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Organisation (if applicable): Making Sense of Fluoride

Requested to speak at the hearings: Yes

Comments:
My comments are in the attached file.

Making Sense of Fluoride (MSoF) Submission to Hamilton City Council

Our organisation supports continuation of community water fluoridation (CWF) in Hamilton city. We believe that there is no reason to question this position on the grounds of effectiveness or safety. Politically, the people of Hamilton supported CWF in the 2013 and the council has accepted this.

However, we are concerned the Hamilton City Council was misinformed during the Fluoride Tribunal last year and as a result has drawn several unwarranted conclusions about fluoridation. These mistaken conclusions seem to be firmly embedded in the Council management and surface whenever CWF is discussed by the Council.

For example, Council management included the following rationale in its draft resolution of the Council meeting on 27 March 2014.

> *All evidence has been considered carefully by Council and, while finely balanced, Council preference is to continue not to fluoridate the city water supply because:*
>
> *i. Application by toothpaste or other means that directly affect the tooth surface are considered much more effective at reducing tooth decay than fluoridation of the city water supply;*
>
> *ii. Fluoridation is wasteful. Of the 224 litres of water used by the average person each day, less than two litres is used for drinking;*
>
> *iii. Communities around the world are rejecting the practise of fluoridation; and*
>
> *iv. There are concerns supported by research that fluoride should not be ingested by babies under six months old; and*
>
> *v. Fluoridation of water supply affects personal choice; and*
>
> *vi. Not fluoridating the city water supply reflects the majority of views expressed through the Council tribunal process.*

In the end, this draft resolution was not considered. But we consider the justifications used indicate the Council management is misinformed on CWF. The inability of the management to produce any similar detailed justification for the accepted resolution supporting return of fluoridation also concerns us. It limited justification to simply:

> *i. Fluoridation of the city water supply is recommended by the Minister of Health and the World Health Organisation as an effective means of supporting the dental health of residents of Hamilton City; and*
>
> *ii. Fluoridation of the city water supply more accurately reflects the current views of the Hamilton community as recorded in the referendum of 12 October 2013.*

One could ask what about the justifications of the safety and effectiveness of CWF as established by research findings? Compared with the detail of the justification for the opposing draft this carries the implication that Council management could not see any scientific justification for CWF.

Hamilton tribunal process produced flawed results.

MSoF contend the tribunal method used is not a good way of obtaining an objective picture of the current scientific consensus on CWF. In this submission we will show that the Hamilton experience with this was flawed and the conclusions drawn unwarranted. We will consider the 6 reasons given by the Council management in order. These are essentially the same as the 6 reasons used to justify the Council decision in its City News publication produced in the middle of 2013.

1*:* The claim application by toothpaste is much more effective at reducing tooth decay than CWF misrepresents the situation.

Anti-fluoridation activists have pushed this interpretation very hard and the council seem to have accepted it at face value. But the real situation is not that simple.

How fluoride protects teeth

Our bones and teeth contain an important mineral – apatite. Apatites are calcium hydroxy phosphates – but in the real world apatites contain other elements as part of their chemical structure and these influence the apatite properties. Fluoride is a normal and natural part of bioapatites. They are, in effect, fluorohydroxyapitites. Fluoride at optimum levels strengthens the mineral and lowers its solubility.

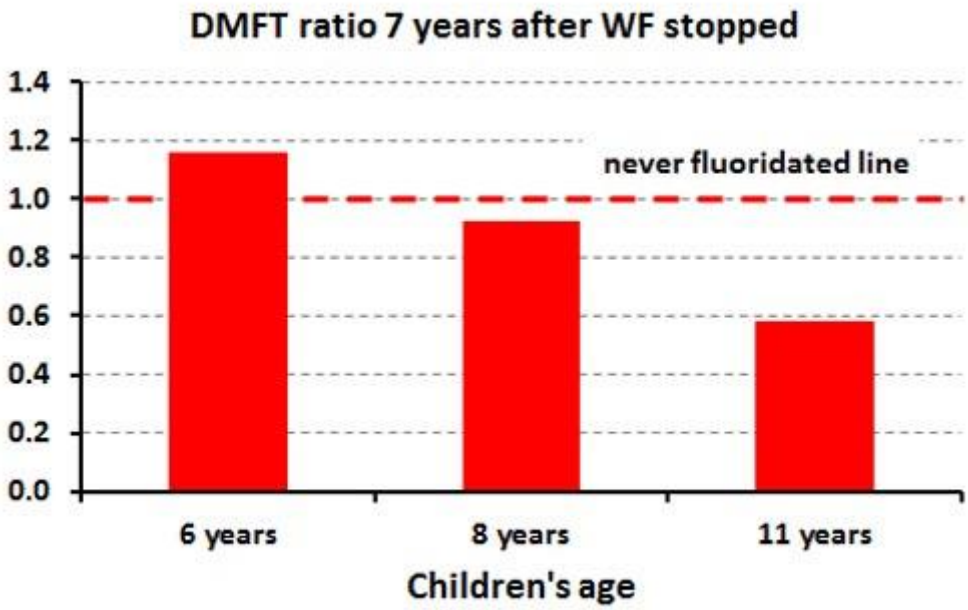
Strong teeth reduces the wear and damage which can, indirectly, lead to decay. However, the mechanism directly initiating decay occurs at the tooth surface and is inhibited by fluoride present in saliva and biofilms on the tooth surface. Opponents of CWF claim this surface mechanism means that ingested fluoride plays no role and fluoride is only effective when topically applied – as with toothpaste. This is a gross simplification and distortion.

