Water Fluoridation: Health Concerns

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Fluoride Action Network

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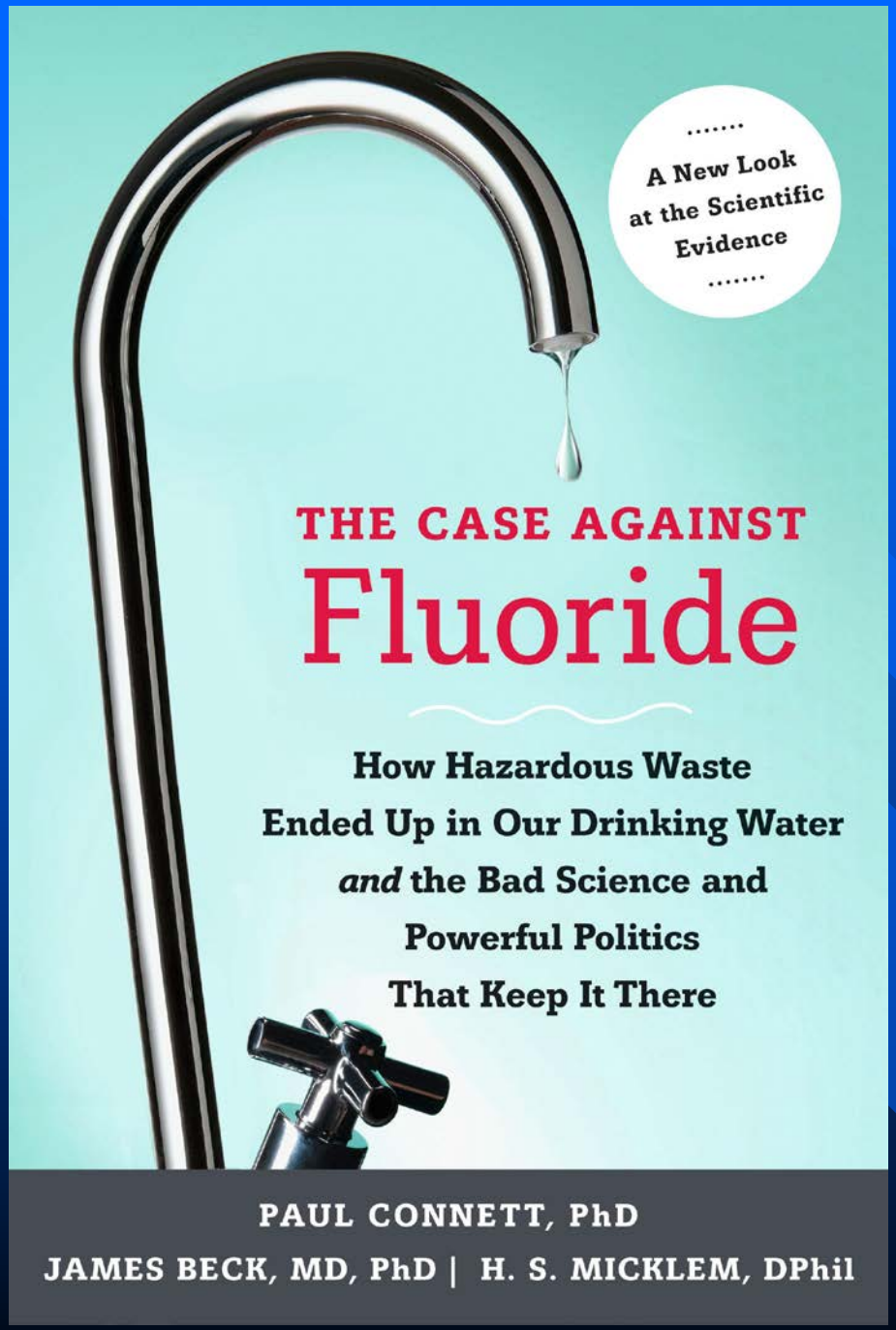
Brampton, Ontario,

Jan 21, **2016**

- I have spent the last 20 years researching **fluoride's toxicity and the policy of water fluoridation** first as a professor of chemistry specializing in environmental chemistry and toxicology, and then as director of the **Fluoride Action Network (2000-2015).**
- Much of this research effort was summarized in a book ***The Case Against Fluoride***



Book published
by Chelsea Green

October, 2010

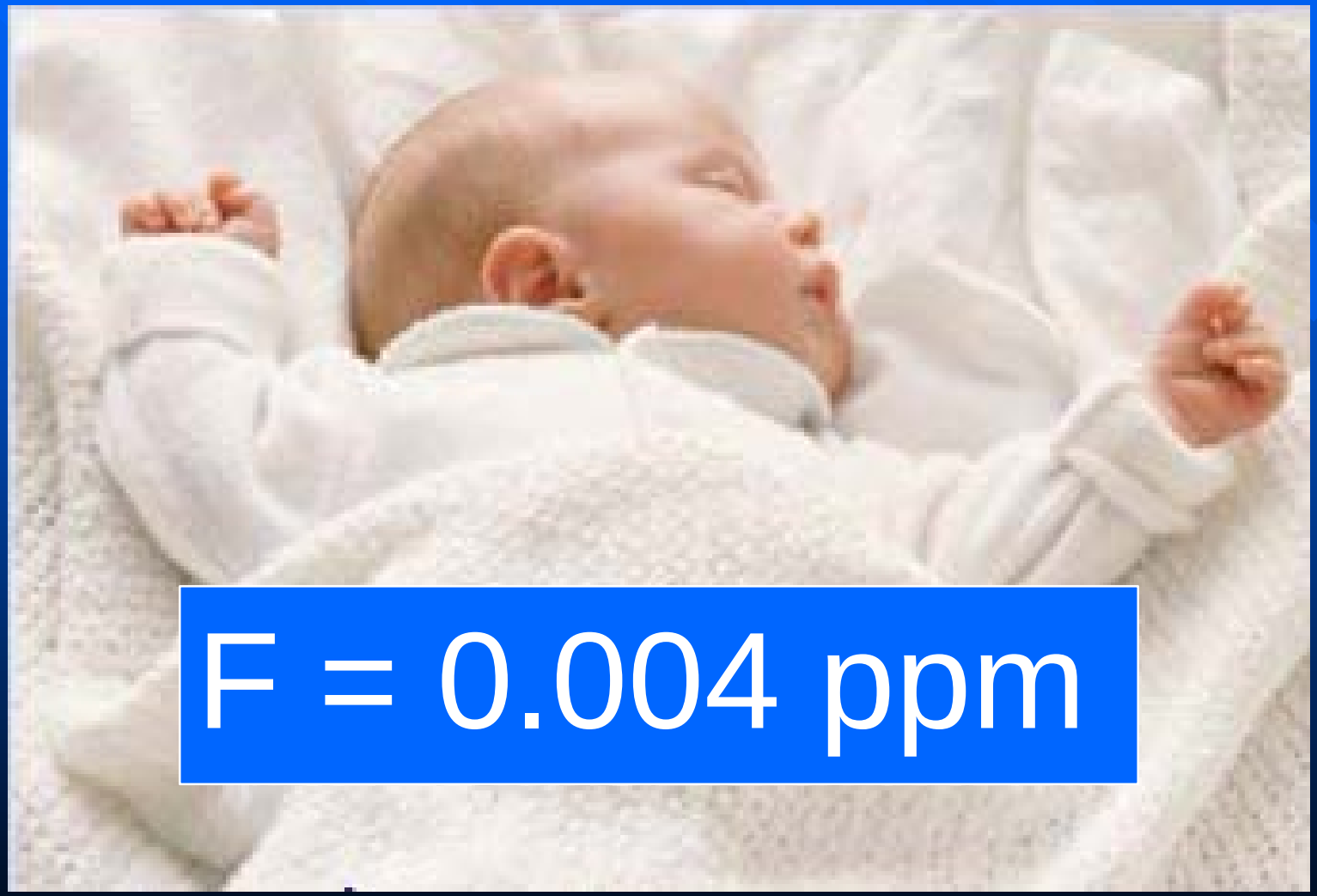
Can be ordered
on Amazon.com

Contains
80 pages
of references
to the
Scientific
literature

Outline of my presentation

1. Mothers' milk protects babies from fluoride
2. The evidence that Fluoride is NEUROTOXIC
3. There is no adequate margin of safety to protect all children drinking fluoridated water from lowered IQ
4. More evidence of harm to the brain
5. Why a drop of a few IQ points at the individual level is so serious at the population level
6. Three Questions for Councillors

