Barristers.Comm • Level 8 Wakefield House • 90 The Terrace
PO Box 8045 • Wellington 6143 • New Zealand • T +64 4 914 1052 • F +64 4 473 3179
M 021 0241 3822 • E l.hansen@barristerscomm.com

LISA HANSEN
BA(Hons)LLB(Hons) Otago
BARRISTER

AN OPEN LETTER TO THE PRIME MINISTER'S CHIEF SCIENCE ADVISOR AND TO THE PRESIDENT OF THE ROYAL SOCIETY OF NEW ZEALAND

26 February 2015

Sir Peter Gluckman
PO Box 108-117
Symonds Street
Auckland 1150

Sir David Skegg
Royal Society of New Zealand
P O Box 598
Wellington 6140

By email: csa@pmcsa.org.nz

Dear Sir Peter and Sir David

Neurotoxic effects of fluoride exposure: impact on IQ

I write on behalf of New Health New Zealand Inc.

The purpose of this letter is to:

a. Refer to the recent acknowledgement of an error in the Gluckman/Skegg report[1] relating to the impact of fluoride on IQ. As originally published, the Gluckman/Skegg report stated that the claimed shift in IQ from fluoride exposure was less than one point. The Gluckman/Skegg report has been amended to recognize that the scientific evidence supports a shift of "less than one standard deviation". One standard deviation is fifteen IQ points and the shift found was -0.45 which is seven IQ points.

b. Request clarification of the conclusion that a negative shift of 7 IQ points "is likely to be a measurement or statistical artefact of no functional significance". One cannot imagine that a possible 1 point and 7 point difference in IQ could both be assessed as insignificant.

c. Express concern that relevant evidence relating to the impact of water fluoridation on IQ was neglected to be included in the Gluckman/Skegg report.

d. Identify that a precautionary approach to fluoridation requires officials to ask themselves the following question. **can the claimed benefits of**

[1] Health effects of water fluoridation: A review of the scientific evidence, August 2014 (Gluckman/Skegg report)

artificial water fluoridation, at best a possible saving of an average of half a filling per child at the age of 12-13[2] (and with no obvious benefit after age 18[3]), outweigh the risks to the child of a possible reduction in IQ?

Introduction

New Health is a consumer-focused health organisation that aims to advance and protect the best interests and health freedoms of consumers. It has members throughout New Zealand.

One issue of particular concern to New Health is artificial water fluoridation.

On behalf of its members, and as a public service to New Zealand consumers generally, New Health has brought claims in the High Court challenging the lawfulness of fluoridation. In particular it has argued: that there is no power in the Local Government Act 2002 to add fluoride to the water supply; that the fluoridating chemicals used are medicines; and that fluoridation constitutes medical treatment without consent. These arguments were unsuccessful in the High Court and are under appeal to the Court of Appeal. [4]

New Health has adduced considerable scientific evidence to support its claims[5]. In its professional view, the scientific evidence does not unambiguously confirm either the efficacy or safety of fluoridation.

New Health was therefore interested to read the recent Gluckman/Skegg report which professed to be a high-level objective review of the scientific evidence for and against the efficacy and safety of fluoridation of public water supplies[6].

The Gluckman/Skegg report concluded that "there are no adverse effects of fluoride of any significance arising from fluoridation at the levels used in New Zealand."

The purpose of this letter is to question that conclusion as it applies in relation to the impact of fluoride on IQ.

Error in the Gluckman/Skegg report

It appears from the Royal Society of New Zealand website that the Gluckman/Skegg report has been quietly amended to include what is being purported to be a simple and insignificant mistake.

