

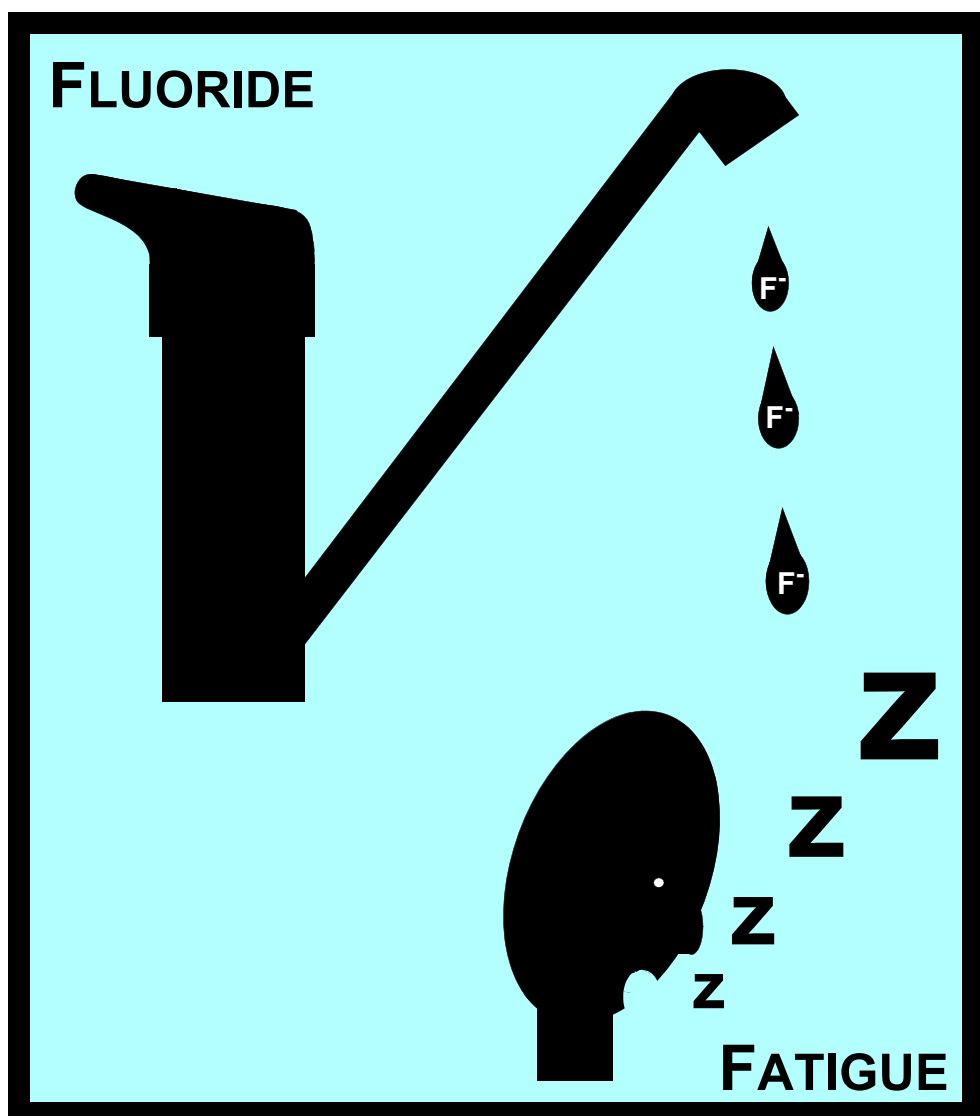
FLUORIDE FATIGUE

Revised 4th printing



FLUORIDE POISONING: is fluoride in your drinking water—and from other sources—making you sick?

Bruce Spittle Forewords by Albert W Burgstahler and AK Susheela



FLUORIDE FATIGUE

FLUORIDE POISONING: is fluoride in your drinking water—and from other sources—making you sick?

Bruce Spittle

Paua Press
Dunedin, New Zealand

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I formed Paua Press Limited in 2007 with the goal of publishing books on topics of interest. The paua is an abalone, a large edible New Zealand shellfish of the genus *Haliotis* with attractive blue and purple colours on the inner surface of the shell but with a rough unattractive outer shell. The vivid colouration within can be revealed by grinding and polishing the outer surface and the shell is then sometimes used in jewellery. Just as a paua appears dull and nondescript on the outside but is of compelling interest when the surface dress is taken away, I am hopeful that the books my press publishes will have, at their centre, something of substance for the reader.



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QUOTATIONS EMBODYING THE SPIRIT OF PAUA PRESS LIMITED

Sapere aude. Motto of the University of Otago. It can be translated to mean: dare to be wise, have the courage to think for yourself rather than blindly accepting the opinions of authorities.

All great truths begin as blasphemies. George Bernard Shaw

All truth passes through three stages: first it is ridiculed, second it is violently opposed, third it is accepted as being self-evident. Arthur Schopenhauer

Great thinkers have always encountered violent opposition from mediocre minds.

Albert Einstein

Don't worry about people stealing your ideas. If your ideas are that good, you'll have to ram them down people's throats. Howard Aitken

Time's glory is to calm contending kings,

To unmask falsehood, and bring truth to light. Shake-speare

In an age of conformism and "team work," where compromise and harmony are offered as the watchwords of human activity, being critical may be considered antisocial. But science without criticality is unthinkable, for the only route to scientific objectivity is to question, not to "accept." Anon. Statistics, science and sense [editorial]. JAMA 1963;186:508. Cited before the preface in: Waldbott GL. *A struggle with titans*. New York: Carlton Press; 1965.

As every past generation has had to disenthral itself from an inheritance of truisms and stereotypes, so in our time we must move on from reassuring repetition of stale phrases to a new, difficult, but essential confrontation with reality.

For the great enemy of truth is very often not the lie—deliberate, contrived, and dishonest—but the myth, persistent, persuasive, and unrealistic. Too often we hold fast to the clichés of our forebears. We subject all facts to a prefabricated set of interpretations. We enjoy the comfort of opinion without the discomfort of thought. President John F Kennedy, Commencement address, Yale University, 11 June 1962. Cited after the dedications in: Waldbott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978.

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DEDICATION

Dedicated to all those who have struggled, in the face of criticism, to see an end to the irrational policy of fluoridating public water supplies.

FOREWORD BY PROFESSOR EMERITUS ALBERT W BURGSTAHLER

This is a vitally important book that has been long needed and begging to be written. Although dental public health officials in countries promoting water fluoridation adamantly deny the existence of illness caused by fluoride in drinking water, undeniable medical ill effects from fluoride added to drinking water have been known and reported since the start of water fluoridation over 50 years ago. Even today, those who experience these adverse effects, whether from fluoride in their drinking water or from other sources, know only too well how insidious these ailments can be, what a relief it is to find out what is causing them, and how easily they can often be overcome simply by reducing excessive intake of fluoride.

Those who deny reality and persist in discounting sensitivity to fluoride in drinking water are like ostriches with their heads in the sand. They would do well to heed what Dr. Spittle has reported here and stop continuing to promote and be misled by scientifically indefensible claims that do not hold up under scrutiny.

Albert W Burgstahler, PhD (Harvard, 1953)

Professor Emeritus of Chemistry

The University of Kansas, USA

Editor, *Fluoride*

Website for *Fluoride*: <http://www.fluorideresearch.org>

FOREWORD BY PROFESSOR AK SUSHEELA

I am delighted with this book which very capably addresses a burning health problem in many developed and developing countries that is afflicting millions of men, women, and children. In particular, the damage caused by fluoride to expectant mothers and the growing embryo and foetus *in utero* is extremely devastating in terms of growth retardation and impaired brain development—so much so that it is hard to compensate for such harmful effects.

I sincerely hope that, besides the general public, policy makers and health officials, in the interest of the nation and the people they are sworn to serve, will learn from reading this book to recognize and desist from the “madness” being exercised by “fluoridation of drinking water.” I wish the very best for bringing this vitally important message to the people who need help and guidance in understanding the harmful effects of fluoride on health and, in the event that they are victims, in learning how they can deal with the health problems by significantly minimizing fluoride entry into the body.

Professor AK Susheela, PhD, FAMS (India), FASc, Ashoka Fellow
Executive Director
Fluorosis Research and Rural Development Foundation
Delhi, India
Website for the Foundation: <http://www.fluorideandfluorosis.com>

ACKNOWLEDGEMENTS

The author acknowledges the advice of Albert W Burgstahler, BSc (Magna cum Laude, Notre Dame, 1949), MA, PhD (Harvard, 1950, 1953), Professor Emeritus of Chemistry, The University of Kansas, Lawrence, Kansas, USA, and Editor, 1999–2007, of *Fluoride*, Quarterly Journal of the International Society of Fluoride Research. Previously he was Co-editor, 1968–1981, Acting Editor 1982–1991, Co-Editor 1992–1997, and Scientific Editor, 1998. He co-authored *Fluoridation: the great dilemma* with Dr George L Waldbott, MD, and Professor H Lewis McKinney (Lawrence, Kansas: Coronado Press; 1978).

The author is likewise grateful for the kindness of Professor AK Susheela, PhD, FAMS (India), FASc, Ashoka Fellow, Executive Director, Fluorosis Research and Rural Development Foundation, Delhi, India, for giving permission for her photographs of structural changes due to fluoride to be used and for her work to be referred to, of Dr Bao-shan Zheng, for the use of his photographs related to food contamination by fluoride, and of Sarah Hamilton, New Zealand Chinchilla Rescue, for allowing the use of a photograph of a chinchilla.

FLUORIDE FATIGUE

FLUORIDE POISONING: IS FLUORIDE IN YOUR DRINKING WATER—AND FROM OTHER SOURCES—MAKING YOU SICK?

INTRODUCTION

The focus of this book is the fatigue, not relieved by sleep, and various other symptoms experienced by many when they drink fluoridated water. As such it is not a comprehensive account of fluoride toxicity but looks at only a part of the overall picture. Fluoride is ingested from other sources apart from fluoridated water such as pesticides, post-harvest fumigants, air, food, salt, medications, toothpaste, dental restorations, and health supplements. Fluoride also causes other illness such as osteosarcoma and hip fractures.

Fluoridated water may be having its most devastating effects on the most vulnerable, those *in utero* and infants less than one year old, whose brains are most sensitive to developmental neurotoxins such as fluoride.^a When body weight is taken into account, non-nursing infants receiving formula made with water fluoridated at or near the level of 1 mg fluoride (F)/litre (L) or 1 part per million (ppm), less than one year old, have been estimated to have a fluoride intake on average of about three times that of adults (0.086 mg/kg/day of F for infants compared to 0.03 mg/kg/day of F for adults^b). About 30% of children in fluoridated areas have chalky white areas on the teeth due to dental fluorosis. However the mottled appearance is due only in part to the presence of fluoride *per se* in the erupted teeth and is a sign that fluoride resulted in a thyroid hormone deficiency during a critical time of tooth development, from *in utero* to approximately 30 months for deciduous teeth (milk teeth, the first teeth to erupt) and permanent incisors (the upper and lower two teeth on each side, closest to the midline, and medial to the canine teeth).^c

Thyroid hormone is the crucial regulator of all the tissue-specific differentiation programmes during development and appropriate levels are critically important for the coordination of developmental processes. When fluoride reduces the level of thyroid hormone during tooth development, by activating a calcium-transducing G-protein receptor G q/11, there is delayed tooth eruption, delayed removal of enamel matrix proteins, and delayed enamel maturation. The evidence of the deficiency is seen later with mottled teeth. While the teeth are developing so also is the brain. There is a growing concern about the effect of fluoride on the developing brain^b and a possible connection between fluoride and autism has been queried.^d

Another emerging area of interest is the interaction between fluoride and iodine resulting in a functional iodine deficiency. Iodine is required for the proper

^aGrandjean P, Landrigan PJ. Developmental neurotoxicity of industrial chemicals. *Lancet* 2006;368:2167-78.

^bDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 85.

^cSchuld A. Is dental fluorosis caused by thyroid hormone disturbances? [editorial]. *Fluoride* 2005;38:91-4.

^dRookard CJ. Fluoride and autism: is there a connection? [letter]. *Fluoride* 2000;33:99-100.

functioning of many organs of the body and reduced tissue iodine levels, possibly through the inhibition of mammary gland deiodinases by fluoride, may be a factor in the development of breast cancer.^{ab}

However, this book will concentrate on the fatigue, not relieved by sleep, and other symptoms due to fluoride from drinking water and other sources. The very existence of this problem is being denied on the basis of seemingly authoritative reports which can have such restrictive inclusion criteria that they can exclude from consideration reports of fluoride causing fatigue and other symptoms^c and then be quoted as evidence that fluoride does not cause such illnesses.^d Thus there is a need to spell out the clinical features of this illness—the chronic fluoride toxicity syndrome or preskeletal fluorosis.

THE SYMPTOMS AND SIGNS OF THE CHRONIC FLUORIDE TOXICITY SYNDROME

George L Waldbott, MD, studied about 500 people affected by chronic fluoride toxicity and, together with Professor Albert W Burgstahler, PhD, and Professor Lewis McKinney, PhD, in *Fluoridation: the great dilemma*, made a list of the clinical features (Figures 1–3).^e



Figure 1. George L Waldbott, MD.
14 January 1898 –
17 July 1982.



Figure 2. Professor Albert W Burgstahler, PhD.



Figure 3. Professor H Lewis McKinney, PhD.
20 December 1935 –
5 February 2004.

^aEskin BA, Anjum W, Abraham GE, Stoddard F, Prestrud A, Brooks AD. Identification of breast cancer by differences in urinary iodide. *Proc Am Assoc Cancer Research* 2005;46:504.

^bEskin BA. Iodine and mammary cancer. *Adv Exp Med Biol* 1977;91:293-304.

^cMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000.

^dCutress TW. Response to a list of "50 reasons to oppose fluoridation," compiled by Dr Connett. 2005. A copy is available in the McNab Room, 3rd floor, Dunedin Public Library, Dunedin. It is included as part of a report on Fluoridation of Public Water Supplies to the Infrastructure Services Committee, Dunedin City Council, from the Water and Waste Services Manager, for the meeting on 12 March 2007, as appendix 4 to a letter, dated 6 March 2007, to Mr Gerard McCombie, Water Operations Team Leader, Dunedin City Council, by Dr John Holmes, Medical Officer of Health and Dr Dorothy Boyd, Senior Public Health Dentist, written in response to a submission made by Dr Bruce Spittle to the 2006/07 Community Plan opposing the use of fluoride in Dunedin's water supply.

^eWaldbott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978. p.392-3.

He noted, however, that the symptoms could have other origins even in someone suffering from chronic fluoride poisoning.

- 1 chronic fatigue, not relieved by extra sleep or rest
- 2 headaches
- 3 dryness of the throat and excessive water consumption
- 4 frequent need to urinate
- 5 urinary tract irritation
- 6 aches and stiffness in the muscles and bones; arthritic-like pains in the lower back, neck, jaw, arms, shoulders and legs
- 7 muscular weakness
- 8 muscle spasms, involuntary twitching
- 9 tingling sensations in the feet and, especially, in the fingers
- 10 gastrointestinal disturbances: abdominal pains, diarrhoea, constipation, blood in stools, bloated feeling or gas, and tenderness in the stomach area
- 11 feeling of nausea, flu-like symptoms
- 12 pinkish-red or bluish-red spots, like bruises but round or oval, on the skin, that fade and clear up in 7–10 days (Chizzola maculae.^a They were first recognized by an Italian general practitioner, Dr M Cristofoloni, in the neighbourhood of an aluminium factory near the village of Chizzola in northern Italy).
- 13 skin rash or itching, especially after showers or bathing
- 14 mouth sores, also with using fluoridated toothpaste
- 15 loss of mental acuity and the ability to concentrate
- 16 depression
- 17 excessive nervousness
- 18 dizziness
- 19 tendency to lose balance
- 20 visual disturbances, temporary blind spots in the field of vision, a diminished ability to focus
- 21 brittle nails

Professor AK Susheela, Executive Director of the Fluorosis Research and Rural Development Foundation, Delhi, India, (Figure 4), made a similar list and added that, when patients came from an area with high fluoride levels in the water, fluoride toxicity should be suspected when there were complaints of:^b

- 22 repeated miscarriages or still births
- 23 male infertility
- 24 dental fluorosis with discolouration of the enamel of the front teeth, the central or lateral incisors of the upper and lower jaws

She noted that the presence of dental fluorosis may be a clue that there has been exposure to drinking water contaminated with fluoride. Dental fluorosis can only occur if the fluoride exposure is during the first years of life while the teeth are forming.



Figure 4. Professor AK Susheela, PhD, FAMS (India), FASc, Ashoka Fellow.

^aCristofoloni M, Largaiolli D. Su di una probabile tossidermia da fluoro. *Rivista Med Trentina* 1966;4:1-5. [in Italian].

^bSusheela AK. A treatise on fluorosis. Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 53-60, 78-9.

The discolouration starts with the teeth losing their shine and developing white and yellow spots, or chalky white patches. The discolouration may turn brown and form horizontal streaks or spots on the enamel surface. She considered brown streaks near the tip of the permanent teeth occurred with exposure to fluoride up to the 2nd year, in the middle of the teeth from 2–4 years, and in the part of the teeth closest to the gums from 4–6 years.

THE PATHOPHYSIOLOGY OR MECHANISMS UNDERLYING THE SYMPTOMS

How fluoride is toxic is complicated,^a and a recent review by Professor Anna Strunecká, DSc, Professor J Patočka, DrSc, Dr Russell L Blaylock, and the late Professor Emerita Niloufer J Chinoy, PhD, with 331 references is especially noteworthy (Figures 5–7 and 51).^b



Figure 5. Professor Anna Strunecká, DSc.



Figure 6. Professor Jiří Patočka, DrSc.

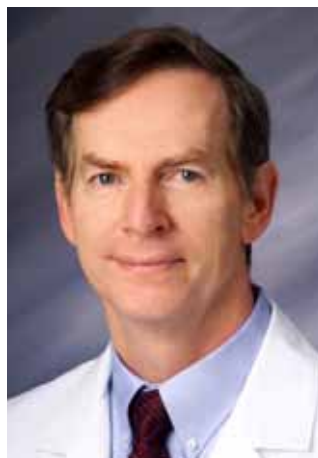


Figure 7. Russell L Blaylock, MD.

In the acidic environment of the stomach, with a pH of 1–4, fluoride forms hydrofluoric acid which penetrates the tissues and causes corrosion, irritation, and inflammation.^c The mechanism for the occurrence of urinary urgency is less clear. Tissue irritation from hydrofluoric acid is again a possibility but the pH of urine is usually close to neutral, i.e. 7, although it can vary between 4.5 and 8. At pH 7, only about 0.015% of the F is present as undissociated HF. Whether this is enough to produce this clinical symptom is uncertain and it may be due to indirect effects.

Fluoride, maybe in the form of HF, has been reported to form strong hydrogen bonds with amide groups and thereby alter the shape of proteins and thus enzymes.^{de}

^aSpittle B. Psychopharmacology of fluoride: a review. *Int Clin Psychopharmacol* 1994;9:79-82.

^bStrunecká A, Patočka J, Blaylock RL, Chinoy NJ. Fluoride interactions: from molecules to disease. *Current Signal Transduction Therapy* 2007;2:190-213.

^cWaldrott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978. p. 246-7, 359.

^dEmsley J, Jones DJ, Miller JM, Overill RE, Waddilove RA. An unexpectedly strong hydrogen bond: *ab initio* calculations and spectroscopic studies of amide-fluoride systems. *J Am Chem Soc* 1981;103:24-8.

^eDeLauder SF, Mauro JM, Poulos TL, Williams JC, Schwarz FP. Thermodynamics of hydrogen cyanide and hydrogen fluoride binding to cytochrome c peroxidase and its Asn-82→Asp mutant. *Biochem J* 1994;302:437-42.

After the discovery of the ability of fluoride to release, in conjunction with calcium, inflammatory mediators such as histamine from white blood cells, including mast cells,^{ab} the focus moved to G-proteins. Aluminium fluoride has been shown to act as a phosphate analog^c and stimulate G-protein receptors and signalling pathways, such as the phosphatidylinositol pathway, which control protein phosphorylation, the uptake of calcium into cells, and the release of calcium from intracellular stores.^d These processes are involved in hormonal and immunologic responses, transmission of nerve impulses, cell division, and even neoplastic transformations.^e

Many of the symptoms of chronic fluoride toxicity are identical to those observed in thyroid or iodine deficiency disorders (IDD).^f Aluminium fluoride can mimic the action of TSH (thyroid stimulating hormone) by activating a calcium-transducing G-protein receptor, G q/11, in the thyroid leading, via a feedback mechanism with increased intracellular cAMP, to desensitization of the TSH receptor^g and ultimately hypothyroidism. Fluoride, like TSH, has the ability to influence all aspects of thyroid hormone homeostasis in all tissues where the TSH receptor is expressed, which includes the brain and bone as well as the thyroid, including iodine uptake and utilization, thyroid hormone homeostasis, deiodination, and thyroid peroxidase (TPO) activity. Deiodination involves the conversion of the hormone produced in the thyroid gland, thyroxine or T4, to the active thyroid hormone triiodothyronine, T3.^{hij} Moreover, Dr Russell Blaylock has suggested that fluoride may lead to excitotoxicity with cell death in the brain from overstimulation. It may also induce, via brain NMDA receptor stimulation, a chronic activation of the microglial cells in the brain, with the release of high levels of the excitotoxic aminoacids glutamate and aspartate, and the secretion of high levels of immune cytokines, and other immune factors, which can enhance excitotoxicity.^{klmn}

Some persons are evidently more sensitive than others for developing the symptoms of chronic fluoride toxicity, particularly those with renal (kidney)

^aPatkar SA, Kazimierzczak W, Diamant B. Histamine release by calcium from sodium fluoride-activated rat mast cells: further evidence for a secretory process. *Int Arch Allergy Appl Immunol* 1978;57:146-54.