1. Mothers' milk protects our babies from early exposure to fluoride



Water fluoridation removes nature's protection if babies are bottle-fed with fluoridated water

2)

The evidence that fluoride is NEUROTOXIC

The evidence that fluoride is NEUROTOXIC is very strong:

See www.FluorideACTION.net/issues/health/brain

Evidence that Fluoride is neurotoxic

- **Over 100 animal studies** show that prolonged exposure to fluoride can damage the brain
- **49 human studies** link modest-high fluoride exposures with lowered IQ
- **34 animal studies** show rodents exposed to fluoride have an impaired capacity to learn and/or remember
- **12 studies** (7 human, 5 animal) link fluoride with neurobehavioral deficits
- **3 human studies** show fluoride impacts the fetal brain

34 out of 36 Animal Studies Have Found Fluoride Impairs Learning/Memory

IQ studies – the current tally

- **49** out of **56** studies have found an association exposure to fluoride and lowered IQ (China, India, Mexico and Iran)

Xiang et al. (2003 a,b)

- **Compared IQ of children in two villages:**
- Low Fluoride Village Average F in well water = **0.36 ppm** (Range = 0.18 -0.76 ppm)
- High Fluoride Village Average F in well water = **2.5 ppm** (Range 0.57 – 4.5 ppm)
- **Controlled for lead exposure** and **iodine intake**, and retrospectively for **arsenic**
- Found a drop of 5-10 IQ points across the whole age range between the two villages

Xiang et al. (2003 a,b)

MALES

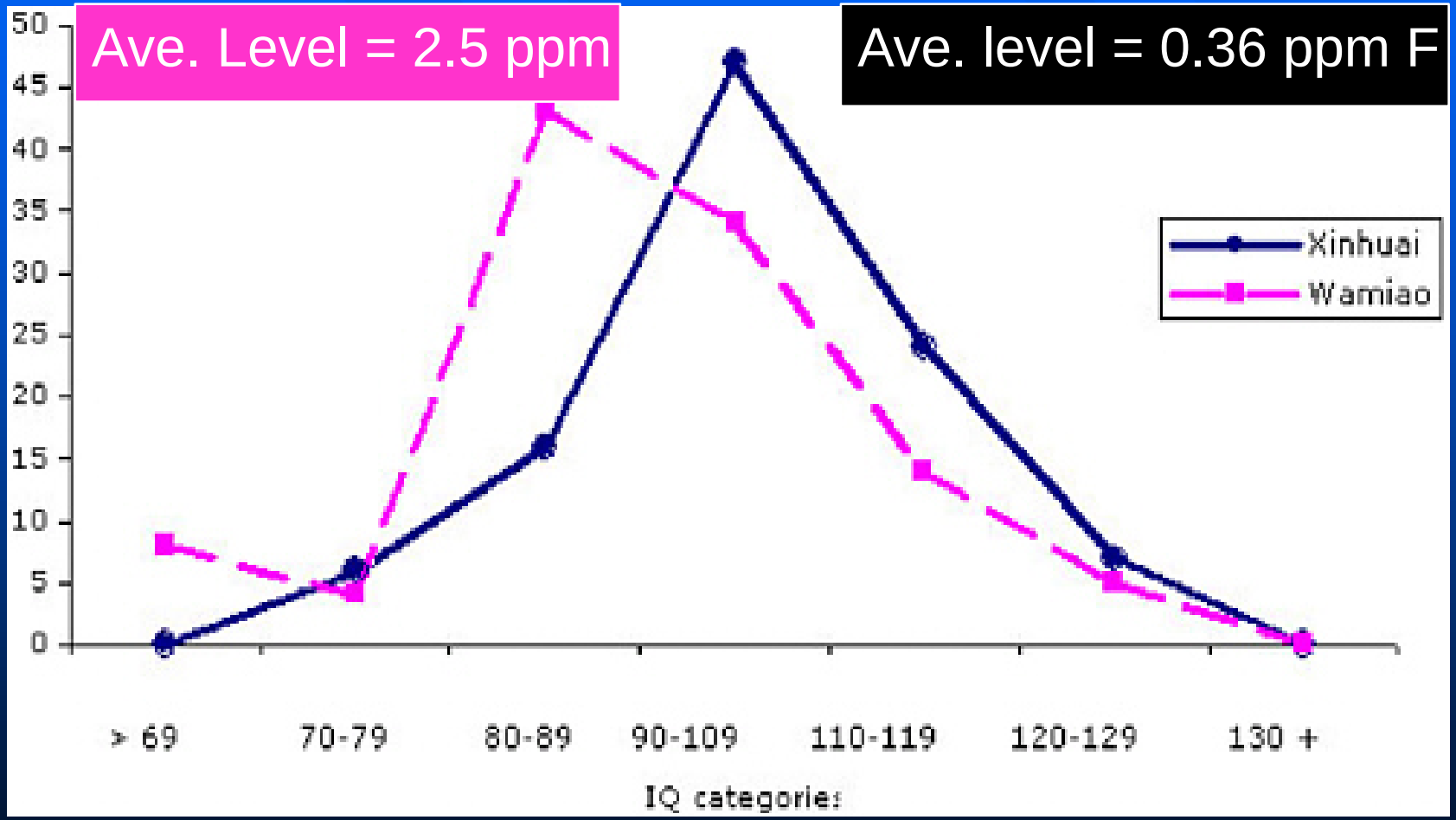


Table 8. Level of fluoride in drinking water and children's IQs

Village	Group	F in drinking water (mg/L)		IQ and rate of retardation		
		No. sample	Water F level (Mean±SD)	No. children	IQ (Mean±SD)	Rate of IQ<80 (%)
Xinhuai Wamiao	F	290	0.36±0.15	290	100.41±13.21	6.55
	A	9	0.75±0.14	9	99.56±14.13	0.00
	B	42	1.53±0.27	42	95.21±12.22*	9.52
	C	111	2.46±0.30	111	92.19±12.98†	14.41*
	D	52	3.28±0.25	52	89.88±11.98†	21.15†
	E	8	4.16±0.22	8	78.38±12.68†	37.50†

*$p<0.05$. †$p<0.01$ compared with group F.