The Royal Society of NZ website states:

> **Erratum**: the previous version of the executive summary of this paper stated that the claimed shift of IQ from fluoride exposure was less than one IQ point;

---

[2] Gluckman/Skegg report, p 36

[3] Our Oral Health 2010, Ministry of Health

[4] *New Health NZ Inc v South Taranaki District Council* [2014] NZHC 395, and *New Health NZ Inc v Attorney General* [2014] NZHC 2487

[5] The evidence can be found at: http://www.newhealth.co.nz/news.php

[6] Health effects of water fluoridation: A review of the scientific evidence, August 2014

it should have stated less than one standard deviation.[7]

The text of the Gluckman/Skegg report itself has been changed from

> Further, the **claimed shift of less than one IQ point** suggests that this is likely to be a measurement or statistical artefact of no functional significance."
>
> to:
>
> Further, **the claimed shift of less than one standard deviation** suggests that this is likely to be a measurement or statistical artefact of no functional significance.

In IQ terms one standard deviation is 15 IQ points.

There are no other changes and the related sentences in the body of the Gluckman/Skegg report remain the same.

New Health applauds that the authors of the Gluckman/Skegg report have taken steps to at least recognize the validity of the criticism of the international peer review of the Gluckman/Skegg report on this point.[8] There are, however, numerous other errors, omissions, and contradictions in the Gluckman/Skegg report identified by the international peer review that haven't yet been addressed.

The purpose of this letter is to focus primarily on the above erratum. New Health is concerned that the ramifications of the error may not have been adequately considered or understood.

Questions

New Health raises the following questions.

First, the error indicates a serious misreading of the available evidence that is difficult to excuse. However, everyone makes mistakes and the question is why was there no other amendment to the text after the error was discovered? A possible difference of "less than 1 standard deviation" in IQ (15 points) rather than "less than 1 point" warrants at least some additional explanation to reassure readers that this crucial point has been thoroughly addressed. One cannot imagine that a possible 1 point and 15 point difference in IQ could both be assessed as insignificant.

You should also be aware that the Gluckman/Skegg report has misrepresented Choi et al.

For example, the Gluckman/Skegg report states:

---

[7] http://www.royalsociety.org.nz/expert-advice/commissioned-reviews/yr2014/health-effects-of-water-fluoridation/

[8] Scientific and Critical Analysis of 2014 Fluoridation report
http://fluoridefree.org.nz/wp-content/uploads/2014/12/Critical-Analysis-of-2014-NZ-Fluoridation-Review.pdf

> Choi et al. determined that the standardised weighted mean difference in IQ scores between "exposed" and reference populations was only -0.45. The authors themselves note that this difference is so small that "it may be within the measurement error of IQ testing".

Choi et al did not say that such a difference in IQ "is so small". They said:

> The estimated decrease in average IQ associated with fluoride exposure based on our analysis may seem small and may be within the measurement error of IQ testing. However, as research on other neurotoxicants has shown, a shift to the left of IQ distributions in a population will have substantial impacts, especially among those in the high and low ranges of the IQ distribution (Bellinger 2007).

Secondly, the shift in IQ found by the Choi authors was - 0.45 of a standard deviation. This amounts to a possible 7 point shift in IQ.

As noted by Choi et al, a shift to the left of IQ distribution in the population will have substantial impacts, especially among those in the high and low ranges of IQ distribution. In other words there will be fewer people at the very high end and more people unable to function fully.

As amended, the Gluckman/Skegg report appears to conclude that a 7 point IQ shift is "a measurement or statistical artifact of no functional significance".

This conclusion is difficult to understand and requires urgent clarification.

Are the authors saying that 7 IQ points can be dismissed as a statistical error, or, are they saying that a negative shift of an average of 7 IQ points is of no functional significance.

If the correct conclusion is that 7 IQ points is within the margin of measurement or being a statistical error:

1. what evidence do they rely on to say that IQ tests are not reliable within 7 IQ points?

2. what is the authors understanding of the confidence level in the Choi meta analysis? (On this point New Health understands that there was a 95% confidence interval.)

If the authors are saying that a negative shift of an average of 7 IQ points is not "functionally significant", please provide the evidence that they rely on to justify that conclusion.

On its face such a conclusion is extraordinary and contrary to the findings of Choi et al. The average IQ of New Zealanders is 100 and a shift of 7 points to the left or the right would be of major moment.

Further, IQ reduction should not only be assessed by reference to the number of IQ points lost, but as a symptom of central nervous system damage. Has the Gluckman/Skegg report considered the issue from that perspective?

