



Refute of Paul Connett's "50 Reasons To Oppose Fluoridation"

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"In summary, the author of the '50 Reasons' document has not used a search strategy or explicit inclusion or exclusion criteria to identify and select appropriate studies to address well-focussed questions regarding the benefits and risks of public water fluoridation. The author has not considered study quality and has not differentiated between methodologically sound and unsound studies. There is insufficient information provided to assess and discuss the internal and external validity of the studies cited. In addition, there is no acknowledgment or discussion of the relevance and reliability of estimates of effect in animal or laboratory studies for human populations. As a result of these fundamental flaws, no valid inferences or conclusions can or should be drawn from the limited information contained in the '50 Reasons' document."

--A critical appraisal of, and commentary on, "50 Reasons to oppose fluoridation"
Dr. Joe Mullen and the Irish Expert Body on Fluoride and Health

Connett Reason #1: *Fluoride is the only chemical added to water for the purpose of medical treatment.*

The U.S. Food and Drug Administration (FDA) classifies fluoride as a drug when used to prevent or mitigate disease (FDA 2000). As a matter of basic logic, adding fluoride to water for the sole purpose of preventing tooth decay (a non-waterborne disease) is a form of medical treatment. All other water treatment chemicals are added to improve the water's quality or safety, which fluoride does not do.

Facts:

A. Fluoridation is the simple adjustment of the concentration level of a mineral which has always existed in water. The fluoride added through fluoridation is identical to that fluoride which humans have ingested in water since the beginning of time. No court of last resort has ever affirmed the attempt by fluoridation opponents to suddenly proclaim this mineral to be a drug.

The FDA has no jurisdiction over additives to public water supplies. This jurisdiction falls entirely under the EPA. What the FDA classifies is therefore of no relevance to water fluoridation.

B. Connett's "basic logic" is irrelevant. The courts have soundly rejected this "logic".

C. From a 2016 ruling by the High Court of New Zealand

"The High Court concluded that fluoridation does not constitute medical treatment, on the basis that medical treatment involves direct interference with the body or state of mind of an individual, and does not extend to public health interventions delivered to the inhabitants of a particular locality or the population at large. There was no material distinction between fluoridation and other established public health measures, such as chlorination of water or the addition of iodine to salt." (29)

Connett Reason #2: *Fluoridation is unethical.*

Informed consent is standard practice for all medication, and one of the key reasons why most of Western Europe has ruled against fluoridation. With water fluoridation we are allowing governments to do to whole communities (forcing people to take a medicine irrespective of their consent) what individual doctors cannot do to individual patients. Put another way: Does a voter have the right to require that their neighbor ingest a certain medication (even if it is against that neighbor's will)?

Facts:

That which is unethical is denying entire populations the disease preventive benefits of a very valuable public health initiative such as water fluoridation, based on nothing but false assertions, unsubstantiated claims, and misinformation.

A. Local officials do not need informed consent before approving contents of local water supplies under their jurisdiction. They are accorded consent to do their jobs via election/ appointment to office. Informed consent applies to treatment rendered. Any such consent in regard to fluoridation would have to be from the individual, given to himself, prior to his "administering" fluoridated water to himself.....which is obviously ludicrous.

B. There are myriad reasons why different countries may choose not to fluoridate their water supplies, few, if any, in regard to concerns with informed consent. These include such things as logistics of water systems rendering fluoridation cost-prohibitive, utilization of fluoridated salt and/or milk programs in lieu of water fluoridation, existing fluoride levels already at, or above the optimal level, and equal access to comprehensive dental care for all citizens.

C. No one is required to do anything in regard to water fluoridation. People are free to consume fluoridated water or not. Entirely their choice.

Connett Reason #3: *The dose cannot be controlled.*

Once fluoride is put in the water it is impossible to control the dose each individual receives because people drink different amounts of water. Being able to control the dose a patient

receives is critical. Some people (e.g., manual laborers, athletes, diabetics, and people with kidney disease) drink substantially more water than others.

Facts:

When the amount of a substance which can be ingested falls below the threshold of adverse effects for that substance, then dose is not a concern in regard to adverse effects. Prior to reaching the threshold of adverse effects of fluoride from optimally fluoridated water in addition to that from all other normal sources of fluoride intake, water toxicity would be the concern, not fluoride. This is true not only for fluoride but for chlorine, ammonia, and the numerous other substances routinely added to public water supplies.

In actuality, the dose of fluoride from optimally fluoridated water is, indeed, very well controlled. In fact, it is more strictly controlled than is the dose from non-fluoridated systems.

A. Simply put, water is fluoridated at 0.7 mg/liter (ppm=mg/liter). Thus, for every liter of fluoridated water consumed, the "dose" of fluoride intake is 0.7 mg. The CDC estimates that of the total daily intake, or "dose", of fluoride from all sources including dental products, 75% is from the water.

The US National Academy of Medicine (formerly known as the US Institute of Medicine) has established that the daily upper limit for fluoride intake from all sources, for adults, before adverse effects will occur, short or long term, is 10 mg. The range of safety between the minuscule 0.7 mg fluoride from optimally fluoridated water, and the threshold at which adverse effects may occur is so wide that "dose" is not an issue in regard to any concerns with adverse effects of fluoridated water. Before the UL of 10 mg could be reached, water toxicity would be the concern, not fluoride. (1)

B. The NAM daily upper limit for fluoride intake is far less for infants and children ages 0-8 years. However, this is due solely to the risk of mild to very dental fluorosis during those teeth developing years. Mild to very mild dental fluorosis is a barely detectable effect which causes no adversity on cosmetics, form, function, or health of teeth. As peer-reviewed science has demonstrated mildly fluorosed teeth to be more decay resistant, many consider this effect to not even be undesirable, much less adverse. The 2006 NRC Committee on Fluoride in Drinking Water considered mild dental fluorosis to not be an adverse effect. (2) (3)

Connett Reason #4: The fluoride goes to everyone regardless of age, health, or vulnerability. According to Dr. Arvid Carlsson, the 2000 Nobel Laureate in Medicine and Physiology and one of the scientists who helped keep fluoridation out of Sweden: "Water fluoridation goes against leading principles of pharmacotherapy, which is progressing from a stereotyped medication — of the type 1 tablet 3 times a day — to a much more individualized therapy as regards both dosage and selection of drugs. The addition of drugs to the drinking water means exactly the opposite of an individualized therapy" (Carlsson 1978).

Facts:

That the fluoride goes to everyone is one of the strongest points of this initiative. This eliminates the compliance issues which so hinder other preventive measures.

There is no "pharmacotherapy" involved in water fluoridation. It is simply the adjustment of the concentration level of a mineral which has existed in water since the beginning of time.

A. According to Dr. John Doull, one of the most highly respected toxicologists in the United States and chair of the 2006 NRC Committee on Fluoride in Drinking Water.....

"I do not believe there is any valid, scientific reason for fearing adverse health conditions from the consumption of water fluoridated at the optimal level"

---John Doull, MD, PhD, Chair of the National Academy of Sciences, National Research Council 2006 Committee Report on Fluoride in Drinking Water (23)

B. According to the Deans of the Harvard Schools of Medicine, Dentistry, and Public Health....

"As Deans of Harvard Medical School, Harvard School of Dental Medicine and the Harvard School of Public Health, we continue to support community water fluoridation as an effective and safe public health measure for people of all ages. Numerous reputable studies over the years have consistently demonstrated that community water fluoridation is safe, effective, and practical. Fluoridation has made an enormous impact on improving the oral health of the American people. Our country is fortunate to have over 204 million Americans living in fluoridated communities and having access to the health and economic benefits of this vital public health measure." (4)

Sincerely,
Jeffrey S. Flier, MD
Dean of the Faculty of Medicine
Caroline Shields Walker Professor of Medicine
Harvard Medical School

R. Bruce Donoff, DMD, MD
Dean and Walter C. Guralnick Distinguished Professor of Oral and Maxillofacial Surgery
Harvard School of Dental Medicine

Julio Frenk, MD, MPH, PhD
Dean of the Faculty, Harvard School of Public Health
T & G Angelopoulos Professor of Public Health and International Developm

C. According to the past 6 US Surgeons General.....

Dr. Vivek H. Murthy, Surgeon General (2014-2017):
"Water fluoridation is the best method for delivering fluoride to all members of the community, regardless of age, education, income level or access to routine dental care. Fluoride's effectiveness in preventing tooth decay extends throughout one's life, resulting in fewer – and less severe – cavities. In fact, each generation born over the past 70 years has enjoyed better dental health than the one before it. That's the very essence of the American promise."

Dr. Regina Benjamin, Surgeon General (2009-2013):

“With the development of fluoridated drinking water and dental sealants, Americans are less likely to experience tooth loss and gingivitis by middle age ... Community water fluoridation continues to be a vital, cost-effective method of preventing dental [cavities].”

Dr. Richard Carmona, Surgeon General (2002-2006):

“Water fluoridation has helped improve the quality of life in the United States by reducing pain and suffering related to tooth decay, time lost from school and work, and money spent to restore, remove or replace decayed teeth.”

Dr. David Satcher, Surgeon General (1998-2002):

“More than 50 years of scientific research has found that people living in communities with fluoridated water have healthier teeth and fewer cavities than those living where the water is not fluoridated. ... A significant advantage of water fluoridation is that anyone, regardless of socioeconomic level, can enjoy these health benefits during their daily lives — at home, work, or at school or play — simply by drinking fluoridated water or beverages prepared with fluoridated water.”

Dr. Audrey Manley, Surgeon General (1995-1997):

“Data consistently have indicated that water fluoridation is the most cost-effective, practical, and safe means for reducing the occurrence of tooth decay in a community.”

Dr. C. Everett Koop, Surgeon General (1982-1989):

“Fluoridation is the single most important commitment a community can make to the oral health of its children and to future generations.” (5)

D. According to the US CDC, the US EPA, the American Dental Association, the Canadian Dental Association, the World Health Organization, Health Canada, the American Medical Association, the American Academy of Pediatrics, and well over 100 more of the most highly respected healthcare and healthcare-related organizations in the world.....the public health benefits of water fluoridation are well recognized. (6)

Connett Reason #5: *People now receive fluoride from many other sources besides water. Fluoridated water is not the only way people are exposed to fluoride. Other sources of fluoride include food and beverages processed with fluoridated water (Kiritsy 1996; Heilman 1999), fluoridated dental products (Bentley 1999; Levy 1999), mechanically deboned meat (Fein 2001), tea (Levy 1999), and pesticide residues (e.g., from cryolite) on food (Stannard 1991; Burgstahler 1997). It is now widely acknowledged that exposure to non-water sources of fluoride has significantly increased since the water fluoridation program first began (NRC 2006).*

Facts:

A. The CDC estimates that of the total fluoride intake from all sources, 75% is from water and beverages.

"In the United States, water and processed beverages (e.g., soft drinks and fruit juices) can provide approximately 75% of a person's fluoride intake. Many processed beverages are prepared in locations where the drinking water is fluoridated. Foods and ingredients used in food processing vary in their fluoride content. As consumption of processed beverages by children increases, fluoride intake in communities without fluoridated water will increase whenever the water source for the processed beverage is fluoridated. In fluoridated areas, dietary fluoride intake has been stable because processed beverages have been substituted for tap water and for beverages prepared in the home using tap water." (7)

B. In regard to the 2006 NRC Committee:

The 2006 NRC Committee on Fluoride in Drinking Water was charged to evaluate the adequacy of the EPA primary and secondary MCLs for fluoride, 4.0 ppm and 2.0 ppm respectively, to protect against adverse effects. The final recommendation of this Committee was for the primary MCL to be lowered from 4.0 ppm. The sole reasons cited by the Committee for this recommendation were the risk of severe dental fluorosis, bone fracture, and skeletal fluorosis, with chronic ingestion of water with a fluoride content of 4.0 ppm or greater. Nothing else. Had this Committee deemed there to be any other concerns with fluoride at this level, it would have been responsible for stating so and recommending accordingly. It did not.

Additionally, the NRC Committee made no recommendation to lower the secondary MCL of 2.0 ppm. Water is fluoridated at 0.7 ppm, one third the level which the 2006 NRC Committee on Fluoride in Drinking Water made no recommendation to lower. (3)

Connett Reason #6: Fluoride is not an essential nutrient.

No disease, not even tooth decay, is caused by a "fluoride deficiency"

(NRC 1993; Institute of Medicine 1997, NRC 2006). Not a single biological process has been shown to require fluoride. On the contrary there is extensive evidence that fluoride can interfere with many important biological processes. Fluoride interferes with numerous enzymes (Waldbott 1978). In combination with aluminum, fluoride interferes with G-proteins (Bigay 1985, 1987). Such interactions give aluminum-fluoride complexes the potential to interfere with signals from growth factors, hormones and neurotransmitters (Strunecka & Patocka 1999; Li 2003). More and more studies indicate that fluoride can interfere with biochemistry in fundamental ways (Barbier 2010).

Facts:

A. Although irrelevant to the public health initiative of water fluoridation, fluoride is, indeed, an essential nutrient.

i. "This report focuses on five nutrients—calcium, phosphorus, magnesium, vitamin D, and fluoride, all of which play a key role in the development and maintenance of bone and other calcified tissues."

----Institute of Medicine (US) Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride. Washington (DC): National Academies Press (US); 1997. Preface.

ii. "Fluoride is regarded as an essential nutrient now well known to be effective in the maintenance of a tooth enamel that is more resistant to decay."