^bKuza M, Kazimierzczak W. On the mechanism of histamine release from sodium fluoride-activated mouse mast cells. *Agents Actions* 1982;12:289-94.

^cStrunecká A, Patocka J. Pharmacological and toxicological effects of aluminofluoride complexes. *Fluoride* 1999;32:230-42.

^dHunter T. Protein kinases and phosphatases: the yin and yang of protein phosphorylation and signaling [review]. *Cell* 1995;80:225-36.

^eBirnbaumer L. Expansion of signal transduction by G proteins The second 15 years or so: from 3 to 16 alpha subunits plus betagamma dimers. *Biochim Biophys Acta* 2007;1768(4):772-93.

^fSchuld A. Fluoride effects on thyroid function. *Fluoride* 2003;36:72.

^gTezelman S, Shaver JK, Grossman RF, Liang W, Siperstein AE, Duh QY, et al. Desensitization of adenylate cyclase in Chinese hamster ovary cells transfected with human thyroid-stimulating hormone receptor. *Endocrinology* 1994;134(3):1561-9.

^hLubkowska A, Zyluk B, Chlubek D. Interactions between fluorine and aluminium [editorial]. *Fluoride* 2002; 35:73-7.

ⁱStrunecká A, Patocka J. Pharmacological and toxicological effects of aluminofluoride complexes. *Fluoride* 1999;32:230-42.

^jSchuld A. Is dental fluorosis caused by thyroid hormone disturbances? [editorial]. *Fluoride* 2005;38:91-4.

^kBlaylock RL. Fluoride neurotoxicity and excitotoxicity/microglial activation: critical need for more research. *Fluoride* 2007;40:89-92.

^lBlaylock RL. Excitotoxicity: a possible central mechanism in fluoride neurotoxicity. *Fluoride* 2004;37:301-14.

^mBlaylock RL. Health and nutrition secrets that can save your life. Revised ed. Albuquerque, New Mexico: Health Press; 2006. p. 93-131.

ⁿBlaylock RL. Excitotoxins: the taste that kills. How monosodium glutamate, aspartame (Nutrasweet®) and similar substances can cause harm to the brain and nervous system and their relationship to neurodegenerative diseases such as Alzheimer's, Lou Gehrig's disease (ALS) and others. Santa Fe, New Mexico: Health Press; 1997.

disease, diabetes mellitus, and allergies. Patients with renal impairment are less able to eliminate fluoride promptly, diabetics tend to drink more water than average, and allergic individuals are less tolerant to noxious agents than are normal individuals. Dr Waldbott estimated that about 1% of persons exposed to fluoridated water develop the chronic fluoride toxicity syndrome, while Dr Hans Moolenburgh, a general practitioner in the Netherlands, considered the proportion to be about 5–6%.^{ab} Subtle toxicity may affect many more.

MAKING THE DIAGNOSIS OF THE CHRONIC FLUORIDE TOXICITY SYNDROME

Not all the symptoms are necessarily present at the same time. Their severity and duration, which is often episodic, depend on a person's age, nutritional status, environment, kidney function, amount of fluoride ingested, genetic background, tendency to allergies, and other factors such as the degree of “hardness” of the fluoridated water due to the amount of calcium and magnesium present.

Dr Waldbott, together with Professors Albert Burgstahler and Lewis McKinney, noted that to test whether or not fluoride is causing symptoms of ill health the following must, as far as possible, be rigorously avoided:

- 1 all fluoridated water (Substitute distilled or other nonfluoridated water such as that obtained with a reverse osmosis filter. Ordinary charcoal or carbon water filters do not remove fluoride. Dr Michael Easley, a profluoridationist and dental coordinator for the state Department of Health, Florida, notes “Nobody drags anyone to a water faucet and makes them drink. Dig a well. Move out of the country.” but his comments are both unsympathetic and impractical.^c)
- 2 fluoridated beverages
- 3 fluoride-rich foods such as tea, ocean fish, gelatin, skin of chicken, fluoridated salt, food contaminated with fluoride-containing insect or post-harvest fumigants (e.g. sulfuryl fluoride) and pesticides (e.g. cryolite, sodium aluminium fluoride, Na_3AlF_6 , which may be used on grapes), etc.
- 4 fluoridated toothpastes
- 5 fluoride from any other environmental source, including cigarette smoke and industrial pollution, e.g. fluoride in dust and fumes from industries such as those manufacturing steel, aluminium,^d enamel,^e pottery, glass, bricks, phosphate fertilizer, and others involved with power, welding, water fluoridation plants,^f refrigeration, rust removal, oil refining,^g plastics, pharmaceuticals, tooth-paste, chemicals, and automobiles.^h

Dr Susheela notes that other sources of fluoride may include:ⁱ

- 6 medications containing fluoride and fluoride mouth rinses
- 7 black rock salt (fluorite, CaF_2) and foods containing black rock salt (Kala Namak) for flavour, e.g. Dhalmoth, other salty snacks, chat masala, etc.
- 8 red rock salt and foods made using red rock salt
- 9 tobacco or supari (Aracanut) when they are chewed by themselves

In China, fluoride toxicity occurs with:

- 10 brick tea made, in Tibet, by compressing the older tea leaves, which have a higher fluoride content, into “bricks.” Part of the brick is broken off to prepare the tea.^j

^aWaldbott GL. Affidavit in: Dr Waldbott presents affidavit to assist Massachusetts Superior Court Case. National Fluoridation News 1980;XXVI(3):1-2.

^bMoolenburgh HC. Dutch doctor describes hazards of fluoridated water. National Fluoridation News 1979;XXV(4):3.

^cAnton M. For some fluoridated water still hard to swallow. Los Angeles Times. 2007 Dec 27.

^dWaldbott GL. Fluoridation: a clinician's experience. South Med J 1980;73:301-6.

^eWaldbott GL. Preskeletal fluorosis near an Ohio enamel factory: a preliminary report. Vet Hum Toxicol 1979;21:4-8.

^fWaldbott GL. Subacute fluorosis due to airborne fluoride. Fluoride 1983;16:72-82.

^gWaldbott GL, Lee JR. Toxicity from repeated low-grade exposure to hydrogen fluoride: case report. Clin Toxicol 1978;13(3):391-402.

^hSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 17-8.

ⁱSusheela AK. A treatise on fluorosis. Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 100.

^jCao J, Liu JW, Tang LL, Sangbu DZ, Yu S, Zhou S, et al. Dental and early-stage skeletal fluorosis in children induced by fluoride in brick-tea. Fluoride 2005;38:44-7.

- 11 food contaminated with fluoride. In some parts of China, food, such as chillies and corn, becomes contaminated with fluoride over a period of months as it is dried in dwellings in which the heating and cooking is done with coal briquettes made by mixing cheaper powder coal with clay which is high in fluoride. The presence of clay results in smoke with a high fluoride level and, in the absence of a chimney flue, the food stored in the dwelling gradually becomes contaminated with fluoride (Figures 8-11).^{ab}

If the symptoms are in fact caused by fluoride, they should diminish markedly within a week and largely disappear within several weeks. If symptoms persist, consult a physician for possible alternative explanations. True fluoride toxicosis can be reproduced by re-exposure to fluorides from whatever source. Dr Susheela found the gastrointestinal symptoms settled within 15 days.^c She noted that for diagnosing skeletal fluorosis, measuring the levels of fluoride, in the blood and urine, was helpful along with taking radiographs of the forearm to look for the presence of calcification of the interosseous membrane or a wavy outline of the bones of the forearm, and of any region or joint where there was pain, rigidity or stiffness, looking for increased bone density, or, in patients with calcium deficiency, a weakening of the bone (osteomalacia).



Photograph by BS Zheng

Figure 8. Powdered coal, which is one third of the price of lumps of coal, is mixed with clay to form briquettes so that air spaces are present in the fire to allow the coal to burn. The clay acts as an adhesive to form lumps of a mixture of coal powder and clay. The air can enter between the lumps in the fire thus allowing the coal to burn.

^aZheng BS, Wu DS, Wang BB, Liu XJ, Wang AM, Chen XZ, et al. Fluorosis caused by indoor coal combustion in China: discovery and progress. Proceedings of the XXVIth conference of the International Society for Fluoride Research; 2007 Oct 9-12; Beijing, PR China.

^bWu DS, Zheng BS, Wang AM, Yu GQ. Fluoride exposure from burning coal-clay in Guizhou Province, China. *Fluoride* 2004;37:20-7.

^cSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 95.



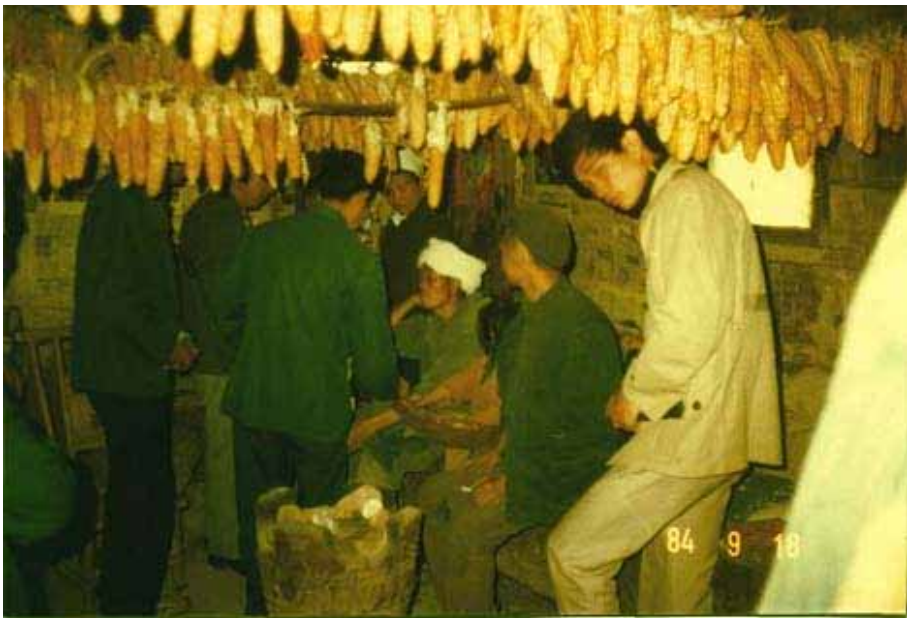
Photograph by BS Zheng

Figure 9. Chillies drying above a stove without a flue burning powdered coal briquettes made with high fluoride clay and becoming contaminated with fluoride from the smoke.



Photograph by BS Zheng

Figure 10. Corn drying above a stove without a flue burning powdered coal briquettes made with high fluoride clay.



Photograph by BS Zheng

Figure 11. Corn drying above a stove without a flue burning powdered coal briquettes made with high fluoride clay.

She considered that if the patient has joint pain, such as in the neck, back, knee, or shoulder, then, when taking a radiograph of the affected region, it was important to take a radiograph of the forearm.^{ab} The forearm has two long bones in it, the radius on the thumb side and the ulna on the side of the little finger, with a fibrous membrane between the bones (interosseous membrane). Normally there is no bone in the membrane and it does not show up as an opacity in radiographs or “X-rays.” When fluoride toxicity is present, bone containing calcium is laid down in membranes, ligaments, and joints where it does not normally appear. When it is laid down in the membrane between the two bones in the forearm, it is called forearm interosseous membrane calcification.

In the chronic fluoride toxicity syndrome or preskeletal fluorosis, Dr Waldbott found that although fluoride levels in the urine are occasionally elevated or lower than normal, the lack of consistency does not permit the use of these tests as absolute diagnostic criteria for fluoride poisoning.^c He found the degree of poisoning does not necessarily parallel the amount of the toxic agent stored in organs or present in the blood stream and that merely the flow of a toxic agent through a person could damage their health. He noted that an elevation of the urinary fluoride is not a prerequisite for the diagnosis of nonskeletal fluorosis.

Although fluoride may be present in a medication or an anaesthetic agent, it may be less toxic by being in a bound rather than a free form. Unless fluorinated organic chemicals are metabolised in the body to release the fluoride they contain, the covalently bound fluoride may be eliminated from the body without having been released as free fluoride ions. A small increase in the serum^d fluoride level occurs with the partially metabolized ciprofloxacin, a fluoroquinolone antibiotic, while a larger increase occurs with fluorinated anaesthetics such as halothane, which are metabolised to a greater extent.^e It is possible that small amounts of fluoride released from fluoride-containing medications may be a cause of illness, particularly if the release is in an area, such as the brain, where even minute concentrations may have a very potent effect.

WHAT TO DO IF THE DIAGNOSIS OF CHRONIC FLUORIDE TOXICITY IS MADE

If symptoms remit after avoiding fluoride, little encouragement should be needed to continue to avoid it. Neither laboratory studies on animals nor data on human teeth and bones have provided conclusive evidence that fluoride is essential for life.^f

^aSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 63-7.

^bSusheela AK. Fluorosis: an easily preventable disease through practice of interventions for doctors functioning in all health delivery outlets in endemic districts in India. India: Fluorosis Research and Rural Development Foundation; 2005. p. 10-1.

^cWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p. 243, 255.

^dSerum is the clear straw coloured fluid that is left after blood coagulates or clots, or the clear supernatant left after the red and white blood cells (erythrocytes and leukocytes) in the blood are separated, usually by centrifugation.

^eDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 49-51.

^fWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p. 243, 76-85.

Rather than medication for remediation, Dr Susheela recommends proper nutrition to give a diet containing at least 1.0 g of calcium a day together with vitamin C, vitamin E, and other antioxidants such as β -carotene, glutathione, quercetin, allicin, capsaicin, ellagic acid, gallic acid, epicatechin, lycopene, glucosinolates, lutein and zeaxanthin.^{ab} Antioxidants are particularly important in protecting the body from fluoride toxicity. They act as “scavengers” to remove “free radicals” and occur naturally in fresh fruit and vegetables. Vitamin E (α -tocopherol), a potent antioxidant, exerts its protective effect primarily through destruction of cell damaging free oxygen species.^c Vitamin C (ascorbic acid) is an antioxidant with detoxification properties. Calcium may help overcome the hypocalcaemia induced by fluoride and act synergistically with vitamin C.

CASE REPORTS OF FLUORIDE TOXICITY

The 507-page, 2006 National Research Council report, *Fluoride in drinking water: a scientific review of EPA's standards* (2006 NRC report),^d notes that the primary symptoms of gastrointestinal injury are nausea, vomiting, and abdominal pain, and that these had been reported in case studies by Waldbott^e and Petraborgh^f as well as in a double-blind clinical study by Grimbergen^g involving the research group of doctors in the Netherlands with Dr Hans Moolenburgh. The report noted that the case reports were well documented and that the authors could have been examining a group of patients whose gastrointestinal (GI) tracts were particularly hypersensitive. It noted:

“The possibility that a small percentage of the population reacts systematically to fluoride, perhaps through changes in the immune system, cannot be ruled out. ...

“Perhaps it is safe to say that less than 1% of the population complains of GI symptoms after fluoridation is initiated (Feltman and Kosel 1961^h). The numerous fluoridation studies in the past failed to rigorously test for changes in GI symptoms and there are no studies on drinking water containing fluoride at 4 mg/L in which GI symptoms were carefully documented. ...

“In a recent study, Machaliński et al. 2003ⁱ) reported that the four different human leukemic cell lines were more susceptible to the effects of sodium hexafluorosilicate, the compound most often used in fluoridation, than to NaF [sodium fluoride].”

Feltman and Kosel, whose large controlled clinical study was conducted by dental supporters of fluoride, wrote:

^aSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 89-94.

^bSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 89-94.

^cChinoy NJ, Nair SB, Jhala DD. Arsenic and fluoride induced toxicity in gastrocnemius muscle of mice and its reversal by therapeutic agent. *Fluoride* 2004;37:243-8.

^dDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. *Fluoride in drinking water: a scientific review of EPA's standards*. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 269, 293, 303.

^eWaldbott GL. Incipient chronic fluoride intoxication from drinking water. II. Distinction between allergic reactions and drug intolerance. *Int Arch Allergy Appl Immunol* 1956;9(5):241-9.

^fPetraborgh HT. Chronic fluoride intoxication from drinking water (preliminary report). *Fluoride* 1974;7:47-52.

^gGrimbergen GW. A double blind test for determination of intolerance to fluoridated water (preliminary report). *Fluoride* 1974;7:146-52.

^hFeltman R, Kosel G. Prenatal and postnatal ingestion of fluoride: fourteen years of investigation; final report. *J Dent Med* 1961;16:190-8.

ⁱMachaliński B, Baskiewicz-Masiuk M, Sadowska B, Machalińska M, Marchlewicz M, Wiszniewska B, et al. The influence of sodium fluoride and sodium hexafluorosilicate on human leukemic cell lines: preliminary report. *Fluoride* 2003;36:231-40.

“One percent of our cases reacted adversely to the fluoride (1 mg/day tablets). By the use of placebos, it was definitely established that the fluoride and not the binder was the causative agent. These reactions, occurring in gravid women and in children of all ages in the study group, affected the dermatologic, gastro-intestinal, and neurological systems. Eczema, atopic dermatitis, urticaria, epigastric distress, emesis, and headache have all occurred with the use of fluoride and disappeared upon the use of placebo tablets, only to recur when the fluoride tablet was, unknowingly to the patient, given again. When adverse reactions occur, the therapy can be readily discontinued and the patient or parent advised of the fact that sensitivity exists and the element is to be avoided as much as possible.”

Some case reports from Canada, the USA, New Zealand, the Netherlands, and India will now be presented to illustrate the chronic fluoride toxicity syndrome.

ILLNESS IN PEOPLE IN CANADA

Sickness occurred with people after fluoride has been added to their drinking water. Fluoride was added to the drinking water in Windsor, Ontario, Canada, on 11 September 1962.^a However, the local health department did not announce immediately that the change had been made because they feared an adverse reaction by the citizens. This situation provided an excellent opportunity to test whether fluoridated water produced sickness. When the press announced the commencement of fluoridation to the public two weeks later, eight individuals were able to diagnose their own disease.

Mrs MH and Mrs EK:^b Two of the eight, Mrs MH, a nurse, age 57, and Mrs EK, age 38, had been in the habit of drinking one or two glasses of water before breakfast. For some unknown reason, they suddenly experienced abdominal cramps and vomited immediately after their customary morning drink. During the course of the day they developed headaches, pains in the lower spine, and numbness and pains in the arms and legs. They had never before had any such discomfort and were not aware that Windsor's water had been fluoridated. The doctor for Mrs MH, Dr FS, considered at first that she had a stomach ailment but medication did not help. After several days of careful observation he suspected that the water might somehow be involved in her illness and advised her to discontinue drinking it. She then promptly recovered. Mrs EK resorted to the use of distilled water on her own and also promptly recovered.

Miss CD:^c Another of the eight was a 13-year-old schoolgirl, Miss CD, who in mid-September 1962 developed increasingly severe migraine-like headaches, pains and numbness in her arms and legs, and a distinct deterioration in her mental alertness which interfered with her attendance at school. A consulting neurologist ruled out the possibility of a brain tumour. Tests to determine whether the headaches were caused by allergy were negative. On the advice of another patient who had been similarly affected, she stopped drinking the Windsor drinking water. Her illness began to subside immediately and she had recovered completely after 10 days. On Mondays and Thursdays however the headaches recurred when, after

^aWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.121.

^bWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.121-2.

^cWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.122-3.

gym classes, she quenched her thirst with Windsor drinking water. These recurrences stopped after she began carrying her own distilled drinking water to school. Proof that the fluoride caused the illness was obtained when the disease was reproduced by a Windsor doctor giving fluoride in water in a double-blind manner. After the symptoms had subsided with being on a fluoride-free water supply, the condition recurred when water was used containing 1 part per million of fluoride (2.2 ppm of sodium fluoride) with neither the patient nor the testing doctor being aware of when the fluoride was reintroduced.

ILLNESS IN PEOPLE IN THE USA

Mrs SS:^a In 1954, Mrs SS, age 40, a resident of Bay City, Michigan, USA, was referred to an allergy specialist in Warren, Michigan, George L Waldbott, MD, because of painful spastic bowels, frequent nausea and vomiting, bloating of the stomach, and persistent migraine-like headaches. She mentioned that every morning on awakening she was so thirsty that she had to drink several glasses of water. She wondered if the Bay City's water could account for her stomach and bowel upsets because they usually occurred in the morning after she had consumed water. She gave the clue to her diagnosis by noting that whenever she was away from the city, her mouth and throat no longer felt dry, she was no longer thirsty, the cramps in her abdomen stopped, and her headaches did not occur. Neither she nor Dr Waldbott realized that Bay City's water was fluoridated in 1951. This was the first case of fluoride toxicity Dr Waldbott encountered.

Mrs MJ:^{bcd} Dr Waldbott met another patient a few months later in 1954. Mrs MJ, age 35, of Highland Park, Michigan, USA, had a mysterious illness with a variety of symptoms. Highland Park's water had been fluoridated since 1952. Her condition was more severe than the Bay City patient. She was constantly nauseated, vomited frequently, had periodic pains in the stomach, suffered diarrhoea, and had pains in the lower back. Her general health deteriorated so that she became bedridden and reported a progressive weight loss, passed blood repeatedly from her kidneys and uterus, had a constant and frequently unbearable pain in her head, and had a problem with her eyesight, noticing blind spots or moving spots in both eyes. She had lesions on her skin that she thought were the result of bleeding or bruises, and the muscles of her hands and arms weakened so that she often dropped potatoes when she was peeling them. She often lost control of her legs, could no longer coordinate her thoughts, and became incoherent, drowsy, and forgetful. She had lived near Hanchow, China, an area with a high fluoride level, until the age of 5, and had had mottled teeth since early childhood. This gave a clue to her diagnosis.

She was admitted to hospital in Detroit and examined by eight specialists who considered her illness to be serious but could not make an overall diagnosis. Until the preliminary tests were completed she had been instructed to continue to use the fluoridated Highland Park water. She was then changed to the nonfluoridated

^aWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.114-5.

^bWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.115-8.

^cWaldbott GL. Chronic fluorine intoxication from drinking water. *Int Arch Allergy* 1955;7:70-4.

^dWaldbott GL. Incipient fluorine intoxication from drinking water. *Acta Medica Scandinavica* 1956;CLVI:157-68.

Detroit water with 0.1 ppm of fluoride. Within two days the stomach symptoms and headaches subsided and she was soon well enough to be discharged. Neither in the hospital nor after her discharge was she given any medication. Instead she was instructed to strictly avoid fluoridated water, not only for drinking but also for cooking her food. She was also told to avoid both tea and seafood because of their high fluoride content. The headaches, eye disturbances, and muscular weakness disappeared in a most dramatic manner. After about two weeks her mind began to clear and she underwent a complete change in her personality. For the first time in two years she was able to undertake her household duties without having to stop and rest. Within a four-week period she had gained five pounds.

Subsequently the patient was subjected to a series of tests which definitely proved that her disease was related to fluoridated water. Without being aware of what she was receiving, she developed symptoms with fluoridated water but not distilled water. A classical attack of migraine headache was produced by one milligram of fluoride in two glasses of water.

She recovered completely without any treatment other than the elimination of Highland Park fluoridated water for drinking and cooking. A feature of her disease was that the more water, she drank the thirstier she became. The numbness in her arms, hands, and legs, and the arthritic pains in the spine were worse upon awakening in the morning, whereas one would usually have expected the reverse after a night's rest.

Mrs HM.^{ab} A few weeks later, in November 1954, Dr Waldbott saw 30 people in Saginaw, Michigan, USA, who had been ill there, and who had become suspicious of fluoridated water because their health improved immediately, and their illnesses gradually cleared up completely, following the termination of fluoridation in Saginaw. Nine of the 30 had a disease that matched that of the Highland Park case of Mrs MJ. Some of them had experienced relief when they were away from Saginaw, even for short periods. Most of them had been unaware that fluoride was being added to their drinking water until they were confronted with voting in a referendum on fluoridation. Some of the individuals suffered exclusively from bladder and bowel symptoms. Mrs HM, age 49, had mottled teeth like Mrs MJ and had spent her childhood near Toronto, Canada, where the well water was said to contain fluoride. During July 1953, two years and three months after Saginaw fluoridated its water supply, she noted a peculiar gnawing sensation in her stomach after eating "as though there was something burning inside." At the same time she experienced increasing stiffness of her back which was partly relieved by using a board on her bed. Her hands began to tingle in the areas around her ring and little fingers. She could not finish peeling her potatoes. She lost control of her legs which "seemed to collapse" under her. Gradually she developed severe muscular pains in her arms and legs. Her throat, eyes, and nose became extremely dry. The more drinking water she drank the thirstier she became. Her head became "foggy," her thinking "not clear," her hair began to fall out, and her finger nails became brittle and ridged. On hot days, when she drank more water, the general weakness,

^aWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.118-9.

^bWaldbott GL. Incipient fluorine intoxication from drinking water. Acta Medica Scandinavica 1956;CLVI:157-68.

mental sluggishness, and dryness of the throat became worse. On 19 October 1953 she started to use bottled water for drinking and distilled water for cooking after learning, for the first time, that the Saginaw water was fluoridated. Within a few days her illness began to clear up. The pain in the stomach and dryness of the mouth improved first. The backache and muscular pains lasted for about three more weeks. The nails became normal after several months and she then remained in excellent health.

Mr RM:^a Mr RM, age 42, was also in the Saginaw group of 30. He was about to give up his job because of progressive pains and weakness in his hands that prevented him from grasping the steering wheel of his car. The condition became so severe that he often had to stop on the highway. He finally became suspicious of Saginaw's water because the disease invariably lessened when he was on extended sales trips away from Saginaw. When fluoridation was abandoned there in 1954 he quickly recovered.

Dr Waldbott also cared for the next two patients, Mrs CMK and Miss GL.

Mrs CMK:^b “Mrs CMK, a 30-year-old ragweed, hayfever patient, under my care since March 1963, had allergic reactions to many drugs including codeine, iodine, penicillin and xylocaine. On 15 June 1965, two years and nine months after the Windsor, Ontario water supply had, unbeknown to her, become fluoridated, she had extensive laboratory studies in a Windsor hospital because of periorbital edema, a tendency to generalized fluid retention associated with headaches, scintillating scotomata, and spastic bowels. The EEG had suggested a tendency to “convulsive disorders,” but otherwise no diagnosis had been made.

“On 20 May 1966 she was hospitalized at Harper Hospital, Detroit, by Dr JPG. In addition to the above complaints, she stated that she had frequent episodes of abdominal pains, dysuria and urinary tenesmus, and muscular weakness with a tendency to fall down without warning and without losing consciousness. She had noted slurred speech, pains, paraesthesias in the arms and legs, general malaise, marked mental sluggishness, and a gradual deterioration of the eyesight which was not corrected by glasses.

“On examination she showed fibrillation of the facial muscles and grayish-blue suffusions [coloured areas] on the arms and legs, 2 to 3 cm in diameter, which she stated came on frequently without trauma. The neurological examination (Dr JEG) showed slightly increased tendon reflexes. Electromyographic tests (Dr FSS) were indicative of hypocalcaemic tetany. Retinoscopy [viewing the retinae of the eyes] (Dr OAB) showed slight edema of the optic discs in both eyes. Cystoscopic examination (Dr HVM) of the bladder revealed evidence of mild urethritis [inflammation of the ureters] and cystitis [inflammation of the bladder].

“A test dose of 6.8 mg of fluoride (15 mg sodium fluoride, NaF), [given on 19 May 1966], 24 hours prior to admission, resulted in a marked aggravation of her condition and precipitated an episode of urticaria [an allergic skin reaction with swelling and itching similar to that produced by the sting of a nettle] which

^aWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.119-20.

^bWaldbott GL. Hydrofluorosis in the U.S.A. Fluoride 1968;1:94-102.

persisted for two days. Throughout the hospital stay, while on low fluoride water (0.1 mg/L or ppm) she improved progressively. Upon discharge, on 6 June 1966, she was free of symptoms. Serum calcium levels ranged from 8.2 to 9.2 mg/dL or mg% (normal 8.8–10.0 mg/dL), shortly after admission, and urinary calcium from 86 to 150 mg/24 hours (normal <250 mg/24 hr). Otherwise the laboratory tests were unremarkable.

“On 9 June 1966 she was given a double-blind test under supervision of Dr JPG. She was able to identify the bottle which contained the fluoride in water because of the gradual return of her previous illness, particularly the general edema and the abdominal symptoms.

“Three identical bottles labelled #1, 2, and 3, are prepared by the pharmacist: Two contain plain distilled water, the third, 1 mg of fluoride (2.2 mg sodium fluoride, NaF) per tablespoon of water, the daily dose recommended for the prevention of tooth decay. Neither the patient nor the physician knows which bottle contains fluoride. The patient is instructed to take half a tablespoon twice a day in one pint of water (before breakfast and before dinner) from bottle #1 for one week, from bottle #2 the second week, and from bottle #3 the third week. Usually the fluoride water causes the symptoms to recur within 1 to 3 days. During the test, urinary fluoride determinations are made.

“Since avoiding tea, seafood, and fluoridated water, she had remained well except for minor recurrences which have been due to inadvertently imbibing Windsor fluoridated water. On 20 May 1966, [the day] after she was given the above [6.8 mg fluoride] test dose, the 24 hour urinary fluoride excretion was 2.8 mg; on 6 June 1966, the day she was discharged from the hospital, 0.27 mg.”

Miss GL:^a “Miss GL, 27 years old, had been under my care since July 1966 because of allergic nasal and sinus disease of about six years’ duration. She complained also of frontal and occipital headaches, of paresthesias and pains in the arms and hands, of backache, of arthritis in the interphalangeal joints [the joints in the fingers and toes], of persistent gastralgia [stomach pain] and spastic constipation, of frequent episodes of ulcers in the mouth, and of pyelocystitis for which she was being treated by other specialists. Desensitization for ragweed, grass pollen, and fungi to which she was sensitive cleared up the nasal allergy but failed to affect any of the other symptoms.

“The urinary tract disturbances and the marked generalized weakness progressed to such an extent that they interfered with her employment as a teacher and necessitated hospitalization at Hutzel Hospital on 1 February 1967.

“Laboratory tests, including kidney function studies were unremarkable. A cystoscopy and pyelography [radiograph or “X-ray” showing kidney function by using a dye, IVP, intravenous pyelogram] revealed an ectopic left kidney which failed to excrete the indigo carmine dye. The urologist (Dr FSB) considered this kidney without function and advised its removal. There was also a congenital fusion of the lumbar vertebrae, congenital absence of two lumbar segments and disc spaces; the right leg had been amputated at age 8 because of a congenital abnormality.

“Because the patient’s condition failed to respond to therapy and because of the similarity of the clinical picture with that encountered in other individuals

^aWaldbott GL. Hydrofluorosis in the U.S.A. Fluoride 1968;1:94-102.

intolerant to fluoride—without being aware of it she been drinking fluoridated water for 17 years in Highland Park, Michigan—she was placed on distilled water for cooking and drinking, and instructed to avoid “high fluoride” food (tea and seafood). The gastrointestinal symptoms and headaches disappeared completely within 10 days. On 12 June 1967, pyelography and cystoscopy revealed that the function of the ectopic left kidney had returned to normal. No blind or double-blind tests were carried out in this case because of the risk involved, particularly with respect to the kidneys.

“The patient has had no further urinary disturbances and has remained symptom-free. The 24-hour urinary fluoride, on 9 December 1966, prior to the hospitalization on 1 February 1967, was 1.3 mg. On 14 June 1967 no fluoride was detected in the urine.”

In 1972, Mr J Quirk brought to the attention of Dr Harvey T Petraborg, MD, of Aitkin, Minnesota, USA, the plight of six people in Cudahy, Wisconsin, USA, who had developed a variety of systemic symptoms after their water supply was fluoridated on 8 November 1966 and whose symptoms cleared up promptly after they stopped using fluoridated water (Figure 12). Dr Petraborg interviewed these six people together with a seventh person, also identified by Mr Quirk, in fluoridated Saint Francis, Wisconsin, on 3–5 August 1972.^a



Figure 12. Harvey T Petraborg, MD. 3 February 1895–24 August 1981.

Mr EH: Mr EH, age 52, became ill in the second week of November 1966, within a week of fluoridation starting. After having been in excellent health, he developed bloating in the lower portion of the abdomen, oedema in the extremities and pain in the feet and fingers. As the illness progressed he developed diarrhoea with 7–8 watery stools daily which were often tinged with blood. He was admitted to hospital for 4 days and had a variety of tests which did not show the cause of his illness. The diarrhoea persisted after his discharge from hospital. He developed marked itching on his legs when he showered but no itching occurred with showers at his workshop where the water was not fluoridated. He developed general dermatitis when he took a bath. This drew his attention to the possibility that his illness might be related to drinking water. He switched to nonfluoridated water and the bleeding and diarrhoea stopped. On several subsequent occasions whenever, unbeknown to himself, he drank fluoridated water the diarrhoea promptly recurred.

Mrs RAJ: Mrs RAJ, age 31, became unwell in November 1966 with persistent headaches, intermittent abdominal cramps with diarrhoea, and increasing fatigue which gradually became more severe and made it difficult for her to do her

^aPetraborg HT. Chronic fluoride intoxication from drinking water (preliminary report). *Fluoride* 1974;7:47-52.

housework. The condition promptly subsided in 1971 when she moved with her family to Stratford, Wisconsin, which was not fluoridated. In April 1972, the family moved to fluoridated Milwaukee, Wisconsin, and within 24 hours the headaches returned, followed shortly afterwards by diarrhoea and abdominal cramps. At first the intestinal disorders occurred once or twice a week and lasted 1–2 days but gradually they became persistent. Her abdomen was constantly bloated and severe general disability followed. On being advised about fluoridation by Mr Quirk she began to use spring water for cooking and drinking. Within a few days her health improved remarkably and by continuing to avoid fluoridated water she remained in good health.

Mrs RM: Mrs RM, age 31, also became ill in November 1966 after fluoridation started. She experienced a gradual deterioration in her strength with a loss of appetite and weight. She became so weak that it was a great effort for her to do her housework. On the advice of Mr Quirk she switched to nonfluoridated spring water and within a short time her appetite returned, she gained weight, she slept well, and her energy and strength recovered. By continuing to use nonfluoridated water she remained in good health.

Mr FT: Mr FT, a machinist, age 36, had been in perfect health until soon after fluoridation began when he began to be tired and lethargic. He became tense, mentally depressed, and experienced frequent headaches. After a day's work he found it necessary to lie down and sleep for several hours. He developed generalized itching after bathing. The symptoms all went when, on the advice of Mr Quirk, he stopped using the fluoridated Cudahy water. After several weeks on the low fluoride regime he returned to Cudahy water because he found it inconvenient and expensive to keep himself supplied with nonfluoridated water. The itching, headaches, general malaise, and mental depression then promptly returned. His symptoms again disappeared when he resumed using nonfluoridated water.

Mrs JM: Mrs JM, age 31, had excellent health while living in nonfluoridated Boyceville, Wisconsin, but within 24 hours of moving to fluoridated Cudahy, on 4 July 1971, she experienced constant abdominal pains, bloating, and diarrhoea. This was soon followed by persistent vertigo and general malaise which progressed to the point where she was unable to walk without assistance. Her vision became blurred and her comprehension began to fail. Her legs collapsed frequently and she was unable to rise from the floor. She found that she was always thirsty and drank excessive amounts of the Cudahy water. In the latter part of July 1971, she developed severe pain in the right side of her head and paresthesias in the right part of her face. She underwent extensive tests at a hospital including having a lumbar puncture but no diagnosis was made. About one week after leaving hospital she was given nonfluoridated spring water as a trial and instructed to avoid the Cudahy water for drinking and cooking. Within a week the dizziness, lethargy, pain, and gastrointestinal symptoms cleared up and she has enjoyed perfect health since.

Mrs AM: Mrs AM, age 74, was in good health until 1965 when the family moved to Saint Francis, Wisconsin, which uses Milwaukee fluoridated water. Within a few days she developed headaches, vertigo, nausea, abdominal pains with

diarrhoea, and a gradual loss of weight. The headaches became severe and the vertigo so pronounced that she could no longer walk from one room to another without colliding with the furniture. The general exhaustion rendered her bedridden during part of the day. Gradually she developed back pain as well as arthritis in both knees and right shoulder joint. On the recommendation of Mr Quirk, she started using nonfluoridated spring water in 1969. Within one to two weeks, a remarkable change in her physical condition took place. All her symptoms cleared except for her arthritic pains in her back and knees which gradually lessened. Subsequently she has enjoyed good health.

Mr AA: Mr AA, 47 years, stated that about 4 years ago in 1968 he had an acute episode involving kidney stones [nephrolithiasis]. He was hospitalized for 4 days and passed 5 kidney stones. On his discharge from hospital he was advised to drink large quantities of water. Shortly after carrying out this advice, he began to complain of fatigue, vertigo, irritability, and had to restrict his activity at work. He developed continuous headaches involving the whole skull bilaterally [on both sides]. Although he had been flying his own aeroplane for 25 years, he could no longer perform any precision maneuvering. At night, he could not see as well as formerly. Because of the dizziness, he no longer felt safe flying his plane. In 1970, on the advice of Mr Quirk, he switched from the fluoridated Cudahy water to nonfluoridated spring water. Within a few days, the headaches, vertigo, and lack of energy disappeared and he was able to pilot his airplane as well as ever.

ILLNESS IN PEOPLE IN NEW ZEALAND

Mrs PA (pseudonym A): In 1997, Mrs PA, a 77-year-old woman in Dunedin, New Zealand, where fluoride was added to the water in 1967, had a ten year history of weight loss and abdominal pain from a gastric ulcer, which was shown by biopsy to be severe chronic active gastritis with campylobacter pylori present.^a She obtained only temporary relief from the medication given to her. She said that for many years her activities were restricted by abdominal pain and that she existed on plain yoghurt. She said she could eat only about four tablespoonfuls of a meal and was unable to tolerate foods like vegetables. Her symptoms remitted within about two weeks of her commencing to use, in 1997, water from which the fluoride had been removed with a reverse osmosis filter. She also noted a marked improvement in the arthritis that she had in her back, shoulders, and jaw. Ten years later, in 2007, at the age of 87, she remained well and had gained 6.4 kg in weight. She continued to use filtered water which she said had been “like magic.” She said that the improvement in her health had been “just a miracle.”

Mrs PB: On 30 July 2007, Mrs PB, a 67-year-old Dunedin woman, reported having multiple symptoms and having noted that she became worse after being back in Dunedin for about a month after being away for several weeks in other parts of New Zealand that did not have fluoridated water. After a month back in Dunedin, she noticed that her balance was poorer, she had tingling in her toes at night that she tried to relieve by getting up and walking about, she felt that her mouth was dry and that she should drink more during the day, she became aware

^aSpittle B. Dyspepsia associated with fluoridated water. Proceedings of the XXVIIth conference of the International Society for Fluoride Research; 2007 Oct 9-12; Beijing, PR China.

of “blind spots” in her vision for the first time, she felt tired, and she had right upper abdominal tenderness. She said that she had had the abdominal pain several years previously and that it was attributed to “a twisted bowel.” She said that she had a pain in her jaw and that she had a bluish spot on the inner aspect of her left arm that came and went. It was about 10 mm in diameter and was not a bruise due to an injury. It did not turn yellow or brown. She said she had headaches, felt nervous, and was aware of palpitations. She also reported nausea, constipation, and pain in her lower-mid thoracic spine. She was aware of a weakness in her arms and was playing poorly at sport involving her arms. She said she tended to be dizzy and that her nails broke easily. She commenced a trial of avoiding fluoridated water by using nonfluoridated water, and not using fluoridated toothpaste or tea. On 13 August 2007 she reported that her balance was “so much better” and that she was less tired than before. She said that the tingling in her legs at night, which she had had for a long time and which had been getting worse, had lessened. She said that her right upper abdominal pain had improved. She reported that her constipation had improved without any change in medication, that her nausea was better, and that the headaches had gone. She said that the pain in her mid-lower thoracic spine was better, her vision was better, and that the troublesome spots had gone. She said that the dryness of her throat had gone and she was not experiencing a lack of energy. Her ability to play sport had improved and she was better able to anticipate her opponents’ moves. She said that her nervousness had gone and that she had not had any more palpitations. She said that she had lost the pain in her jaw and that the improvement had been remarkable. On 4 September 2007 she remained improved with not having the dark spots in her vision, dry mouth, or constipation and with a better sense of balance. She said that she could put her shoes on standing on one leg. The other areas of improvement also remained and she planned to continue to avoid fluoridated water, fluoridated toothpaste, and tea. The cause of her improvement could not be proven to be related to avoiding fluoride, but the pattern of improvement is consistent with that described for chronic fluoride toxicity.

Mr PC: On 8 June 2006, Mr PC, a 38-year-old man in Dunedin described having a long standing problem with chronic fatigue, gastro-intestinal difficulties, and problems with his memory and concentration. He said that he drank a lot of water, up to about 4 L a day of the fluoridated Dunedin water. He said that he used to swallow fluoridated toothpaste when he was younger. He commenced a trial of using nonfluoridated spring water from a public source at Speight’s Brewery, Rattray Street, Dunedin, with 0.1 ppm of fluoride, and avoiding fluoridated toothpaste. He reported a week later that his energy had improved and that he had been for a run, something he had previously been unable to do. He continued to improve in his energy and on 22 June 2006 said that he felt his energy was at a higher level than it had ever been before. On 29 June 2006 he reported that he was going for small runs on three mornings a week and that he was managing on 6 hours sleep a night, which was less than he had previously slept for. On 27 November 2007, 17 months later, he remained well on nonfluoridated water, continued to experience an increased energy level, and had further increased his capacity for running.

Mrs PD: On 24 September 2007, Mrs PD, a 59-year-old Dunedin woman with a long history of urinary urgency that had been investigated and considered to be due to a small bladder capacity and for which an appropriate treatment would be an operation to dilate the bladder, reported that her bladder problem had settled after a trial of some weeks of using nonfluoridated spring water and reducing her tea consumption from about 1.5 L a day to about 400 mL daily. On 18 October 2007 she reported a further improvement in the urgency and that she had had several good days without any symptoms. She said that she was pleased with this and felt that it meant that she did not have to have “a bladder stretching operation.” She said that she had also had less stomach pain than she usually had and that she did not have the bloating that she usually experienced. She reported that she had skin itching after showering. Although a causative relationship cannot be proven, the improvement in her symptoms is consistent with that described by others with chronic fluoride toxicity.

Mrs IH:^a Also in the South Island of New Zealand, in late 1973, Mrs IH, a 47-year-old Timaru woman, found that, soon after fluoride was introduced into the water supply, she became constipated for the first time in her life. She said that she tried everything from bran to fresh fruit but nothing worked. She said that she knew it must be something that she was taking but could not work out what it was. She said somebody suggested it could be fluoride but she scoffed at the idea. When she stayed with her son in nonfluoridated Christchurch her problem vanished. Back in Timaru, her illness did not return while she used nonfluoridated water from a reservoir on the outskirts of town but as soon as she went back to the fluoridated water she became constipated again. She was convinced by her experience that her constipation had been due to the fluoridated water.

Mrs PE: Mrs IH also reported that another woman had had a bad skin rash for two years, ever since fluoridation started in Timaru, for which medical treatment had been unsuccessful. Tests by her doctor suggested fluoride might be the cause. The woman then switched to nonfluoridated water and within two weeks her rash was gone.