It is therefore extremely important that this issue is clarified urgently as the erratum is unclear and ambiguous, and raises more questions than answers.

Additionally,

1. given that the alleged benefit of fluoridation is ½ a filling, please provide research evidence that ½ a filling is of functional significance, specifically, that it is of more functional significance than losing 7 IQ points.

2. please provide research evidence that the cost to the health system of ½ a filling, if it were a real saving, is more than the cost of institutionalizing the additional proportion of the population due to mental deficiency resulting from any -7 IQ point shift on a population basis.

Gluckman/Skegg report neglected to include other relevant evidence on the risks to IQ

Another metastudy by Cheng and Lynn[9] that was not considered by the authors of the Gluckman/Skegg report has also found that fluoride negatively impacted on children's intelligence.

Can you please explain why this study was omitted from consideration.

A further relevant recent study (referred to by Cheng and Lynn) was also overlooked.

A cross-sectional study by Saxena et al (2012) was conducted among 12-year-old school children of Madhya Pradesh state, India.[10] The children were selected from low (< 1.5 parts per million) and high (≥1.5 parts per million) fluoride areas.

Differences in participants' sociodemographic characteristics, urinary iodine, urinary lead, and urinary arsenic levels were statistically not significant. However, a statistically significant difference was observed in the urinary fluoride levels. Reduction in intelligence was observed with an increased water fluoride level. The urinary fluoride level was a significant predictor for intelligence.

Figure 1 below shows the relationship between the intelligence grade and water fluoride levels. Figure 2 shows the close correlation between urinary fluoride and water fluoride.

No doubt proponents of fluoridating water supplies could find fault with and dismiss the study if they looked closely enough. However, two aspects of this study are obvious, even to lay people.

---

[9] Cheng H, Lynn R, The adverse effect of fluoride on children's intelligence: a systematic review. Mankind Quarterly. 2013; 53 (3/4): 306-47

[10] J Neurosci Rural Pract. 2012 May-Aug; 3(2): 144–149.
Effect of fluoride exposure on the intelligence of school children in Madhya Pradesh, India

Sudhanshu Saxena, Anjali Sahay, and Pankaj Goel

Firstly, the cut-off point between low and high levels of intake was quite close to the maximum levels of fluoride permitted in New Zealand's fluoridated water supplies (up to 1.5 mg/L). Secondly, there is a near linear decrease in IQ with increasing fluoride levels with no sign of a threshold.

This study measured children's intelligence using the Raven's Standard Progressive Matrices which are grades of intelligence measures that are inversely related to the more familiar IQ measures.

The children's scores were converted to percentile and specific grades were allotted, based on the following criteria:

> Grade I: Intellectually superior — If the score lies at or above the ninety-fifth percentile for that age group.
> Grade II: Definitely above average — If the score lies at or above the seventy-fifth percentile for that age group.
> Grade III: Intellectually average — If the score lies between the twenty-fifth and seventy-fifth percentile for that age group.
> Grade IV: Definitely below average in intellectual capacity — If the score lies at or below the twenty-fifth percentile for that age group.
> Grade V: Intellectually impaired — If the score lies at or below the fifth percentile for that age group.

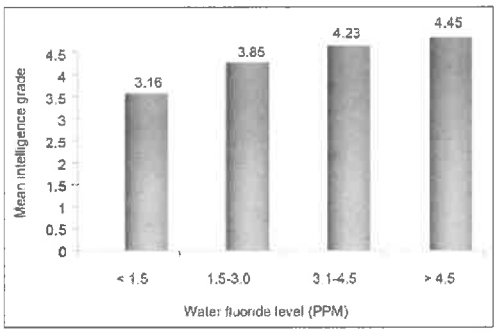

Figure 1: Mean intelligence grades of children with different levels of water fluoride

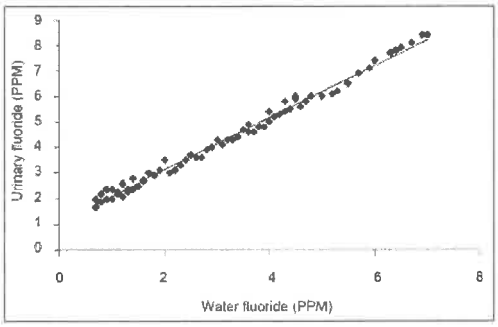

Figure 2: Simple linear regression analysis with urinary fluoride as a dependent variable and water fluoride as an independent variable

This evidence not only supports the hypothesis that fluoridated water does decrease IQ, but shows that any reduction in IQ appears to be dose related and begins at levels similar to those found in New Zealand fluoridated drinking water supplies.