---Fluoride as a Nutrient
American Academy of Pediatrics
Committee on Nutrition
Pediatrics, vol. 49, No 3, March 1972

iii. "Fluoride is a normal constituent of the human body, involved in the mineralisation of both teeth and bones (Fairley et al 1983, Varughese & Moreno 1981). The fluoride concentration in bones and teeth is about 10,000 times that in body fluids and soft tissues (Bergmann & Bergmann 1991, 1995). Nearly 99% of the body's fluoride is bound strongly to calcified tissues. Fluoride in bone appears to exist in both rapidly- and slowly-exchangeable pools. Because of its role in the prevention of dental caries, fluoride has been classified as essential to human health (Bergmann & Bergmann 1991, FNB:IOM 1997)8"

-----Australian Government
National Health and Medical Research Council
<https://www.nrv.gov.au/nutrients/fluoride>

B. There is no valid, peer-reviewed scientific evidence of any adverse effect resultant of optimal level fluoride interfering with "biological process".

Connett Reason #7: The level in mother's milk is very low.

Considering reason #6 it is perhaps not surprising that the level of fluoride in mother's milk is remarkably low (0.004 ppm, NRC, 2006). This means that a bottle-fed baby consuming fluoridated water (0.6 – 1.2 ppm) can get up to 300 times more fluoride than a breast-fed baby. There are no benefits (see reasons #11-19), only risks (see reasons #21-36), for infants ingesting this heightened level of fluoride at such an early age (an age where susceptibility to environmental toxins is particularly high).

Facts:

A. The fluoride content of "mother's milk" is irrelevant to water fluoridation.

i. There is no valid, peer-reviewed scientific evidence of any adverse effects of optimal level fluoride on infants, or anyone else.

ii. "Mother's milk" is deficient in iron, vitamin K and vitamin D. By Connett's "logic" infants should be anemic free-bleeders who develop Ricketts.

B. The benefits of water fluoridation are well documented. Countless peer-reviewed scientific studies clearly demonstrate the effectiveness of this public health initiative. A list of 10 such studies is provided at the end of this document.

C. The only "risk" to infants "at such an early age" from optimally fluoridated water is mild to very mild dental fluorosis, a barely detectable effect which causes no adverse effect on cosmetics, form, function, or health of teeth.

Connett Reason #8: *Fluoride accumulates in the body.*

Healthy adult kidneys excrete 50 to 60% of the fluoride they ingest each day (Marier & Rose 1971). The remainder accumulates in the body, largely in calcifying tissues such as the bones and pineal gland (Luke 1997, 2001). Infants and children excrete less fluoride from their kidneys and take up to 80% of ingested fluoride into their bones (Ekstrand 1994). The fluoride concentration in bone steadily increases over a lifetime (NRC 2006).

Facts:

When fluoride is ingested, approximately 50% is excreted through the kidneys, with the rest being retained and stored within the hard tissues, i.e. teeth and bones. Although the retention within the hard tissues is cumulative, it is not a linear constant. In other words, it does not simply continue to accumulate without variation. There is an equilibrium maintained between the fluoride within the blood plasma, and that stored within the hard tissues. As the plasma levels decrease, fluoride is removed from the bones back into the plasma, until the equilibrium is once again attained. Plasma levels of fluoride are determined by fluoride intake, and that released from the hard tissues.)

Connett Reason #9: *No health agency in fluoridated countries is monitoring fluoride exposure or side effects.*

No regular measurements are being made of the levels of fluoride in urine, blood, bones, hair, or nails of either the general population or sensitive subparts of the population (e.g., individuals with kidney disease).

Facts:

No health agency in fluoridated countries is monitoring "exposure or side effects" to any of the other myriad of naturally occurring minerals and other substances in water, either. Why? Because it is not necessary. When the maximum amount of a substance which can be ingested is below the threshold for adverse effects, exposure is self-limiting. Therefore, there is no reason to monitor "exposure or side effects". Humans have been ingesting fluoride in drinking water since the beginning of time. To suddenly declare there to be a need to "monitor exposure" to this mineral.....is ludicrous.

Connett Reason #10: *There has never been a single randomized clinical trial to demonstrate fluoridation's effectiveness or safety.*

Despite the fact that fluoride has been added to community water supplies for over 60 years, "there have been no randomized trials of water fluoridation" (Cheng 2007). Randomized studies

are the standard method for determining the safety and effectiveness of any purportedly beneficial medical treatment. In 2000, the British Government's "York Review" could not give a single fluoridation trial a Grade A classification – despite 50 years of research (McDonagh 2000). The U.S. Food and Drug Administration (FDA) continues to classify fluoride as an "unapproved new drug."

Facts:

The infeasibility of performing randomized controlled trials on large population-based public health initiatives is well recognized. Due to this fact, RCTs will never be performed for water fluoridation. The next best thing is quality, observational studies. These are fully accepted by respected science and healthcare as valid sources of information. Countless peer-reviewed scientific studies clearly demonstrate the effectiveness of fluoridation, while in the entire 70 year history of the initiative there have been no proven adverse effects.

The 2015 Cochrane Review, which was an update of the 2000 York Review, recognized: a) the infeasibility of RCTs for large population-based public health initiatives, b) that RCTs would thus never be performed for fluoridation and c) the unfairness of grading observational studies against RCTs

"However, there has been much debate around the appropriateness of GRADE when applied to public health interventions, particularly for research questions where evidence from randomized controlled trials is never going to be available due to the unfeasibility of conducting such trials. Community water fluoridation is one such area."

And:

"we accept that the terminology of 'low quality' for evidence may appear too judgmental. We acknowledge that studies on water fluoridation, as for many public health interventions, are complex to undertake and that researchers are often constrained in their study design by practical considerations. For many public health interventions, the GRADE framework will always result in a rating of low or very low quality. Decision makers need to recognise that for some areas of research, the quality of the evidence will never be 'high' and that, as for any intervention, the recommendation for its use depends not just upon the quality of the evidence but also on factors such as acceptability and cost-effectiveness (Burford 2012)." (8)

Connett Reason #11: *Benefit is topical, not systemic. The Centers for Disease Control and Prevention has now acknowledged that the mechanism of fluoride's benefits are mainly topical, not systemic.*

There is no need whatsoever, therefore, to swallow fluoride to protect teeth. Since the purported benefit of fluoride is topical, and the risks are systemic, it makes more sense to deliver the fluoride directly to the tooth in the form of toothpaste.

Since swallowing fluoride is unnecessary, and potentially dangerous, there is no justification for forcing people (against their will) to ingest fluoride through their water supply.

Facts:

A. The effects of fluoride are both topical and systemic. The systemic effects are demonstrated in mild to very mild dental fluorosis, the only dental fluorosis in any manner associated with optimally fluoridated water. Mild to very mild dental fluorosis is a barely detectable effect which causes no adverse effect on cosmetics, form, function, or health of teeth. As peer-reviewed science has demonstrated mildly fluorosed teeth to be more decay resistant, many consider this effect to not even be undesirable, much less adverse. Dental decay resistance is a benefit. Dental fluorosis can only occur systemically. (2)

Additionally, saliva with fluoride incorporated into it provides a constant bathing of the teeth in a low concentration of fluoride all throughout the day, a very effective means of dental decay prevention. 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." (7)

Additionally, in a 2014 study Cho, et al. found:

"Conclusions: While 6-year-old children who had not ingested fluoridated water showed higher dft in theWF-ceased area than in the non-WF area, 11-year-old children in theWF-ceased area who had ingested fluoridated water for approximately 4 years after birth showed significantly lower DMFT than those in the non-WF area. This suggests that the systemic effect of fluoride intake through water fluoridation could be important for the prevention of dental caries." (9)

B. There is no valid, peer-reviewed scientific evidence of any "risks" of optimal level fluoride, systemic or otherwise.

C. Connett is unqualified to render a credible opinion as to how best to deliver fluoride protection to the human dentition.

D. Connett is unqualified to render a credible opinion as to the necessity of systemic delivery of fluoride to the human dentition.

E. No one is forced to do anything "against their will" in regard to water fluoridation. Because water flows from one's faucet does not, in any manner, mean that one is forced against their will to drink it.

Connett Reason #12: *Fluoridation is not necessary. Most western, industrialized countries have rejected water fluoridation, but have nevertheless experienced the same decline in childhood dental decay as fluoridated countries. (See data from World Health Organization presented graphically in Figure).*

Facts:

A. The reasons that other countries may not fluoridate their water systems are myriad and diverse. They are not a "rejection" of fluoridation.

The following is an outline of the situation with fluoridation throughout the world taken from a recent issue of the newsletter of the New Zealand National Fluoride Information Service:

Countries with widespread water fluoridation programmes include Australia, the United States of America, Canada, the United Kingdom, Ireland, Spain, Israel, Brazil, Brunei, Chile, Argentina, Colombia, Hong Kong, South Korea, Singapore and Malaysia. Countries with limited water fluoridation programmes include Vietnam, Fiji, Papua New Guinea, and South Korea.

Several countries are unable to introduce water fluoridation programmes due to technical, financial or sociocultural reasons. As an alternative, both salt and milk have been found to be reliable and convenient vehicles for increasing fluoride intake to an optimal level for hard to reach and low socio-economic communities. Studies have found them to be as effective as community water fluoridation schemes.

Some European, Latin American, and Caribbean countries, including France, Switzerland, Germany, Costa Rica, Colombia and Jamaica currently use fluoridated salt schemes. Mexico and most Latin American and Caribbean countries (apart from Argentina, Brazil, Chile and French Guyana) have or have had salt fluoridation programmes.

A smaller number of countries currently have fluoridated milk programmes, including Bulgaria, Chile, China, Peru, Russia, Thailand and the United Kingdom

Some country regions have optimal amounts of naturally occurring fluoride which provides good protection for oral health. examples of countries supplied with naturally fluoridated water at or around the optimum level needed to prevent dental decay include the United Kingdom (estimated 329,000 people), United States of America (estimated 10,078,000 people) Canada (estimated 300,000 people) and Australia (estimated 144,000 people).

It is estimated that 39.5 million people around the world have access to naturally fluoridated water at the optimal level although variations from one community to another over time make it difficult to calculate an accurate total.

Reasons for not fluoridating water supplies and/or using alternative ways of overcoming fluoride deficiencies are simply not restricted to attitudes towards freedom of choice and health concerns, although they may have been deciding factors for a few countries. This is another instance where opponents of fluoridation are making widespread simplistic claims (like Europe bans use of fluorosilicic acid) based on only a few facts, and ignoring (or hiding) the details. (10)

B. The graph which Connett uses to claim to be what "WHO data shows" is a skewed misrepresentation of WHO data fabricated by Connett's organization, "FAN". They have cherry-picked a couple of points out of a cluster of points for each country, plotted them and claimed that to be what "WHO data shows".

New Zealander biochemist, Ken Perrott, PhD, has nicely dissected and explained Connett's deceptive graph and manipulation of WHO data. This may be found:

<https://openparachute.wordpress.com/2015/08/12/fluoridation-connetts-naive-used-of-who-data-debunked/>

Connett Reason #13: Fluoridation's role in the decline of tooth decay is in serious doubt. The largest survey ever conducted in the US (over 39,000 children from 84 communities) by the National Institute of Dental Research showed little difference in tooth decay among children in fluoridated and non-fluoridated communities (Hileman 1989). According to NIDR researchers, the study found an average difference of only 0.6 DMFS (Decayed, Missing, and Filled Surfaces) in the permanent teeth of children aged 5-17 residing their entire lives in either fluoridated or unfluoridated areas (Brunelle & Carlos, 1990). This difference is less than one tooth surface, and less than 1% of the 100+ tooth surfaces available in a child's mouth. Large surveys from three Australian states have found even less of a benefit, with decay reductions ranging from 0 to 0.3 of one permanent tooth surface (Spencer 1996; Armfield & Spencer 2004). None of these studies have allowed for the possible delayed eruption of the teeth that may be caused by exposure to fluoride, for which there is some evidence (Komarek 2005). A one-year delay in eruption of the permanent teeth would eliminate the very small benefit recorded in these modern studies.

Facts:

A. The Brunelle and Carlos study is routinely read superficially by folks eager to discount fluoridation.

The paper can be quoted as averages to minimize the effect because the 0.6 surface is the effect averaged over both age and geography. 5 year olds have only 1 or two permanent teeth and there is essentially no difference between cavity rates at that early age yet they are counted in calculating the "average"

By age 17 the difference between fluoridated and non-fluoridated is about 1.6 surfaces and the benefit curve is sharply accelerating with a benefit just under 3 times higher than the 0.6 so commonly quoted.

-----Int J Occup Environ Health. 2005 Jul-Sep;11(3):322-6. Scientific evidence continues to support fluoridation of public water supplies. Pollick HF.

Also, in areas where fluoridation is common the Halo effect minimizes the differences between the two types of water systems. Thus the average results actually hide both the Halo Effect and the remarkable differences between communities where fluoridation is uncommon. In the Pacific Region then fluoridated at 19% about the same as Oregon today the difference was a whopping 61%

B. Connett continually attempts to marginalize dental disease. Even taking Connett's 0.6 of a tooth surface, as dental decay does not stop at defined borders on a tooth surface, prevention of decay on 0.6 of a tooth surface means prevention of dental decay on one tooth surface. More often than not, the restoration of one tooth surface requires the restoration of the adjacent surface. Thus, the prevention of decay on 0.6 of one surface prevents the need for restoration of 1-2 tooth surfaces in each of the 39,000 children of the NIDR survey. Prevention of decay in that 0.6 surface of Connett's means that 39,000 teeth have been spared dental decay, anesthesia, removal of decay with a dental drill and restoration with dental material. These teeth have also been spared the assault required if and when these restorations require replacement and the distinct potential of necessity of root canals and crowns at that point.

And, that is only if the decay in those 39,000 children has been treated. When this decay goes untreated, as it often does, the result can be a lifetime of extreme pain, debilitation, black discoloration and loss of numerous or even all of the teeth, development of serious medical conditions, and life-threatening infection all as a direct result of one untreated cavity on that 0.6 surface that Connett trivializes. People have died as a direct result of one untreated cavity in one tooth.

Prevention of decay in Connett's 0.6 surface is, in actuality, the prevention of dental disease and all of the potential, ensuing lifetime of devastating effects.