Researchers usually refer to the reaction of fluoride at the tooth surface responsible for inhibiting demineralisation and promoting remineralisation as the “predominate” – **not the only** – mechanism for the beneficial role of fluoride **on existing teeth**. Research shows fluoride plays a beneficial role during tooth development before eruption as well as in protection of existing teeth.

Benefits during teeth development

Epidemiological evidence supports a beneficial role of ingested fluoride during teeth development. That is on pre-erupted teeth (Buzalaf et al 2011; Newbrun 2006). For example, Cho et al (2014) found children who drank fluoridated water during their first 4 years (before

eruption of their first permanent teeth) had significantly less tooth decay at 11 than children who had not had access to CWF during their first 4 years (see figure below).



Decayed, missing and filled teeth 7 years after fluoridation stopped. Expressed as ratio compared with data for area never fluoridated. (Cho et al 20014)

Other research indicates topical exposure to CWF confers more benefit than ingested fluoride to smooth tooth surfaces, but ingested fluoride before tooth eruption is more beneficial than topical exposure for tooth pits and fissures (Singh & Spencer 2004; Singh et al 2007). Dirks et al (1961) concluded that degree of protection from topical exposure to fluoride is partly determined by the accessibility of the surface for fluoride ions and the condition in the interproximal space. Consequently only an insignificant effect of topical exposure was found if fluoridation was started after eruption.

CWF involved in topical, surface, reaction

Opponents of CWF often misrepresent this by claiming the surface reaction requires “topical applications – toothpaste or dental fluoride applications. They then claim that CWF is ineffective – but this is a motivated misrepresentation of the situation.

It is possible that ingested fluoride can, through excretion in saliva, contribute to the topical or surface effect reducing tooth decay – despite its low concentration. However, consumption of fluoridated water and food contributes to the fluoride concentration in saliva and biofilms on the teeth by direct transfer. This is enough for the beneficial effect of the protective reaction at the tooth surface (Buzalef et al 2011, Centers for Disease Control and Prevention 2001). Both consumption of fluoridated water and regular toothbrushing with a fluoridated toothpaste help to boost the concentration of fluoride in saliva to effective levels.

After peaking, the fluoride concentration in saliva declines to baseline concentrations over about 45 minutes after drinking fluoridated water (DenBensten 1996; Naumova 2012). "Storage" of fluoride in surface biofilms or plaque extends this time up to as much as 6 hours (Naumova 2012; Petersson et al 2002). This means CWF complements the effect of fluoridated toothpaste as it is drunk more often than the teeth are brushed (Whitford 2002).

Anti-CWF organisations like the Fluoride Action Network of NZ (FANNZ) use mental gymnastics to deny any beneficial role from the consumption of fluoridated water – or any effect of simple transfer of fluoride from drinking water to saliva (see ***Misleading claim against FANNZ of misrepresentation***). They continually promote their argument that topical application is required and that ingested fluoride is ineffective – comparing this to the use of sun block – it must be applied not drunk.

This deception was one of the arguments which convinced Hamilton City Councillors and staff to decide against fluoridation last year – and Council documents still repeat the faulty argument.

2: The claim CWF is wasteful.