ILLNESS IN PEOPLE IN THE NETHERLANDS

Dr Hans Moolenburgh, a family physician, in Haarlem, the Netherlands, with an interest in allergy, reported his experiences when fluoridation was introduced on 20 March 1972 to half of his practice in nearby Heemstede, which received water from Amsterdam, while the other half of his practice in Haarlem remained free from fluoridation (Figure 13).^b

Miss PF: He said that he would never forget his first patient with fluoride toxicity.^c A 14-year-old girl, Miss PF, got colicky pains in her stomach two weeks after fluoridation started that prevented her from going to school. He suggested that she use nonfluoridated water. It was difficult to convince her parents to do this because they had not known that fluoridation had started but with the

^aAnon. Fluoridation stopped in Timaru, New Zealand. National Fluoridation News 1986; XXXI(4):2.

^bMoolenburgh H. Fluoride: the freedom fight. Edinburgh: Mainstream Publishing; 1987. p. 64

^cMoolenburgh H. Fluoride: the freedom fight. Edinburgh: Mainstream Publishing; 1987. p. 65

nonfluoridated water the girl had immediate pain relief. However, one Sunday morning, the pain suddenly came back. The father commented that it was not fluoridated water after all. Dr Moolenburgh asked him to think carefully. The father then began to laugh and said “You’re right doc, I remember bringing up the tea this morning and making it with drinking water.”

Mr PG: His second patient, Mr PG, had an itchy rash all over his body.^a

Dr Moolenburgh reported that one of the first symptoms seen in fluoridated Amsterdam was small, white, very painful sores in the mouth (aphthous stomatitis). Later he saw this regularly in the users of fluoridated toothpaste.

There were people with nagging pains in the abdomen who often had another side-effect of increased thirst which led them into a vicious circle in which, the more drinking water they drank, the more their symptoms increased.

Baby PH: He also noted “A five-week-old baby started crying and cried on and on, day and night. It was taken to the hospital where nothing could be found wrong with the child. It went on crying after returning home and was in pain from something. After some weeks when the parents were frantic with despair, I suggested nonfluoridated water. (This baby was not in my practice and the parents only heard about our research when the illness of the child had continued for several weeks.) With nonfluoridated water in the bottle the baby changed overnight to a sweet contented child and stayed that way.”

Baby M: Dr Moolenburgh saw respiratory problems. He wrote “A boy, Michael, two weeks old, was taken to the doctor because his breathing was not right.^b The mother had three older children. She said, ‘His breathing is different from the other ones. It is laboured.’ Neither the doctor nor the specialist could find anything wrong. The breathing grew steadily worse. As I am very interested in allergy, this boy was brought to me when he was five months old. Here was typical asthmatic breathing, and the child was not so bright and kicking as might be expected from a healthy baby. He looked a little bit drowsy. I suggested nonfluoridated water in the bottle to begin with, and in three days the child was healed. ... The boy is now 7 years old and absolutely healthy.”

Baby PI: Dr Moolenburgh observed that, when using fluoridated water, allergic children showed a tendency to fall back into old allergic complaints or show a severe worsening of still existing complaints. He recorded “For instance, there was a ten-month-old boy in my practice who had been healed from getting eczema by changing the cow’s milk in the bottle for soy milk. Three days after the



Figure 13. Dr Hans Moolenburgh.

^aMoolenburgh H. Fluoride: the freedom fight. Edinburgh: Mainstream Publishing; 1987. p. 65

^bMoolenburgh HC. Dutch doctor describes hazards of fluoridated water. National Fluoridation News 1979;XXV(4):3.

introduction of fluoridation the eczema was back all over the skin (without cows' milk!) and only healed after the tap water had been thrown out."^a

Mrs PJ: Dr Moolenburgh stated that apart from skin troubles, gastrointestinal complaints, and respiratory illnesses, other troubles during these first months of fluoridation were headache, excessive thirst, a general feeling of being unwell, and difficulty in concentration. He referred also to the side-effect of arthritis-like complaints that came on much later, after several months, and went away more slowly, over several weeks. They were mostly located in the lower part of the back and in the small finger joints. One lady, Mrs PJ, was nearly crippled by these complaints and, because even small amounts of fluoridated water were enough to keep the illness going, she eventually had to move to a nonfluoridated region.^b

Dr PK: Dr Moolenburgh formed a group with other doctors to conduct research into the side-effects of fluoridation.^c One day, Dr PK, a 60-year-old doctor in his research group, looked pale and gloomy.^d They asked him if he did not feel well and he confessed that he had had a slowly increasing pain in his abdomen for some months and was afraid that he had cancer. One of them, as a joke, suggested it was the fluoridated water. He replied that that was "Stuff and nonsense" and that it did not happen to him. Dr Moolenburgh suggested he try nonfluoridated water. He did and was healed in three days. However a week later his complaints suddenly returned and he did not understand why until he discovered that he had drunk some coffee made with fluoridated water while attending a home delivery. He continued to avoid fluoridated water and his complaints never returned.

ILLNESS IN PEOPLE IN INDIA

Professor AK Susheela described patients who became ill from fluoride in India. *Mr PL:* Mr PL, a 45-year-old man who drank water with an elevated fluoride level, complained of aches and pains in his joints and a 12-year history of non-ulcer dyspepsia (nausea, loss of appetite, pain in the stomach, gas formation and a bloated feeling, constipation followed by intermittent diarrhoea, and headache).^e He took a laxative magnesium hydroxide (Milk of magnesia) for the constipation. The presence of skeletal fluorosis was confirmed by radiographs showing forearm interosseous membrane calcification, and increased bone mass and density. The fluoride levels in his blood and urine were also increased. After three weeks of hospitalization and using water with less than 0.5 ppm of fluoride, he was discharged with the abdominal pain, and the joint aches and pains, largely relieved.

Master PM and Mr PN: Master PM, a 10-year-old boy suffered from excessive thirst (polydipsia), drinking 4 L of water a day at school between 7 am and 2 pm, and frequent urination (polyuria).^f He limped when he got out of bed and also had

^aMoolenburgh HC. Dutch doctor describes hazards of fluoridated water. National Fluoridation News 1979;XXV(4):3.

^bMoolenburgh HC. Dutch doctor describes hazards of fluoridated water. National Fluoridation News 1979;XXV(4):3.

^cGrimbergen GW. A double blind test for determination of intolerance to fluoridated water (preliminary report). Fluoride 1974;7:146-52.

^dMoolenburgh HC. Dutch doctor describes hazards of fluoridated water. National Fluoridation News 1979;XXV(4):3.

^eSusheela AK. A treatise on fluorosis. Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 105.

^fSusheela AK. A treatise on fluorosis. Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 111-3.

constipation with a bowel movement every three days. His serum and urine fluoride levels were elevated at 0.08 mg/L (ppm, normal range ≤ 0.02 mg/L) and 8.0 mg/L (normal ≤ 0.10 mg/L) respectively. His father, Mr PN, also had symptoms with abdominal pain, a bloated feeling with gas formation, nausea, constipation followed by intermittent diarrhoea, extreme weakness, and fatigue. Both were receiving excessive amounts of fluoride through water, food, and toothpaste and responded to avoiding fluoridated toothpaste and a lowered intake of fluoride in the food and water. After 7 months of intervention the boy's serum fluoride had fallen to 0.02 mg/L and the urine fluoride to 0.60 mg/L. Both Master PM and Mr PN continued to be well.

While a urine fluoride level of ≤ 0.10 mg/L would be normal on a low fluoride diet, a level of 0.2–0.3 mg/L might still be considered fairly normal in today's environment even without fluoridated water.

Mr PO: Mr PO, a 59-year-old man, was diagnosed with fluoride toxicity after forearm interosseous membrane calcification was found by an orthopaedic surgeon.^a He had a 15-year-history of back ache, found it difficult to climb stairs, and was very depressed. He was found to have severe non-ulcer dyspepsia symptoms with gas formation, a bloated stomach, nausea, and constipation with intermittent diarrhoea. His serum and urine fluoride levels were elevated at 0.08 mg/L (normal range ≤ 0.02 mg/L) and 2.50 mg/L (normal ≤ 0.10 mg/L), respectively. His drinking water fluoride was not elevated but he was using fluoridated toothpaste, and consuming 100–150 g of Dhalmoth, a salted snack with black rock salt, and was treating himself with an Ayurvedic tablet, Hajmola, which also contained black rock salt. Black rock salt (Kala Namak, fluorite, CaF_2) has a high fluoride content, about 250 ppm. With a nutritional intervention, avoiding fluoridated toothpaste and black rock salt, and taking a diet with 1.0 g of calcium a day, vitamins C and E, and antioxidants, he improved remarkably over 10 months, at which stage his serum and urine fluoride levels were 0.03 mg/L and 0.70 mg/L.

OTHER ILLNESSES DUE TO FLUORIDE

An apparent, but statistically non-significant, association has been found between fluoridation and the earlier onset of female sexual maturity. Girls examined in fluoridated Newburgh, New York, had an average age for starting to menstruate (menarche) of 12 years compared to 12 years 5 months in the nonfluoridated control city of Kingston.^b Animal studies with Mongolian gerbils found a similar effect.^{cd} A hormone, melatonin, produced in the pineal gland in the brain, normally controls the onset of sexual maturity. Fluoride is concentrated in the pineal gland, which has a rich blood supply, and the 2006 NRC report calls for

^aSusheela AK. A treatise on fluorosis. Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 109–11.

^bSchlesinger ER, Overton DE, Chase HC, Cantwell KT. Newburgh-Kingston caries-fluorine study, XIII. Paediatric findings after ten years. J Am Dent Assoc 1956;52(3):296–306.

^cLuke JA. The effect of fluoride on the physiology of the pineal gland [thesis]. Guildford: University of Surrey; 1997.

^dLuke J. Effects of fluoride on the physiology of the pineal gland in the Mongolian gerbil *Meriones unguiculatus*. Fluoride 1998;31(3):S24.

further research to determine if it reduces melatonin production and causes an earlier menarche.^a

Fluoride has been linked to other illnesses such as the occurrence of a rare form of bone cancer, osteosarcoma, in young men after exposure to fluoridated water as young boys. Exposure of 6–8-year-old-boys to fluoridated water resulted in significant increase, 500% at age 7, in the occurrence of osteosarcoma by age 20 years.^{bc} Ingested fluoride is partly excreted in the urine and partly stored in bones where it can inhibit the normal cycle of bone breaking down and being rebuilt. Fluoride first affects the bone-resorbing cells, resulting in more bone being formed (osteomegaly).^d Over time, or with greater fluoride exposure, bone-forming cells are also affected, resulting in less bone being present (osteopaenia). Thus fluoride initially stimulates bone formation resulting in bones that are more dense but the quality of the bone is inferior. Bones with high fluoride levels are more brittle and hip fractures increase as the level of fluoride in the water supply increases.^{efg}

Fluoride causes thyroid hormone disturbances. A close similarity exists between the numerous symptoms and signs of hypothyroidism and those for fluoride toxicity including dental fluorosis.^{hij} There is also evidence that Down Syndrome is associated with fluoridation.^{klmno}

Increased violent crime has been linked to fluoridation with silicofluorides such as sodium silicofluoride or hydrofluosilicic acid.^p These are the forms of fluoride usually used in fluoridation rather than sodium fluoride, are by-products of industrial processes such as the manufacture of phosphate fertilizers rather than being of pharmaceutical grade, have not been properly tested for safety in fluoridating water, and differ in their effects from those of sodium fluoride by being more potent in inhibiting acetylcholinesterase and increasing lead absorption into the body, resulting in an impairment of brain functioning with a lessened control over violent behaviour.^q Silicofluorides act as a solvent for lead,

^aDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 264, 267.

^bBassin EB, Wypij D, Davis RB, Mittleman MA. Age-specific fluoride exposure in drinking water and osteosarcoma (United States). *Cancer Causes Control* 2006;17:421-8.

^cBryson C. The fluoride deception. New York: Seven Stories Press; 2006. [trade paperback edition]. p.xiv-xxx.

^dKrook LP, Justus C. Fluoride poisoning of horses from artificially fluoridated drinking water. *Fluoride* 2006;39:3-10.

^eConnett P. Waterborne fluoride and bone fractures [editorial]. *Fluoride* 2001;34:91-4.

^fDiesendorf M, Colquhoun J, Spittle BJ, Everingham DN, Clutterbuck FW. New evidence on fluoridation. *Aust NZ J Public Health* 1997;21:187-90.

^gLindsay R. Fluoride and bone: quantity versus quality [editorial]. *N Engl J Med* 1990;322:845-6.

^hSusheela AK, Bhatnagar M, Vig K, Mondal NK. Excess fluoride ingestion and thyroid hormone derangements in children living in Delhi, India. *Fluoride* 2005;38:98-108.

ⁱSchuld A. Fluoride effects on thyroid function. *Fluoride* 2003;36:72.

^jSchuld A. Is dental fluorosis caused by thyroid hormone disturbances? [editorial]. *Fluoride* 2005;38:91-4.

^kSusheela AK, Bhatnagar M, Vig K, Mondal NK. Excess fluoride ingestion and thyroid hormone derangements in children living in Delhi, India. *Fluoride* 2005;38:98-108.

^lBurgstahler AW. Fluoride and Down's syndrome (Mongolism) [editorial review]. *Fluoride* 1975;8:1-11.

^mBurgstahler AW. Fluoridated water and Down's syndrome [abstract]. *Fluoride* 1997;30:113.

ⁿTakahashi K. Fluoride-linked Down syndrome births and their estimated occurrence due to water fluoridation [review]. *Fluoride* 1998;31:61-73.

^oBurgstahler AW. Fluoride and Down syndrome: an update. Proceedings of the XXVIIth conference of the International Society for Fluoride Research; 2007 Oct 9-12; Beijing, PR China.

^pMasters RD. A moratorium on silicofluoride usage will save \$millions [editorial]. *Fluoride* 2005;38:1-5.

^qCoplan MJ, Masters RD. Silicofluorides and fluoridation [editorial]. *Fluoride* 2001;34:161-4.

dissolving it into a solution, so that lead ingested from the environment, such as soil contaminated by lead paint or from plumbing fittings containing lead, is more readily absorbed.^a In combination with water disinfection agents, such as chloramines and ammonia, silicofluorides cause a greater leaching of lead from leaded-brass plumbing parts.^b Another factor leading to a raised blood lead concentration may involve increased fluoride exposure increasing the dietary requirement for calcium, and higher blood and tissue concentrations of lead occurring when the diet is low in calcium.^c A study by Jay Seavey suggested that sodium fluoride was associated with violent crime independently of lead.^d

Lowered intelligence has been reported in children from high fluoride areas, particularly when associated with iodine deficiency, and the toxic effects of fluoride on the development of the brain are supported by animal studies.^{e f g h i j k l}

A rare form of skin cancer affecting the genital area in women, vulvar extramammary Paget's disease (EMPD), has also been linked to fluoridated water.^m *Ms CH*: Ms CH, age 67, first encountered fluoridated water when she moved to a fluoridated community in Washington State, USA, in 1994. Within five years she developed a small itchy area in the perineal area that was initially diagnosed as a fungal infection and later as a "chronic perianal and vulvar dermatitis." Treatment with antifungal and topical medication was ineffective and the condition came and went for several years. In 2003 she had an ovarian cyst removed and a partial colectomy for the treatment of diverticulitis. One month later, the perineal rash doubled in size and became unbearably painful. In addition, she experienced other symptoms including dry skin, rashes on her arms and body, earaches, a build up of "a white wax-like substance in her tonsils ('tonsil stones')," dizzy spells, pain in her legs, and an allergy to latex (rubber). She was found to have high blood pressure and blood tests showed high calcium and parathyroid hormone levels. A biopsy showed extramammary Paget's disease and surgical removal of the affected skin was recommended. She had trained as a nurse and suspected that she may be allergic to something. She tested various foods over a

^aHirzy JW. Silicofluorides and blood-lead: a mechanistic investigation [abstract]. *Fluoride* 2005;38:231.

^bMass RP, Patch SC, Christian AM, Coplan MJ. Effects of fluoridation and disinfection agent combinations on lead leaching from leaded-brass parts. *Neurotoxicology* 2007;28:1023-31.

^cDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. *Fluoride in drinking water: a scientific review of EPA's standards*. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 52.

^dSeavey J. Water fluoridation and crime in America. *Fluoride* 2005;38:11-22.

^eLi XS, Zhi JL, Gao RO. Effect of fluoride exposure on intelligence in children. *Fluoride* 1995;28:189-92.

^fZhao LB, Liang GH, Zhang DN, Wu XR. Effect of a high fluoride water supply on children's intelligence. *Fluoride* 1996;29:190-2.

^gGe YM, Ning HM, Feng CP, Wang HW, Yan XY, Wang SL, et al. Apoptosis in brain cells of offspring rats exposed to high fluoride and low iodine. *Fluoride* 2006;39:173-8.

^hTrivedi MH, Verma RJ, Chinoy NJ, Patel RS, Sathawara NG. Effect of high fluoride water on intelligence of school children in India. *Fluoride* 2007;40:178-83.

ⁱXiang Q, Liang Y, Chen L, Wang C, Chen B, Chen X, et al. Effect of fluoride in drinking water on children's intelligence. *Fluoride* 2003;36:84-94.

^jXiang QY, Liang YX. Blood lead of children in Wamiao-Xinhui intelligence study [letter]. *Fluoride* 2003;36:198-9.

^kBurgstahler AW. Influence of fluoride and lead on children's IQ: U.S. tolerance standards in question [editorial]. *Fluoride* 2003;36:79-81.

^lSpittle B. Fluoride and intelligence [editorial]. *Fluoride* 2000;33:49-52.

^mConnert MP. Vulvar Paget's disease: recovery without surgery following change to very low-fluoride spring and well water. *Fluoride* 2007;40:96-100.

six month period but found no relationship between any foods and the pain. Because she had not had any problem previously when living in nonfluoridated Wichita, Kansas, she decided to test whether fluoride in water affected her condition. Within three days of using spring water for drinking and cooking, she noticed an “immediate” improvement in her symptoms. She then continued with a six week trial of spring water followed by the long term use of low fluoride (<0.1 ppm [mg/L] of fluoride). She noted:

“I stopped using the tap water for drinking and bathing and the Paget’s started clearing up immediately. I now use well water from my son’s house and go there to bathe. I was free of symptoms within weeks—except the tonsil stones. It took about a year for those to completely go away.”

The blood pressure, calcium level, and parathyroid hormone level returned to normal and her vulvar Paget’s cleared up completely. Apart from one brief recurrence, when she used fluoridated water again, it has remained settled. She said:

“In 2005 I had house guests and we were on the go a lot. I didn’t want to go to my kids’ house to bathe so I showered at home. We ate out a lot at local restaurants that use the local tap water. I started itching and turning red in the same area. The symptoms cleared up in 2–3 days after I stopped [using the tap water].”

Since the improvement occurred when the change was made from using fluoridated drinking water to low fluoride spring or well water it was considered that fluoride, or possibly some other component of drinking water such as chlorinated disinfection by-products, contributed to her skin disease.

Impaired glucose tolerance in humans has been found with fluoride intakes of 0.07–0.4 mg/kg/day thus putting infants, children aged 1–2 years, athletes and heavy manual workers, and patients with diabetes mellitus and nephrogenic diabetes insipidus at risk with fluoridated water with 1 mg F/L.^a

WHAT TO DO IN THE FACE OF SKEPTICISM ABOUT THE VALIDITY OF THE EXISTENCE OF A CHRONIC FLUORIDE TOXICITY SYNDROME FROM FLUORIDATED DRINKING WATER

The examples used to illustrate the occurrence in some people, perhaps 1–5% of the population, of a chronic fluoride toxicity syndrome from using fluoridated water will not be convincing to many, particularly numerous health professionals including dentists and doctors. Health professionals tend to have the views taught to them by their teachers, and their teachers, in turn, are influenced by what they see as the views of the various authorities at the time. These things change very slowly over decades. It has been said that “Science progresses, funeral by funeral.” The Russian novelist Leo Tolstoy identified the problem when he wrote

“I know that most men, including those at ease with problems of the greatest complexity, can seldom accept even the simplest and most obvious truth if it be such as would oblige them to admit the falsity of conclusions which they have delighted in explaining to colleagues, which they have proudly taught to others, and which they have woven, thread by thread, into the fabric of their lives.”

^aDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA’s standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 65, 256–67.

For this slowness to see the light, I have coined the term "tardive photopsia."^a

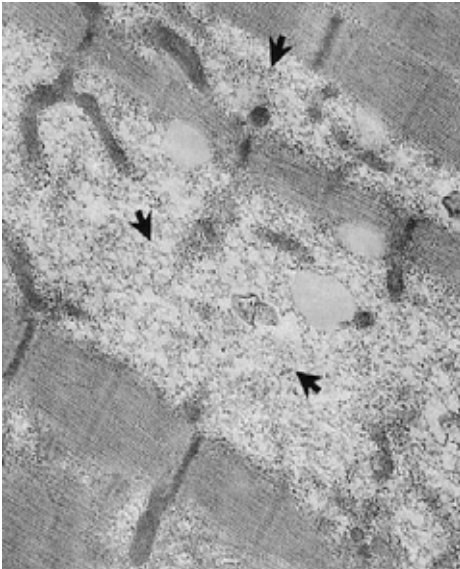
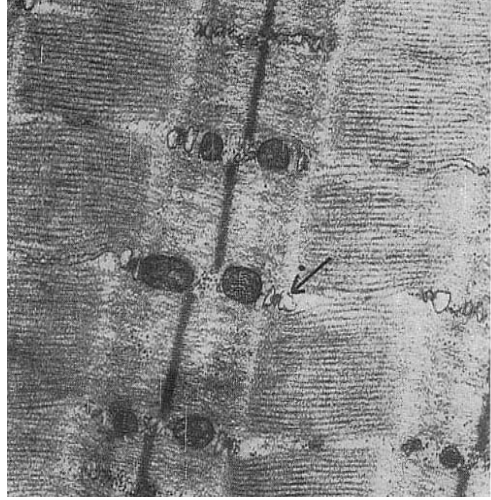
Thus those with symptoms consistent with chronic fluoride toxicity have nothing to lose from having a trial of avoiding fluoride for a few weeks, to see if it results in improved health, and have the possibility of much to gain.