Furthermore, given that the vast majority of New Zealand toothpaste is fluoridated, fluoride intake could be expected to be somewhat higher than from water alone. There are also sources of fluoride from food and pesticides that needs to be taken into account when assessing overall intake.

Indeed, the Ministry of Health's own assessment of fluoride intake in young children revealed that intake of fluoride from fluoridated toothpaste increased consumption of fluoride to levels above recommended safe levels of intake.

Precautionary approach essential

From New Health's assessment of the available evidence, it is clear that there is a growing body of evidence to support the hypothesis that water fluoridation decreases IQ. What is not known, however, is what that effect on children is at the levels of fluoridation used in New Zealand. This is of special concern given that no NOAEL (No Observed Adverse Effect Level) has been identified.

In New Health's professional opinion, there remains uncertainty and doubt regarding the risk of harm at the current levels of fluoridation.

The question then is what is the appropriate policy response where there is a real scientific possibility of an existing but as yet unmeasured impact on IQ from water fluoridation at between 0.7 and 1 ppm. In other words the risk of serious harm is real but the degree of harm is unknown.

New Health says the only responsible response is a conservative and precautionary one.

Agenda 21, which many Councils ascribe to, is grounded in the precautionary principle.

Principle 15 declares; [emphasis added] "**In order to protect the environment**, the precautionary approach shall be widely applied by States according to their capabilities. **Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation**."

This principle can be extrapolated to artificial water fluoridation as follows:

> "**In order to protect our children**, the precautionary approach shall be widely applied by Councils when considering fluoridation. **Where there are threats of serious or irreversible damage to our children's (and hence nation's) health, such as decreased IQ in children due to increased fluoride intake, lack of full scientific certainty shall not provide a basis for ignoring such a high-stake risk and dismissing it** as, "a measurement or statistical artefact of no functional significance".

The question that officials should ask is this: **can the claimed benefits of artificial water fluoridation, at best a possible saving of an average of half a filling per child at the age of 12-13[11] (and with no obvious benefit after age 18[12]), outweigh the risks to the child of a possible reduction in IQ.**

Any IQ loss in a child is undesirable and any parent asked that question would be expected to respond with a resounding No.

Even if the risk of harm is small, it has serious consequences. Parents deserve to be informed of the real levels of risks and benefits, and be permitted to elect the risk of an extra half filling rather than risk any IQ loss.

---

[11] Gluckman/Skegg report, p 36

[12] Our Oral Health 2010, Ministry of Health

New Health requests that you seriously engage with the contents of this letter and provide a scientifically objective response.

Our children's intelligence is too precious to be put at risk.

This letter is being sent to all DHB chairs, members and chief executives, all council mayors, councillors, and chief executives, and will be posted on New Health's website.

It is being sent to councils because the Gluckman/Skegg report was meant to reassure them about the efficacy and safety of water fluoridation. However, New Health is concerned that the error about IQ (together with the other criticisms of the Gluckman/Skegg report by the international peer review), raise serious questions about the reliability of the Gluckman/Skegg report.

Councils should also be aware of how the Gluckman/Skegg report compares to other reviews of fluoridation carried out internationally such as the 2006 NRC Review and the 2000 York Review. A comparison was prepared by the international peer reviewers and an extract from pp 60 to 61 of their report is attached as an appendix[13]. Compared to the NRC report and York report the Gluckman/Skegg report appears to have been done quickly, cheaply, secretly and with no attempt at a balanced composition of reviewers.

