlauris@fob.usp.br

http://www.ncbi.nlm.nih.gov/pubmed/23252588

8). 2012

Abstract

The effectiveness of fluoridation has been documented by observational and interventional studies for over 50 years. Data are available from 113 studies in 23 countries. The modal reduction in DMFT values for primary teeth was 40-49% and 50-59% for permanent teeth. The pattern of caries now occurring in fluoride and low-fluoride areas in 15- to 16-year-old children illustrates the impact of water fluoridation on first and second molars.

----Caries Res. 1993;27 Suppl 1:2-8.
Efficacy of preventive agents for dental caries. Systemic fluorides: water fluoridation.
Murray JJ.
Source
Department of Child Dental Health, Dental School, University of Newcastle upon Tyne, UK.

http://www.ncbi.nlm.nih.gov/pubmed/8500120

9) 1993

CONCLUSIONS:
The survey provides further evidence of the effectiveness in reducing dental caries experience up to 16 years of age. The extra intricacies involved in using the Percentage Lifetime Exposure method did not provide much more information when compared to the simpler Estimated Fluoridation Status method.

-----Community Dent Health. 2012 Dec;29(4):293-6.
Caries status in 16 year-olds with varying exposure to water fluoridation in Ireland.
Mullen J, McGaffin J, Farvardin N, Brightman S, Haire C, Freeman R.
Source
Health Service Executive, Sligo, Republic of Ireland. joej.mullen@hse.ie

http://www.ncbi.nlm.nih.gov/pubmed/23488212

10). 2012

CONCLUSIONS:
Children with severe dental caries had statistically significantly lower numbers of lesions if they lived in a fluoridated area. The lower treatment need in such high-risk children has important implications for publicly-funded dental care.

------Community Dent Health. 2013 Mar;30(1):15-8.
Fluoridation and dental caries severity in young children treated under general anaesthesia: an analysis of treatment records in a 10-year case series.
Kamel MS, Thomson WM, Drummond BK.
Source
Department of Oral Sciences, Sir John Walsh Research Institute, School of Dentistry, The University of Otago, Dunedin, New Zealand.