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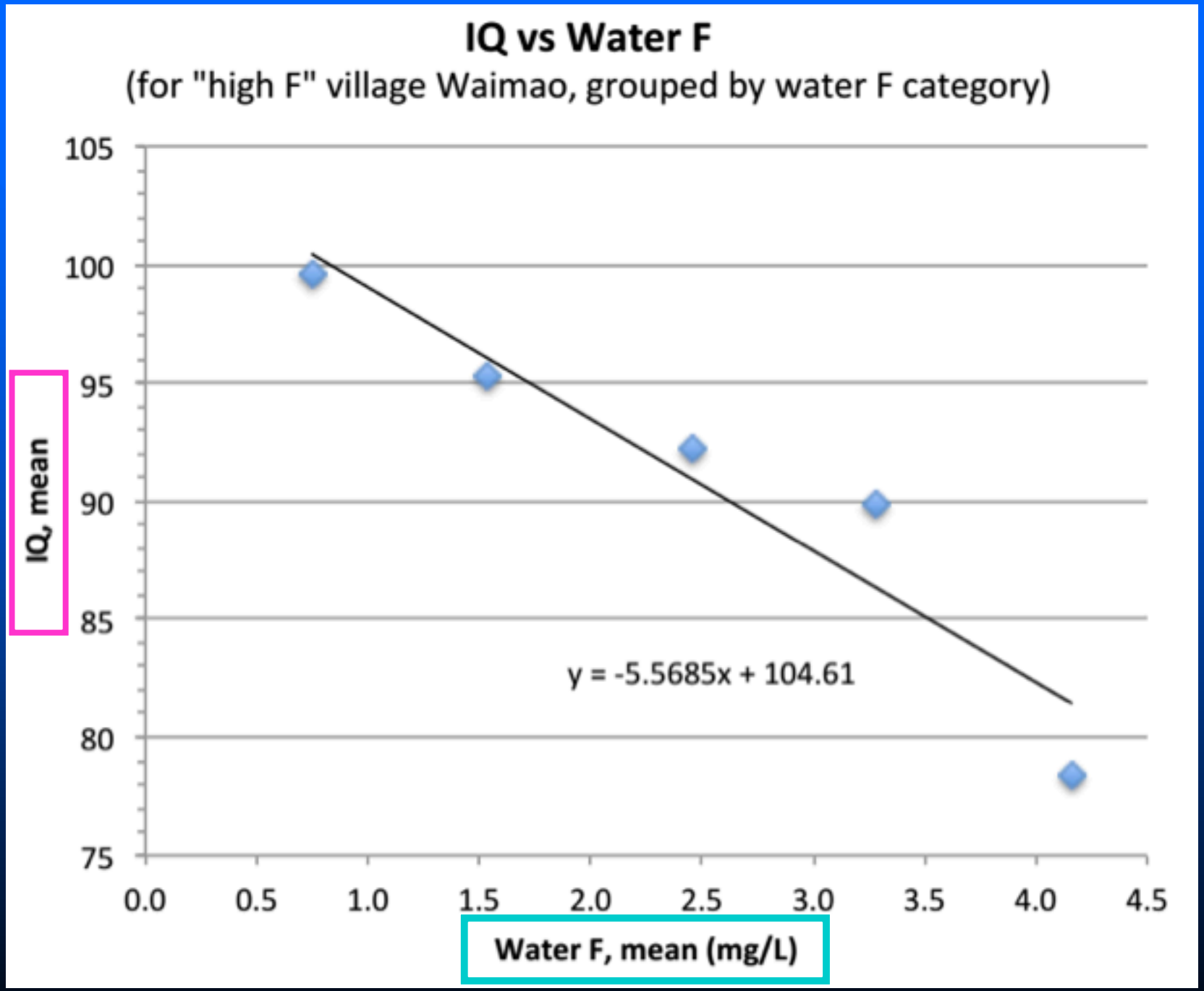
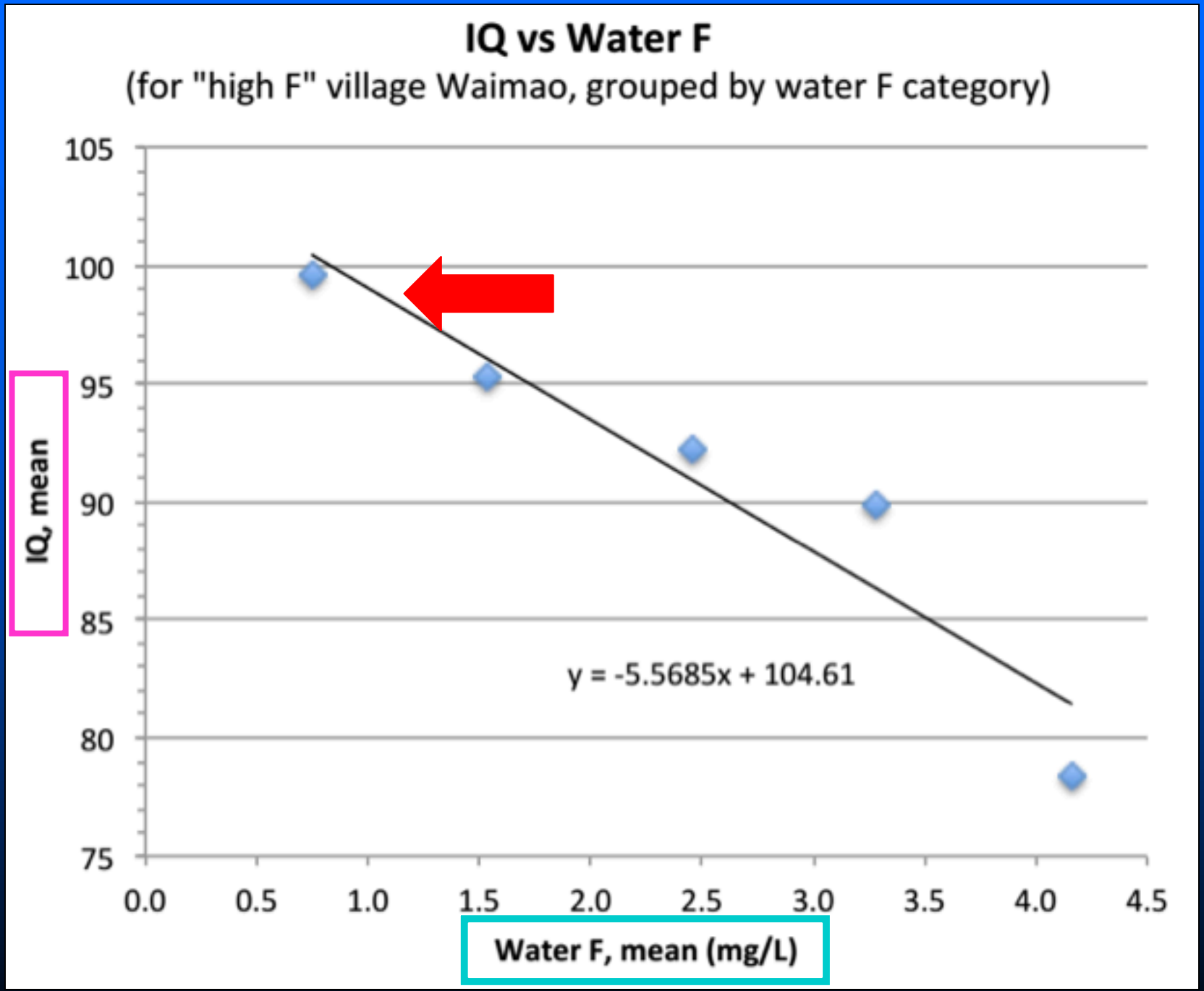

IQ vs Water F
(for "high F" village Waimao, grouped by water F category)
105
100
95
90
85
80
75
IQ, mean
y = -5.5685x + 104.61
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Water F, mean (mg/L)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4.0
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Water F, mean (mg/L)

This data would suggest that IQ is lowered somewhere between 0.75 and 1.5 ppm

Moreover, in two respects these Chinese children had LESS exposure from other sources than US children: 1) they were probably breast-fed not bottle-fed and 2) they didn't use Fluoridated toothpaste

The Harvard Meta-analysis

- In 2012, Choi et al (the team included Philippe Grandjean) published a meta-analysis of 27 studies comparing IQ in “high” versus “low” fluoride villages

Harvard Meta-analysis of IQ studies

Review

Developmental Fluoride Neurotoxicity: A Systematic Review and Meta-Analysis

Anna L. Choi,[1] Guifan Sun,[2] Ying Zhang,[3] and Philippe Grandjean[1,4]

[1]Department of Environmental Health, Harvard School of Public Health, Boston, Massachusetts, USA; [2]School of Public Health, China Medical University, Shenyang, China; [3]School of Stomatology, China Medical University, Shenyang, China; [4]Institute of Public Health, University of Southern Denmark, Odense, Denmark

BACKGROUND: Although fluoride may cause neurotoxicity in animal models and acute fluoride poisoning causes neurotoxicity in adults, very little is known of its effects on children's neurodevelopment.

OBJECTIVE: We performed a systematic review and meta-analysis of published studies to investigate the effects of increased fluoride exposure and delayed neurobehavioral development.

METHODS: We searched the MEDLINE, EMBASE, Water Resources Abstracts, and TOXNET databases through 2011 for eligible studies. We also searched the China National Knowledge Infrastructure (CNKI) database, because many studies on fluoride neurotoxicity have been published in Chinese journals only. In total, we identified 27 eligible epidemiological studies with high and reference exposures, end points of IQ scores, or related cognitive function measures with means and variances for the two exposure groups. Using random-effects models, we estimated the standardized mean difference between exposed and reference groups across all studies. We conducted sensitivity analyses restricted to studies using the same outcome assessment and having drinking-

Registry 2003). Fluoride exposure to the developing brain, which is much more susceptible to injury caused by toxicants than is the mature brain, may possibly lead to permanent damage (Grandjean and Landrigan 2006). In response to the recommendation of the NRC (2006), the U.S. Department of Health and Human Services (DHHS) and the U.S. EPA recently announced that DHHS is proposing to change the recommended level of fluoride in drinking water to 0.7 mg/L from the currently recommended range of 0.7–1.2 mg/L, and the U.S. EPA is reviewing the maximum amount of

Environmental Health Perspectives, *2012* Oct;120(10):1362-8.

Harvard meta-analysis of 27 studies

- The Harvard team acknowledged that there were weaknesses in many of the studies, however, **they stressed that the results were remarkably consistent**
- In ***26 of the 27 studies*** average IQ in the "high fluoride" village was lowered by **about 7 IQ points**

Fluoridation proponents have argued that the concentrations in the “high” fluoride villages were not relevant to water fluoridation in the US.

They are wrong!