C. There is no merit to Connett's "delayed eruption" theory. His misrepresentation of Australian data to support this theory was exposed and confirmed by the Australian Research Center.

"However, while there is well established evidence of differences in dental development at similar ages across cultural and ethnicity groups, there is not evidence that water fluoridation is a cause of differential tooth eruption."

"Information recently published by the Fluoride Action Network based on Australian data, suggesting a substantial difference in tooth eruption between fluoridated and non fluoridated areas of Australia, have been confirmed as being based on erroneous data."

"The Australian research centre (ARCPOH) responsible for these data have confirmed the data error and reported that when the error is corrected there is little variation in the number of permanent teeth present at each age between children in Queensland and all of Australia." (12)

Additionally, from the peer-reviewed literature:

A). From Kumar, et al., 2014: "Conclusion: Exposure to fluoride in drinking water did not delay the eruption of permanent teeth. The observed difference in dental caries experience among children exposed to different fluoride levels could not be explained by the timing of eruption of permanent teeth." (13)

B). From Leroy, et al, 2003: "The present study indicates that the impact of any of the four fluoride exposure parameters on permanent tooth emergence was relatively minimal. Caries experience in the primary molars had a more pronounced impact on the timing of emergence of the successors than exposure to any of the four fluoride parameters." (14)

C). From Kunzel, et al. 1976: "Nearly 57000 children (aged from 4 years, 4 months to 15 years, 9 months) of Karl-Marx-Stadt (1.0 ppm F) and Plauen (0.2 ppm F) were examined to compare the mean eruption times of permanent teeth before and after 12 years of water fluoridation. Whereas a direct influence of internally administered fluorides is to be excluded, an indirect action on the premolars may be assumed with certainty. The delayed eruption of all premolars in children of the area with optimally fluoridated water was the only systematic effect which could be detected. This normalization is explained by a prolonged stay of the deciduous teeth in the dental arch which is due to a lesser caries prevalence." (15)

Connett Reason #14: *NIH-funded study on individual fluoride ingestion and tooth decay found no significant correlation. A multi-million dollar, U.S. National Institutes of Health (NIH)-funded study found no significant relationship between tooth decay and fluoride intake among children. (Warren 2009) This is the first time tooth decay has been investigated as a function of individual exposure (as opposed to mere residence in a fluoridated community).*

Facts:

Connett has plucked a sentence from the Warren, Levy study and used it out-of-context to misrepresent the findings of this study. Warren, et al. set out to determine whether the optimal level is that for caries prevention, minimizing of dental fluorosis, or both. What they found was that while it appeared that the fluorosis was the factor most sensitive to different fluoride levels within the optimal range, due to overlap, halo, etc, it was too difficult to determine total fluoride intake to a precise enough level to determine an exact optimal level at which minimum dental fluorosis would occur. It was also concluded, however, that, given that the majority of dental fluorosis is of little or no esthetic concern, with it even being viewed by many as being a positive, establishing a precise level at which dental fluorosis would not occur is unwarranted.

Warren, Levy, et al, statement utilized out-of-context by Connett:

"These findings suggest that achieving a caries-free status may have relatively little to do with fluoride intake, while fluorosis is clearly more dependent on fluoride intake."

Further comments from Warren, Levy, et al.:

"Despite the limitations, the study provides the only recent, outcome based assessment of the "optimal" fluoride intake, and as such, it appears that while the generally accepted range of 0.05 to 0.07 mg F/kg bw may still be associated with caries prevention, it may not be optimal in preventing fluorosis." (16)

From a statement by co-author Steve Levy:

"1) We looked at total F intake from almost all sources (water, beverages, selected foods that absorb water, dietary F supplements, dentifrice)(they acknowledge this ok in their point #3)

2) But we did not say that we "found no relation between tooth decay and the amount of fluoride swallowed", but that it is very complicated--e.g., those with caries but not mild dental fluorosis tended to have lower F intake than the other 3 sub-groups

3) And in many other published articles and abstracts as well as unpublished data, we consistently see ~14-20% less decay among those in F areas, across exams at several ages (for prevalence at 5, 9, 13 and 17 years and incidence across 4-year intervals) --even after adjusting for all that we can (brushing with F dentifrice, SES, dietary exposures, F supplements, etc.)"

-Steven M. Levy, DDS, MPH
Wright-Bush-Shreves Endowed Professor of Research
Department of Preventive & Community Dentistry
University of Iowa
College of Dentistry

Connett Reason #15: *Tooth decay is high in low-income communities that have been fluoridated for years. Despite some claims to the contrary, water fluoridation cannot prevent the oral health crises that result from rampant poverty, inadequate nutrition, and lack of access to dental care. There have been numerous reports of severe dental crises in low-income neighborhoods of US cities that have been fluoridated for over 20 years (e.g., Boston, Cincinnati, New York City, and Pittsburgh). In addition, research has repeatedly found fluoridation to be ineffective at preventing the most serious oral health problem facing poor children, namely "baby bottle tooth decay," otherwise known as early childhood caries (Barnes 1992; Shiboski 2003).*

Facts:

Water fluoridation was never meant, or expected, to eradicate all dental decay. It is simply an effective use of a mineral that we ingest in our water anyway, fluoridated or not. It has been long since determined that by raising the existing level of fluoride ions in water by a minuscule amount, to the optimal level, a significant resistance to dental decay is imparted to the teeth through the ingestion of this water. That all dental decay is not eradicated by fluoridation is not a reason for entire populations to not obtain maximum benefit from this mineral that is ingested in water.

Connett Reason #16: *Tooth decay does not go up when fluoridation is stopped. Where fluoridation has been discontinued in communities from Canada, the former East Germany, Cuba and Finland, dental decay has not increased but has generally continued to decrease (Maupomé 2001; Kunzel & Fischer, 1997, 2000; Kunzel 2000; Seppa 2000).*

Facts:

This is a clear misrepresentation of these studies. The studies demonstrate the complex nature of decay patterns after cessation of fluoridation, and the continuation of the positive effects of

fluoridation even after cessation. They did not indicate an ineffectiveness of fluoridation as Connett attempts to portray.

A. Maupome and Levy:

"Our results suggest a complicated pattern of disease following cessation of fluoridation. Multiple sources of fluoride besides water fluoridation have made it more difficult to detect changes in the epidemiological profile of a population with generally low caries experience, and living in an affluent setting with widely accessible dental services. There are, however, subtle differences in caries and caries treatment experience between children living in fluoridated and fluoridation-ended areas." (17)

B. Kunzel and Fischer: East Germany

"Additional surveys (N=1017) carried out in the formerly-fluoridated towns of Spremberg (N=9042) and Zittau (N=6232) were carried out in order to support this unexpected epidemiological finding. Pupils from these towns, aged 8/9-, 12/13- and 15/16-years, have been examined repeatedly over the last 20 years using standardised caries-methodological procedures. While the data provided additional support for the established fact of a caries reduction brought about by the fluoridation of drinking water (48% on average), it has also provided further support for the contention that caries prevalence may continue to fall after the reduction of fluoride concentration in the water supply from about 1 ppm to below 0.2 ppm F. "

"The causes for the changed caries trend were seen on the one hand in improvements in attitudes towards oral health behaviour and, on the other hand, to the broader availability and application of preventive measures (F-salt, F-toothpastes, fissure sealants etc.). There is, however, still no definitive explanation for the current pattern and further analysis of future caries trends in the formerly fluoridated towns would therefore seem to be necessary." (18)

C. Kunzel and Fischer- Cuba

"while the percentage of caries-free children of this age group had increased from 4.8 (1973) and 33.3 (1982) up to 55.2%. A possible explanation for this unexpected finding and for the good oral health status of the children in La Salud is the effect of the school mouthrinsing programme, which has involved fortnightly mouthrinses with 0.2% NaF solutions (i.e. 15 times/year) since 1990." (19)

D. Seppa:

Results: "In 1992, the mean DMFS values were lower in the fluoridated town for the two older age groups, the percentage differences for 12- and 15-year-olds being 37% and 29%, respectively. For the two younger age groups no meaningful differences could be found. In 1995, the only difference with possible clinical significance was found in the 15-year-olds in favor of the fluoridated town (18%). In 1995, a decline in caries was seen in the two older age groups in the nonfluoridated town. In spite of discontinued water fluoridation, no indication of an increasing trend of caries could be found in Kuopio. The mean numbers of fluoride varnish and

sealant applications decreased sharply in both towns between 1992 and 1995. In spite of that caries declined." (20)

Connett Reason #17: *Tooth decay was coming down before fluoridation started. Modern research shows that decay rates were coming down before fluoridation was introduced in Australia and New Zealand and have continued to decline even after its benefits would have been maximized. (Colquhoun 1997; Diesendorf 1986). As the following figure indicates, many other factors are responsible for the decline of tooth decay that has been universally reported throughout the western world.*

Facts:

Colquhoun and Diesendorf were two long time antifluoridationists whose "modern research" has been long since discredited.

From Newbrun, and Horowitz in Perspectives in Biology and Medicine:

"In 1997, the journal Perspectives in Biology and Medicine published an opinion piece, "Why I changed my mind about water fluoridation," by John Colquhoun [1]. Although the journal's stated purpose is to convey new ideas or stimulate original thought in biological and medical sciences, Colquhoun presented no new data. His paper rehashed earlier criticisms of water fluoridation, using selective and highly biased citations of the scientific and nonscientific literature [2-10]."

"Colquhoun cites several studies, including his own findings [2,3], which purportedly show that water fluoridation has no significant beneficial effect in reducing caries prevalence. When comparisons are made between fluoridated and non-fluoridated communities in a properly designed research study, examiners are standardized and calibrated to agreed-upon criteria for diagnosis. However, Colquhoun's data were not recorded for this purpose, as he simply took from school dental clinics the treatment records, in which caries diagnoses were not standardized. The examined children were treated by different school dental nurses, who were untrained in epidemiological survey methods, not standardized in their interpretation of diagnostic criteria, and not calibrated to an expert examiner in their examining techniques. The examiners were likely to have had their own criteria for what constituted a cavity and what teeth required restorative care. Worse still, Colquhoun made no effort to ensure that the children actually resided in either the fluoridated and non-fluoridated communities, but analyzed the data simply on the basis of the district in which the school was located, not where the child lived. Subsequently, it was shown "that 38 percent of the 12-13 year-old children who attended school in Onehunga, the low social class area described by Colquhoun [2], actually lived in high social rank areas in Auckland, districts that received fluoridated drinking water. This confounding of residence and fluoride histories produced serious misclassifications and severely compromised Colquhoun's data, and hence his conclusions" [13]." (21)

From Spencer in the Australian and New Zealand Journal of Public Health:

"Numerous examples of bias in the identification, selection and appraisal of the evidence on water fluoridation presented by Diesendorf et al. are developed. Further, this reaction paper puts

forward both studies and appraisal indicating that water fluoridation should continue to be regarded as a safe and effective public health measure" (22)

Connett Reason#18: *The studies that launched fluoridation were methodologically flawed. The early trials conducted between 1945 and 1955 in North America that helped to launch fluoridation, have been heavily criticized for their poor methodology and poor choice of control communities (De Stefano 1954; Sutton 1959, 1960, 1996; Ziegelbecker 1970). According to Dr. Hubert Arnold, a statistician from the University of California at Davis, the early fluoridation trials "are especially rich in fallacies, improper design, invalid use of statistical methods, omissions of contrary data, and just plain muddleheadedness and hebetude." Serious questions have also been raised about Trendley Dean's (the father of fluoridation) famous 21-city study from 1942 (Ziegelbecker 1981).*

Facts:

Whatever problems Connett claims there to be with half century old studies are irrelevant. Countless peer-reviewed scientific studies clearly demonstrate the effectiveness of fluoridation in the prevention of dental decay in entire populations, many from within the past 5 years. A list of some of these studies follows this document.

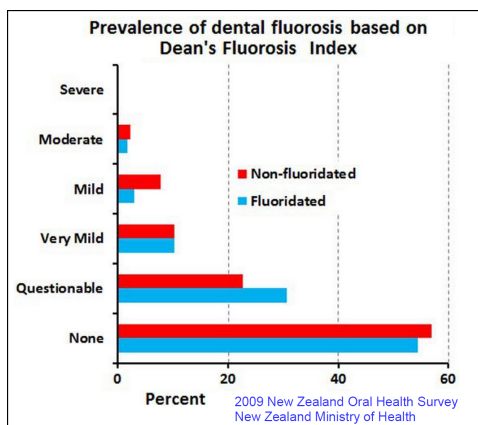
Connett Reason #19: *Children are being over-exposed to fluoride. The fluoridation program has massively failed to achieve one of its key objectives, i.e., to lower dental decay rates while limiting the occurrence of dental fluorosis (a discoloring of tooth enamel caused by too much fluoride. The goal of the early promoters of fluoridation was to limit dental fluorosis (in its very mild form) to 10% of children (NRC 1993, pp. 6-7). In 2010, however, the Centers for Disease Control and Prevention (CDC) reported that 41% of American adolescents had dental fluorosis, with 8.6% having mild fluorosis and 3.6% having either moderate or severe dental fluorosis (Beltran-Aguilar 2010). As the 41% prevalence figure is a national average and includes children living in fluoridated and unfluoridated areas, the fluorosis rate in fluoridated communities will obviously be higher. The British Government's York Review estimated that up to 48% of children in fluoridated areas worldwide have dental fluorosis in all forms, with 12.5% having fluorosis of aesthetic concern (McDonagh, 2000).*

Facts:

1. Connett presents no substantiation for his claim that fluoridation has failed to lower dental decay rates. The peer-reviewed science disagrees with his assessment.