This is a surprising justification for the Council to use as it could also be used to argue against any community treatment of drinking water or for having a double reticulation infrastructure - treated drinking water and untreated water for other uses. According to this logic we could save money by stopping chlorination or deflocculation of 99% of our water. And why bother removing arsenic from 99% of our water? (Arsenic in the Waikato river water occurs naturally at levels 3 or more times greater than the maximum allowable levels for drinking water. - McLaren & Kim 1995). Presumably society has chosen to use a single reticulation system for very good reasons - one of them probably being financial.

3: The claim that communities around the world are rejecting CWF

Communities in a number of countries are offered a choice on CWF. Periodically some communities decide against this and others decide for it. Hamilton is one of the communities that have decided both ways in the space of one year! The claim, *"communities around the world"* are rejecting this social health measure is just too simple. The Council appears to have uncritically accepted the propagandist claims of the anti-fluoridation activists at face value.

There are a number of reasons why a community may not adopt CWF:

1. For much of the world just getting a clean water supply is the issue. CWF is not a luxury they are considering.
2. A number of countries (eg. China, India, parts of Northern Africa and the Middle east) suffer the problem of excessive fluoride in their natural water supplies leading to health problems like skeletal fluorosis. The issue for them is removal of excessive fluoride or location of other sources with lower fluoride. Even some countries with CWF systems have to deal with areas with the natural levels are too high.

3. Some countries have sufficiently high natural levels of fluoride in their drinking water so have no need to supplement them during water treatment. This is true for some European countries (eg parts of Italy and Scandinavia).
4. The water reticulation systems in some countries are not suitable for fluoridation because they are insufficiently centralised (eg Switzerland and France) or too old (parts of eastern and central Europe).
5. Some countries (eg Sweden) have decided against CWF on the basis of freedom of choice. This is basically a values/political decision - not a health or scientific decision.

The claim that most of Europe does not fluoridate is also too simplistic. They may not use CWF but they do use other forms of fluoridation. Fluoridated salt and milk, programmes such as fluoride rinses and fluoride dental applications.

The reason for and against CWF are therefore complex and varied depending on geography and geology, political, infrastructure, the quality of the health system (especially dental health) and the standard of living.

Whatever the political or community decisions the overriding facts is that the health authorities in these countries, and internationally, support the principle of using fluoride in one form or another to improve dental healthy.

4: The claim that babies should not ingest fluoride

This just does not reflect current scientific understanding or the recommendations of health authorities. The claim was one of the issues which brought criticism down on the head of the City Council; from health experts last year.

Bottle fed infants

Sometimes bottle-fed infants have a higher fluoride intake than the recommended maximum for their weight when fluoridated water is used to prepare the formula. However, the low incidence of dental fluorosis in New Zealand has led health authorities to consider raising the recommended maximum (Cressey et al 2009; Cressey 2010). In the meantime health authorities acknowledge that some parents may be concerned about the risk of future dental fluorosis and recommend – for their peace of mind – that concerned parents of 100% bottle-fed infants sometimes uses non-fluoridated water in preparing their formula.

Note: – This is a peace of mind recommendations – not a blanket recommendation for all bottle-fed children as opponents of CWF often claim.

It is also worth putting the issue of dental fluorosis into correct context here. It is the only recognised negative health effect from

Dental Fluorosis

This is often misrepresented. The mildest forms of dental fluorosis are relatively common in both fluoridated and unfluoridated areas. Sometimes the occurrence is higher in the unfluoridated areas than the fluoridated ones. Mild dental fluorosis is of only cosmetic

concern and it usually requires professional examination to detect. Health experts usually accept CWF can contribute to mild or very mild dental fluorosis but see this as an acceptable trade-off for the benefits. Severe dental fluorosis is very uncommon but is caused by high fluoride intake from natural sources, industrial pollution, consumption of fluoridated toothpaste, etc. Opponents of CWF often quote data for the common occurrence of mild dental fluorosis – but then describe it (or illustrate with photos) as if it were severe. For example, the FANNZ website displays photographs of dental fluorosis examples from mild to severe (see ***Dental health***) claiming the Ministry of Health reported these examples for 20% of the children in Southland. However, the Ministry of Health had used photograph of normal, mild and moderate dental fluorosis in their illustrations for the quote.