Author/year	ppm in High F village
Chen 1991	4.55
Lin 1991	0.88
An 1992	2.1 – 7.6 (mean = 4.9)
Xu 1994	1.8
Yang 1994	2.97
Li 1995	1.81 – 2.69 (mean = 2.25)
Yao 1996	2 – 11 (mean = 6.5)
Zhao 1996	4.12
Yao 1997	2
Lu 2000	3.15
Hang 2001	2.90
Wang 2001	2.97
Xiang 2003	0.57 – 4.5 (mean = 2.54)
Seraj 2006	2.5
Wang 2006	5.44 +/- 3.88 (1.52 – 9.32)
Fan 2007	1.14 - 6.09 (mean = 3.62)
Wang 2007	3.8 – 11.5 (mean = 7.65)
Li 2010	2.47 +/- 0.75 (1.72 – 3.22)
Poureslami 2011	2.38
Wang 1996	>1- 8.6 (mean = 4.8)

Mean of 20 results (using means) = 70.49 / 20 = 3.52

Taken from Choi et al, 2012 – Table 1, pp 24-26.

- The mean of these 20 studies is LOWER than the EPA's safe drinking water standard (4 ppm)
- And, in several studies the High F village is less than 3 ppm

IQ studies with water F concentration below 3 mg/L in "higher F group", and with statistically significant results

Study	IQ point difference	Water F concentration "high F group" (mg/L)
Xu et al. 1994	-14.0	1.8
Yao et al. 1997	-6.5	2
Hong et al. 2001	-6.6	2.90
Seraj et al. 2006	-13.4	2.5
Poureslami et al. 2011	-6.2	2.38

- Fluoridation promoters focus on the highest levels where IQ lowered
- But in order to protect the whole population regulatory toxicologists look for the lowest levels where harm is found!

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The Xiang (2003) data would suggest that IQ is lowered somewhere between 0.75 and 1.5 ppm

3)

There is no adequate margin of safety to protect all our children from lowered IQ

Dr. William Hirzy, a former risk assessment specialist at US EPA, has used standard risk assessment procedures to calculate a **safe level of fluoride that would protect all children against lowered IQ** *and this is exceeded in the US even before consuming fluoridated water!*

There is certainly NO MARGIN OF SAFETY to protect the brains of ALL children exposed to fluoride in the US or Canada from a combination of water fluoridation and other sources.

The very last children who need a loss of IQ points are children from low-income families, who are precisely the children targeted in water fluoridation programs!

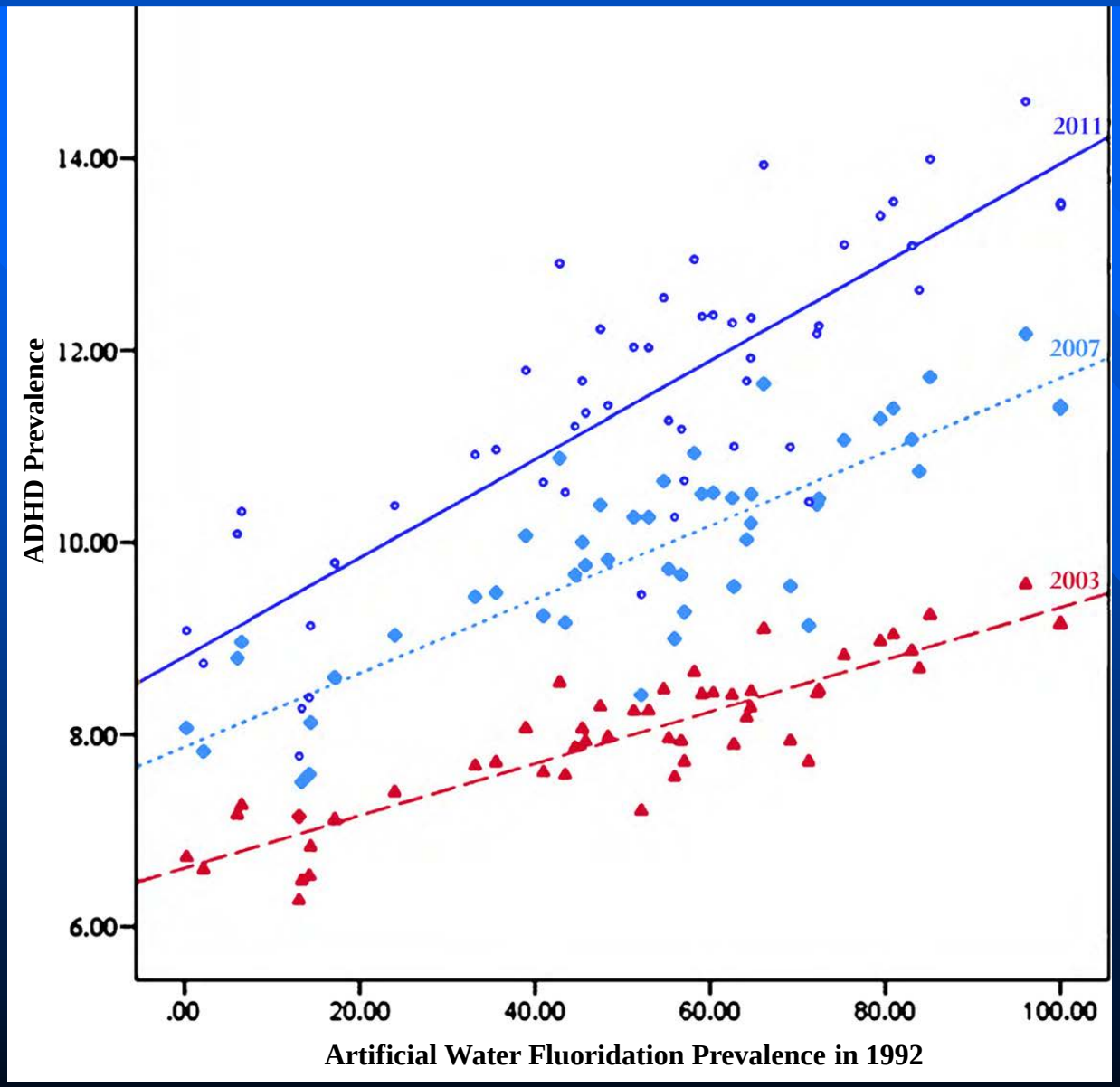
4)

But it is not just lowered IQ that is of concern.

A recent Canadian study found an association between the prevalence of ADHD in the USA with fluoridation

A J Malin and C Till, (2015). “Exposure to fluoridated water and attention deficit hyperactivity disorder prevalence among children and adolescents in the United States: anecological association.” ***Environmental Health*** **(2015) 14:17**

Percent of children with ADHD (by state) for 2003, 2007 and 2011 plotted against the % of population in each state fluoridated in 1992



The Lancet (2014)

- In 2014, in the prestigious medical journal *The Lancet*, Landrigan and Grandjean cited the Harvard meta-analysis to support their conclusion that fluoride is one of only 11 chemicals that is known to damage the developing brain.

The Lancet (2014)

- "Our very great concern is that children worldwide are being exposed to unrecognized toxic chemicals that are silently eroding intelligence, disrupting behaviors, truncating future achievements, and damaging societies…" **Landrigan and Grandjean**

Dr. Philippe Grandjean

"Fluoride seems to fit in with lead, mercury, and other poisons that cause chemical brain drain." (Harvard Press Release)