2. Mild dental fluorosis is a barely detectable effect which causes no adverse effect on cosmetics, form, function, or health of teeth. As peer-reviewed science has demonstrated mildly fluorosed teeth to be more decay resistant, many consider this effect to not even be undesirable, much less adverse. (2)

3. Connett's unsubstantiated claim that "the fluorosis rate in fluoridated communities will obviously be higher", is false. As can be seen from the below graph from the 2009 New Zealand Oral Health Survey, dental fluorosis occurs nearly equally between fluoridated and non-fluoridated communities, with occurrence in non-fluoridated communities slightly higher. This demonstrates that water fluoridation is not the issue with dental fluorosis.



Connett Reason #20: *The highest doses of fluoride are going to bottle-fed babies. Because of their sole reliance on liquids for their food intake, infants consuming formula made with fluoridated water have the highest exposure to fluoride, by bodyweight, in the population. Because infant exposure to fluoridated water has been repeatedly found to be a major risk factor for developing dental fluorosis later in life (Marshall 2004; Hong 2006; Levy 2010), a number of dental researchers have recommended that parents of newborns not use fluoridated water when reconstituting formula (Ekstrand 1996; Pendrys 1998; Fomon 2000; Brothwell 2003; Marshall 2004). Even the American Dental Association (ADA), the most ardent institutional proponent of fluoridation, distributed a November 6, 2006 email alert to its members recommending that parents be advised that formula should be made with “low or no-fluoride water.” Unfortunately, the ADA has done little to get this information into the hands of parents. As a result, many parents remain unaware of the fluorosis risk from infant exposure to fluoridated water.*

Facts:

Connett misrepresents these studies in regard to powdered infant formulas. The concerns in the studies was with the fluoride content of infant formula, not with optimally fluoridated water, as Connett misrepresents them to be. Neither these studies, nor the ADA have recommended or advised use of non-fluoridated water with powdered formula. Due to the existing fluoride content of the powdered formula, the use of fluoridated water to reconstitute it chances mild dental fluorosis in the developing dentition. Mild dental fluorosis is a barely detectable effect which causes no adverse effect on cosmetics, form, function, or health of teeth. Pendrys 1998 stated that, due to this fluoride content of powdered formula, the most prudent action may be to use pre-mixed formula, most if not all, of which are made with low fluoride content water.

The ADA has not "alerted" anyone about powdered formula, and has not "recommended that parents be advised that formula should be made with low or no-fluoride water". Due to the existing fluoride content of powdered formula, for those parents who are concerned with even mild dental fluorosis in spite of the dental decay resistance benefit, the ADA and the CDC have simply suggested the use of either low fluoride content water to reconstitute the powder, or use of pre-mixed formula.

Connett Reason #21: *Dental fluorosis may be an indicator of wider systemic damage. There have been many suggestions as to the possible biochemical mechanisms underlying the development of dental fluorosis (Matsuo 1998; Den Besten 1999; Sharma 2008; Duan 2011; Tye 2011) and they are complicated for a lay reader. While promoters of fluoridation are content to dismiss dental fluorosis (in its milder forms) as merely a cosmetic effect, it is rash to assume that fluoride is not impacting other developing tissues when it is visibly damaging the teeth by some biochemical mechanism (Groth 1973; Colquhoun 1997). Moreover, ingested fluoride can only cause dental fluorosis during the period before the permanent teeth have erupted (6-8 years), other tissues are potentially susceptible to damage throughout life. For example, in areas of naturally high levels of fluoride the first indicator of harm is dental fluorosis in children. In the same communities many older people develop skeletal fluorosis.*

Facts:

A. Connett offers his personal opinions and speculation here, in lieu of facts and evidence. He offers no valid, peer-reviewed scientific evidence to support his speculation that dental fluorosis is an indicator of negative impact on “other developing tissues”

B. The “promoters of fluoridation whom [Connett claims] are content to dismiss dental fluorosis (in its milder forms) as merely a cosmetic effect” include the 2006 NRC Committee on Fluoride in Drinking Water, from whose final report Connett frequently plucks out-of-context quotes as seeming support for his position. This Committee considered only the severe level of dental fluorosis to be an adverse effect, with the other levels considered to simply be cosmetic effects. This committee also clearly stated in its report that severe dental fluorosis does not occur in communities with a water fluoride content of 2.0 mg/liter, or less. Water is fluoridated at 0.7 mg/liter. (3)

Connett Reason #22: *Fluoride may damage the brain. According to the National Research Council (2006), “it is apparent that fluorides have the ability to interfere with the functions of the brain.” In a review of the literature commissioned by the US Environmental Protection Agency (EPA), fluoride has been listed among about 100 chemicals for which there is “substantial evidence of developmental neurotoxicity.” Animal experiments show that fluoride accumulates in the brain and alters mental behavior in a manner consistent with a neurotoxic agent (Mullenix 1995). In total, there have now been over 100 animal experiments showing that fluoride can damage the brain and impact learning and behavior. According to fluoridation proponents, these animal studies can be ignored because high doses were used. However, it is important to note that rats generally require five times more fluoride to reach the same plasma levels in humans (Sawan 2010). Further, one animal experiment found effects at remarkably low doses (Varner 1998). In this study, rats fed for one year with 1 ppm fluoride in their water (the same level used in fluoridation programs), using either sodium fluoride or aluminum fluoride, had morphological changes to their kidneys and brains, an increased uptake of aluminum in the brain, and the formation of beta-amyloid deposits which are associated with Alzheimer’s disease. Other animal studies have found effects on the brain at water fluoride levels as low as 5 ppm (Liu 2010).*

Facts:

A. The 2006 NRC Committee on Fluoride in Drinking Water was charged to evaluate the adequacy of the EPA primary and secondary MCLs for fluoride, 4.0 ppm and 2.0 ppm respectively, to protect against adverse effects. The final recommendation of this Committee

was for the primary MCL to be lowered from 4.0 ppm. The sole reasons cited by the Committee for this recommendation were the risk of severe dental fluorosis, bone fracture, and skeletal fluorosis, with chronic ingestion of water with a fluoride content of 4.0 ppm or greater. Nothing else. Had this Committee deemed there to be any other concerns with fluoride at this level, it would have been responsible for stating so and recommending accordingly. It did not.

Additionally, the NRC Committee made no recommendation to lower the secondary MCL of 2.0 ppm. Water is fluoridated at 0.7 ppm, one third the level which the 2006 NRC Committee on Fluoride in Drinking Water made no recommendation to lower. (3)

In March of 2013, Dr. John Doull, Chair of the 2006 NRC Committee on Fluoride in Drinking Water made the following statement:

"I do not believe there is any valid, scientific reason for fearing adverse health conditions from the consumption of water fluoridated at the optimal level"

----John Doull, MD, PhD, Chair of the National Academy of Sciences, National Research Council 2006 Committee Report on Fluoride in Drinking Water (23)

B. In regard to claims of neurotoxicity:

i. Broadbent, et al. concluded in 2015:

"Results. No significant differences in IQ because of fluoride exposure were noted. These findings held after adjusting for potential confounding variables, including sex, socioeconomic status, breastfeeding, and birth weight (as well as educational attainment for adult IQ outcomes)."

"Conclusions. These findings do not support the assertion that fluoride in the context of CWF programs is neurotoxic. Associations between very high fluoride exposure and low IQ reported in previous studies may have been affected by confounding, particularly by urban or rural status" (11)

ii. The Scientific Committee on Health and Environmental Risks (SCHER) concluded in 2011:

"SCHER agrees that there is not enough evidence to conclude that fluoride in drinking water at concentrations permitted in the EU may impair the IQ of children. SCHER also agrees that a biological plausibility for the link between fluoridated water and IQ has not been established." (24)

iii. Mang, et al. concluded:

"A certain low dose of fluoride intake may play a potential protective rather than harmful role in cognitive functions; however, high fluoride exposure is a potential risk factor for cognitive impairment." (30)

iv. In her doctoral dissertation at the University of Michigan, Thomas reported:

“Overall, this investigation found no evidence of a detectable adverse outcome on offspring neurobehavioral development associated with maternal fluoride exposure during pregnancy. Fluoride measured in pregnancy urine and plasma was not significantly associated with child’s MDI at any age, and it did not differentially affect MDI at ages 1, 2, and 3. Furthermore, trimester-specific measures of maternal fluoride measures were not significantly associated with offspring MDI.” (31)

v. Aggeborn and O’hman concluded:

“First, we investigate and confirm the long-established positive relationship between fluoride and dental health. Second, we find precisely estimated zero effects on cognitive ability, non-cognitive ability and education. We do not find any evidence that fluoride levels below 1.5 mg/l have negative effects. Third, we find evidence that fluoride improves labor market outcome later in life, which confirms that good dental health is a positive factor on the labor market.” (32)

D. In regard to Mullinex, Ross and Daston concluded:

"We do not believe the study by Mullinex, et al. can be interpreted in any way as indicating the potential for NaF to be a neurotoxicant". (25)

E. In regard to animal studies:

From a 2013 article in *American Council on Science and Health*:

“We have been saying that mice are not little men since ACSH’s founding in 1978, adds ACSH’s Dr. Gilbert Ross. We see the same thing happening with animal testing of all sorts of alleged toxic chemicals, which lay low rodents in various tests, but are quite safe for humans in typical exposures. Hopefully, this revelation, albeit restricted in this study to mice and a few medical conditions, will be useful to illustrate the lack of analogy between rodent and human toxicology and physiology.” (33)

Connett Reason #23: *Fluoride may lower IQ. There have now been 33 studies from China, Iran, India and Mexico that have reported an association between fluoride exposure and reduced IQ. One of these studies (Lin 1991) indicates that even just moderate levels of fluoride exposure (e.g., 0.9 ppm in the water) can exacerbate the neurological defects of iodine deficiency. Other studies have found IQ reductions at 1.9 ppm (Xiang 2003a,b); 0.3-3.0 ppm (Ding 2011); 1.8-3.9 ppm (Xu 1994); 2.0 ppm (Yao 1996, 1997); 2.1-3.2 ppm (An 1992); 2.38 ppm (Poureslami 2011); 2.45 ppm (Eswar 2011); 2.5 ppm (Seraj 2006); 2.85 ppm (Hong 2001); 2.97 ppm (Wang 2001, Yang 1994); 3.15 ppm (Lu 2000); 4.12 ppm (Zhao 1996). In the Ding study, each 1 ppm increase of fluoride in urine was associated with a loss of 0.59 IQ points. None of these studies indicate an adequate margin of safety to protect all children drinking artificially fluoridated water from this affect. According to the National Research Council (2006), “the consistency of the results [in fluoride/IQ studies] appears significant enough to warrant additional research on the effects of fluoride on intelligence.” The NRC’s conclusion has recently been amplified by a team of Harvard scientists whose fluoride/IQ meta-review concludes that fluoride’s impact on the developing brain should be a “high research priority.” (Choi et al., 2012). Except for one small IQ study from New Zealand (Spittle 1998) no fluoridating country has yet investigated the matter.*

Facts:

A. The "reduced IQ studies" are a reference to a 2011 review of 27 Chinese studies dug out of obscure Chinese journals by researchers Phillippe Grandjean and Anna Choi. These studies were of the effects of high levels of fluoride (as high as 11.5 ppm) in the well-water of various Chinese, Mongolian, and Iranian villages.

As Grandjean and Choi are members of the faculty of the Harvard School of Public Health, antifluoridationists erroneously refer to this study as the "Harvard Study". After excluding studies which were so seriously flawed that they did not even warrant review, Grandjean and Choi ended up with 27 in their review. By their own admission these studies had key information missing, inadequate control for confounders, and questionable methodologies. These 27 studies were so seriously flawed that Grandjean and Choi were led to issue a public statement in March, 2012 that the studies should not be used to judge water fluoridation in the US. This obviously has not stopped "FAN" from doing so anyway.

"These results do not allow us to make any judgment regarding possible levels of risk at levels of exposure typical for water fluoridation in the U.S. On the other hand, neither can it be concluded that no risk is present. We therefore recommend further research to clarify what role fluoride exposure levels may play in possible adverse effects on brain development, so that future risk assessments can properly take into regard this possible hazard."

--Anna Choi, research scientist in the Department of Environmental Health at HSPH, lead author, and Phillippe Grandjean, adjunct professor of environmental health at HSPH, senior author (34)

B. The 2006 NRC Committee on Fluoride in Drinking Water was charged to evaluate the adequacy of the EPA primary and secondary MCLs for fluoride, 4.0 ppm and 2.0 ppm respectively, to protect against adverse effects. The final recommendation of this Committee was for the primary MCL to be lowered from 4.0 ppm. The sole reasons cited by the Committee for this recommendation were the risk of severe dental fluorosis, bone fracture, and skeletal fluorosis, with chronic ingestion of water with a fluoride content of 4.0 ppm or greater. Nothing else. Had this Committee deemed there to be any concerns with neurotoxicity attributable to fluoride at this level, it would have been responsible for stating so and recommending accordingly. It did not.

Additionally, the NRC Committee made no recommendation to lower the secondary MCL of 2.0 ppm. Water is fluoridated at 0.7 ppm. one third the level which the 2006 NRC Committee on Fluoride in Drinking Water made no recommendation to lower.

C. Broadbent of New Zealand, a fluoridated country, did, indeed, "investigate the matter" in 2014. In a 2014 study published in the American Journal of Public Health, Broadbent, et al. concluded:

"These findings do not support the assertion that fluoride in the context of CWF programs is neurotoxic. Associations between very high fluoride exposure and low IQ reported in previous studies may have been affected by confounding, particularly by urban or rural status." (11)

Connett Reason #24: *Fluoride may cause non-IQ neurotoxic effects. Reduced IQ is not the only neurotoxic effect that may result from fluoride exposure. At least three human studies have reported an association between fluoride exposure and impaired visual-spatial organization (Calderon 2000; Li 2004; Rocha-Amador 2009); while four other studies have found an association between prenatal fluoride exposure and fetal brain damage (Han 1989; Du 1992; Dong 1993; Yu 1996).*

Facts:

A. See introductory comments about Connett's misuse and misrepresentation of scientific studies.

B. Calderon 2000 studied groups in which "Mean levels of F in water were almost 3.5 and 6 times higher than WHO limits in Salitral and 5 de Febrero, respectively." (26)

C. Li studied effects of high fluoride levels. According to the version of this study translated by "Fluoride Action Network", and utilized by Connett, these levels ranged from 1.7 mg/liter to 6.0 mg/liter. (27)

D. Rocha-Amador studied effects of high levels of environmental pollutants. As stated in the study, there was no control for low quality of education. According to the abstract of this study posted on the website of "Fluoride Action Network", "The aim of this study (Rocha-Amador) was to assess the value of the children's version of the Rey-Osterrieth Complex Figure Test as a screening test in a population exposed to different mixtures of neurotoxicants."