ILLUSTRATIONS OF SOME OF THE ABNORMALITIES UNDERLYING THE SYMPTOMS IN CHRONIC FLUORIDE TOXICITY

Skeletal muscle, in the arms and legs, has actin and myosin filaments arranged regularly to give a striped or striated pattern on microscopic examination (Figure 14). With chronic fluoride toxicity the regular arrangement is disrupted by areas of degeneration (Figures 15–16). The patient with this degeneration experiences muscle weakness.^b

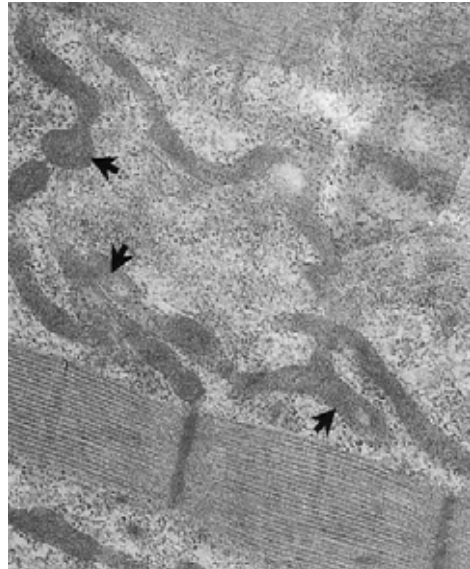
Photograph by AK Susheela

Figure 14. Transmission electron micrograph showing actin and myosin filaments forming the structural framework of a skeletal muscle fibre.



Photograph by AK Susheela

Figure 15. Skeletal muscle from a fluorosed human subject showing widespread degenerative changes of actin and myosin filaments.



Photograph by AK Susheela

Figure 16. Skeletal muscle from a fluorosed human subject showing widespread degenerative changes of actin and myosin filaments.

^aSpittle B. Fluoridation promotion by scientists in 2006: an example of "tardive photopsia" [editorial]. *Fluoride* 2006;39:157-62.

^bSusheela AK. A treatise on fluorosis. 2nd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2003. p. 59-61.

The intestinal lining or mucosa of the duodenal region normally has cells with small protrusions on them (microvilli) and a layer of slimy substance (mucus, Figure 17). The microvilli and mucus are lost with chronic fluoride toxicity giving rise to symptoms such as nausea, loss of appetite, pain in the stomach, gas formation and a bloated feeling, constipation followed by intermittent diarrhoea, and headache (Figures 18–19).^a These symptoms of non-ulcer dyspepsia are early warning signs of fluoride toxicity.

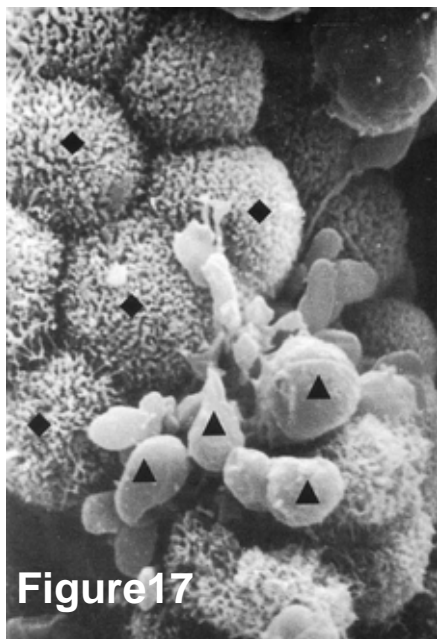


Figure 17

Photograph by AK Susheela
Figure 17. Scanning electron micrograph of the intestinal mucosa of the duodenal region showing the normal mucosal surface with columnar cells packed with microvilli and mucus droplets.

▲ mucus droplets ◆ microvilli

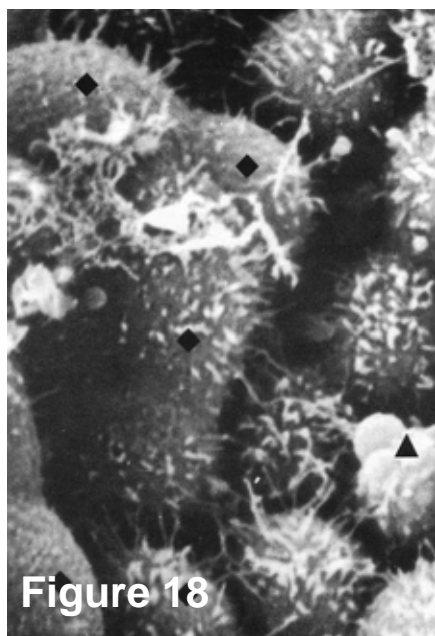


Figure 18

Photograph by AK Susheela
Figure 18. Scanning electron micrograph of the intestinal mucosa of the duodenal region showing the columnar cells with scanty microvilli and a loss of mucus droplets from a person consuming drinking water with 1.2 mg/L or ppm of fluoride.

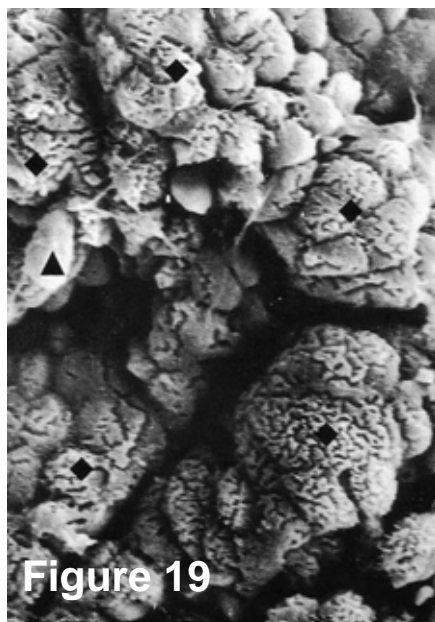
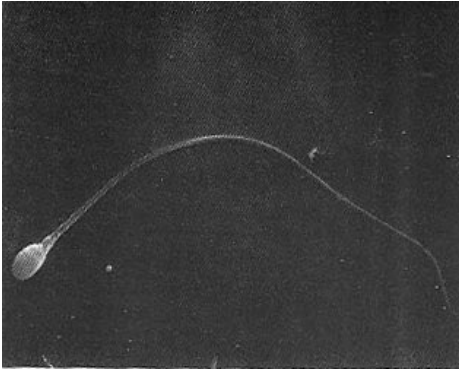


Figure 19

Photograph by AK Susheela
Figure 19. Scanning electron micrograph of the intestinal mucosa of the duodenal region showing the columnar cells with a loss of microvilli and mucus droplets, and a “cracked clay appearance of the mucosa” from a person consuming drinking water with 3.2 mg/L or ppm of fluoride.

^aSusheela AK. A treatise on fluorosis. 2nd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2003. p. 66-8.

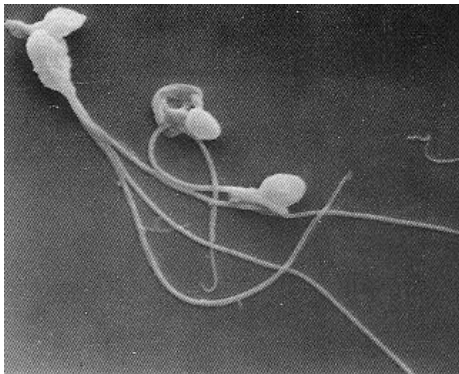
Male infertility with abnormalities in sperm morphology (Figures 20–23), a deficiency in the number of spermatozoa in the semen (oligospermia), the absence of spermatozoa from the semen (azoospermia), and low testosterone levels are very common in those residing in areas of India where chronic fluoride toxicity is common due to fluoride-contaminated water.^a Some individual variation in the susceptibility to developing infertility is present.



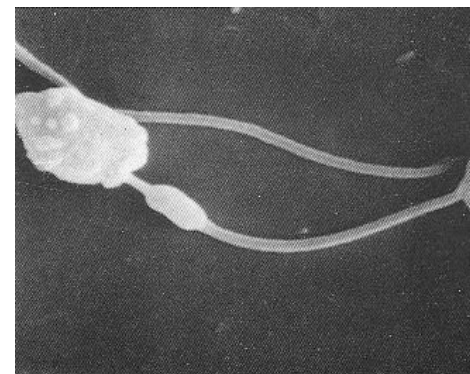
Photograph by AK Susheela
Figure 20. Scanning electron micrograph of normal human sperm.



Photograph by AK Susheela
Figure 21. Scanning electron micrograph of abnormal double-headed human sperm from an infertile male consuming fluoride-contaminated water.



Photograph by AK Susheela
Figure 22. Scanning electron micrograph of abnormal human sperm with multiple and coiled tails from an infertile male consuming fluoride-contaminated water.



Photograph by AK Susheela
Figure 23. Scanning electron micrograph of abnormal human sperm with an abnormal head and midpiece from an infertile male consuming fluoride-contaminated water.

The capacity of fluoride to induce new bone formation in areas of the body where it does not normally occur such as in the forearm interosseous membrane is illustrated by the condition of periostitis deformans, described by Dr Soriano,^{bc} due to the habitual drinking of wine that was illegally contaminated by fluoride. It

^aSusheela AK. A treatise on fluorosis. 2nd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2003. p. 69-71.

^bSoriano M. Periostitis deformans due to wine fluorosis. *Fluoride* 1968;1:56-64.

^cSoriano M, Manchón F. Radiological aspects of a new type of bone fluorosis, periostitis deformans. *Radiology* 1966;87:1089-94.

is a rare condition and the extra bone formation was much greater in Dr Soriano's patients than that usually seen in fluoride toxicity (Figure 24).^{abc} This may have been due to the higher levels of fluoride in the contaminated wine, 8–72 mg/L or ppm, and the presence of poor nutrition with a lack of protection from adequate amounts of calcium and antioxidants in persons with alcohol dependence. With poor nutrition there is a lack of the dietary factors that give protection against fluoride toxicity. Other factors such as alcohol and impaired liver function may also have contributed to the excessive bone formation in areas where bone does not usually occur such as in membranes and tendons (fibrositis ossificans), and muscles (myositis ossificans, Figures 25–31). The initial change in the bones of an increased bone density (osteosclerosis) can be followed by a later stage of reduced bone density (osteoporosis) and bone atrophy. Bones affected by fluoride are weaker and fracture more readily (Figure 32).



Interosseous membrane calcification

Figure 24. Forearm radiographs. 24A: 51-year-old with normal forearm. 24B: 54-year-old with calcification of the interosseous membrane due to fluoride toxicity. (Khandare, Rao, Balakrishna, 2007).



Figure 25. Forearms with swellings simulating bone tumours due to periosteal stimulation due to fluoride toxicity in a patient in Spain who had been drinking wine to which fluoride had been added to retard fluoridation resulting in fluoride levels of 8–72 mg/L (8–72 ppm). The condition is called periostitis deformans. (Soriano, 1968).



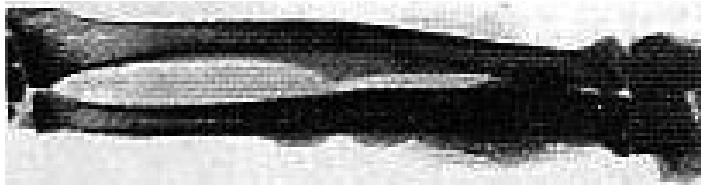
Figure 26. Periosteal growth in the forearm (pseudotumours) involving the interosseous membrane (invading osteophytosis). The osseous lamellae with irregular margins at the interosseous membrane of the forearm are typical of wine fluorosis. (Soriano, 1968).

^aKhandare AL, Rao GS, Balakrishna N. Dual energy X-ray absorptiometry (DXA) study of endemic skeletal fluorosis in a village of Nalgonda District, Andhra Pradesh, India. *Fluoride* 2007;40:190-7.

^bSoriano M. Periostitis deformans due to wine fluorosis. *Fluoride* 1968;1:56-64.

^cWaldbott GL. New observations on fluorosis [editorial]. *Fluoride* 1968;1:54-5.

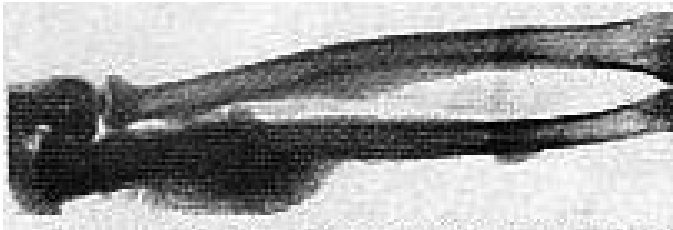
Distal
(wrist) end
of forearm



Proximal
(elbow) end
of forearm

Figure 27. Radiograph of a forearm showing the initial, osteoblastic stage, of periosteal growth with the formation of new bone (calcification). Usually growth occurs in this condition, found in Spanish drinkers of wine adulterated with fluoride, for 3–5 months and the growths, on the forearms and thighs, can be as large as an apple. (Soriano, 1968).

Proximal
(elbow)
end of
forearm



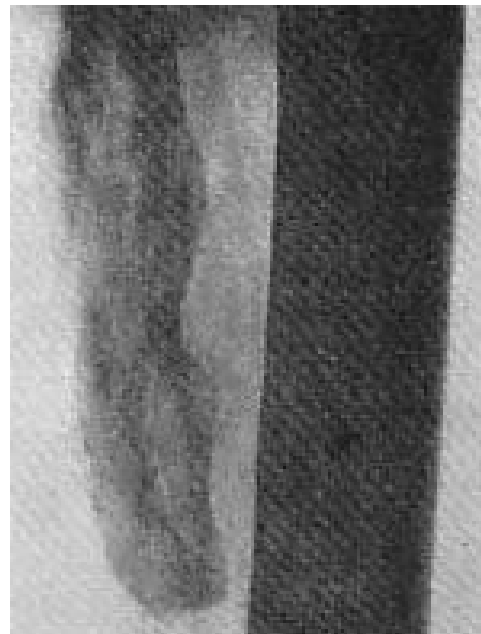
Distal
(wrist) end
of forearm

Figure 28. Radiograph of a same forearm as in Figure 24, one year later. After 3–5 months of growth, the lesions cease growing and their size decreases (atrophic stage). The osteophytes have a lamellar appearance on the radiographs. (Soriano, 1968).



Figure 29. Advanced periosteal growth in the forearm in the osteoclastic phase of periostitis deformans in another patient. After the lesions have grown for 3–5 months bone resorption occurs (osteoclastic phase) and the size of the lesions decreases (atrophic stage). Periostitis deformans differs from the typical picture in skeletal fluorosis in which calcification of the interosseous membrane of the forearm may occur but not the large growths. (Soriano, 1968).

Figure 30. Bone formation) in muscle of the thigh (myositis ossificans, on left) with marked osteosclerosis (increased bone density) of the femur (on right). (Soriano, 1968).



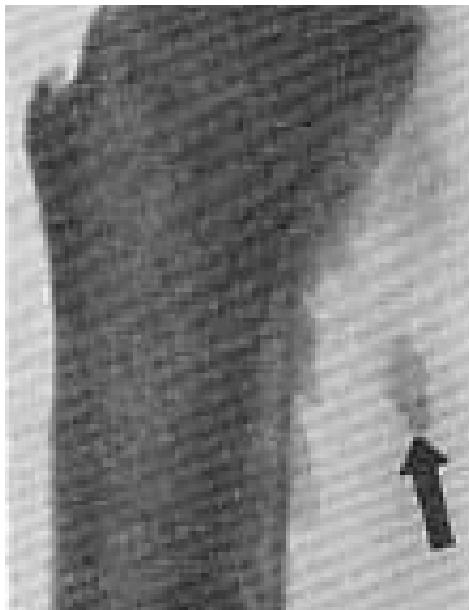


Figure 31. Bone formation in muscle of near the knee (myositis ossificans) in “Wine fluorosis. (Soriano, 1968).



Figure 32. Endosteal lesions of the femur. Fracture in an osteoporotic (reduced bone density) zone of the striated compact bone; atrophy (wasting) of the femoral head; and osteosclerosis of the pelvis. (Soriano, 1968).

AN EXAMPLE OF THE OPPOSITION TO THE CONCEPT OF A CHRONIC FLUORIDE TOXICITY SYNDROME FROM FLUORIDATED WATER

The concept of chronic low-grade poisoning by fluoride was examined in New Zealand by a Commission appointed by Command of His Excellency, the Governor-General CWM Norrie on 6 November 1956. Wilfred Stilwell, Esquire, Judge of the Arbitration Court, chairman; Norman Edson, Esquire, Professor of Biochemistry, member; and Percy Stainton, Esquire, Merchant, member, presented their report, *Report of the Commission of Inquiry on the Fluoridation of Public Water Supplies*, on 10 July 1957, to the House of Representatives.^a

In paragraph 307 they noted:

“We have listed in paragraph 232 (10) a number of complaints which in themselves are of a minor nature. They included mental and physical inertia, loss of feeling in the fingers, loss of the use of limbs, the dropping of small objects, cramps in the extremities, dry mouth, thirst, nausea, and various skin troubles. It was argued that these minor complaints were the outward expression of chronic fluoride intoxication at a low level of intake. It was said that some persons are more sensitive or allergic to fluoride than others, and on this account some members of the community will exhibit signs and symptoms of low-grade poisoning while others will not. In medical literature a group of signs and symptoms, which are said collectively to represent the effect of a single morbid cause, constitutes a “syndrome.” We use this term to cover the signs

^aStilwell WF, Edson NL, Stainton PVE. Report of the commission of inquiry on the fluoridation of public water supplies. Wellington: RE Owen, Government Printer; 1957.

and symptoms collectively, although it should be emphasized that any one person may not exhibit all these manifestations or all simultaneously."

It was noted that Dr Leo Spira and Dr George Waldbott were the most prominent of the medically qualified persons who had vigorously opposed fluoridation in the United States, and their views were considered in detail in 10 pages of text.

In paragraph 336 the case of Mrs MJ is referred to, who as discussed earlier, spent the first five years of her life near Hanchow, China, and became ill after the Highland Park water was fluoridated.

"336. As we have stated, Dr Waldbott also believes in the existence of a syndrome comprised of minor ailments which he regards as the manifestations of incipient fluorine poisoning. He states:

"No information on the incipient stage of this disease which would make it possible to establish an early diagnosis can be found in the literature." (Waldbott, 1956.^a)

"He states also that a case [Mrs MJ] which he described presented:

"presumptive evidence of incipient chronic fluorine poisoning from drinking water at 1 part per million. ..."

The commission recorded Dr Waldbott's views:

"337. In reviewing his observations Dr Waldbott states;

"One is impressed by the sparsity of objective findings, by the absence of changes in joints, bones, and teeth, and by the great variety of symptoms. Nevertheless, on carefully examining the case reports, a clear-cut disease pattern can be discerned. "...The most characteristic manifestations are backache, numbness, and pain in the legs and arms, especially in the ulnar area, gastro-intestinal and bladder disturbances as well as ulcers in the mouth and visual disturbances. Most impressive are extreme malaise and mental sluggishness. Two unusual phenomena may perhaps be considered pathognomonic as they probably occur in no other disease; the more water the patient drinks the more he complains of dryness in the mouth and throat (this is in distinction to acute poisoning in which excessive salivation is a major symptom). Exhaustion is most pronounced when the patient should feel most rested, namely in the morning after resting at night. Arthritis, headaches, and seborrhoeic dermatitis may or may not be a feature of this disease."

"Elsewhere he mentions brittle and breakable nails, gastritis, and irritation of mucous membranes in the alimentary and lower urinary tract."

The Commission considered that the grounds on which Dr Waldbott dismissed the syndrome as being psychosomatic in nature as being inadequate:

"338. It will be seen that Dr Waldbott's description of the syndrome is almost identical with that of Dr Spira, but he appears to be more cautious. "So far," he has said, "the evidence that this is fluorine poisoning is presumptive," and he states the facts on which the presumptive conclusion is based. He discusses the possibility of a psychosomatic basis (the influence of the mind and emotions on bodily health) for the syndrome and dismisses the possibility but on grounds which appear to be quite insufficient. Finally Dr Waldbott says:

"The evidence presented so far is lacking final substantiation by determination of fluorine in urine, blood, and in bones and other organs. Such studies are now in progress."

^aWaldbott GL. Incipient chronic fluoride intoxication from drinking water. II. Distinction between allergic reactions and drug intolerance. Int Arch Allergy Appl Immunol 1956;9(5):241-9.

Dr Waldbott addressed the question of a psychosomatic basis for the syndrome in his 1956 paper^a which was given by the Commission as a reference in paragraph 336. In this paper Dr Waldbott wrote;

"Is there a psychosomatic basis?"

"In order to rule out other diseases, adequate consultation by competent specialists was obtained in the hospitalized cases. They were unable to establish a diagnosis, but did not attribute the illness to psychosomatic causes.

"This view is supported by the following facts: In two individuals subjected to exploratory surgery (prostatectomy and exploratory laparotomy, respectively), the operation did not relieve the urinary symptoms or the abdominal pains.¹ (1 A third case in Lubbock, Texas with natural fluorides at 4.2 ppm, with advanced skeletal fluorosis, the record of which I was able to study (Methodist Hosp. Record No. 177822) had a laparotomy which did not reveal the cause of an acute abdomen.) An operation would certainly have produced a sufficient stimulus to reveal a psychosomatic basis. Months later these patients recovered completely without any treatment when fluoride water was eliminated without their knowledge. Other patients were neither aware that fluorides had been added to the drinking water or that fluoridation had been discontinued. This, I believe, is a more valid test than any carefully devised "blindfold" or placebo studies.

"It is inconceivable that these patients could have been familiar with the description of this disease. Although residing in different parts of the country, they reported exactly the same symptoms in different words. For instance, the ulnar nerve damage is described in the following manner by a different person in each case: 'cannot grip a golf club,' 'cannot peel potatoes,' 'cannot hold a hymn book in church,' 'cannot grip my steering wheel,' 'things are dropping from my grasp for no apparent reason.'