The essence of scientific enquiry is criticality. One wonders if this mode of enquiry was dispensed with in the course of preparing the Gluckman/Skegg report and that its principal objective was simply to affirm the status quo.

Yours sincerely

Lisa Hansen

[13] Scientific and Critical Analysis of 2014 Fluoridation report, pp 60 - 61
http://fluoridefree.org.nz/wp-content/uploads/2014/12/Critical-Analysis-of-2014-NZ-Fluoridation-Review.pdf

APPENDIX

Review Comparison

Review	York	US National Research Council	NZ
Timeframe	1 year (1999-2000)	3 years (2003 – 2006)	3 months (April - July 2014)
Budget	£ 1 million	$US 6 million	$ NZ 50 thousand
Chair	Advisory panel: neutral; Review panel: pro-fluoridation	Pro-fluoridation	Two co-chairs, publicly committed to fluoridation
Panel makeup	There were two panels – a fully pro-fluoridation review panel and a mixed advisory panel: pro-, anti- and neutral.	13. Balanced: pro-, anti-, and neutral	5. All pro-fluoridation. Some panellists declined/resigned due to procedural concerns.
Methodology	Systematic review of original published research (approx 3,300). This was established by the UK Health Department "to prove once and for all the safety and effectiveness of fluoridation", as it was intended to launch a renewed push for expanding fluoridation. Excluded animal studies on toxicity, and medical case histories. Parameters were deliberately narrowed to exclude 100 case histories of fluoride-poisoned children received by the review Board.	Systematic review of original published research on adverse health effects of fluoride, from 1ppm upwards. 512 page report. Included animal studies on toxicity, and medical case histories. Focus was solely on health risks from fluoride; not claimed benefits.	Some original research purportedly reviewed. No record of what was rejected. No record of "anti-fluoridation" studies not cited. Pro-fluoridation panel members wrote their own summaries, gave these to the writer to consolidate, and peer-reviewed their own work. Co-chair Skegg admits that the research on toxicity is so 'vast and complex' that they could not possibly review it – second hand pro-fluoridation reviews were adopted instead, contrary to the statements in the public report. Excluded most studies on toxicity, just like York.
Transparency	Review was publicized before being conducted. Information provided openly to the public during the review. Pre-publication peer review included those opposed to fluoridation.	Open, transparent process. The existence and membership of the committee (including a short summary of the project) were all online. Parts of the first meetings were open to the	Conducted in secret, with no external input. Peer reviewers appear to have been selected for pro-fluoridation views. No attempt to have a balanced panel, and evasive when

Review	York	US National Research Council	NZ
		public and some public submissions were heard. Wide canvassing of external community for relevant research. Members of the public also submitted studies/papers for the NRC committee to include, and at least some of those were used.	asked what experts with views against fluoridation were approached.
Outcome	In spite of the bias with which it was established, this review presents a summary of the best available and most reliable evidence on the alleged efficacy of water fluoridation. "Given the level of interest surrounding the issue of public water fluoridation, it is surprising to find that little high quality research has been undertaken." No conclusive evidence on safety, or benefit to the poor. Evidence for general benefit in reducing tooth decay was based on few studies, of mediocre quality, with wide-ranging conclusions (including fluoride increasing tooth decay). "Legitimate scientific controversy will remain until better quality research is done."	The level (of natural fluoride only) allowed in the US of 4ppm is not safe. A promised but disallowed minority report would have recommended a maximum level of 0.4ppm until a truly safe level could be scientifically determined. The Chair stated in an interview for Scientific American "What the committee found is that we've gone with the status quo regarding fluoride for many years—for too long really—and now we need to take a fresh look . . . In the scientific community people tend to think this is settled. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this [fluoridation] has been going on."	Concluded that there was general consensus that fluoridation is 'safe and effective', as the two co-chairs had publicly proclaimed before the review. This was shortly after the Deputy Director of the National Poisons Centre, Michael Beasley, stated publicly that the "I think the jury is still out regarding the safety of Fluoride." Claimed there was an adequate margin of safety in spite of repeated statements throughout the report identifying there was not.