"This study provided evidence that children included in this research are living in high risk areas and were exposed to neurotoxicants. Poor performance in the test could be explained in some way by F, Pb, As or DDE exposure, however social factors or the low quality of school education prevalent in the areas could be playing an important role." (28)

Connett Reason #25: *Fluoride affects the pineal gland. Studies by Jennifer Luke (2001) show that fluoride accumulates in the human pineal gland to very high levels. In her Ph.D. thesis, Luke has also shown in animal studies that fluoride reduces melatonin production and leads to an earlier onset of puberty (Luke 1997). Consistent with Luke's findings, one of the earliest fluoridation trials in the U.S. (Schlesinger 1956) reported that on average young girls in the fluoridated community reached menstruation 5 months earlier than girls in the non-fluoridated community. Inexplicably, no fluoridating country has attempted to reproduce either Luke's or Schlesinger's findings or examine the issue any further.*

Facts:

There is no valid, peer-reviewed scientific evidence of any adverse effect from accumulation of fluoride resultant of optimally fluoridated water. Humans have been ingesting fluoride in the range of the optimal level since the beginning of time. To suddenly deem this fluoride to be causing problems with menstruation is completely without merit.

Connett Reason #26: *Fluoride affects thyroid function. According to the U.S. National Research Council (2006), "several lines of information indicate an effect of fluoride exposure on thyroid function." In the Ukraine, Bachinskii (1985) found a lowering of thyroid function, among otherwise healthy people, at 2.3 ppm fluoride in water. In the middle of the 20th century, fluoride*

was prescribed by a number of European doctors to reduce the activity of the thyroid gland for those suffering from hyperthyroidism (overactive thyroid) (Stecher 1960; Waldbott 1978). According to a clinical study by Galletti and Joyet (1958), the thyroid function of hyperthyroid patients was effectively reduced at just 2.3 to 4.5 mg/day of fluoride ion. To put this finding in perspective, the Department of Health and Human Services (DHHS, 1991) has estimated that total fluoride exposure in fluoridated communities ranges from 1.6 to 6.6 mg/day. This is a remarkable fact, particularly considering the rampant and increasing problem of hypothyroidism (underactive thyroid) in the United States and other fluoridated countries. Symptoms of hypothyroidism include depression, fatigue, weight gain, muscle and joint pains, increased cholesterol levels, and heart disease. In 2010, the second most prescribed drug of the year was Synthroid (sodium levothyroxine) which is a hormone replacement drug used to treat an underactive thyroid.

Facts:

Connett provides nothing but speculation based on half-century old opinions of antifluoridationists such as Waldbott, and others. There is no valid, peer-reviewed scientific evidence of any adverse effect on the thyroid from optimally fluoridated water.

The US Institute of Medicine established daily upper limit of fluoride intake before adverse effects may occur in those 8 years and above, is 10 mg. The daily upper limit is considerably less for 0-8 years, however this only due to chance of mild dental fluorosis during those teeth developing years, not due to any risk to the thyroid or anything else.

B. The 2006 NRC Committee on Fluoride in Drinking Water expressed no concern with adverse effects on the thyroid in its final recommendation. The only concerns expressed by this committee in its final recommendation were risk of severe dental fluorosis, bone fracture, and skeletal fluorosis with chronic ingestion of water with a fluoride content of 4.0 mg/liter or greater. Had this committee any concerns with thyroid at this level of fluoride, it would have been responsible for so stating and recommending accordingly. It did not.

C. BRITISH FLUORIDATION SOCIETY STATEMENT (January 2006) on the absence of an association between water fluoridation and thyroid disorders.

This statement has been reviewed and endorsed by the British Thyroid Association (BTA); however, the BTA would recommend that appropriate monitoring of thyroid status should be considered in areas where fluoridation is introduced to enable an ongoing epidemiological evidence base for thyroid status with fluoridation to be created.

The available medical and scientific evidence suggests an absence of an association between water fluoridation and thyroid disorders.

Many major reviews of the relevant scientific literature around the world support this conclusion. Of particular importance are:

an exhaustive review conducted in 1976 by an expert scientific committee of the Royal College of Physicians of England; a systematic review in 2000 by the NHS Centre for Reviews and Dissemination at the University of York; and, a 2002 review by an international group of experts for the International Programme on Chemical Safety (IPCS), under the joint sponsorship of the World Health Organisation (WHO), the United Nations Environment Programme (UNEP), and

the International Labour Organisation (ILO). None has found any credible evidence of an association between water fluoridation and any disorder of the thyroid.

Report of Royal College of Physicians

A scientific committee was established by the Royal College of Physicians to review whether, and to what extent, water fluoridation benefited people's teeth and whether there were any harmful effects to general human health. As well as confirming that water fluoridation reduces levels of tooth decay, the review also found that it was safe.

Specifically, the report concluded that "there is no evidence that fluoride is responsible for any disorder of the thyroid". It also confirmed that iodine deficiency was the root cause of goitre, and that fluoride does not significantly influence the thyroid's uptake of iodine.

The University of York Review

Published in 2000, the York Systematic review identified over three thousand references in total. However, they found no scientific studies of an acceptable scientific standard that would support suggestions of an association between water fluoridation and thyroid disorders, including goitre, in the populations drinking fluoridated water.

When the Medical Research Council subsequently used the York report as a basis for determining whether further research on any aspect of water fluoridation was needed, it concluded on the basis of the evidence already available that new research on fluoride and thyroid disorders should be regarded as a low priority.

Review by the International Programme on Chemical Safety (IPCS)

The IPCS review of fluoride was one of several published by the World Health Organisation intended to "provide critical reviews on the effects on human health and the environment of chemicals and of combinations of chemicals ...", and to "assist national and international authorities in making risk assessments and subsequent risk management decisions." As such, it examined evidence on fluoride relevant to all aspects of human health.

The review, which included 788 original studies from the worldwide scientific literature – both published and unpublished - identified no evidence of an association between fluoride and thyroid dysfunction in humans.

Experience in the UK's most extensively fluoridated region

The conclusions of these authoritative reviews are mirrored by the experience of specialist doctors diagnosing and treating thyroid disorders in hospitals in the West Midlands, which has had fluoridation schemes in operation since the mid-1960s and which is today the most extensively fluoridated region of the United Kingdom. Around seven out of ten people in the West Midlands now drink water whose natural fluoride content has been topped up to the optimum for dental health of one part of fluoride per million parts of water.

Dr Andy Toogood, a consultant endocrinologist in the Department of Medicine at the Queen Elizabeth Hospital in Birmingham, says that he and his colleagues have seen nothing to suggest a rise in thyroid disorder cases resulting from water fluoridation.

Nor have public health officials who monitor trends in disease across the West Midlands detected any impact on the health of local populations drinking fluoridated water - other than a reduction in tooth decay levels which puts children living in the West Midlands among the best in the country for dental health.

Connett Reason #27: *Fluoride causes arthritic symptoms. Some of the early symptoms of skeletal fluorosis (a fluoride-induced bone and joint disease that impacts millions of people in India, China, and Africa), mimic the symptoms of arthritis (Singh 1963; Franke 1975; Teotia 1976; Carnow 1981; Czerwinski 1988; DHHS 1991). According to a review on fluoridation published in Chemical & Engineering News, "Because some of the clinical symptoms mimic arthritis, the first two clinical phases of skeletal fluorosis could be easily misdiagnosed" (Hileman 1988). Few, if any, studies have been done to determine the extent of this misdiagnosis, and whether the high prevalence of arthritis in America (1 in 3 Americans have some form of arthritis – CDC, 2002) and other fluoridated countries is related to growing fluoride exposure, which is highly plausible. Even when individuals in the U.S. suffer advanced forms of skeletal fluorosis (from drinking large amounts of tea), it has taken years of misdiagnoses before doctors finally correctly diagnosed the condition as fluorosis.*

Facts:

There is no valid, peer-reviewed scientific evidence of arthritis, or arthritic symptoms being attributable to optimally fluoridated water. Skeletal fluorosis is so rare in the United States as to be nearly non-existent. Connett has no foundation for his claim that the highly respected healthcare system of the United States has repeatedly and continually "misdiagnosed" skeletal fluorosis.

Connett Reason #28: *Fluoride damages bone. An early fluoridation trial (Newburgh-Kingston 1945-55) found a significant two-fold increase in cortical bone defects among children in the fluoridated community (Schlesinger 1956). The cortical bone is the outside layer of the bone and is important to protect against fracture. While this result was not considered important at the time with respect to bone fractures, it did prompt questions about a possible link to osteosarcoma (Caffey, 1955; NAS, 1977). In 2001, Alarcon-Herrera and co-workers reported a linear correlation between the severity of dental fluorosis and the frequency of bone fractures in both children and adults in a high fluoride area in Mexico.*

Facts:

Interestingly, Connett constantly claims that water fluoridation is based on old studies and out-date science. Yet, as clearly seen in this claim of his, it is Connett who relies on half-century old information which he misconstrues and uses as innuendo to further his speculation of association of optimally fluoridated water with osteosarcoma.

The peer-reviewed science is clear on this issue. There is no valid, peer-reviewed scientific evidence of any association of optimally fluoridated water with osteosarcoma, or any other bone disorder.

Chochra, Limeback, et al. found:

"Analysis of our data suggests that the variability in heterogenous urban populations may be too high for the effects, if any, of low-level fluoride administration on skeletal tissue to be discerned (35)

In regard to Osteosarcoma claims:

A. Levy, et al. (2011):

"Conclusion

Our ecological analysis suggests that the water fluoridation status in the continental U.S. has no influence on osteosarcoma incidence rates during childhood and adolescence." (36)

B. New Zealand Cancer Society (2013):

"At this time there is no evidence that community water fluoridation programmes cause osteosarcoma. A number of studies have looked at whether there has been an increase in osteosarcoma following the introduction of fluoride to community drinking water. Studies have been published looking at communities in Ireland and the United States. These studies have not been able to show any changes. As the levels of fluoride in New Zealand are similar to those used in these countries, similar findings are likely to be found here as well."

"Osteosarcoma is a very rare cancer in New Zealand with only around 14 cases diagnosed each year. The peak age is between 10 and 19 years in both boys and girls. To date there has been no change to the numbers of cases diagnosed each year as recorded by the New Zealand Cancer register."

"If there was a relationship between community water fluoridation and osteosarcoma, a change in the number of cases reported each year would be expected by now (after 50 years of CWF in some communities) when comparing areas with CWF with those without CWF." (37)

C. Comber, Deady, et al. (2011)

"The results of this study do not support the hypothesis that osteosarcoma incidence in the island of Ireland is significantly related to public water fluoridation. However, this conclusion must be qualified, in view of the relative rarity of the cancer and the correspondingly wide confidence intervals of the relative risk estimates." (38)

D. Hayes, Williams, et al. (2011)

"The association between fluoride and risk for osteosarcoma is controversial. The purpose of this study was to determine if bone fluoride levels are higher in individuals with osteosarcoma. Incident cases of osteosarcoma (N = 137) and tumor controls (N = 51) were identified by orthopedic physicians, and segments of tumor-adjacent bone and iliac crest bone were

analyzed for fluoride content. Logistic regression adjusted for age and sex and potential confounders of osteosarcoma was used to estimate odds ratios (OR) and 95% confidence intervals (CI). There was no significant difference in bone fluoride levels between cases and controls. The OR adjusted for age, gender, and a history of broken bones was 1.33 (95% CI: 0.56-3.15)." (39)

E. Blakey, Feltblower, et al. (2014)

"CONCLUSIONS:

The findings from this study provide no evidence that higher levels of fluoride (whether natural or artificial) in drinking water in GB lead to greater risk of either osteosarcoma or Ewing sarcoma." (40)

Connett Reason #29: Fluoride may increase hip fractures in the elderly. When high doses of fluoride (average 26 mg per day) were used in trials to treat patients with osteoporosis in an effort to harden their bones and reduce fracture rates, it actually led to a higher number of fractures, particularly hip fractures (Inkovaara 1975; Gerster 1983; Dambacher 1986; O'Duffy 1986; Hedlund 1989; Bayley 1990; Gutteridge 1990. 2002; Orcel 1990; Riggs 1990 and Schnitzler 1990). Hip fracture is a very serious issue for the elderly, often leading to a loss of independence or a shortened life. There have been over a dozen studies published since 1990 that have investigated a possible relationship between hip fractures and long term consumption of artificially fluoridated water or water with high natural levels. The results have been mixed – some have found an association and others have not. Some have even claimed a protective effect. One very important study in China, which examined hip fractures in six Chinese villages, found what appears to be a dose-related increase in hip fracture as the concentration of fluoride rose from 1 ppm to 8 ppm (Li 2001) offering little comfort to those who drink a lot of fluoridated water. Moreover, in the only human epidemiological study to assess bone strength as a function of bone fluoride concentration, researchers from the University of Toronto found that (as with animal studies) the strength of bone declined with increasing fluoride content (Chachra 2010). Finally, a recent study from Iowa (Levy 2009), published data suggesting that low-level fluoride exposure may have a detrimental effect on cortical bone density in girls (an effect that has been repeatedly documented in clinical trials and which has been posited as an important mechanism by which fluoride may increase bone fracture rates).