"The lack of control in their legs was described as follows: 'my legs buckle under me,' 'I suddenly collapse,' 'my legs are not tracking,' 'my legs give way,' 'I suddenly lurch towards buildings.' Thus, it is clear that this syndrome cannot be explained on a psychosomatic basis."

The Commission did not explain why they found the grounds given by Dr Waldbott for dismissing a psychosomatic cause to be inadequate. It is hard to see how Mrs MH and Mrs EK who became ill in Windsor, Ontario, Canada, after the water was fluoridated had a psychosomatic illness when they were not aware that fluoridation had started when they became ill.

The Commission noted Dr Waldbott's summary and view in paragraph 339.

"339. Basing his data on fifty-two cases, Dr Waldbott (1956) summarises the signs and symptoms described in paragraph 337 and goes on to state:

"The evidence so far is based on: The identity of the symptoms observed with those described: (a) in my first reported case from artificially fluoridated water; (b) in industrial poisoning in men; (c) in fluorosis encountered in natural fluoride areas; (d) in animals grazing near plants emanating fluorides. Whereas there is an appreciable deterioration of general health, laboratory and objective findings are sparse at this stage of the disease. The cardinal features associated with advanced fluorosis, namely, changes in bones, ligaments, joints, and teeth, were not noted in its incipient stage.

^aWaldbott GL. Incipient chronic fluoride intoxication from drinking water. II. Distinction between allergic reactions and drug intolerance. *Int Arch Allergy Appl Immunol* 1956;9(5):241-9.

“Further corroborating studies now in progress, indicate that a variety of diseases of heretofore unknown origin, may be due to, or at least aggravated by, traces of fluorine in air, food, and water.”

In paragraphs 340–3 the Commission summarized and evaluated Dr Waldbott’s claims.

“340. The evidence for the syndrome as outlined by Dr Waldbott consists of:

“(1) Identity of the symptoms with those described in the first case (Waldbott, 1955b^a [Mrs MJ]); and

“(2) Analogies with industrial poisoning, fluorosis due to excessive ingestion of high-fluoride water, and fluorosis in animals grazing near industrial plant from which the hazard emanates.

“We have been informed by Mr Penlington by letter dated 17 June 1957 that Dr Waldbott is to publish a series of five articles, the first of which has already appeared (Waldbott, 1956). The first of this series is referred to in paragraph 339 and shows that Dr Waldbott has not changed the basis for his theories. This basis we now proceed to examine.

“341. There is no evidence that the symptoms exhibited by Dr Waldbott’s first case were in fact due to either the 1 ppm of fluoride present in the water consumed or to any other fluoride ingested, and there is no rational basis for concluding that the existence of analogies is proof that the syndrome is due to fluoride. Dr Waldbott has introduced a doubtful note at the conclusion of his summary where he states that

“*“a variety of diseases of heretofore unknown origin, may be due to, or at least aggravated by, traces of fluoride in air, food, and water.”*

“(The italics are ours.) These statements suggest that he is aware of the fact that he possesses no scientific evidence to demonstrate that the syndrome is caused by fluoride.

“342. In the absence of evidence to demonstrate that the conditions described are due to fluoride poisoning, both Dr Waldbott and Dr Spira have used ‘therapeutic tests’ to support their arguments. In these tests fluoridated water has been withdrawn and low-fluorine diets have been prescribed. Both physicians have claimed disappearance of symptoms after these and other precautions were taken. In no case was the urinary fluoride determined in relation to the test. These arguments are unconvincing and fail to persuade us that the effects described were due to the withdrawal of fluoride, real or presumptive.”

In paragraph 345 the Commission stated its conclusions:

“345. At this point we summarise our conclusions on the “Spira-Waldbott Syndrome” as follows:

“(1) We are of the opinion that the individual signs and symptoms of the alleged syndrome may be due to any number of unrecognised causes; and

“(2) We are satisfied that there is no causal relationship between any of these signs and symptoms and the ingestion of water containing 1 ppm of fluoride and food cooked in this water.”

The Commission states in paragraph 341 that there was no evidence to show that the symptoms present in the patient, Mrs MJ, were due to the 1 ppm of fluoride in the water consumed. However Dr Waldbott showed that she recovered within weeks from a serious illness when she stopped using the Highland Park water

^aWaldbott GL. Chronic fluorine intoxication from drinking water. Int Arch Allergy 1955;7:70-4.

containing 1 ppm of fluoride with no other treatment. The nausea, vomiting, and abdominal pain cleared up within a week. She gained five pounds in weight in four weeks. When she was placed again on Highland Park fluoridated water, on 1 November 1954, she became ill again within three days with general weakness, exhaustion, and lethargy; cramping of the hands and legs day and night; and tingling and numbness in the fourth and fifth fingers as high as the elbow, but with no objective findings on examination.

It is not clear how the Commission can describe as being “no evidence” the alleviation of illness after withdrawing water containing 1 ppm of fluoride and the relapse of illness with the reintroduction of this water. If they were implying that some other component of the water other than the fluoride was responsible they have given no evidence of what this is.

Dr Waldbott gave more detail about Mrs MJ in *Fluoridation: the great dilemma* where he noted:^a

“Until completion of the preliminary tests in the hospital, the patient [Mrs MJ] was instructed to use fluoridated Highland Park water that she had brought with her to the hospital. After the tests were completed, she began drinking unfluoridated (0.1 ppm) Detroit water. Within only two days the stomach symptoms and headaches subsided, and she was soon well enough to be discharged.

“Neither in the hospital nor after her discharge was she given any medication. Instead, she was instructed to avoid fluoridated water strictly, not only for drinking but also for cooking her food as well. She was also told to avoid both tea and seafood because of their high fluoride content. The headaches, eye disturbances, and muscular weakness disappeared in a most dramatic manner. After about two weeks her mind began to clear, and she underwent a complete change in personality. For the first time in two years she was able to undertake her household duties without having to stop and rest. Within a four-week period she had gained five pounds.

“Subsequently, the patient was subjected to a series of tests which definitely proved that her disease was related to fluoridated water. She was given test injections of minute amounts of fluoride in drinking water and distilled water as a control. She was not aware which water contained fluoride. The fluoride solutions induced a recurrence of the symptoms, whereas the fluoride-free water showed no adverse effects. In one of the subsequent tests a classical attack of migraine headache was produced by one milligram of fluoride taken in two glasses of water. This is about one fifth to one half the average amount ingested in one day by people living in a fluoridated area.

“Further laboratory and other diagnostic studies were contemplated, especially a study of the behavior of calcium, phosphorus, and magnesium, the activity of certain enzymes, and a tracing of her brain waves before and after administration of a test dose of fluoride. These plans came to an abrupt end when the patient suffered another sudden episode of excruciating pains in the head, muscles and spine following an experimental dose of fluoride. The severity of her response to this so-called blind test made me stop all further testing. Fortunately, the patient recovered completely without any treatment other than the elimination of Highland Park fluoridated water for drinking and cooking.”

Dr Waldbott also addressed the question about whether something else in the water other than fluoride might have caused her illness:

^aWaldbott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978. p. 117-8.

“Could something other than fluoride have caused the disease, perhaps another poison in the water? This question was definitely answered by the ease with which this disease could be reproduced at will when extremely small amounts of fluoride were administered to her. In order to ascertain the cause of her problem she was given a test dose of fluoride in water without being told the nature of the test. She had, of course, given me permission to carry out any test I saw fit.”

Thus the Commission was incorrect to say in paragraph 341 that there was no evidence the symptoms in Dr Waldbott's first case were due to fluoride. Dr Waldbott had collected the evidence that fluoride was involved by eliciting the symptom of headache after giving her a test dose of 1 mg of fluoride in two glasses of water. This detail, of giving 1 mg of fluoride in two glasses of water, was published by Dr Waldbott in *Fluoridation: the great dilemma* in 1978 and was not mentioned in the 1956 paper referred to by the Commission. However the 1956 paper noted:

“This condition cleared up completely following elimination of fluoridated water at the 1 P.P.M. concentration and recurred following its resumption.”

If the Commission wanted to “split hairs” and imply that some other component of the water apart from fluoride was involved they could have asked Dr Waldbott if there was additional information available or given him the chance to comment on their conclusion before the Commission's report was presented.

In paragraph 242 the Commission stated that it found the arguments based on “therapeutic test” where fluoridated water has been withdrawn and low-fluorine diets have been prescribed to be unconvincing and failing to persuade them without spelling out their reasons for so concluding. It noted that in no case had the actual fluoride intake been measured and that in only one case [Mrs MJ] was the urinary fluoride excretion determined in relation to the test.

They appear to be implying that the fluoridated water in places like Highland Park and Caduhy in Wisconsin, USA, or in Windsor, Ontario, Canada, where people became sick consuming the water may not have in fact contained the 1 ppm of fluoride that the water was claimed to have. Water engineers routinely monitor fluoridated water to check that the level of fluoride is at the intended level. Dr Waldbott and Dr Petraborg have accepted the situation that the fluoridated water in the places studied did in fact have the levels of fluoride of about 1 ppm. To dismiss the results of the “therapeutic tests” because documentation was not given to show that water fluoridated by a water department to a level of 1 ppm did in fact have 1 ppm of fluoride in it appears to be pedantic and likely to result in a type II error, the situation of “missing a winner,” where a significant result is overlooked.

Although the Commission saw monitoring the urine fluoride levels to be important they did not show why this information was critical to acceptance or not of the results of the “therapeutic tests.” Dr Waldbott noted:^a

“The evidence presented so far is lacking final substantiation by determination of fluorine in urine, blood, and in bones and other organs. Such studies are now in progress.”

^aWaldbott GL. Incipient fluorine intoxication from drinking water. *Acta Medica Scandinavica* 1956;CLVI:157-68.

“Symptoms of fluorine poisoning do not always parallel either fluorine levels in bones and blood, nor its elimination in the urine. It is general knowledge that relatively large amounts may be stored and eliminated without ill effect. Seven years in one instance, and even ten years after patients had stopped drinking fluoride-water, stored fluorine is still excreted in excess amounts. On the other hand, there is evidence that relatively small doses can cause symptoms of poisoning in individuals or animals susceptible to the disease. The well-known authority on the subject, DeEds^a observed that the ‘streaming through the system of fluorides, even in relatively small amounts, may cause considerable damage to the organs involved.’

“Urinary fluorine output depends mainly on the amount of stored fluorine mobilized from the bones under conditions not yet explained, and on the amount of fluoride ingested in food, especially tea and fish. The absorption of ingested fluoride into the blood stream from the intestinal tract varies with the presence of other minerals in the water, with the compound of fluoride and the acidity of the stomach.”

Two of the case reports above by Dr Susheela, published in 2001, involving a 10-year-old boy, Master PM, and a 59-year-old man, Mr PO, showed that the urinary and serum (blood) fluoride levels fell as the “therapeutic test” proceeded.^b

However the availability of this additional information, from Dr Waldbott in 1978 about Mrs MJ becoming ill when given 1 mg of fluoride in two glasses of water^c or of the urinary and serum fluoride falling during a ‘therapeutic test’ from Dr Susheela in 2001, has not altered the stance taken by the Ministry of Health in New Zealand on fluoridation.

The Ministry of Health has been reluctant to participate in meetings where research on fluoride toxicity has been discussed. Although one person from the Ministry, Julia Purchas, attended and reported back on the 25th conference of the International Society for Fluoride Research held in Dunedin in 2003, no representatives from the Ministry were present at the 22nd conference in Bellingham, Washington State, USA, in 1998; the 23rd conference in Szczecin, Poland in 2000; the 24th conference in Otsu, Shiga, Japan, in 2001; the 26th conference in Wiesbaden, Germany, in 2005; or the 27th conference in Beijing, China, in 2007. When Yvonne McDonald wrote to The Hon. Pete Hodgson, Minister of Health, to ask if a Member of Parliament would be attending the 26th conference at Wiesbaden, Germany, 26–29 September 2005, he replied, in a letter dated 18 May 2005,^d that

“The International Society for Fluoride Research is not a reputable body so the Government will not be sending a representative ...”

In a letter to Mr Hone Harawira, Member of Parliament, Te Tai Tokerau, Parliament Buildings, dated 19 July 2006, The Hon. Pete Hodgson, Minister of Health replied to a letter from Mr Harawira:^e

“Tena koe Mr Harawira

^aLargent EJ. Rates of elimination of fluoride stored in the tissues of man. *A M A Arch Ind Hyg Occup Med* 1952;6(1):37-42.

^bSusheela AK. A treatise on fluorosis. Delhi, India: Fluorosis Research and Rural Development Foundation; 2001. p. 100.

^cWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.115-8.

^dHodgson P. Letter to Yvonne McDonald. 2005 May 18. Unpublished.

^eHodgson P. Letter to Hone Harawira. 2006 Jul 6. Unpublished.

"Thank you for your letter of 15 May 2006, with enclosed email from Mr Bill Wilson, about fluoridation. I apologise for the long delay in responding.

"Like other natural occurring trace elements, fluoride is essential for good health. There are many essential nutrients, elements and vitamins which taken in excess, are toxic. The important point is dosage of each element or nutrient, not the element itself. In areas in New Zealand where drinking water is fluoridated, the concentration of fluoride generally ranges from 0.7 to 1.0 mg/litre (or one part per million).

"The Ministry of Health holds routinely collected data on the oral health status of children at age five and year eight, from 1990 onwards. The data consistently shows that children in non-fluoridated areas have poorer oral health than children in fluoridated areas. This data is available on the Ministry's website as part of the 'Oral Health Toolkit' (www.newhealth.govt.nz/toolkits-old/oralhealth.htm).

"I have communicated in previous correspondence to Mr Wilson that I am aware of Mr Connett's infamous report *50 Reasons to Oppose Fluoridation*. I am also familiar with the views of the late John Colquhoun [Figure 52]. Ministry of Health officials recently viewed an interview with the late Mr Colquhoun, made in 1998. The interview was conducted by Professor Paul Connett [Figure 62] and was enclosed in Mr Wilson's most recent correspondence to me concerning fluoridation.

"The views of both Professor Connett and Mr Colquhoun are regarded as highly unconventional. Nevertheless, Ministry officials commissioned an independent review of Professor Connett's report in order to be satisfied that the weight of literature supporting fluoridation remained valid.

"Independent scientists have also considered Professor Connett's views against recent reviews by the Australian National Health Medical Research Council (1999), the York report (2000) and the World Health Organization. The conclusion of the Ministry's review and of these independent reports is uniform. Evidence does not support suggestions of health risks associated with water fluoridation.

"The benefits of water fluoridation are most pronounced for those most at risk of poor oral health, including the poorer areas of your consistency. The Ministry continues to believe that water fluoridation is effective as a means of reducing current inequalities in oral health. To deny areas of need of an effective oral health measure would be unfortunate.

"The decision whether or not to fluoridate a region's water supply is not made by the Ministry but the responsible district council. Therefore, if you require further details of fluoridation in the Far North, I suggest contracting Northland District Council directly. The contact details are:

"Far North District Council, Memorial Avenue, Private Bag 752, Kaikohe; Freephone: 0800 920029.

"The council should also be able to provide you with information on how data sampling was carried out in the decision to fluoridate the Far North's water supply.

"The Government and the Ministry believe that there is overwhelming evidence of the effectiveness and safety of water fluoridation in improving the dental health of New Zealanders. Additional information on the Ministry of Health position on water fluoridation is available on the Ministry's website (www.moh.govt.nz/fluoride).

"I trust this information is useful in replying to Mr Wilson.

"Naku noa, na

"Hon Pete Hodgson

"Minister of Health"

The Hon Pete Hodgson, Minister of Health, subsequently visited Oamaru, North Otago, New Zealand, on 21 September 2007, shortly before a referendum on

fluoridation was held. It was reported that he said that it would be “a sad outcome” if the Waitaki District voted against fluoridation and that he considered the benefits of fluoridation far exceeded any perceived risks. He urged voters to make sure they were fully informed about the issues based on sound scientific evidence rather than being swayed by what he termed “scam science off the Internet.”^a Evidence based decision making is laudable but not easy to achieve. Many of the points made by The Hon. Pete Hodgson in his letter to Mr Harawira are contestable. Dr AK Susheela, Director of the Fluorosis Research and Rural Development Foundation, Delhi, India, also appealed to science stating:^b

“The ‘take home’ message for the professionals of India is that they should ... practise the recent scientific developments in the field of Fluoride and Fluorosis ...”

However she had the opposite message:

“The ‘take home’ message for the professionals of India is that they should not follow the practices of the ‘West’ but should practise the recent scientific developments in the field of Fluoride and Fluorosis, which have led to the concept that fluoride should not enter the body as far as possible. Trace amounts entering through sources which are beyond any one’s control need to be overlooked. Promoting fluoridation of dental products in India should be considered as a ‘crime.’”

She included New Zealand on her world map showing areas where there is widespread chronic fluoride toxicity. She considers that dental caries are not a fluoride deficiency disorder and that topical fluoride as contained in toothpaste or mouthwashes does not have the potential to remineralise or rectify the damage to the teeth due to caries.

The Hon. Pete Hodgson, Minister of Health, noted how the World Health Organization supported fluoridation. Waldbott, Burgstahler, and McKinney noted:

“On July 23, 1969, fluoridation was brought up again at the 22nd World Health Organization Assembly in Boston. The resolution recommending the measure appeared on the agenda daily but was strongly opposed and blocked by delegates from Italy, Senegal, the Congo, and elsewhere. G. Penso, head of the Italian delegation, expressed his concern regarding ‘this mania of our century to add additives to anything.’ He pointed out that there are unknown amounts of fluoride in the air we breathe and in the food we eat. He cautioned particularly about possible damage to future generations. Nevertheless, during the final hours of the session, when only 55 to 60 of the 1,000 delegates from 131 countries were still present, all bills that had not been accepted were collected into one and voted upon, including a statement on fluoridation. The mildly-worded resolution urged that member states examine the possibility of introducing fluoridation in those communities where fluoride intake from water and other sources ‘is below the optimal levels.’ It also requested the Director General ‘to continue to encourage research into the etiology of dental caries, the fluoride content of diets, the mechanism of action of fluoride at optimal levels in drinking water, and into the effects of greatly excessive intake of fluoride from natural sources, and to report thereon to the World Health Assembly ...”^c

A study published in 2007, by Oxman, Lavis, and Fretheim, found that systematic reviews and concise summaries of findings were rarely used for

^aBruce D. Minister sees need for fluoridation. Otago Daily Times. 2007 Sept 22:21.

^bSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 17-8.

^cWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p.283-5.

developing WHO recommendations.^a Instead the processes usually relied heavily on experts in a particular speciality, rather than representatives of those who have to live with the recommendations, or on experts in particular methodological areas. WHO officials admitted that most recommendations and guidelines were prepared by the special interest groups without external review. WHO recommendations are thus nothing but special pleading like the promotion of fluoridation by groups such as the US Centers for Disease Control, US Public Health Service, and the American Dental Association. The unsuitability of the WHO guideline of 1.5 mg/L of fluoride as the “desirable” upper limit in drinking water is being increasingly felt and Senegal has reduced the permissible upper limit to 0.6 mg/L.^b The 2006 World Health Organization publication, *Fluoride in drinking water*, makes no reference to the 2006 NRC report on the same topic, has only 20 references in chapter 3 on “Human health effects,” and does not include any of the publications by Dr Waldbott.^c

The Hon. Pete Hodgson, Minister of Health, noted that Ministry of Health officials had commissioned an independent review of Professor Connett’s report on *50 reasons to oppose fluoridation* and that this review did not support Connett’s view that there were health risks associated with fluoridation.

A 20-page paper by Dr Terry W Cutress, BDS, PhD, dental scientist, dated 25 October 2005, *Response to a list of ‘50 reasons to oppose fluoridation,’ compiled by Dr Connett* (www.fluoridealert.org/50) was peer reviewed by Paul Fitzmaurice, Food Safety, Institute of Environmental Science and Research Ltd.^d

The responses to reasons 12 and 30 concerned fluoride retention in the body.

For reason 12 Connett stated:

“Reason 12. Fluoride is a cumulative poison. On average, only 50% of the fluoride we ingest each day is excreted through the kidneys. The remainder accumulates in our bones, pineal gland, and other tissues. If the kidney is damaged, fluoride accumulation will increase, and with it, the likelihood of harm.”

In his response to reason 12 Dr Cutress stated:

“Fluoride is not continuously cumulative in the body tissues—see recent comprehensive reviews (NHMRC, 1999;^e York Report, 2000;^f MRC, 2002;^g WHO, 2002^h). Approximately 99% of body fluoride is stored in the mineralized tissues (bones and teeth). However, these

^aOxman AD, Lavis JN, Fretheim A. Use of evidence in WHO recommendations. *Lancet* 2007;369:1883-9.

^bSusheela AK. A treatise on fluorosis. 3rd ed. Delhi, India: Fluorosis Research and Rural Development Foundation; 2007. p. 15-6.

^cFawell J, Bailey K, Chilton J, Dahi E. Fluoride in drinking-water. London: IWA Publishing and World Health Organization (WHO); 2006.

^dCutress TW. Response to a list of “50 reasons to oppose fluoridation,” compiled by Dr Connett. 2005. A copy is available in the McNab Room, 3rd floor, Dunedin Public Library, Dunedin. It is included as part of a report on Fluoridation of Public Water Supplies to the Infrastructure Services Committee, Dunedin City Council, from the Water and Waste Services Manager, for the meeting on 12 March 2007, as appendix 4 to a letter, dated 6 March 2007, to Mr Gerard McCombie, Water Operations Team Leader, Dunedin City Council, by Dr John Holmes, Medical Officer of Health and Dr Dorothy Boyd, Senior Public Health Dentist, written in response to a submission made by Dr Bruce Spittle to the 2006/07 Community Plan opposing the use of fluoride in Dunedin’s water supply.