An incredible double standard

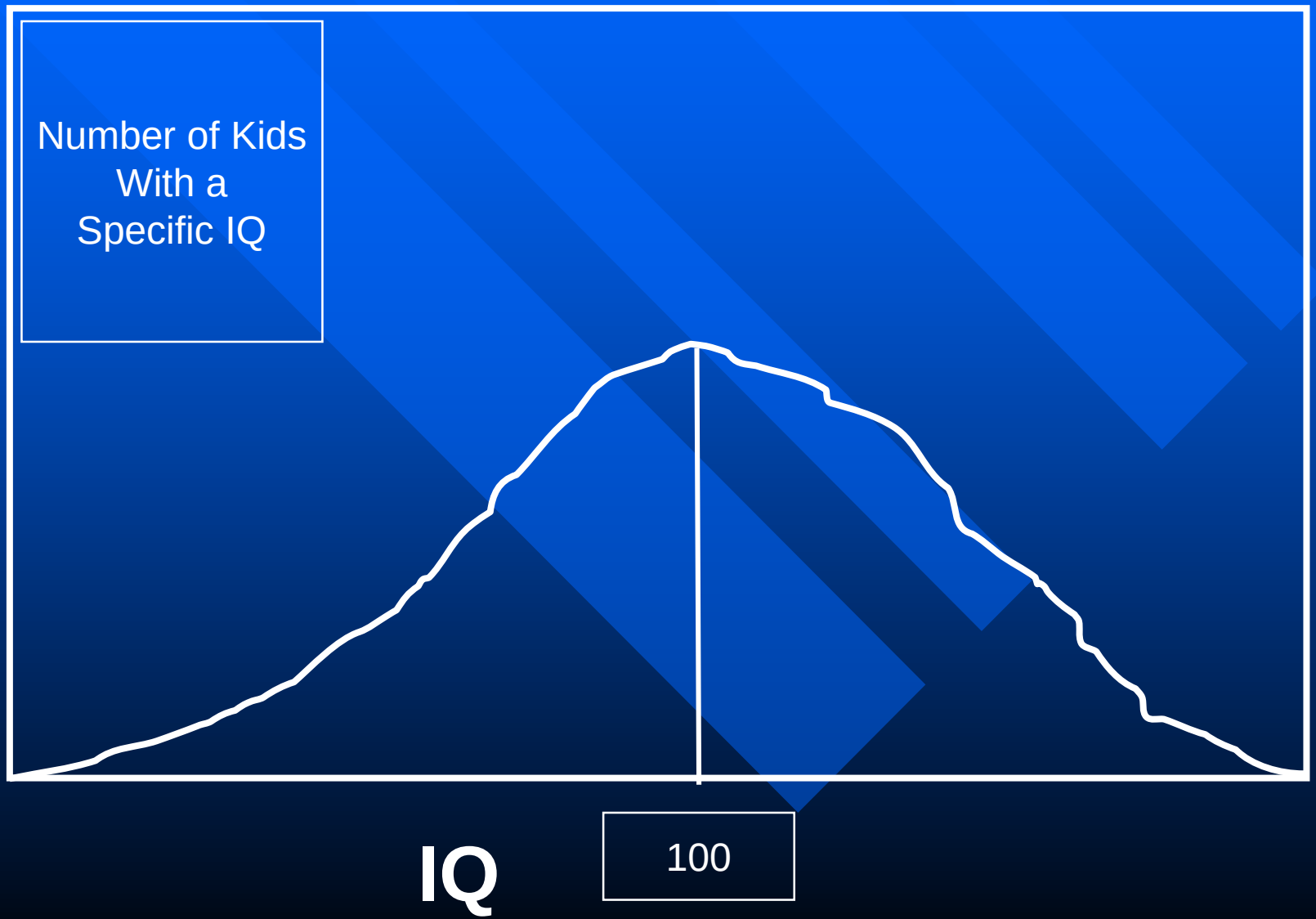
US and Canadian health agencies have been aggressively reducing exposure of children to lead,

because IT IS NEUROTOXIC

BUT they continue to allow fluoride to be DELIBERATELY added to their drinking water even though there is strong evidence it is NEUROTOXIC!

5)
Why a small loss of IQ at the individual level is very serious at the population level

IQ and population



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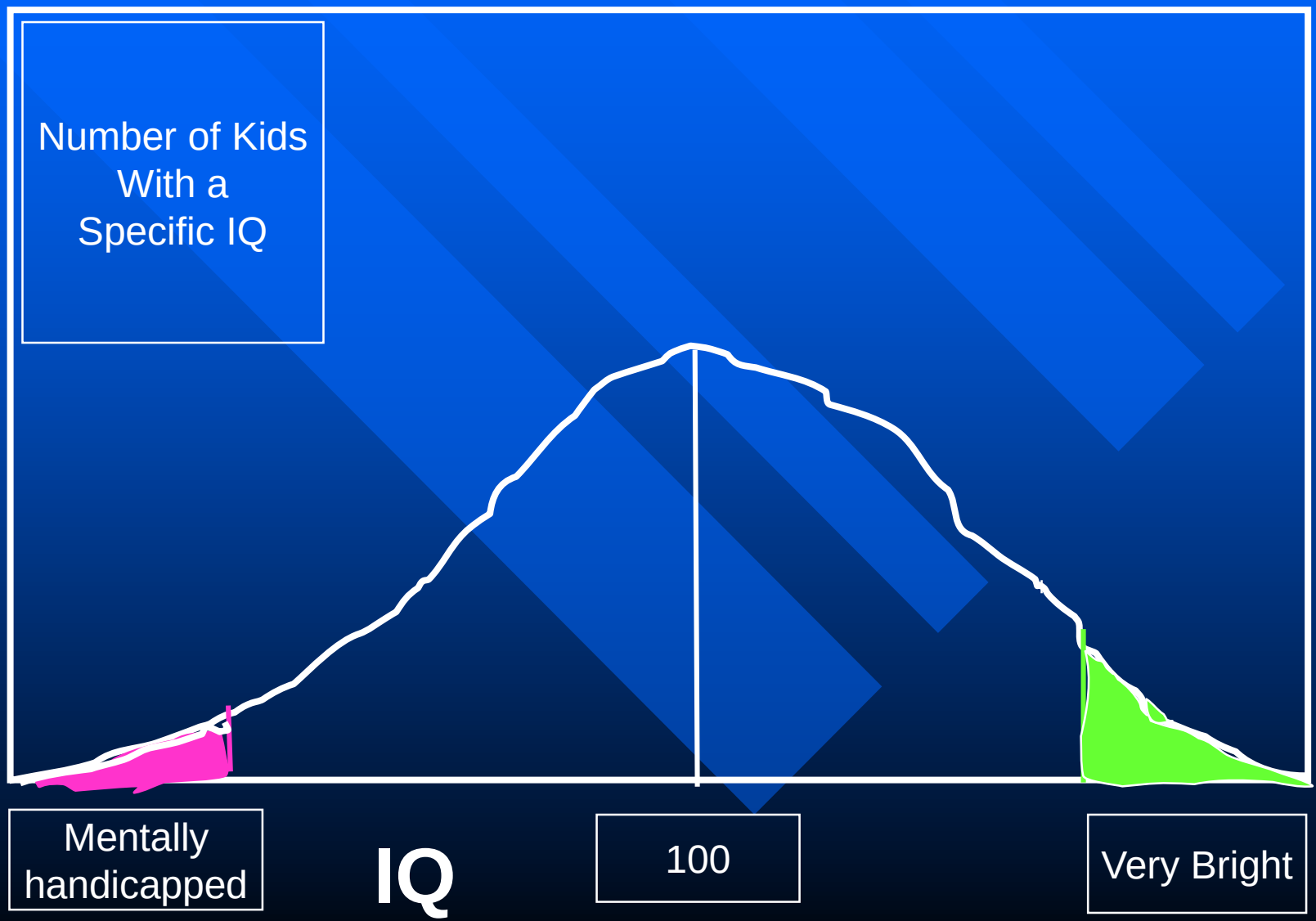