Facts:

There is no valid, peer-reviewed scientific evidence of any association of hip fracture and optimally fluoridated water. Connett presents nothing here but effects of high fluoride levels on bone, misrepresented science (Chochra), and unsubstantiated claims.

A. Näsman, Ekstrand, et al. (2013):

"Overall, we found no association between chronic fluoride exposure and the occurrence of hip fracture. The risk estimates did not change in analyses restricted to only low-trauma osteoporotic hip fractures. Chronic fluoride exposure from drinking water does not seem to have any important effects on the risk of hip fracture, in the investigated exposure range." (41)

B. Chochra, Limeback, et al. (2010)

“Analysis of our data suggests that the variability in heterogenous urban populations may be too high for the effects, if any, of low-level fluoride administration on skeletal tissue to be discerned (35)

Connett Reason #30: *People with impaired kidney function are particularly vulnerable to bone damage. Because of their inability to effectively excrete fluoride, people with kidney disease are prone to accumulating high levels of fluoride in their bone and blood. As a result of this high fluoride body burden, kidney patients have an elevated risk for developing skeletal fluorosis. In one of the few U.S. studies investigating the matter, crippling skeletal fluorosis was documented among patients with severe kidney disease drinking water with just 1.7 ppm fluoride (Johnson 1979). Since severe skeletal fluorosis in kidney patients has been detected in small case studies, it is likely that larger, systematic studies would detect skeletal fluorosis at even lower fluoride levels.*

Facts:

This is more unsubstantiated speculation by Connett. There is no valid, peer-reviewed scientific evidence of any adverse effect on those with kidney disease from optimally fluoridated water. Skeletal fluorosis is so rare in the United States as to be nearly non-existent.

Ludlow, et al. (2007)

"Because the kidneys are constantly exposed to various fluoride concentrations, any health effects caused by fluoride would likely manifest themselves in kidney cells. However, several large community-based studies of people with long-term exposure to drinking water with fluoride concentrations up to 8 ppm have failed to show an increase in kidney disease."

"People exposed to optimally fluoridated water will consume 1.5mg of fluoride per day. Available studies found no difference in kidney function between people drinking optimally fluoridated and non-fluoridated water. There is discrepant information in studies relating to the potential negative effects of consuming water with greater than 2.0ppm of fluoride."

"Available literature indicated that impaired kidney function results in changes in fluoride retention and distribution in the body. People with kidney impairment showed a decreased urine fluoride and increased serum and bone fluoride correlated with degree of impairment; however, there was no consistent evidence that the retention of fluoride in people with stage four or stage five CKD, consuming optimally fluoridated water, resulted in negative health consequences." (42)

Connett Reason #31: *Fluoride may cause bone cancer (osteosarcoma). A U.S. government-funded animal study found a dose-dependent increase in bone cancer (osteosarcoma) in fluoride-treated, male rats (NTP 1990). Following the results of this study, the National Cancer Institute (NCI) reviewed national cancer data in the U.S. and found a significantly higher rate of osteosarcoma (a bone cancer) in young men in fluoridated versus unfluoridated areas (Hoover*

et al 1991a). While the NCI concluded (based on an analysis lacking statistical power) that fluoridation was not the cause (Hoover et al 1991b), no explanation was provided to explain the higher rates in the fluoridated areas. A smaller study from New Jersey (Cohn 1992) found osteosarcoma rates to be up to 6 times higher in young men living in fluoridated versus unfluoridated areas. Other epidemiological studies of varying size and quality have failed to find this relationship (a summary of these can be found in Bassin, 2001 and Connett & Neurath, 2005). There are three reasons why a fluoride-osteosarcoma connection is plausible: First, fluoride accumulates to a high level in bone. Second, fluoride stimulates bone growth. And, third, fluoride can interfere with the genetic apparatus of bone cells in several ways; it has been shown to be mutagenic, cause chromosome damage, and interfere with the enzymes involved with DNA repair in both cell and tissue studies (Tsutsui 1984; Caspary 1987; Kishi 1993; Mihashi 1996; Zhang 2009). In addition to cell and tissue studies, a correlation between fluoride exposure and chromosome damage in humans has also been reported (Sheth 1994; Wu 1995; Meng 1997; Joseph 2000).

Facts:

Connett presents irrelevant data reports which controlled for none of the myriad variables involved in cancer, his own speculation, and unsubstantiated claims.

There is no valid, peer-reviewed scientific evidence of any association of optimally fluoridated water with osteosarcoma.

A few of the volume of studies refuting associations with cancer have been cited in #28 above.

Connett Reason #32: *Proponents have failed to refute the Bassin-Osteosarcoma study. In 2001, Elise Bassin, a dentist, successfully defended her doctoral thesis at Harvard in which she found that young boys had a five-to-seven fold increased risk of getting osteosarcoma by the age of 20 if they drank fluoridated water during their mid-childhood growth spurt (age 6 to 8). The study was published in 2006 (Bassin 2006) but has been largely discounted by fluoridating countries because her thesis adviser Professor Chester Douglass (a promoter of fluoridation and a consultant for Colgate) promised a larger study that he claimed would discount her thesis (Douglass and Joshipura, 2006). Now, after 5 years of waiting the Douglass study has finally been published (Kim 2011) but in no way does this study discount Bassin's findings. The study, which used far fewer controls than Bassin's analysis, did not even attempt to assess the age-specific window of risk that Bassin identified. Indeed, by the authors' own admission, the study had no capacity to assess the risk of osteosarcoma among children and adolescents (the precise population of concern). For a critique of the Douglass study, click here.*

Facts:

A. Bassin's doctoral thesis required no refute. It was a study which utilized a subset of preliminary data from a larger Harvard study which concluded there to be no association of optimally fluoridated water with osteosarcoma.

B. Bassin's findings have never been replicated, a basic requirement for credibility of such a finding.

C. Bassin's findings are in direct contradiction to the peer-reviewed science which overwhelmingly concludes no association of optimally fluoridated water and osteosarcoma.

D. Connett's attempt to discredit Chester Douglass, notwithstanding, Douglass was the lead researcher in the Harvard study from which Bassin obtained her subset of preliminary data.

In a letter to the editor of the journal *Cancer Causes Control*, Chester Douglass, principal investigator of the Harvard Study, advises readers to be cautious when interpreting the [Bassin] findings, noting the following reasons:

- The preliminary findings from the overall analysis of the cases identified between 1993 and 2000 (second set of cases) do not show an association between osteosarcoma and fluoride in drinking water.

- The cases had been identified from the same hospitals within the same orthopaedic departments and the same pathology departments diagnosing osteosarcoma, and similar methods of fluoride exposure

Bone specimens were also provided by many of the cases – preliminary analysis of bone specimens suggests fluoride level in the bone is not associated with osteosarcoma.

The 1990 NIEHS National toxicology Program study found an association with high levels of fluoride in drinking water and osteosarcoma in male rats. However, the findings of their second study did not find an association.

Some of the limitations noted by Bassin et al in their paper include:

The estimates of fluoride in drinking water at each residence do not reflect the actual consumption of fluoride.

The study did not obtain biologic markers for fluoride uptake in bone.

The actual amount of fluoride in a fluoridated supply may vary (within guideline levels).

Natural fluoride levels can vary over time (the researchers thought this unlikely for the time spent at each residence).

There is a lack of data on other potential confounders.

Fluoride may not be causative agent

– another factor in drinking water may be correlated with the presence of fluoride.

Data to assess fluoride exposure from

diet, industrial sources or other sources such as pesticides was not available – cases

may have been exposed to other unknown factors such as contaminants or carcinogens in the bottled or well water, with the fluoride in these products or natural sources irrelevant, regardless of the concentration. (43)

Connett Reason #33: *Fluoride may cause reproductive problems. Fluoride administered to animals at high doses wreaks havoc on the male reproductive system – it damages sperm and increases the rate of infertility in a number of different species (Kour 1980; Chinoy 1989; Chinoy 1991; Susheela 1991; Chinoy 1994; Kumar 1994; Narayana 1994a,b; Zhao 1995; Elbetieha 2000; Ghosh 2002; Zakrzewska 2002). In addition, an epidemiological study from the US found increased rates of infertility among couples living in areas with 3 ppm or more fluoride in the water (Freni 1994), two studies have found increased fertility among men living in high-fluoride areas of China and India (Liu 1988; Neelam 1987); four studies have found reduced level of circulating testosterone in males living in high fluoride areas (Hao 2010; Chen P 1997; Susheela 1996; Barot 1998), and a study of fluoride-exposed workers reported a “subclinical reproductive effect” (Ortiz-Perez 2003). While animal studies by FDA researchers have failed to find evidence of reproductive toxicity in fluoride-exposed rats (Sprando 1996, 1997, 1998), the National Research Council (2006) has recommended that, “the relationship between fluoride and fertility requires additional study.”*

Facts:

Studies in regard to the effect of exposure to high levels of fluoride are irrelevant to water fluoridated at the minuscule optimal level of 0.7 ppm. There is no valid, peer-reviewed scientific evidence of any adverse effects on the reproductive system from optimal level fluoride.

Connett Reason #34: *Some individuals are highly sensitive to low levels of fluoride as shown by case studies and double blind studies. In one study, which lasted 13 years, Feltman and Kosel (1961) showed that about 1% of patients given 1 mg of fluoride each day developed negative reactions. Many individuals have reported suffering from symptoms such as fatigue, headaches, rashes and stomach and gastro intestinal tract problems, which disappear when they avoid fluoride in their water and diet. (Shea 1967; Waldbott 1978; Moolenburgh 1987) Frequently the symptoms reappear when they are unwittingly exposed to fluoride again (Spittle, 2008). No fluoridating government has conducted scientific studies to take this issue beyond these anecdotal reports. Without the willingness of governments to investigate these reports scientifically, should we as a society be forcing these people to ingest fluoride?*

Facts:

There is no valid, peer-reviewed scientific evidence of any sensitivity to fluoride at the optimal level at which water is fluoridated.

A. Feltman's half century old study was completely refuted by the American Academy of Allergy in 1971:

"The reports of fluoride allergy reviewed (3, 4, 5, 6, 7) listed a wide variety of symptoms including vomiting, abdominal pain, headaches, scotomata, personality change, muscular weakness, painful numbness in extremities, joint pain, migraine headaches, dryness in the mouth, oral ulcers, convulsions, mental deterioration, colitis, pelvic hemorrhages, urticaria, nasal congestion, skin rashes, epigastric distress and hematemesis.

The review of the reported allergic reactions showed no evidence that immunologically mediated reaction of the Types I-IV had been presented. Secondly, the review of the cases reported demonstrated that there was insufficient clinical and laboratory evidence to state that true syndromes of fluoride allergy or intolerance exist.

As a result of this review, the members of the Executive Committee of the American Academy of Allergy have adopted unanimously the following statement:

'There is no evidence of allergy or intolerance to fluorides as used in the fluoridation of community water supplies.' ". (44)

Feltman and Kosel were #'s 4 and 5 of the reports reviewed by the AAA.

B. Waldbott was the founder of the antifuoridationist faction, the "International Academy For Fluoride Research". The journal of this group, "Fluoride", is highly biased toward antifuoridationist literature and is not even listed on PubMed. A review of Waldbott's book may be found:

<http://books.google.com/books?id=z5rX0Q0WAL4C&pg=PA1108&dq=%22Fluoridation:+The+Great+Dilemma%22&cd=8#v=onepage&q=%22Fluoridation%3A%20The%20Great%20Dilemma%22&f=false>

C. Moolenburgh is an anti-vaxxer connected to pseudo-science, including something called the "healing sound movement." This movement claims that people can heal their health problems by listening to digital recordings of ancient chants and "cosmic" sounds.

Connett's Reason #35: *Other subsets of population are more vulnerable to fluoride's toxicity. In addition to people suffering from impaired kidney function discussed in reason #30 other subsets of the population are more vulnerable to fluoride's toxic effects. According to the Agency for Toxic Substances and Disease Registry (ATSDR 1993) these include: infants, the elderly, and those with diabetes mellitus. Also vulnerable are those who suffer from malnutrition (e.g., calcium, magnesium, vitamin C, vitamin D and iodine deficiencies and protein-poor diets) and those who have diabetes insipidus. See: Greenberg 1974; Klein 1975; Massler & Schour 1952; Marier & Rose 1977; Lin 1991; Chen 1997; Seow 1994; Teotia 1998.*

Facts:

There is no valid, peer-reviewed scientific evidence of any adverse effect of optimal level fluoride on those with "impaired kidneys, infants, the elderly, those with diabetes mellitus...or those who suffer from malnutrition".

Connett Reason #36: *There is no margin of safety for several health effects. No one can deny that high natural levels of fluoride damage health. Millions of people in India and China have had their health compromised by fluoride. The real question is whether there is an adequate margin of safety between the doses shown to cause harm in published studies and the total dose people receive consuming uncontrolled amounts of fluoridated water and non-water sources of fluoride. This margin of safety has to take into account the wide range of individual sensitivity expected in a large population (a safety factor of 10 is usually applied to the lowest level causing harm). Another safety factor is also needed to take into account the wide range of doses to which people are exposed. There is clearly no margin of safety for dental fluorosis (CDC, 2010) and based on the following studies nowhere near an adequate margin of safety for lowered IQ (Xiang 2003a,b; Ding 2011; Choi 2012); lowered thyroid function (Galletti & Joyet*

1958; Bachinskii 1985; Lin 1991); bone fractures in children (Alarcon-Herrera 2001) or hip fractures in the elderly (Kurtzio 1999; Li 2001). All of these harmful effects are discussed in the NRC (2006) review.