^eNational Health and Medical Research Council, Australia. Review of water fluoridation and fluoride intake from discretionary fluoride supplements. Melbourne: National Health and Medical Research Council, Australia; 1999.

^fMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000.

^gMedical Research Council, United Kingdom. Water fluoridation and health: working group report. London: Medical Research Council, United Kingdom; 2002.

^hWorld Health Organization (WHO). Fluorides. Environmental Health Criteria No. 227. Geneva: WHO; 2002.

mineralized tissues can accumulate up to a maximum 4% by weight. Kidney is the only organ with soft tissue that has a changing fluoride content—reflecting its glomerular fluid. Fluoride does not accumulate over a lifetime, its levels in the blood and tissues reflect recent exposure to fluoride, with excess fluoride lost via sweat and faeces. Cumulative concentration of fluoride in the pineal gland is unproven. (note: Kidney tissues are not affected by low levels of fluoride—urinary concentrations of fluoride are proportional to intake.”

For reason 30 Connett stated:

“Reason 30. Once fluoride is put into the water it is impossible to control the dose each individual receives. This is because:

“1. some people, (e.g. manual labourers, athletes, diabetics, and people with kidney disease), drink more water than others

“2. we receive fluoride from sources other than the water supply. Other sources of fluoride include food and beverages processed with fluoridated water (Kiritsy 1996^a and Heilman 1999^b), fluoridated dental products (Bentley 1999^c and Levy 1999^d), mechanically deboned meat (Fein 2001^e), teas (Levy 1999^f), and pesticide residues on food (Stannard 1991^g and Burgstahler 1997^h).”

In his response to reason 30 Dr Cutress stated:

“Fluoride ingestion and excretion from the body achieves a balance dependent on the availability of fluoride. Bones and teeth are the only tissue to accumulate fluoride but this is limited to less than 4% by weight. Excess fluoride is excreted via urine, sweat, saliva and faeces within a few hours of ingestion. Less fluoride is excreted in younger people until the primary (99%) storage tissue, bone reaches saturation at 3.8%. The variation in water intakes by individuals determines respective fluoride intakes, but retention levels decrease and plateau in early adulthood.”

In his response, dated 25 October 2005, to reason 12, Dr Cutress states that “Cumulative concentration of fluoride in the pineal gland is unproven.” However Dr Jennifer Luke published an article in 2001 on *Fluoride deposition in the aged human pineal gland* showing that by old age the pineal gland had readily accumulated fluoride with a level of 297 ± 257 mg F/kg wet weight of pineal compared to 0.5 ± 0.4 mg F/kg wet weight of muscle.¹ Bone contained $2,037 \pm 1,095$ mg F/kg bone ash weight. In the 2006 National Research Council report, *Fluoride in drinking water: a scientific review of EPA's standards* (2006 NRC report) fluoride and the pineal are discussed. The report notes that the pineal gland, a small organ, weighing 150 mg in humans, located near the centre of the brain, is a calcifying tissue and that as with other calcifying tissues, it can accumulate fluoride. Fluoride is present in the pineal glands of older people, aged 72–100 years, in concentrations of 14–875 mg of fluoride per kg of gland. The fluoride

^aKiritsy MC, Levy SM, Warren JJ, Guha-Chowdhury N, Heilman JR, Marshall T. Assessing fluoride concentrations of juices and juice-flavored drinks. J Am Dent Assoc 1996;127: 895-902.

^bHeilman JR, Kiritsy MC, Levy SM, Wefel JS. Fluoride concentrations of infant foods. J Am Dent Assoc. 1997;128(7):857-63.

^cBentley EM, Ellwood RP, Davies RM. Fluoride ingestion from toothpaste by young children. Br Dent J 1999;186: 460-2.

^dLevy SM, Guha-Chowdhury N. Total fluoride intake and implications for dietary fluoride supplementation. J Public Health Dent 1999;59:211-23.

^eFein NJ, Cerklewski FL. Fluoride content of foods made with mechanically separated chicken. J Agric Food Chem 2001;49: 4284-6.

^fLevy SM, Guha-Chowdhury N. Total fluoride intake and implications for dietary fluoride supplementation. J Public Health Dent 1999;59:211-23.

^gStannard JG, Shim YS, Kritsineli M, Labropoulou P, Tsamtsouris A. Fluoride levels and fluoride contamination of fruit juices. J Clin Pediatr Dent 1991;16:38-40.

^hBurgstahler AW, Robinson MA. Fluoride in California wines and raisins. Fluoride 1997;30:142-6.

¹Luke J. Fluoride deposition in the aged human pineal gland. Caries Res 2001;35:125-8. [abstract in Fluoride 2001;34:152].

concentration in the pineal gland is positively related to the calcium concentration in the pineal gland, but not to the bone fluoride, suggesting that pineal fluoride is not necessarily a function of cumulative fluoride exposure of the individual. It is noted that fluoride has not been measured in the pineal glands of children or young adults, and that investigations have not been made of the relationship between pineal fluoride concentrations and either recent or cumulative fluoride intakes. In the discussion the report states that whether fluoride exposure causes decreased nocturnal melatonin production or an altered circadian (daily) rhythm of melatonin production in humans has not been investigated but that fluoride is likely to cause decreased melatonin production and to have other effects on normal pineal function, which in turn could contribute to a variety of effects in humans.^a In the recommendations it is noted that the major areas for investigation include pineal function, including, but not limited to, melatonin production. Thus the brief dismissal of the topic by Dr Cutress with “Cumulative concentration of fluoride in the pineal gland is unproven” is not supported by the literature and does not do justice to the complexity of the issue.

In his response, dated 25 October 2005, to reasons 12 and 30, Dr Cutress states that fluoride is stored in bones and teeth until a saturation point is reached at 3.8% by weight and then excess fluoride is excreted via the urine, sweat, saliva, and faeces within a few hours, with the implication that this is safe. The overall chemical formula of fluoroapatite is $\text{Ca}_{10}\text{F}_2(\text{PO}_4)_6$ but is often simplified to $\text{Ca}_5\text{F}(\text{PO}_4)_3$. The formula weight is 1008.6 g/mole, and the percentage of F is $(38/1008) \times 100 = 3.77\%$ or approximately 38,000 mg F/kg or 38,000 ppm F. This figure represents the complete conversion of the normal dihydroxyapatite, $\text{Ca}_{10}(\text{OH})_2(\text{PO}_4)_6$ into fluoroapatite. Therefore 38,000 ppm F or 3.8% by weight is the maximum possible content of F in bone ash (all mineral) consisting of only fluoroapatite. In the 2006 NRC report, it is noted, on page 21, that 1% fluoride in bone ash is equivalent to 10,000 mg/kg or 10,000 ppm.^b It is further noted, on page 140, that bone ash is assumed to include 65% of the volume of viable bone. Thus 3.8% by weight, 38,000 mg/kg or ppm of fluoride in bone ash is equivalent to about 65% of 38,000 ppm or 24,700 mg F/kg or ppm of F or 2.47% by weight of F in dry, fat-free bone before ashing. Thus the saturation point of 3.8% referred to by Dr Cutress applies to bone ash rather than to bone.

On pages 173–7 of the NRC report it is noted that in stage II skeletal fluorosis the bone ash fluoride concentrations are 4,300–9,200 mg F/kg and 3,000–4,600 mg F/kg in bone (dry fat-free material from the iliac crest or pelvis) while for stage III skeletal fluorosis the bone ash fluoride concentrations are 4,200–12,700 mg F/kg and the mean bone concentration was 3,600 mg F/kg (dry fat-free material from the iliac crest or pelvis). Clinical stage II skeletal fluorosis is associated with

^aDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 252-6, 267.

^bDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 21, 140, 173-7.

chronic joint pain, arthritic symptoms, calcification of ligaments, and osteosclerosis of cancellous bones (increased bone density of the non-cortical bone, or bone away from the surface of the bone). Stage III has been termed “crippling” skeletal fluorosis because mobility is significantly affected as a result of excessive calcification in joints, ligaments, and vertebral bodies. This stage may also be associated with muscle wasting and neurological deficits due to spinal cord compression.

The 2006 NRC report notes that the excessive intake of fluoride will manifest itself in a musculoskeletal disease, skeletal fluorosis, with a high morbidity. The view expressed by Dr Cutress that fluoride is stored in bones and teeth until a saturation point is reached at 3.8% by weight, 38,000 mg F/kg of bone [ash], and then excess fluoride is excreted via the urine, sweat, saliva, and faeces within a few hours, is at odds with the occurrence clinically of skeletal fluorosis with excessive intake and the bone levels of fluoride in this condition being considerably lower than 38,000 mg F/kg of bone ash, with the range for the bone ash fluoride concentration in stage II skeletal fluorosis being 4,300–9,200 mg F/kg

Similar point by point replies could be made to the other responses by Dr Cutress. However only reason 22 will be commented on further as it is relevant to the syndrome of chronic fluoride toxicity or preskeletal fluorosis described by Dr Waldbott. For reason 22 Connett stated:

“Reason 22. In the first half 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 (over-active thyroid; Stecher 1960,^a Waldbott 1978^b). With water fluoridation, we are forcing people to drink a thyroid-depressing medication which could, in turn, serve to promote higher levels of hypothyroidism (under-active thyroid) in the population, and all the subsequent problems related to this disorder. Such problems include depression, fatigue, weight gain, muscle and joint pains, increased cholesterol levels, and heart disease. It bears noting that according to the Department of Health and Human Services (1991^c) fluoride exposure in fluoridated communities is estimated to range from 1.6 to 6.6 mg/day, which is a range that actually overlaps the dose (2.3–4.5 mg/day) shown to decrease the functioning of the human thyroid (Galletti and Joyce 1958^d). This is a remarkable fact, particularly considering the rampant and increasing problem of hypothyroidism in the United States (in 1999, the second most prescribed drug of the year was Synthroid [thyroxine sodium], which is a hormone replacement drug used to treat an under-active thyroid). In Russia, Bachinskii (1985^e) found a lowering of thyroid function, among otherwise healthy people, at 2.3 ppm fluoride in water.

In his response, dated 25 October 2005, to reasons 13–22, 24–28, and 34–35, Dr Cutress states that many diverse disease and health conditions, including fatigue, weight gain, muscle and joint pains, and heart disease have been claimed to be linked to the supplementation of water with low concentrations of fluoride but

^aStecher PG, editor. The Merck index: an encyclopedia of chemicals and drugs. 7th ed. Rahway, NJ: Merck and Co., inc.; 1960. p. 952.

^bWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978.

^cDepartment of Health & Human Services. (U.S. DHHS). Review of Fluoride: Benefits and Risks. Report of the Ad Hoc Committee on Fluoride, Committee to Coordinate Environmental Health and Related Programs. Washington, DC: Department of Health and Human Services, USA; 1991.

^dGalletti PM, Joyet G. Effect of fluorine on thyroidal iodine metabolism in hyperthyroidism. *J Clin Endocrinol Metab* 1958;18: 1102-10.

^eBachinskii PP, Gutsalenko OA, Naryzhniuk ND, Sidora VD, Shliakhta AI. Action of fluoride on the function of the pituitary-thyroid system of healthy persons and patients with thyroid disorders. *Probl Endokrinol (Mosk)* 1985; 31: 25-9. [in Russian].

that, according to recent major reviews, none of the conditions can be explained by a fluoride aetiology. As an example he quotes the University of York systematic review, 2000, as stating:^a

“Insufficient evidence is available to reach a conclusion that bone fractures, cancer, or other adverse health conditions were associated with fluoride in water.”

I was unable to find this quotation in the University of York systematic review. In the section of the executive summary on other possible negative effects, pages xiii–xiv, it is noted:

“A total of 33 studies of the association of water fluoridation with other possible negative effects were included in the review. Interpreting the results of studies of other possible negative effects is very difficult because of the small numbers of studies that met inclusion criteria on each specific outcome, and poor study quality. A major weakness of these studies generally was failure to control for any confounding factors.

“Overall, the studies examining other possible negative effects provide insufficient evidence on any particular outcome to permit confident conclusions. Further research in these areas needs to be of a much higher quality and should address and use appropriate methods to control for confounding factors.”

The quotation given by Dr Cutress did not appear in the discussion at the end of chapter 10 on “Other possible negative effects,” page 63, which finished with:

“... Overall, the studies examining other possible negative effects provide insufficient evidence on any particular outcome to reach conclusions.”

Similarly, the quotation does not appear in chapter 12 on Conclusions in section 12.4 addressing “Does fluoridation have negative effects?,” page 67, where it is noted:

“... The miscellaneous other adverse effects studied did not provide enough good quality evidence on any particular outcome to reach conclusions. The outcomes related to infant mortality, congenital defects and IQ indicate a need for further high quality research, using appropriate analytical methods to control for confounding factors. While fluorosis can occur within a few years of exposure during tooth development, other potential adverse effects may require long-term exposure to occur. It is possible that this long-term exposure has not been captured by these studies.”

Again in section 12.9.2 addressing adverse effects studies, page 70, the quotation is not present:

“... The other possible adverse effect studies suffered greatly by not sufficiently controlling for important confounding factors, many of which were discussed by authors in the study report, but not controlled for. Very few of the possible adverse effects studied appeared to show a possible effect. High quality research that takes confounding factors into account is needed.”

Thus I have been unable to find the exact quotation which Dr Cutress states as coming from the University of York systematic review. The quotation

“Insufficient evidence is available to reach a conclusion that bone fractures, cancer, or other adverse health conditions were associated with fluoride in water”

leaves some uncertainty with the reader to what extent the syndrome of chronic fluoride toxicity or pre-skeletal fluorosis described by Dr Waldbott has been carefully examined and found to be wanting. The publications by Dr Waldbott on fluoride number 142.^b The University of York systematic review has 294

^aMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000.

references in the bibliography but not one is by Dr Waldbott. A reference is included to a paper by me on “Allergy and hypersensitivity to fluoride” in which I referred to seven papers by Waldbott, but the reference to my paper in the systematic review was only to reject it because it did not meet the inclusion criteria.^{ab}

“Although some authors (Spittle 1993) have reported cases of hypersensitivity to fluoridated water, no studies meeting the inclusion criteria were found.”

Thus, rather than the University of York systematic review having carefully considered the work of Dr Waldbott, they set inclusion criteria for their review that were such as to exclude his work from consideration. The statement by Dr Terry Cutress that University of York systematic review found insufficient evidence to reach a conclusion that other adverse health conditions were associated with fluoride in water cloaks the reality that the review did not in fact examine any of Waldbott’s publications. In contrast to the 2000 University of York systematic review, with 243 pages and 294 references, the 2006 NRC report with 507 pages and 1077 references considered Waldbott’s work and was not dismissive of it. As already noted on page 9 of this book, the 2006 NRC report^c stated that the primary symptoms of gastrointestinal injury are nausea, vomiting, and abdominal pain and that these had been reported in well documented case studies by Waldbott^d and Petraborgh^e as well as in a double-blind clinical study by Grimbergen^f involving the research group of doctors in the Netherlands with Dr Hans Moolenburgh and that these authors could have been examining a group of patients whose gastrointestinal (GI) tracts were particularly hypersensitive. Similarly the work by these doctors on skin reactions was noted:

“In the studies by physicians treating patients who reported problems after fluoridation was initiated, there were several reports of skin irritation (Waldbott 1956;^g Grimbergen 1974;^h Petraborgh 1977ⁱ). ...”

The Australian National Health Medical Research Council (NHMRC, 1999) report^j has been updated by a 203-page 2007 report,^k *A systematic review of the efficacy and safety of fluoridation*, with 113 references, but does not include any

^bAnon. Fluoride publications of George L Waldbott, MD. Fluoride 1998;31:21-5.

^aSpittle B. Allergy and hypersensitivity to fluoride. Fluoride 1993;26:267-73.

^bMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000. p. 59.

^cDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA’s standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 269, 293, 303.

^dWaldbott GL. Incipient chronic fluoride intoxication from drinking water. II. Distinction between allergic reactions and drug intolerance. Int Arch Allergy Appl Immunol 1956;9(5):241-9.

^ePetraborgh HT. Chronic fluoride intoxication from drinking water (preliminary report). Fluoride 1974;7:47-52.

^fGrimbergen GW. A double blind test for determination of intolerance to fluoridated water (preliminary report). Fluoride 1974;7:146-52.

^gWaldbott GL. Incipient chronic fluoride intoxication from drinking water. II. Distinction between allergic reactions and drug intolerance. Int Arch Allergy Appl Immunol 1956;9(5):241-9.

^hGrimbergen GW. A double blind test for determination of intolerance to fluoridated water (preliminary report). Fluoride 1974;7:146-52.

ⁱPetraborgh HT. Chronic fluoride intoxication from drinking water (preliminary report). Fluoride 1974;7:47-52.

^jNational Health and Medical Research Council, Australia. Review of water fluoridation and fluoride intake from discretionary fluoride supplements. Melbourne: National Health and Medical Research Council, Australia; 1999.

^kAustralian Government. National Health and Medical Research Council. A systematic review of the efficacy and safety of fluoridation. Canberra: Australian Government. National Health and Medical Research Council; 2007.

publications by Dr Waldbott. Similarly the World Health Organization report (2002) has been updated by a 144-page 2006 report, *Fluoride in drinking-water*, with 248 references, but none of Dr Waldbott's publications.^{ab} The Australian NHMRC report dismisses the relevance to water fluoridation of the 2006 NRC report, *Fluoride in drinking water: a scientific review of EPA's standards*, which includes Dr Waldbott's work on people affected by fluoridated water, in two sentences:

"The reader is also referred to recent comprehensive reports regarding water fluoridation published by the World Health Organisation (WHO, 2006) and the National Research Council of the National Academies (NAS, 2006). The NAS report refers to the adverse health effects from fluoride at 2–4 mg/L, the reader is alerted to the fact that fluoridation of Australia's drinking water occurs in the range of 0.6 to 1.1 mg/L."

The NHMRC report does not alert the reader to the fact that it is the dosage rather than the concentration in the water that is important so that someone drinking 3 L with 1 ppm of fluoride would receive the same amount, 3 mg, as is contained in 1.5 L of water with 2 ppm of fluoride. Those with above average water intakes include some athletes, persons doing heavy manual labour, persons with diabetes, and those with renal failure. The 2006 NRC report^c is of clear relevance to water fluoridation and, in addition to referring to two of Waldbott's publications, reviewed animal studies showing adverse changes occurred in the brains of rats with water containing 0.34 ppm and 1 ppm of fluoride. Similarly the report included data on fluoride and fractures involving fluoridated water, and the relevant animal work studying fluoride and the pineal gland. The NHMRC report repeats uncorrected mistakes present in the York report,^d e.g. in Table 62 on page 122 of the NHMRC report the I.Q. difference reported by Zhao (1996)^e is given as –7.7 when the correct figure from the original study is –7.5, and on page 123 it is stated:

"Lin (1991)^f found a significant negative association of combined low iodine and high fluoride with goitre and mental retardation."

whereas Lin FF et al. found that the average I.Q. of children in high fluoride and low iodine areas was 19–25% lower than the average I.Q. of children in control areas.^g A positive association was present between the water fluoride level and mental retardation. As the fluoride level increased, so too did the incidence of

^aWorld Health Organization (WHO). Fluorides. Environmental Health Criteria No. 227. Geneva: WHO; 2002.

^bFawell J, Bailey K, Chilton J, Dahi E. Fluoride in drinking-water. London: IWA Publishing and World Health Organization (WHO); 2006.

^cDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>. p. 131-80, 216-7, 252-6. An abstract of the paper Varner JA, Jensen KF, Horvath W, Isaacson RL. Chronic administration of aluminum-fluoride or sodium fluoride to rats in drinking water: alterations in neuronal and cerebrovascular integrity. Brain Res 1998;784:284-98 is in Fluoride 1998;21:91-5.

^dMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000. p. 59-63.

^eZhao LB, Liang GH, Zhang DN, Wu XR. Effect of a high fluoride water supply on children's intelligence. Fluoride 1996;29:190-2.

^fLin FF, Zhao HX, Lin J, Jian JY. The relationship of a low-iodine and high-fluoride environment to subclinical cretinism in Xinjiang. Yutian, Xinjiang, China: Xinjiang Institute for Endemic Disease Control and Research, Office of Leading Group for Endemic Disease Control of Hetian Prefectural Committee of the Communist Party of China and County Health and Endemic Prevention Station, Yutian, Xinjiang; 1991. Unpublished report submitted through NHS CRD web site. The reference was omitted from the NHMRC report but included in the York report.

^gGe YM, Ning HM, Feng CP, Wang HW, Yan XY, Wang SL, Wang JD. Apoptosis in brain cells of offspring rats exposed to high fluoride and low iodine. Fluoride 2006;39:173-8.

mental retardation. The NHMRC report does not make it easier for the reader to check the Lin quotation by omitting the paper from the references. The York report noted an inverse association between the water fluoride level and I.Q. had been reported by Zhao (1996) and Lin (1991). As the fluoride level increased, the I.Q. decreased. No mention is found in the discussion in the NHMRC report of the inverse association between the water fluoride level and intelligence.

Dr Cutress noted in his introductory general comments on Dr Connett's list of 50 *reasons to oppose fluoridation* that:

"Many of the references are from doubtful publications (e.g. 10% are published in the journal *Fluoride* which specialises in anti-fluoride articles).

Publication in *Fluoride* is determined by the scientific merit of the articles which are peer reviewed by an international editorial board. The International Society for Fluoride Research does not hold an official position as a Society on issues such as water fluoridation but encourages, through its conferences and the publication of papers, commentaries, and letters to the editor, a critical examination of the scientific basis of the views which are held by individuals and organizations. Rather than publishing "anti-fluoride" articles, the Society promotes the sharing of scientific information on all aspects of inorganic and organic fluorides and has done this by publishing its quarterly journal *Fluoride* since 1968 and hosting 27 international conferences in Spain, Austria, the Netherlands, England, the United States of America, Switzerland, India, Japan, Hungary, China, Poland and New Zealand. *Fluoride*, an open access journal, is available, free in full text including the most recent issues, at <http://www.fluorideresearch.org>.