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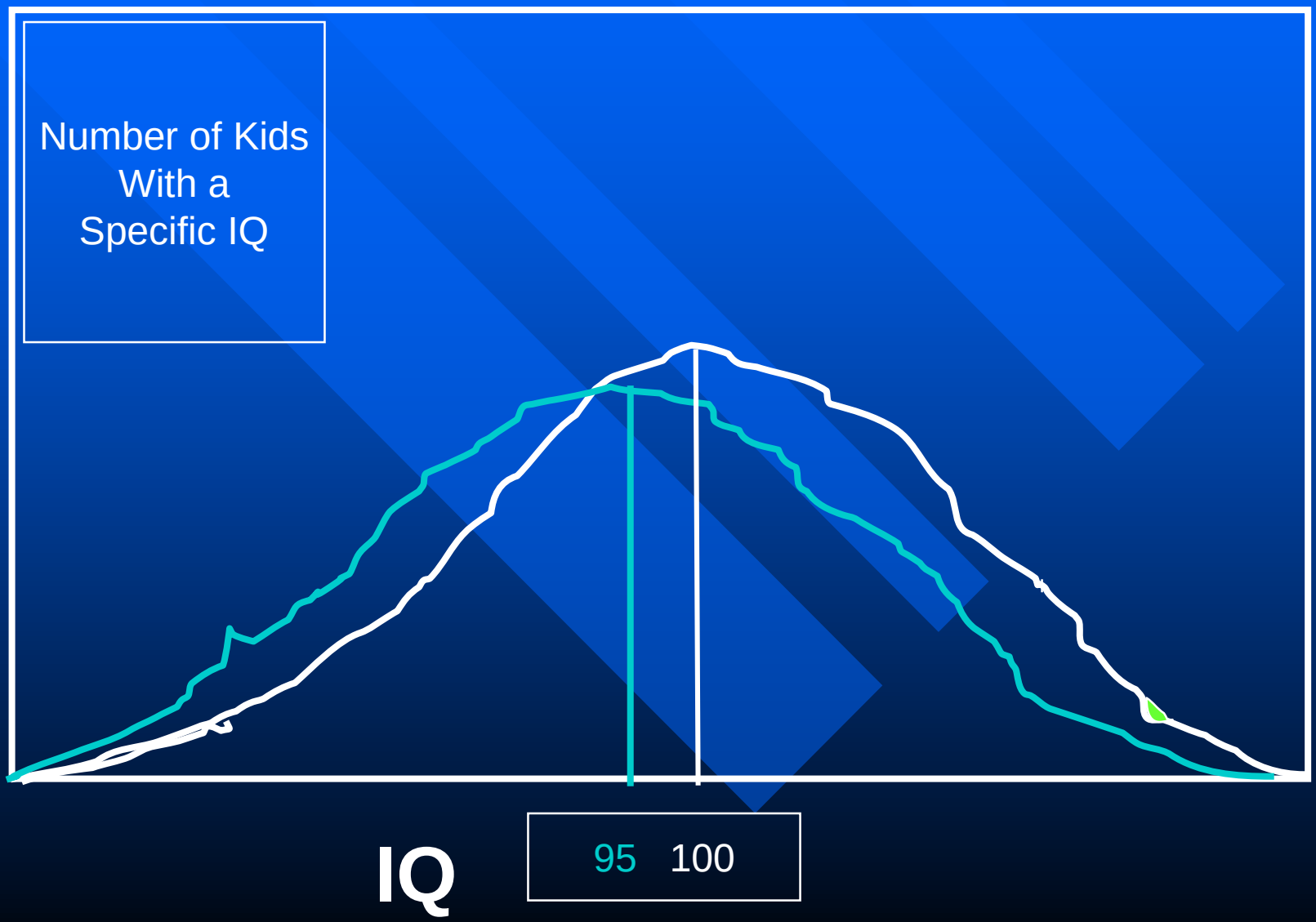

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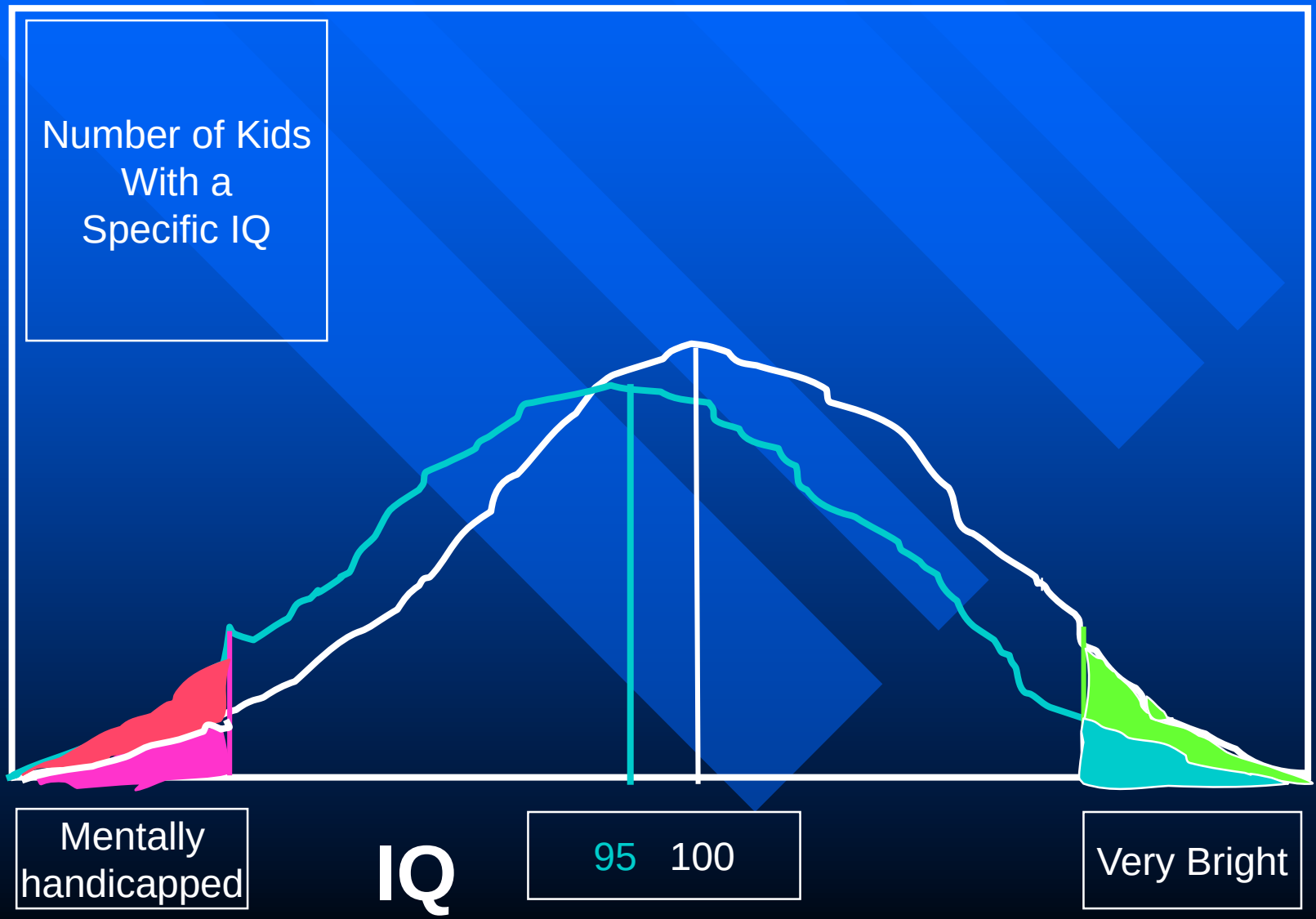


6)
Three key questions for councillors

1) Have the promoters of this practice convinced you that they have strong scientific evidence (i.e. not opinion but primary studies) that allows them and you to confidently ignore *all* the evidence of fluoride's neurotoxicity?

2) How can they claim (and you accept) that fluoridation is “safe” if they cannot show that there is AN ADEQUATE MARGIN OF SAFETY to protect *ALL* our children from lowered IQ or other neurological effects?

3) Why are proponents of fluoridation prepared to take such serious risks when a) the evidence that swallowing fluoride lowers tooth decay is very weak and b) there are alternative approaches to fighting tooth decay (practiced in many other countries) which don't force fluoride on people who don't want it?

EXTRA SLIDES

A note on endorsements

1. Proponents use a long list of endorsements from government agencies and professional bodies that claim that fluoridation is “safe and effective”
2. But these endorsements date back to the 1950s and were made when there was virtually no science on the table
3. All they represent today is how difficult it is for bureaucracies to change their minds once they have adopted something as a “policy.” When ‘Policy’ is king, science becomes a slave!

Endorsements

4. In short, for many dental bodies fluoridation has become a “belief” system which is extremely resistant to new scientific evidence

5. Note also that these endorsements have not impressed the vast majority of the countries that do no fluoridate their water – including 97% of Europe

Beware of “reviews” conducted by pro-fluoridation governments

These are usually conducted by hand-picked panels with a majority already pro-fluoridation. The results are predictable and self-serving. Examples:

The 1991 DHHS review

The 2002 Irish Fluoridation Forum

The 2007 Australian NHMRC review

The 2011 Health Canada Review

Beware of “reviews” conducted by pro-fluoridation governments

In the case of the 2011 Health Canada Review, they relied on a panel of six experts – 4 of which were dentists and well-known to be pro-fluoridation and one known to be one of the most avid promoters of fluoridation in the USA (Jay Kumar)!

7) Other countries have shown that there are better ways of fighting tooth decay in children from low-income families

Scotland

- Instead of water fluoridation, the Scottish Government has a **ChildSmile** program, which:

a) teaches toothbrushing in nursery-schools;

b) provides healthy snacks & drinks in school;

c) provides dental health and dietary advice to both children and parents, and

d) provides annual dental check-ups and treatment if required including fluoride varnish applications.