Facts:

Humans have been ingesting fluoride in water since the beginning of time. In the 73 year history of fluoridation, hundreds of millions having chronically consumed optimally fluoridated water during this time, there have been no proven adverse effects, in spite of the continual best efforts of fluoridation opponents to do so. Given these facts, the "margin of safety" between the minuscule optimal level of fluoride, and the threshold of adverse effects has been clearly demonstrated to be adequate.

There are no "dose" issues with optimally fluoridated water. Simply put, water is fluoridated at 0.7 mg/liter (ppm=mg/liter). Thus, for every one liter of this water consumed, the "dose" of fluoride intake is 0.7 mg. The average daily water consumption by an adult is 2-3 liters per day. The US CDC estimates that of the total daily intake, or "dose", of fluoride from all sources including dental products, 75% is from the water.

The US Institute of Medicine has established that the daily upper limit for fluoride intake from all sources, for adults, before adverse effects will occur, short or long term, is 10 mg. as can be noted from a simple math equation, before the daily upper limit of fluoride intake could be attained in association with optimally fluoridated water, water toxicity would be the concern, not fluoride.

The range of safety between the minuscule few parts per million fluoride that are added to existing fluoride levels in your water, is so wide that "dose" is not an issue. (45)

Connett Reason #37: *Low-income families penalized by fluoridation. Those most likely to suffer from poor nutrition, and thus more likely to be more vulnerable to fluoride's toxic effects, are the poor, who unfortunately, are the very people being targeted by new fluoridation programs. While at heightened risk, poor families are least able to afford avoiding fluoride once it is added to the water supply. No financial support is being offered to these families to help them get alternative water supplies or to help pay the costs of treating unsightly cases of dental fluorosis.*

Facts:

A. There is no valid, peer-reviewed scientific evidence of any "toxic effects" of optimal level fluoride.

B. There is no scientific reason for low-income, or anyone else to obtain water from another source for the sole reason of avoiding fluoride. For any who desire to do so anyway, any financial costs are not the responsibility of society.

C. There is no "unsightly dental fluorosis" attributable to optimally fluoridated water. The only dental fluorosis which may be associated with the minuscule amount of fluoride in this water is mild to very mild, a barely detectable effect which causes no adversity on cosmetics, form, function, or health of teeth. As peer-reviewed science has demonstrated mildly fluorosed teeth

to be more decay resistant, many consider this effect to not even be undesirable, much less adverse. (46)

As concluded by Rozier, et al., the perception of mild dental fluorosis by children and their parents is neutral, while perception of decayed teeth is negative. (47)

Connett Reason #38: *Black and Hispanic children are more vulnerable to fluoride’s toxicity. According to the CDC’s national survey of dental fluorosis, black and Mexican-American children have significantly higher rates of dental fluorosis than white children (Beltran-Aguilar 2005, Table 23). The recognition that minority children appear to be more vulnerable to toxic effects of fluoride, combined with the fact that low-income families are less able to avoid drinking fluoridated water, has prompted prominent leaders in the environmental-justice movement to oppose mandatory fluoridation in Georgia. In a statement issued in May 2011, Andrew Young, a colleague of Martin Luther King, Jr., and former Mayor of Atlanta and former US Ambassador to the United Nations, stated:*

“I am most deeply concerned for poor families who have babies: if they cannot afford unfluoridated water for their babies’ milk formula, do their babies not count? Of course they do. This is an issue of fairness, civil rights, and compassion. We must find better ways to prevent cavities, such as helping those most at risk for cavities obtain access to the services of a dentist...My father was a dentist. I formerly was a strong believer in the benefits of water fluoridation for preventing cavities. But many things that we began to do 50 or more years ago we now no longer do, because we have learned further information that changes our practices and policies. So it is with fluoridation.”

Facts:

That Andrew Young has chosen to accord credence to the misinformation of antifuoridationists is unfortunate for him and those whom he represents. However, it is not a reason to deprive entire populations of the benefits of water fluoridation.

The claim of disparities in fluoride “vulnerability” has no merit. Connett is providing his own interpretation of what he claims to be CDC data. This is not a report of the CDC.

In a 2017 study, Aarora, Kumar, et al., concluded:

“Enamel fluorosis was not associated with race/ethnicity. Our analysis suggests that exposure to similar levels of fluoride in the water does not appear to place certain race/ethnic groups at a higher risk for developing enamel fluorosis, and lowering the optimal range of drinking water fluoride to a single value of 0.7 ppm will provide a level of protection against enamel fluorosis that will benefit all race/ethnicity groups.” (48)

Connett Reason #39: *Minorities are not being warned about their vulnerabilities to fluoride. The CDC is not warning black and Mexican-American children that they have higher rates of dental fluorosis than Caucasian children (see #38). This extra vulnerability may extend to other toxic effects of fluoride. Black Americans have higher rates of lactose intolerance, kidney problems and diabetes, all of which may exacerbate fluoride’s toxicity.*

Facts:

There is no valid evidence of any increased “vulnerability” to fluoride by minorities. Unsubstantiated speculation and personal opinions about what "may" occur, are meaningless in the absence of valid, peer-reviewed scientific evidence of support for such claims.

Connett Reason #40: *Tooth decay reflects low-income not low-fluoride intake. Since dental decay is most concentrated in poor communities, we should be spending our efforts trying to increase the access to dental care for low-income families. The highest rates of tooth decay today can be found in low-income areas that have been fluoridated for many years. The real “Oral Health Crisis” that exists today in the United States, is not a lack of fluoride but poverty and lack of dental insurance. The Surgeon General has estimated that 80% of dentists in the US do not treat children on Medicaid.*

Facts:

The overwhelming problem with untreated dental decay in the US and most other countries, is one of the most compelling reasons for water fluoridation, not against it. Countless peer-reviewed scientific studies have clearly demonstrated water fluoridation to be effective in preventing dental decay in entire populations, in the most cost-effective manner possible, with no adverse effects on anyone. Eliminating such a measure only exacerbates the problem.

The advocacy for, and utilization of, one dental decay preventive measure does not preclude doing so for other viable means of prevention. Water fluoridation was never meant, or expected, to be a replacement for other preventive measures.....simply to be in addition them.

Connett Reason #41: *The chemicals used to fluoridate water are not pharmaceutical grade. Instead, they largely come from the wet scrubbing systems of the phosphate fertilizer industry. These chemicals (90% of which are sodium fluorosilicate and fluorosilicic acid), are classified hazardous wastes contaminated with various impurities. Recent testing by the National Sanitation Foundation suggest that the levels of arsenic in these silicon fluorides are relatively high (up to 1.6 ppb after dilution into public water) and of potential concern (NSF 2000 and Wang 2000). Arsenic is a known human carcinogen for which there is no safe level. This one contaminant alone could be increasing cancer rates – and unnecessarily so.*

Facts:

A. This "reason" as much, or moreso, than any other, clearly demonstrates the danger to the health of the public by according credence to activists such as Connett, and the intentional misleading of the public by these activists. The use of “pharmaceutical grade” fluoride for fluoridation of community water supplies is not only far more expensive, but potentially introduces greater levels of contaminants into these systems than does hydrofluorosilic acid.

From the US CDC:

Some have suggested that pharmaceutical grade fluoride additives should be used for water fluoridation. Pharmaceutical grading standards used in formulating prescription drugs are not appropriate for water fluoridation additives. If applied, those standards could actually increase the amount of impurities as allowed by AWWA and NSF/ANSI in drinking water.

The U.S. Pharmacopeia-National Formulary (USP-NF) presents monographs on tests and acceptance criteria for substances and ingredients by manufacturers for pharmaceuticals. The USP 29 NF-24 monograph on sodium fluoride provides no independent monitoring or quality assurance testing. That leaves the manufacturer with the responsibility of quality assurance and reporting. Some potential impurities have no restrictions by the USP including arsenic, some heavy metals regulated by the U.S. EPA, and radionuclides.

The USP does not provide specific protection levels for individual contaminants, but tries to establish a relative maximum exposure level of a group of related contaminants. The USP does not include acceptance criteria for fluorosilicic acid or sodium fluorosilicate.

Given the volumes of chemicals used in water fluoridation, a pharmaceutical grade of sodium fluoride for fluoridation could potentially contain much higher levels of arsenic, radionuclides, and regulated heavy metals than a NSF/ANSI Standard 60-certified product.

AWWA-grade sodium fluoride is preferred over USP-grade sodium fluoride for use in water treatment facilities because the granular AWWA product is less likely to result in dusting exposure of water plant operators than the more powder-like USP-grade sodium fluoride." (49)

B. Drinking water quality standards begin with water at the tap. In the US, all such water meet all quality certification requirements under Standard 60 of NSF International. Standard 60 mandates that no contaminant be present in water at the tap in excess of 10% of the EPA MCL for that contaminant. It makes no difference what is in raw, undiluted fluoridation substances. If the water at the tap does not meet all of the Standard 60 requirements, it is not allowed. Fluoridated water at the tap easily meets all Standard 60 requirements. The only detected contaminants detected in fluoridated water at the tap, by strict NSF testing, are in minuscule amounts far below EPA mandated maximum allowable levels of safety.

A detailed list of the contents of fluoridated water at the tap, including precise amounts of any detected contaminants, and the EPA mandated maximum allowable levels for each may be found on the "Fact Sheet on Fluoridation Chemicals" on the website of NSF International.

<http://www.nsf.org/newsroom/nsf-fact-sheet-on-fluoridation-chemicals>

C. The safe level for arsenic (MCL) has been determined by the US EPA to be 10 parts per billion. The maximum EPA mandated allowable amount of arsenic in water at the tap is 10% of this amount which is 1.0 ppb. Under stringent NSF testing of fluoridated water at the tap, the maximum amount of arsenic detected was 0.6 ppb, with the average amount being 0.17 ppb.

Due to the ubiquitous nature of arsenic in the environment, and strong evidence that arsenic is a required nutrient, it is likely that a zero level of arsenic in drinking water is neither attainable, nor desirable. (NSF, Arsenic as a nutrient study). (50)

D. Unsubstantiated speculation about what "may be increasing cancer rates" is irresponsible and meaningless, in the absence of any valid evidence to support such claims.

Connett Reason #42: *The silicon fluorides have not been tested comprehensively. The chemical usually tested in animal studies is pharmaceutical grade sodium fluoride, not industrial grade fluorosilicic acid. Proponents claim that once the silicon fluorides have been diluted at the public water works they are completely dissociated to free fluoride ions and hydrated silica and thus there is no need to examine the toxicology of these compounds. However, while a study from the University of Michigan (Finney et al., 2006) showed complete dissociation at neutral pH, in acidic conditions (pH 3) there was a stable complex containing five fluoride ions. Thus the possibility arises that such a complex may be regenerated in the stomach where the pH lies between 1 and 2.*

Facts:

For one with a PhD in chemistry, Connett exhibits a remarkable lack of understanding of the chemical process which occurs with fluoridation substances.

A. See #41 above, in respect to Connett's lack of understanding of the danger of using "pharmaceutical grade" fluoride instead of the "industrial grade fluorosilic acid".

Proponents do not "claim that once the silicon fluorides have been diluted at the public water works are completely dissociated to free fluoride ions and hydrated silica.....". This is a scientific fact. Upon addition to drinking water, due to the pH of that water (~7), HFA is immediately and completely decomposed. The products of this decomposition are fluoride ions, identical to those which have always existed in water, and barely detectable trace contaminants in amounts far below US EPA mandated maximum allowable levels of safety. After this point, the HFA no longer exists in that water. It does not reach the tap. It is not ingested. There is no requirement, or any need, to "examine the toxicology of a non-existent substance which is not ingested.

Utilizing Nuclear Magnetic Resonance Spectroscopy, Finney, in 2006, put any question of incomplete decomposition of HFA completely to rest. Using this technology he found no intermediates from this decomposition, down to a pH of 3.5. Unsubstantiated speculation as to reformation of HFA in the acidic environment of the human gut are without merit. There is no valid, peer-reviewed scientific evidence that any such reformation which may occur, causes any adverse effects, whatsoever, within the human gut, or anywhere else within the human body. Humans have been ingesting fluoride in water since the beginning of time, with hundreds of millions of individuals having chronically ingested optimally fluoridated water over the past 73 years, with no valid, peer-reviewed scientific evidence of any adverse effects. Unsubstantiated speculation as to what might "possibly" occur is of no merit.

Finney concluded:

"The dissociation of hexafluorosilicate has been reinvestigated due to recent suggestions that fluorosilicate intermediates may be present in appreciable concentrations in drinking water. ¹⁹F NMR spectroscopy has been used to search for intermediates in the hydrolysis of hexafluorosilicate. No intermediates were observable at 10⁻⁵ M concentrations under excess fluoride forcing conditions over the pH range of 3.5–5. A single intermediate species, assigned as SiF₅⁻ or its hydrate, was detected below pH 3.5. At moderate pH values of 4 and 5 silica oligomerization in the solutions studied made it difficult to directly determine the hexafluorosilicate equilibrium constant. Under more acidic conditions the average pK_d, or

negative log of the dissociation constant K_d , determined by ^{19}F NMR measurements, was 30.6. We also investigated the behavior of hexafluorosilicate in common biological buffer reagents including phosphate/citrate, veronal/HCl buffers, and Ringer's solution. The buffer capacity of all of these systems was found to be insufficient to prevent acidic shifts in pH when hexafluorosilicate was added. The pH change is sufficient explanation for the observed inhibition of acetylcholinesterase that was previously attributed to hexafluorosilicate hydrolysis intermediates." (51)

Additionally, from SCHER (Scientific Committee on Health and Environmental Risks):

Fluoridation of drinking water is recommended in some EU Member States, and hexafluorosilicic acid and hexafluorosilicates are the most commonly used agents in drinking water fluoridation. These compounds are rapidly and completely hydrolyzed to the fluoride ion. No residual fluorosilicate intermediates have been reported. Thus, the main substance of relevance is the fluoride ion (F^-). (52)

Connett Reason #43: *The silicon fluorides may increase lead uptake into children's blood. Studies by Masters and Coplan (1999, 2000, 2007), and to a lesser extent Macek (2006), show an association between the use of fluorosilicic acid (and its sodium salt) to fluoridate water and an increased uptake of lead into children's blood. Because of lead's acknowledged ability to damage the developing brain, this is a very serious finding. Nevertheless, it is being largely ignored by fluoridating countries. This association received some strong biochemical support from an animal study by Sawan et al. (2010) who found that exposure of rats to a combination of fluorosilicic acid and lead in their drinking water increased the uptake of lead into blood some threefold over exposure to lead alone.*

Facts:

The theory of increased lead uptake resultant of fluoridation substances was rebuked by:

A. Urbansky/Schock in 2000

"Overall we conclude that no credible evidence exists to show that water fluoridation has any quantifiable effects on the solubility, bioavailability, bioaccumulation or reactivity of lead (0) or lead (II) compounds. The governing factors are the concentrations of a number of other species such as (bi)carbonate, hydroxide, or chloride, whose effects far exceed those of fluoride or fluorosilicates under drinking water conditions." (53)

B. Jackson in 2002

"The presence of fluoride at a concentration of 1 mg/l will have practically no effect on the chemical speciation and bioavailability of iron, copper or lead."