Normal dental enamel


Mild white spots on teeth – mild diffuse enamel hypoplasia


Mild white spots on teeth – moderate diffuse enamel hypoplasia


Moderate white streaks associated with enamel fluorosis

Above photos from MoH website illustrating a quote *"29 percent of 9-year-old children in Southland who had always received fluoridated water* ***had these changes to the tooth enamel."***

Very mild fluorosis

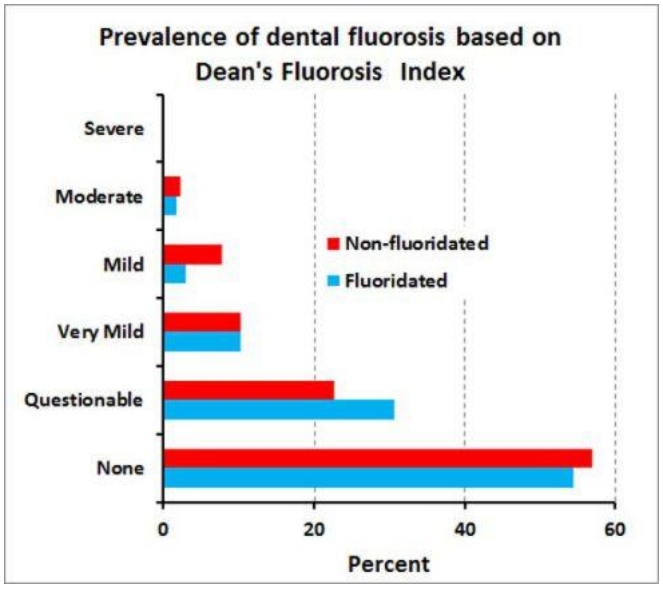
Moderate fluorosis

Severe fluorosis

Severe fluorosis

Above photos from FANNZ website misrepresenting a quote "*29 percent of 9-year-old children in Southland who had always received fluoridated water* ***had these changes to the tooth enamel."***

Putting the different degrees of dental fluorosis into context the ***MoH's 2009 survey*** (Ministry of Health 2010) reported no severe, 2% medium, 5% mild and about 40% very mild or questionable dental fluorosis for dentate adults and children aged 8–30 years.



Graphical representation of dental fluorosis data from Our Dental Health

5: The claim of "personal choice"

We believe the personal choice issue is the most valid one raised by Council management in this list - but it is one-sided.

Ethics is a values or political issue - not a scientific one capable of validating experimentally.. Unfortunately ethics seems never to be discussed in any depth when fluoridation is considered - diversion into scientific and health claims seem inevitable. Professor Gluckman described this as the use of science as a proxy for the real underlying values issues. But that diversion also avoids the underlying values issues.

It is one-sided to see fluoridation as merely a "freedom of choice" issue. It is really an issue of balancing freedom of choice against social good. We often have these discussions in our society because social organisation involves balancing these two apparent extremes. In practice we usually find some procedure enabling a working balance on issues - often in ways that allow actions producing social good while still maintaining a high degree of personal choice.

Consider "social goods" like free secular education and public hospitals. Our society supports these (or something close to them) while at the same time not denying freedom of choice to those members of society who refuse to use them. The fact individuals making that choice to avoid the social good incurs costs to them, sometimes substantial costs like medical insurance and school fees, does not deny the fact they are taking advantage of their freedom of choice. The social goods have not caused a loss of freedom of choice.

Yes, people who wish avoid the advantage of a public health measure like CWF may incur some costs in purchasing other sources of drinking water or kitchen filters (at far less cost than private education and medical insurance fees) does not mean their freedom of choice is being denied. These people may complain about these costs but should remember that freedom of personal choice also involves personal responsibility for the consequences.

There is also the point that the exercise of personal freedom of choice should not take away the freedom of choice of numerous others who benefit from a public health measure. Justice Hansen made this argument in his recent judgment on the fluoridation issue (Hansen 2014);

> *"Provided it does not have consequences for public health a person has the right to make even the poorest decisions in respect of their own health. But where the state, either directly or through local government, employs public health interventions, the right is not engaged. Were it otherwise, the individual's right to refuse would become the individual's right to decide outcomes for others. It would give any person a right of veto over public health measures which it is not only the right but often the responsibility of local authorities to deliver."*

Dr. John Harris of the Department of Ethics and Social Policy at the University of Manchester, UK, made the same point in his article ***The Ethics of fluoridation***:

> *"We should ask not are we entitled to impose fluoridation on unwilling people, but are the unwilling people entitled to impose the risks, damage & costs of the failure to fluoridate on the community at large? When we compare the freedoms at stake, the most crucial is surely the one which involves liberation from pain and disease."*

In our society democracy enables decisions where values/political issues are involved. That is why MSoF consider the fluoridation referendum last year to be a more adequate indicator of what Council policy should be than the minority views of motivated activists.