ChildSmile results

- The proportion of children aged 4–6 years **without obvious dental decay has risen from 42% in 1996 to 67% in 2012.**
- The proportion of children aged 10–12 years without obvious dental decay rose from
- **53% in 2005 to 73% in 2013**

(Information Services Division Scotland, 2013).

ChildSmile Cost savings

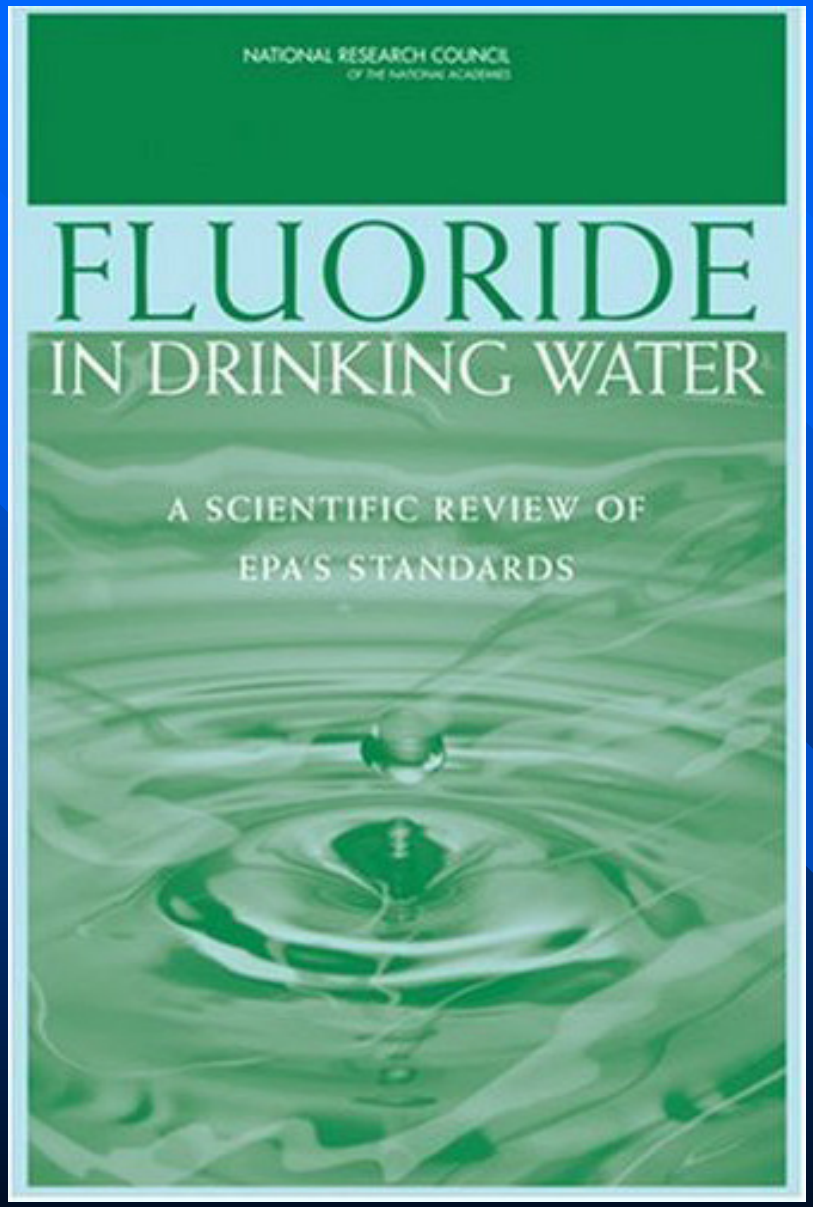
- *"Glasgow researchers found that the scheme had reduced the cost of treating dental disease in five-year-olds by more than half between 2001 and 2010." (BBC, Scotland)*

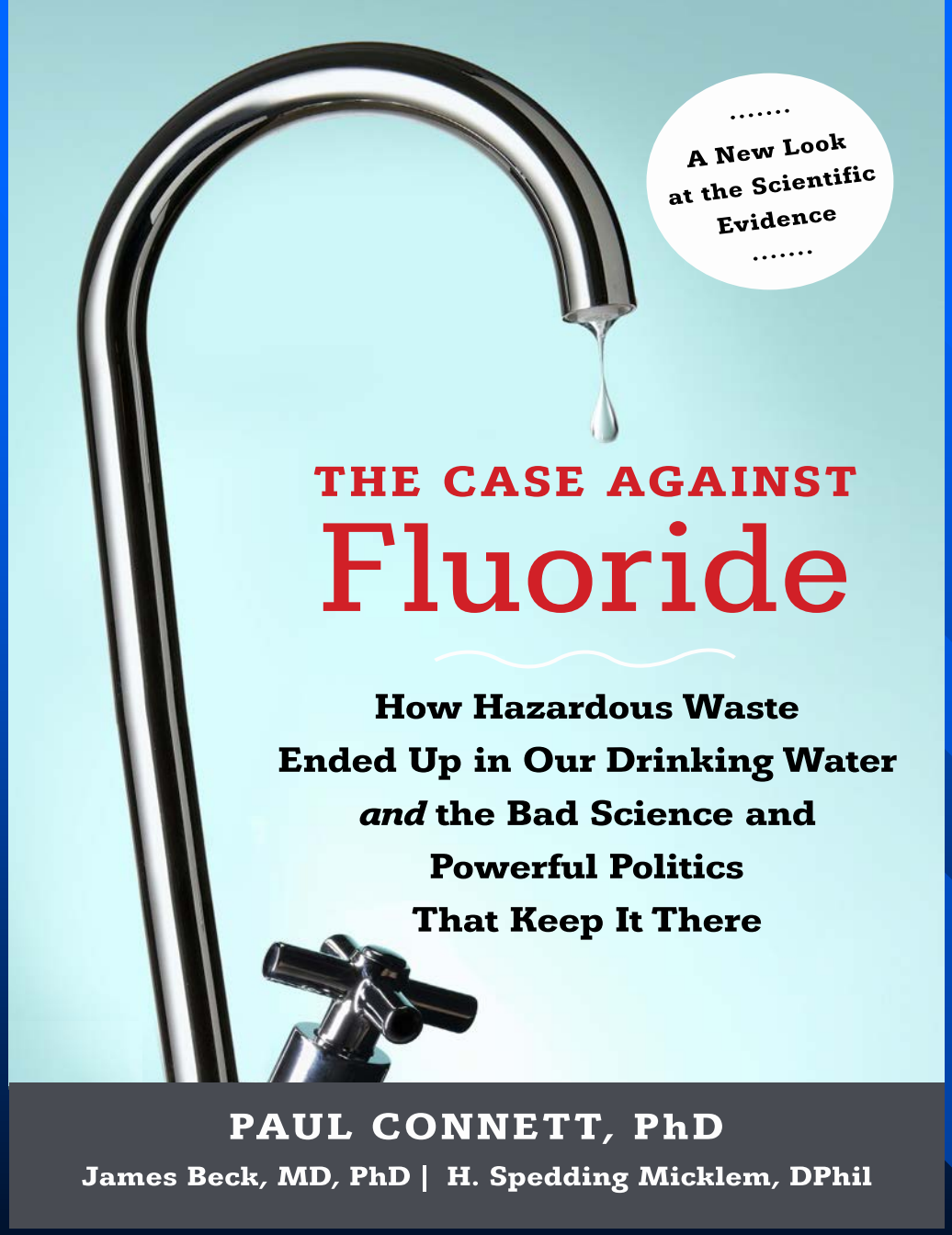
- In short our kids need
- MORE BRUSHING!
- MORE FRUIT AND VEGETABLES!
- LESS SUGAR!
- Less sugar means less tooth decay and less OBESITY
- Less obesity means less diabetes and fewer heart attacks
- In other words education to promote less sugar consumption is a very good investment!

We need
EDUCATION
not FLUORIDATION
to fight tooth decay and obesity.

RESOURCES

NRC (2006)


NATIONAL RESEARCH COUNCIL
FLUORIDE
IN DRINKING WATER
A SCIENTIFIC REVIEW OF
EPA'S STANDARDS



Book published by Chelsea Green

October, 2010

Can be ordered on Amazon.com

Contains 80 pages of references to the Scientific literature

See Also

"50 Reasons to Oppose Water Fluoridation"

Can be viewed ONLINE at www.FluorideACTION.net

See the 28 minute DVD
"Professional Perspectives on Water Fluoridation"
www.FluorideACTION.net

See the
20 minute DVD
"TEN FACTS on FLUORIDE"
PLUS BOOKLET
at
www.FluorideACTION.net

See the 46 minute TV debate between Professor Paul Connett and Dr. Richard Kahn on NJ Educational TV (May, 2015)

http://fluoridealert.org/fan-tv/fluoridation-debate-paul-connett-fan-exec-director-vs-richard-kahn-past-president-of-nj-dental-association/

EXTRA SLIDES for possible questions from the panel

After 70 years there has been NO individual, Randomized Controlled Trial (RCT) for water fluoridation!