"At a concentration of 1 mg/l as F, fluoride could not cause significant interactions between other chemical species in drinking water. Fluoride at a concentration of 1 mg/l will have negligible impact on corrosivity of water towards the distribution system."

“The quantities of trace metals impurities added as a result of fluoridation are very small and would have no discernible impact on “toxicity” of drinking water.” (54)

C. Macek in 2006

"Our analysis does not offer support for the hypothesis that silicofluorides in community water systems increase PbB concentrations in children. On the other hand, given the limitations of our data, our analyses cannot refute a possible link between water fluoridation method and lead uptake in children, particularly among those who live in older dwellings. Although other ecologic studies might allow another opportunity to test the relation between water fluoridation method and PbB concentrations in U.S. children, such analyses are likely to have similar limitations. Ultimately, the hypothesis that one or more fluoride compounds is associated with enhanced lead leaching or increased lead absorption is best addressed via systematic study of lead concentrations in drinking water, experimental chemical investigations, and studies of animal toxicology. Efforts to decrease exposure to lead among children by targeting prevention efforts at high-risk communities and/or populations as well as efforts to prevent dental caries via the use of fluoridated drinking water should continue unless a causal impact of certain fluoridation methods on PbB concentration is demonstrated by additional research." (55)

Connett Reason #44: *Fluoride may leach lead from pipes, brass fittings and soldered joints. In tightly controlled laboratory experiments, Maas et al (2007) have shown that fluoridating agents in combination with chlorinating agents such as chloroamine increase the leaching of lead from brass fittings used in plumbing. While proponents may argue about the neurotoxic effects of low levels of fluoride there is no argument that lead at very low levels lowers IQ in children.*

Facts:

See response to #43 above

Connett Reason #45: *Key health studies have not been done. In the January 2008 issue of Scientific American, Professor John Doull, the chairman of the important 2006 National Research Council review, Fluoride in Drinking Water: A Review of EPA’s Standards, is quoted as saying:*

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. I mean, when the U.S. surgeon general comes out and says this is one of the top 10 greatest achievements of the 20th century, that’s a hard hurdle to get over. 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.

The absence of studies is being used by promoters as meaning the absence of harm. This is an irresponsible position.

Facts:

In response to the constant misuse of his 2007 statement by antifluoridationists to imply opposition to fluoridation, as Connett has done here, John Doull issued the following statement in March of 2013:

"I do not believe there is any valid, scientific reason for fearing adverse health conditions from the consumption of water fluoridated at the optimal level"

---John Doull, MD, PhD, Chair of the National Academy of Sciences, National Research Council 2006 Committee Report on Fluoride in Drinking Water. (56)

Connett Reason #46: *Endorsements do not represent scientific evidence. Many of those promoting fluoridation rely heavily on a list of endorsements. However, the U.S. PHS first endorsed fluoridation in 1950, before one single trial had been completed and before any significant health studies had been published (see chapters 9 and 10 in The Case Against Fluoride for the significance of this PHS endorsement for the future promotion of fluoridation). Many other endorsements swiftly followed with little evidence of any scientific rationale for doing so. The continued use of these endorsements has more to do with political science than medical science.*

Facts:

A. Support for water fluoridation is based upon the most up-to-date, peer-reviewed science available. Countless peer-reviewed scientific studies clearly demonstrate the effectiveness of water fluoridation in the prevention of dental decay in entire populations. There is no such science which supports the myriad adverse health claims put forth by fluoridation opponents. A list of 10 of the most recent studies demonstrating the effectiveness of fluoridation, several from within the past 1-5 years, may be found at the end of this document.

B. Over 100 of the most highly respected healthcare and healthcare-related organizations in the world publicly recognize the importance of water fluoridation in the prevention of dental decay in entire populations. These organizations are comprised of hundreds of thousands of highly respected healthcare providers, healthcare researchers, and healthcare experts, worldwide. To claim that such individuals and organizations would callously allow their names to be associated with a public health initiative about which there is any reasonable doubt concerning its safety or effectiveness is ludicrous.

On the other hand, the number of credible organizations, worldwide, which oppose fluoridation is.....zero.

B. *The Case Against Fluoride* is a book authored by Paul Connett. It has neither been peer-reviewed, nor published in any respected scientific journal. Connett has not one, single piece of peer-reviewed scientific literature on fluoridation to his name. Attempting to use his own, non peer-reviewed book as scientific evidence to support his claims has no merit.

Connett Reason #47: *Review panels hand-picked to deliver a pro-fluoridation result. Every so often, particularly when their fluoridation program is under threat, governments of fluoridating countries hand-pick panels to deliver reports that provide the necessary re-endorsement of the practice. In their recent book Fluoride Wars (2009), which is otherwise slanted toward fluoridation, Alan Freeze and Jay Lehr concede this point when they write:*

There is one anti-fluoridationist charge that does have some truth to it. Anti-fluoride forces have always claimed that the many government-sponsored review panels set up over the years to

assess the costs and benefits of fluoridation were stacked in favor of fluoridation. A review of the membership of the various panels confirms this charge. The expert committees that put together reports by the American Association for the Advancement of Science in 1941, 1944 and 1954; the National Academy of Sciences in 1951, 1971, 1977 and 1993; the World Health Organization in 1958 and 1970; and the U.S. Public Health Service in 1991 are rife with the names of well-known medical and dental researchers who actively campaigned on behalf of fluoridation or whose research was held in high regard in the pro-fluoridation movement. Membership was interlocking and incestuous.

Facts:

A. The support for water fluoridation, worldwide, is overwhelming amongst respected science and healthcare. Connett's organization, "Fluoride Action Network" touts a list of what they term to be 4,600 medical, dental, scientific, and environmental professionals (including 366 dentists and 568 MDs), worldwide, who oppose fluoridation. Considering there are approximately 175,000 dentists and approximately 900,000 MDs in the US alone, the "FAN" reported numbers of 366 and 568, respectively, are negligible. Given this dearth of opposition to fluoride amongst respected science and healthcare, that review panels are predominantly comprised of those who support fluoridation, is not surprising, and is representative of the numbers. It would be surprising, and non-representative if otherwise. (57)

Connett's conspiracy/corruption claims are unsubstantiated and meritless.

B. Connett's unsubstantiated opinions about the 2006 NRC report are misrepresentative of that report, and its findings.

In actuality, the 2006 NRC Committee on Fluoride in Drinking Water was charged to evaluate the adequacy of the EPA primary and secondary MCLs for fluoride, 4.0 ppm and 2.0 ppm respectively, to protect against adverse effects. The final recommendation of this Committee was for the primary MCL to be lowered from 4.0 ppm. The sole reasons cited by the Committee for this recommendation were the risk of severe dental fluorosis, bone fracture, and skeletal fluorosis, with chronic ingestion of water with a fluoride content of 4.0 ppm or greater. Nothing else. Had this Committee deemed there to be any other concerns with fluoride at this level, it would have been responsible for stating so and recommending accordingly. It did not.

Additionally, the NRC Committee made no recommendation to lower the secondary MCL of 2.0 ppm. Water is fluoridated at 0.7 ppm, one third the level which the 2006 NRC Committee on Fluoride in Drinking Water made no recommendation to lower. (3)

Connett Reason #48: *Many scientists oppose fluoridation. Proponents of fluoridation have maintained for many years— despite the fact that the earliest opponents of fluoridation were biochemists—that the only people opposed to fluoridation are not bona fide scientists. Today, as more and more scientists, doctors, dentists and other professionals, read the primary literature for themselves, rather than relying on self-serving statements from the ADA and the CDC, they are realizing that they and the general public have not been diligently informed by their professional bodies on this subject. As of January 2012, over 4,000 professionals have signed a statement calling for an end to water fluoridation worldwide. This statement and a list of signatories can be found on the website of the Fluoride Action Network. A glimpse of the caliber*

of those opposing fluoridation can be gleaned by watching the 28-minute video “Professional Perspectives on Water fluoridation” which can be viewed online at the same FAN site.

Facts:

See section A of the response to Connett's #47 "Reason".

Connett Reason #49: *Proponents usually refuse to defend fluoridation in open debate. While pro-fluoridation officials continue to promote fluoridation with undiminished fervor, they usually refuse to defend the practice in open public debate – even when challenged to do so by organizations such as the Association for Science in the Public Interest, the American College of Toxicology, or the U.S. EPA (Bryson 2004). According to Dr. Michael Easley, a prominent lobbyist for fluoridation in the US, “Debates give the illusion that a scientific controversy exists when no credible people support the fluorophobics’ view” (Easley, 1999). In light of proponents’ refusal to debate this issue, Dr. Edward Groth, a Senior Scientist at Consumers Union, observed that, “the political profluoridation stance has evolved into a dogmatic, authoritarian, essentially antiscientific posture, one that discourages open debate of scientific issues” (Martin 1991).*

Facts:

Scientific discourse of science should be done in a controlled manner with adequate time and resources to present carefully researched facts and evidence. A public, oral debate such as that which Connett constantly seeks with respected science and healthcare personnel, is about the debaters, not about the issue, and presents an unacceptable forum for honest scientific discourse. As can be seen from this document alone, it takes far more time, energy, facts and evidence to adequately address the volume of unsubstantiated claims, personal opinions, and misinformation that Connett can provide in short sentences and paragraphs. The same is true in an oral debate. In such a scenario, Connett can put forth so many different claims, jumping from one to another to another, that it is impossible to adequately address any of them. Thus, not only does Connett benefit himself by appearing to be an equal to the respected professional whom he seeks to engage in such a debate, the audience is left with the misimpression that his points are valid.

I, myself, have offered to debate Connett in a written format, with no time constraints, on several occasions when he, his staff, or his followers have asked me to debate him. He has never responded.

Connett Reason #50: *Proponents use very dubious tactics to promote fluoridation. Many scientists, doctors and dentists who have spoken out publicly on this issue have been subjected to censorship and intimidation (Martin 1991). Dr. Phyllis Mullenix was fired from her position as Chair of Toxicology at Forsythe Dental Center for publishing her findings on fluoride and the brain (Mullenix 1995); and Dr. William Marcus was fired from the EPA for questioning the government’s handling of the NTP’s fluoride-cancer study (Bryson 2004). Many dentists and even doctors tell opponents in private that they are opposed to this practice but dare not speak out in public because of peer pressure and the fear of recriminations. Tactics like this would not be necessary if those promoting fluoridation were on secure scientific and ethical grounds.*

Facts:

The conspiracy theories of Connett and other fluoridation opponents are well-known. They have no relevance or merit. It is ludicrous to believe that any doctor or dentist would have any hesitation to speak out on fluoridation, or any other issue, because of "peer-pressure and the fear of recriminations". That Connett attempts to put forth this argument is clear demonstration as to how out of touch he is with reality and with the worldwide community of respected science and healthcare.

As a dentist, 35 year member of the North Carolina Dental Society and the American Dental Association, if there were recriminations from organized dentistry for publicly speaking out against policies and issues of organized dentistry, I would have been "recriminated" tarred, feathered, and run out of the US decades ago. Organized dentistry has neither the authority, nor desire to censor the free speech of dentists, or anyone else.

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Effectiveness Studies

1) 2018

“In unadjusted analysis, caries experience in the primary dentition was lower in counties with $\geq 75\%$ CWF (mean dfs = 3.3, 95% confidence limits [CL]=2.8, 3.7) than in counties with $< 75\%$ CWF (mean dfs =4.6, 95%CL=3.9, 5.4), a prevented fraction of 30% (95%CL = 11, 48). The difference was also statistically significant, though less pronounced, in the permanent dentition: mean DMFS (95%CL) was 2.2 (2.0, 2.4) and 1.9 (1.8, 2.1), respectively, representing a prevented fraction of 12% (95%CL=1, 23). Statistically significant associations likewise were seen when %CWF was modeled as a continuum, and differences tended to increase in covariate-adjusted analysis and in sensitivity analysis. These findings confirm a substantial caries-preventive benefit of CWF for U.S. children and that the benefit is most pronounced in primary teeth.”

Water Fluoridation and Dental Caries in U.S. Children and Adolescents
G.D. Slade, W.B. Grider, W.R. Maas, et al.
J Dental Research
June 14, 2018

2) 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:10.1186/1472-6831-15-9<http://www.biomedcentral.com/1472-6831/15/9>

3) 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>

4) 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.

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.

Research Design: Consecutive clinical case series: clinical details (diagnoses and the treatments provided) were recorded for children who had received comprehensive dental care under GA between 2000 and 2009. Age, gender, ethnicity, socio-economic status and fluoridation status (determined from the residential address) were also recorded.

<http://www.ncbi.nlm.nih.gov/pubmed/23550501>