6: The claim the majority of submissions opposed CWF

Our organisation considers this justification (that opposition to CWF "*reflects the majority of views expressed through the Council tribunal process")* very weak. It is of course true but should not be considered a justification for Council opposition. Surely such a claim should also include an analysis of how representative the submissions were of Hamilton citizens, how valid the scientific and health claims made in the submissions were, etc. We believe that analysis shows these submissions and their numbers to be an unreliable justification for a council decision.

Yes - 1375 submissions opposed fluoridation and 170 supported it. But how many of those submissions were pro forma, simply generated by copying one of the 4 samples provided by the local anti-fluoridation organisation? Submission numbers were boosted by an organised and vocal campaign much wider than Hamilton - 42% of submissions were from non-residents! That campaign was actually international in scope with a number of submissions coming from outside New Zealand. These submission numbers and claims were motivated and one-sided because the campaign was motivated and one-sided. On the other side submissions were far fewer because they came from the expert organisations and a relatively small but unorganised number of individuals. At the time, no activist organisation supporting fluoridation existed.

The council was well aware of the majority support for fluoridation from Hamiltonians expressed in council polling and in the 2006 referendum. Surely it must also have been aware they were seeing the results of an unrepresentative but highly motivated and organised campaign in the tribunal submissions and presentations.

Finally, another aspect of this organised international campaign concerns MSoF which, as an organisation, has been working to correct scientific misinformation on this issue. This is the use of people who are presented as international experts in this campaign. For example, Dr Paul Connett from the USA and Mr Declan Waugh from the republic of Ireland were given video links to present oral submissions and were promoted as international experts.

A simple check on the scientific background of these two people shows that Dr Connett, while having worked as a chemistry lecturer at the small St. Lawrence University in the US, has done no original research on fluoride or fluoridation. His only relevant work has been, in his retirement, to review the literature on fluoride as part of his political activism on the issue. He is also the executive director of the political activist organisation Fluoride Action

Network which is organised from the USA but linked to local organisations. This organisation pays Paul Connett and his wife a monthly retainer. His scientific publications in this field are limited to 2 "letters to the editor" comments and contribution to a review paper in a questionable journal.

Declan Waugh also has no background in fluoride or fluoridation research but produces material for activist organisations aimed at discrediting CWF. He has no publication in peer reviewed scientific journals on fluoride or fluoridation but has produced a number of reports (not peer reviewed) of questionable value. He has a reputation for dishonest citation of literature to support his claims.

The Irish Expert Body on Fluorides and Health found Waugh's main report on fluoride (***Human Toxicity, Environment Impact and Legal Implications of Water Fluoridation***) *"not reliable."* That while the *"report is expertly produced and is impressive in size and appearance . . . in spite of its presentation, its content is decidedly unscientific"* (see ***Appraisal of Waugh report – May 2012***). Among specific points it made are these (see ***Executive Summary of Appraisal of Waugh report – May 2012***):

- *"The allegations of ill health effects are based on a misreading of laboratory experiments and human health studies, and also on an unfounded personal theory of the author's.*
- *There is an absence of reporting of the bulk of the scientific literature which points to the lack of harmful effects from fluoridation.*
- *The views of authoritative bodies such as the World Health Organisation, the European Commission and others are significantly misrepresented.*
- *There is a misunderstanding of the evidence of benefits to oral health and with regards to enamel fluorosis.*
- *The view that there is a build up of fluoride in the environment is unfounded and not supported by the evidence."*

Despite this expert characterisation of Waugh's work one of his reports was listed as the first in the list of key articles from the submissions used by council staff to support ending fluoridation (see ***Scientific research supporting the stopping of fluoridation***).

We realise such characterization of submitters may also be seen as one-sided. Especially by people unfamiliar with the scientific literature and scientific method. But this comes back to a basic flaw in the tribunal process on issues like fluoridation. Such issues are very complex and a proper consideration of the claims made by different sides and those made by their experts requires a level of expertise not usually held by council members. While scientists and health experts may have sufficient contact with the literature and familiarity with literature searching and checking methods to evaluate the claims, councilors usually do not.

This distinction is important for issues like fluoridation when the science and expert consensus is discussed as the existing literature and research findings are more important than opinions. This contrasts with normal political decisions which may rely simply on values and

opinions - and the requirement of elected representatives to ascertain what these are among the people they represent.

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