Fluoridation proponents are misleading when they give decay savings as RELATIVE savings expressed as a PERCENTAGE rather than ABSOLUTE savings in terms of teeth or surfaces

Recent Trends in Dental Caries in U.S. Childr and the Effect of Water Fluoridation

J.A. BRUNELLE and J.P. CARLOS

Epidemiology Branch, National Institute of Dental Research, National Institutes Bethesda, Maryland 20892

The decline in dental caries in U.S. schoolchildren, first observed nationwide in 1979–1980, was confirmed further by a second national epidemiological survey completed in 1987. Mean DMFS scores in persons aged 5–17 years had decreased about 36% during the interval, and, in 1987, approximately 50% of children were caries-free in the permanent dentition.

Children who had always been exposed to community water fluoridation had mean DMFS scores about 18% lower than those who had never lived in fluoridated communities. When some of the "background" effect of topical fluoride was controlled, this difference increased to 25%. The results suggest that water fluoridation has played a dominant role in the decline in caries and must continue to be a major prevention methodology.

J Dent Res 69(Spec Iss):723–727, February, 1990

J. DENT. RES. 69, 723-727 (1990)

Presented at a Joint IADR/ORCA International Symposium on Fluorides: Mechanisms of Action and Recommendations for Use, held March 21–24, 1989, Callaway Gardens Conference Center, Pine Mountain, Georgia

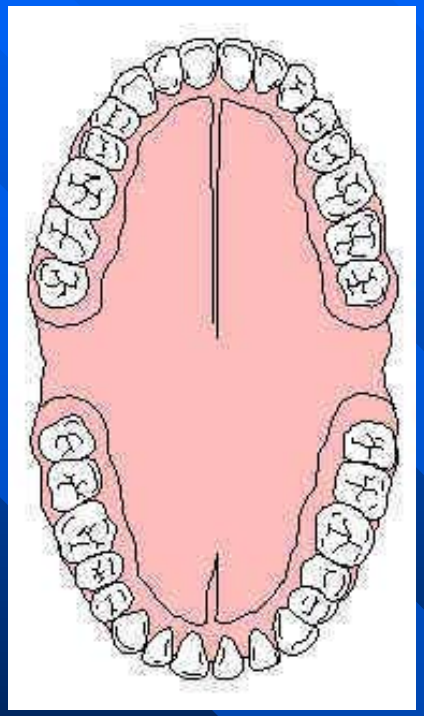
NIDR survey: Brunelle & Carlos (1990)

- This was the largest survey of tooth decay ever carried out in the US. NIDR looked at 39,000 children in 84 communities.
- In Table 6 Brunelle and Carlos compared tooth decay of children who had spent all their lives in a Fluoridated Community with those who had spent all their lives in a Non-Fluoridated one

NIDR survey: Brunelle & Carlos (1990)

- Their measure of tooth decay was Decayed Missing and Filled Surfaces (DMFS) of the permanent teeth.

Brunelle and Carlos (1990) (Table 6)



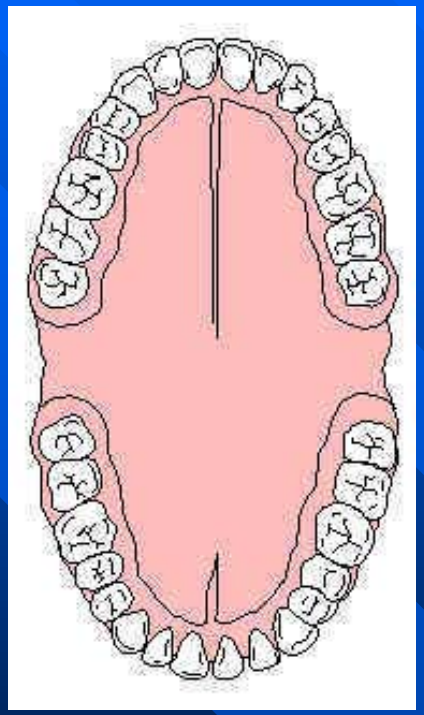
2.8

DMFS

F

The largest US survey of tooth decay

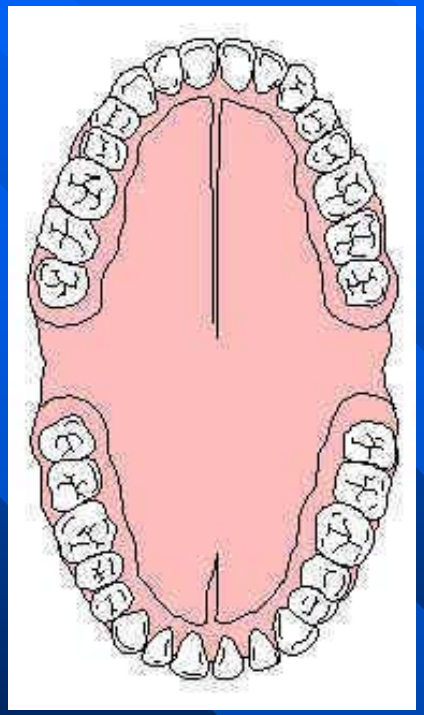
3.4
DMFS
NF



2.8
DMFS
F

Brunelle and Carlos, 1990

3.4
DMFS
NF



2.8
DMFS
F

Average **difference** (for 5 - 17 year olds) in DMFS
= **0.6 tooth surfaces**

Not only was this saving very small (0.6 of one tooth surface) but it was not even shown to be statistically significant!

But note – if this 0.6 of one tooth surface difference is expressed as a RELATIVE percentage difference …

0.6/3.4 x 100 = 18%

it sounds more impressive!

The Cochrane Review (June, 2015)

- In addition, the Cochrane review was not convinced that studies showing that water fluoridation reduces decay in children are applicable to today's society, as nearly all the studies used in calculations (dating back to the 1940's – 1960's) were conducted prior to the availability of fluoride toothpaste and other sources of fluoride which we have today, **and were at high risk of bias.**

Other human studies (in addition to IQ studies)

1) **Rey-Osterrieth Complex Figure Test (ROCT)**, Rocha-Amador, 2009

2) **Neurobahavioral Core Test Battery (NCTB),** Yazdi, 2011 and Guo, 2011

3) **Neonatal Behavioral Neurological Assessment (NBNA)**, Li, 2004

4) **Fetal Brain Studies,** Yu, 1996; Dong, 1989; Du, 1992 and Hen, 1989

UK Hypothyroidism study

UK Hypothyroidism study

Are fluoride levels in drinking water associated with hypothyroidism prevalence in England? A large observational study of GP practice data and fluoride levels in drinking water

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Centre for Health Services Studies, University of Kent, Canterbury, Kent, UK

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Received 18 September 2014
Revised 16 January 2015
Accepted 18 January 2015

ABSTRACT

Background While previous research has suggested that there is an association between fluoride ingestion and the incidence of hypothyroidism, few population level studies have been undertaken. In England, approximately 10% of the population live in areas with community fluoridation schemes and hypothyroidism prevalence can be assessed from general practice data. This observational study examines the association between levels of fluoride in water supplies with practice level hypothyroidism prevalence.

Methods We used a cross-sectional study design using secondary data to develop binary logistic regression models of predictive factors for hypothyroidism prevalence at practice level using 2012 data on fluoride levels in drinking water, 2012/2013 Quality and Outcomes Framework (QOF) diagnosed hypothyroidism prevalence data, 2013 General Practitioner registered

disorder, there are few population studies that examine the association of this disease with fluoride intake.[3]

In the UK, management of hypothyroidism is undertaken by primary care physicians (general practitioners, GPs) and patients' thyroid function (levels of thyroid-stimulating hormone and thyroxine) is tested annually as one element of the GP pay-for-performance system, the Quality and Outcomes Framework (QOF).[7] These data provide a measure of practice prevalence of hypothyroidism which can be geographically mapped against areas with and without fluoride added to the drinking water. This paper examines whether fluoride levels provide a useful contribution to a predictive model of practice level hypothyroidism, and whether there is any difference in hypothyroidism prevalence between practices serving areas where water is