The authors of the 2000 University of York systematic review did have not any difficulties with using references from *Fluoride* and had 9 such references in the total of 294 (3.1%).^a Similarly 57 of the 1077 references in the 2006 NRC report were from *Fluoride* (5.3%).^b

Public health advocates of fluoridation tend to consider of little or no scientific value evidence contradicting their views when it is published in journals such as *Fluoride*, not indexed by *PubMed*, but covered by other search engines such as *SciFinder Scholar* and *Web of Science*.^{cd} Fluoridation promoters, from whose ranks the journal selection panels for *PubMed* are invariably selected, are thus "able" to maintain and safeguard their self-interests, and ignore and discount a large body of solid research that contradicts their position.

^aMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000.

^bDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>

^cArmfield JM. When public action undermines public health: a critical examination of antifluoridationist literature. *Aust N Z Health Policy* 2007;4:25. doi:10.1186/1743-8462-4-25.

^dMaupomé G, Gullion CM, Peters D, Little SJ. A comparison of dental treatment utilization and costs by HMO members living in fluoridated and nonfluoridated areas. *J Public Health Dent* 2007;67:224-33.

FURTHER COMMENTS ON THE SUGGESTION THAT THE CHRONIC FLUORIDE TOXICITY SYNDROME IS PSYCHOSOMATIC

Dr Waldbott commented further in 1978 in *Fluoridation: the great dilemma* on criticism that the so-called “fluoride intolerance” was a variety of unrelated conditions or had a psychogenic (psychosomatic) basis.^a He noted:

“Like most other kinds of chronic poisoning, intoxication from long-term fluoride intake is difficult to diagnose because it develops slowly and unobtrusively with a wide variety of symptoms of the kind that are common to many other ailments. Dwelling on this point, WD Armstrong wrote in the American Journal of Public Health:^b

“He [Waldbott] describes patients who complained of a variety of bizarre symptoms affecting a large number of organ systems. These symptoms, attributed by Dr. Waldbott to the use of fluoridated water, were present with few or no objective signs of specific disease and included gastric distress, pain in the spine, paresthesias, flatulence, polydipsia, mental aberrations, tinnitus, muscular weakness, etc. Rapid symptomatic cures were reported on withdrawal of fluoridated water, and Dr. Waldbott attempts to discount the suggestion that his patients' complaints had a psychogenic basis.’

“ER Schlesinger elaborated further on this seemingly plausible criticism in a publication of the World Health Organization:^c

“Of a selected group of 123 allergic patients tested, five developed a wide variety of symptoms and signs which developed five minutes to three hours after the test dose and lasted from twelve hours to ten days. Of the 21 symptoms and signs reported, only six occurred in more than one patient, and these were mainly of a nondescript nature, such as headache, nausea, vomiting, and epigastric pain. Physical findings such as muscular fibrillation, “cystitis,” “spastic colitis,” and facial oedema were each found in not more than one patient.

“The absence of any suggestion of a clinical syndrome leads to the conclusion that a variety of unrelated conditions were presented as cases of so-called “fluoride intolerance.” This statement creates the false impression that only a limited number of patients experienced chronic poisoning. Actually, the five cases mentioned were only part of a larger group of allergic patients without symptoms of fluoride intolerance. They were subjected to a special fluoride loading test for the purpose of recording any unusual reactions, following the test dose. My experience with the disease now includes approximately 500 cases.

“With respect to the wide spectrum of symptoms, I have already shown in Chapter 11 [In: *Fluoridation: the great dilemma*] that there is solid experimental evidence to link every one of the above-named manifestations with fluoride intake. This nonskeletal phase of chronic fluoride poisoning was first discussed by Roholm (Figure 33),^d one of the foremost authorities on the subject, in conjunction with advanced skeletal fluorosis and has been well confirmed by other investigators. Furthermore, any experienced physician can usually recognize whether or not he is dealing with a real disease or psychosomatic complaints. Having had a lifetime of experience in the practice of allergic diseases—a medical speciality that concentrates, more than any other, on the detection of the causes of a disease—I have learned to distinguish readily between imaginary and real complaints. Moreover, a careful appraisal of the combination of the unusual symptoms which I described suggests a distinct syndrome that does not occur in any other disease: an attenuated phase of the acute stage of fluoride poisoning.”



Figure 33. Professor Kaj Roholm, 1902–1948, a pioneer in fluoride research and author of the first comprehensive monograph on fluoride toxicity *Fluorine intoxication: a clinical-hygienic study with a review of the literature and some experimental investigations*. London: HK Lewis; 1937.

^aWaldbott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978. p. 240-2.

^bArmstrong WD. Books and reports: review of The American fluoridation experiment. *Am J Public Health* 1957;47:1022.

^cSchlesinger ER. Health studies in areas of the USA with controlled water fluoridation. In: Adler P, Armstrong WD, Bell ME, Bhussry BR, Büttner W, Cremer H-D, et al. Contributors. *Fluorides and human health*. WHO Monograph Series No. 59. Geneva: World Health Organization; 1970. p. 309.

ILLNESS IN ANIMALS

Another indicator that the chronic fluoride toxicity syndrome is not psychosomatic is the response of animals to receiving fluoride in their water and food. Presumably, animals are less likely to be affected by psychological factors. Like the response of canaries to methane gas in a coal mine, the health of animals may give a clue that an environment is becoming unsafe for humans. Miners used to take canaries into coal mines to warn them about the build up of firedamp or methane that could become explosive with air. It was ominous if the canary began to sway noticeably on his perch before falling. Some examples will be given of animals being affected by fluoride in their water and diet.

Chinchillas: For six months in the early 1970s Roy Freeman, of Auburn, Kansas, USA, successfully raised chinchillas, a South American rodent about the size of a guinea-pig with a very soft fur (Figure 34).^a Within three days of his changing from low-fluoride Auburn well water to drinking water fluoridated with fluorosilicic acid, the animals started to drink twice as much as before and gradually displayed inferior fur quality, stillbirths and premature mortality. When half the 50 animal colony was placed on distilled water the water consumption in this group soon decreased and became normal, the quality of the fur was restored and no further stillbirths occurred. The chinchillas became sick drinking fluoridated water. Earlier work in the 1950s by Dr HL Richardson at the University of Oregon showed that fluoride in food pellets led to abortions, stillbirths, and infertility in the chinchilla ranch of Mr WR Cox, of Gresham, Oregon, USA.^{bc}



Photograph by Sarah Hamilton, <http://www.freewebs.com/nzchinchilla-rescue/index.htm>, NZ Chinchilla Rescue, New Zealand's Chinchilla Rescue & Boarding Service.

Figure 34. A chinchilla

In an interim report, dated April 1951, Dr Richardson noted that he had personally performed over 200 autopsies on Cox's fluoride-poisoned chinchillas and had found lesions in the kidneys and testes. The kidneys had lesions in the tubules (tubular nephrosis) and the testes showed generalized testicular atrophy. Increased drinking may be sign of impaired kidney function.

Hamsters, guinea-pigs, and rabbits were also found by Dr Richardson to be affected by fluoride with the hamsters being the most sensitive. When the hamsters were fed pellets containing 14 parts per million (ppm) or mg/L of fluoride they developed oedema (swelling of the body due to the accumulation of fluid) after 2–

^dRoholm K. Fluorine intoxication: a clinical-hygienic study with a review of the literature and some experimental investigations. London: HK Lewis; 1937. p. 137-8.

^aBurgstahler AW, Freeman RF, Jacobs PN. Early and prolonged toxic effects of silicofluoridated water on chinchillas, caimans, alligators, and rats in captivity [abstract]. *Fluoride* 2002;35:259-60.

^bWaldcott GL. A struggle with titans. New York: Carlton; 1965. p. 242.

^cCox WR. Hello, test animals ...chinchillas? or you and your grandchildren. Milwaukee, Wisconsin: Lee Foundation for Nutritional Research; 1953.

3 months. On autopsy examination, they had lesions in the kidneys (tubular nephrosis), atrophy of the testes, and lesions in the adrenal glands. Mr Cox found that hamsters given commercial food pellets containing 26.5 ppm of fluoride were listless and took no interest in their surroundings whereas another group with pellets containing 5 ppm of fluoride prepared by a chemist, Mr Raphael Maiers, were “full of life.”

Mr Cox found that as time went on guinea-pigs raised on commercial pellets with a high fluoride content began to look ragged and a bit listless. He found that the health of the babies gradually deteriorated. At first the babies were weak and one or two of a litter would die. The next phase was that one or two of the babies would be stillborn and finally the whole litters would be stillborn. After that there would be no litters at all.

He noted that the same thing happened with rabbits except that it took three times as long for it to happen.

A similar progressive deterioration in the quality of the litters with successive generations of chinchillas, fed on high fluoride pellets, was also seen. After four or five generations had been fed on high fluoride pellets, there were few litters. They seldom conceived and when they did conceive it was not uncommon for one to die within two weeks of the due date. If a pregnant chinchilla survived that period and actually delivered, the litter might have one or more stillborn babies. If they were born alive and it was a multiple birth, then invariably one of the babies was scrawny and would not survive more than a day or two. Those that were left would probably grow well and behave normally until weaning on day 60 when Mr Cox would then find one dead in the morning and within a day or two the other would also be dead. If this period was survived he was not surprised to see bare spots on the animal where the fur had come out. Soon the fur would begin to grow back and shortly thereafter the animal would drop dead. Very few of these chinchillas survived.

Rats, alligators and caimans: From 1961 until 1981 Pat Nichols Jacobs, of Kansas City, Missouri, USA, successfully bred and raised rats, alligators and caimans, an alligator-like reptile from South and Central America.^a On 9 April 1981 the water supply for her animals changed to drinking water fluoridated with fluorosilicic acid. Within three days the eye membranes of the caimans and the alligators started to swell, gradually became reddened, and then ulcerated. The animals also began to avoid being in the water, preferring to remain on deck more than normal and going from tank to tank, evidently in search of water less irritating to their eyes (Figures 35–38). Within two years, without any change in the diet or housing conditions or evidence of vector-borne disease, some of the animals began to exhibit bloated bellies, gastric distress and spinal deformities (Figures 39–40). During the next 20 years, 32 caimans and 3 alligators died, many in apparent agony. Eighteen of the 35 reptiles were less than 10 years old compared to a normal lifespan of 25 years or more. Autopsies showed severe disintegration of the

^aBurgstahler AW, Freeman RF, Jacobs PN. Early and prolonged toxic effects of silicofluoridated water on chinchillas, caimans, alligators, and rats in captivity [abstract]. *Fluoride* 2002;35:259-60.

gastrointestinal tract, Crohn's disease, and liver silicosis. None of the eggs laid since 1981 hatched and all were found to be infertile even though matings had occurred. As the colony used about 2,500 L of water a day the cost of defluoridating the drinking water or obtaining nonfluoridated water was prohibitive. However hatchling caimans raised on distilled water remained in excellent health until they were switched to the fluoridated drinking water at about age 4 months. They then developed the eye swelling and ulceration, bloated bellies, gastric distress, and spinal deformities.



Photograph by Pat Nichols Jacobs

Figure 35. Nicholas, a healthy, 3 metre long, 227 kg, 12-year-old alligator on 10 September 1980 before fluoridation commenced on 9 April 1981 in Kansas City, Missouri, USA. She was raised from 1 February 1968, age 2 months, by Pat Nichols Jacobs who described her as "Perfectly normal, absolutely flawless, a magnificent, splendid, lovely lady who was my beloved friend. She represented an enormous investment of time, work, money and love."



Photograph by Pat Nichols Jacobs

Figure 37. The right eye of Nicholas on 10 September 1983 after 2 years 5 months' exposure to fluoridated water showing inflammation of the eye membranes with downward displacement of the lower eyelids by 38 mm.



Photograph by Pat Nichols Jacobs

Figure 36. The right eye of Nicholas on 18 November 1981 after 7 months exposure to fluoridated water showing inflammation of the eye membranes or conjunctivae which were swollen and red. The lower eyelids were displaced downwards 19 mm.



Photograph by Pat Nichols Jacobs

Figure 38. The left eye of Nicholas on 19 November 1984 after 3½ years exposure to fluoridated water showing conjunctival inflammation and ulceration. Pat Jacobs said "Nick got worse and worse ... She moaned and cried. On 3 December 1987 after 5½ years of exposure to fluoridated water this marvelous, beloved pet suffered to death. She represented 20 years of my life too."



Photograph by Pat Nichols Jacobs

Figure 39. Hiss-a-fer, a 6-year-old female caiman, with a severely bloated belly in late 1981. Hiss-a-fer had been cared for by Pat Nichols Jacobs, Technical Illustrator and Curator of Reptiles, at the Parrot Hill Croc Farm, Kansas City, Missouri, USA, since her arrival on 15 June 1975 at the age of 6 months.



Photograph by Pat Nichols Jacobs

Figure 40. Shep, a male caiman, hatched from an egg held in the hand of Pat Jacobs on 8 June 1978. He developed skeletal fluorosis with a spinal deformity and a bloated belly after prolonged exposure to fluoridated water and died, on 15 September 1998, aged 20 years.

During the six months after fluoridation began, the appearance and health of the rats declined dramatically. Tumours started to appear with over 200 being counted with as many as 6 per rat. Beginning on 1 October 1981 the rats were given only distilled water to drink. Their condition quickly improved and no further tumours were detected. Their reproductivity and lifespans also increased significantly with some of the rats reaching more than 7 years of age.

Pat Nichols Jacobs also noted that, during warm weather, pigeons and other wild birds consistently used the open-air bird baths filled with distilled water before using the ones filled with fluoridated water.

Horses: Cathy Justus, a quarter horse breeder at Pagosa Springs, Colorado, USA, noticed that after fluoridation started in 1985 her horses began to have colic on a regular basis and within two years the horses had chronic fluoride poisoning with brown staining of the teeth (dental fluorosis, Figures 41–43), hoof and leg deformities (Figure 44), increased bone formation (Figures 45–46), decreased thyroid hormone levels, and low conception rates.^a After the fluoridation stopped in 2005 the colic gradually ceased and other improvements occurred.



Figure 41. Incisor teeth of 2-year-10-month-old Quarter horse foal introduced to the farm with fluoridated water at 7 months of age. The upper (maxillary) permanent central incisor teeth have extensive enamel defects distally (the part furthest from the gum or gingiva).



Figure 42. Incisor teeth of 6-year-8-month-old Quarter horse gelding on fluoridated water from birth. There is severe brown discoloration of the central enamel of all teeth, and this enamel is thinner and has receded from surrounding enamel. There is also recession of the maxillary gingiva (upper gum), and the exposed distal enamel shows extensive defects. The mandibular gingival (lower gum) has receded and is bulging, and the entire masticatory surface of the mandibular (lower) teeth exhibits severe brown discoloration.

In addition some horses developed allergic reactions in the skin which disappeared promptly when the horse was removed from the fluoridated water and returned quickly when the animal was re-exposed.^b In one horse the lesions were roughly circular, 1.2–10 cm in diameter, with a centre raised up to 1.5 cm which receded after a few days to leave a crater-like lesion with a well demarcated ring

^aKrook LP, Justus C. Fluoride poisoning of horses from artificially fluoridated drinking water. *Fluoride* 2006;39:3-10.

^bJustus C, Krook LP. Allergy in horses from artificially fluoridated water. *Fluoride* 2006;39:89-94.

(urticaria, Figures 47–48). In another horse numerous skin nodules developed ranging in size from that of marbles to golf balls (1.0–2.5 cm in diameter) with a hard centre until a change was made to nonfluoridated water when they became softer and smaller (figure 49).

Figure 43. Incisor teeth of 23-year-8-month-old Quarter horse mare on fluoridated water for 21 years. There is brown discoloration of the enamel with extensive defects of the distal enamel of the maxillary teeth. Severe loss and recession of apical bone have resulted in exposure to the distal clinical crown and the upper part of the roots of the maxillary teeth, together with recession and bulging of the gingiva of the mandibular teeth.



Figure 44. Severe hoof deformity in left thoracic limb of 22-year-7-month-old Quarter horse mare on fluoridated water for 21 years.





Figure 45. Radiographs of lower two-thirds of left thoracic third metacarpus (MCIII) cut longitudinally at the dorso-palmar midline (palmar is to the left). The left radiograph is from an old thoroughbred horse (routine necropsy at Cornell College of Veterinary Medicine); the right radiograph is from a 17-year-old Quarter horse gelding on fluoridated water for the last 11 years.

Left: The subchondral bone plate is well defined from the lamellar epiphyseal bone. The metaphyseal lamellae become gradually thinner and disappear at the lower half of the picture. The cortex is sharply demarcated from the medullary cavity.

Right: The subchondral bone plate blends diffusely with the epiphyseal bone. The metaphyseal trabeculae remain thick and extend throughout the entire medullary cavity. The cortical surface facing the medulla is less sharply defined, most eloquently so at the upper palmar cortex.



Figure 46. Photo of the left MCIII of 21-year-old Quarter horse mare on fluoridated water all her life. The bone is cut lengthwise in the dorso-palmar midline with the lower end, not including the joint cartilage, at the bottom. The dorsal contour is to the left. The dorsal cortex of the wall bulges severely into the marrow space, beginning just proximal to the epiphysis, creating endosteal hyperostosis "enostosis". The added bone is less dense than the original cortex; the contour of the original cortex is well defined.



Figure 47. This Quarter horse filly was photographed at age 1 year and 2 months, when she had been on artificially fluoridated water for 7 months. Under and below the horizontal part of the halter are well demarcated, annular remnants of allergic lesions. Receding allergic reactions are present on the neck as small nodules. The irregular strand below the eye was once annular lesion. The extent of the lesions over the body is shown in Figure 48.



Figure 48. This figure shows the extent of the allergic reactions over the body with irregular strands, nodules, and annular remnants, at the same time as in Figure 47.



Figure 49. This figure shows receding skin lesions that originally ranged in size from 1.0–2.5 cm.

Thus sickness has been observed in animals as diverse as chinchillas, rats, alligators, caimans, and horses when they used drinking water to which fluoride had been added. Fluoride from industrial air pollution may also cause sickness in animals as has occurred with chronic lameness in free ranging eastern grey kangaroos (*Macropus giganteus*) at the smelter site at Portland Aluminium at Portland, Victoria, Australia.^a

FURTHER COMMENTS ON CANARIES IN THE COAL MINE

Dr Moolenburgh also referred to the canaries in the coal mine.^b

"There is one thing I should like to add. As you know, we did research with the help of double blind cases. This was to prove our case, though for me, clinical proof was enough. These people became quite ill during these double blind cases, and I felt the procedure was dubious from the standpoint of medical ethics.

"Some of the cases were directed to the allergists in our group. These cases had been through double blind tests. It had been scientifically proved that fluoride caused the complaints. And yet our allergist said, 'I cannot find an allergy!'

"It was only after correspondence with Dr. Waldbott that this error in our research was detected and eliminated. What we were seeing was not allergy (a strange reaction of a certain individual from some compound), but low-grade poisoning. This is extremely important. When, during the hay fever season, the pollen concentration in the air increases a million fold, only those allergic to pollen will begin to sneeze. With poisoning, you have a different proposition. When you slowly increase the concentration of the poison, more and

^aClarke E, Beveridge I, Slocombe R, Coulson G. Fluorosis as a probable cause of chronic lameness in free ranging eastern grey kangaroos (*Macropus giganteus*). *Journal of Zoo and Wildlife Medicine* 2006;37(4):477-86.

^bMoolenburgh HC. Dutch doctor describes hazards of fluoridated water. *National Fluoridation News* 1979;XXV(4):3.

more people will show side-effects until at last everybody will be ill (and the most sensitive will be dead).

"And this is the case with fluoridation. Those people showing ill effects are the most sensitive ones in the population. They can be compared to the little birds that coal miners take with them into the mines. These birds are extremely sensitive to small amounts of mine gas. When the birds begin to suffer, the miners are warned of the danger. These people who have adverse reactions to fluoridated water (between 5% and 6% of the population) are like those little birds. They warn the population that there is a poison at large and that they should avoid it, or as can easily be done here, get the poison out."

In addition to the adverse reactions found clinically by Dr Moolenburgh subtle effects on psychological functioning have been found on detailed examination.^a

CLOSING COMMENTS

In this book the focus has been on describing the clinical features of chronic fluoride toxicity as it affects people so that those in fluoridated areas experiencing ill health can consider whether or not it is possible that fluoride is contributing adversely to their health and whether they should have a trial of avoiding fluoride for a few weeks. A number of case histories involving similar symptoms have been presented so that readers can make up their own minds about whether there is such a thing as a chronic fluoride toxicity syndrome associated with the use of water fluoridated with about 0.7–1 ppm of fluoride.

Widely divergent views are held on this point. The New Zealand Commission of Inquiry on the Fluoridation of Public Water Supplies reported in 1957 that they were satisfied that the individual signs and symptoms of the alleged syndrome may be due to any number of unrecognized causes and that they were satisfied that there was no causal relationship with the ingestion of water containing 1 ppm of fluoride and food cooked in this water.^b The Minister of Health in New Zealand, The Hon. Pete Hodgson, in a letter, dated 19 July 2006, stated that the evidence from a Ministry of Health review does not support suggestions of health risks associated with water fluoridation.^c Similarly, Brian Rousseau, Chief Executive, Otago District Health Board, in a letter dated 6 September 2007, stated that adding fluoride to water was "a safe way of reducing tooth decay" and that for people in communities where tooth decay was a serious problem "It would be a tragedy if they are denied an opportunity to improve their health in this way because of the vehement opposition of some people." He noted "The World Health Organization, the New Zealand Dental Association, the New Zealand Medical Association, the Plunket Society and our own Ministry of Health fully support this initiative—high endorsement indeed."^d

Although it was reported, on 28 June 2007, that the Otago District Health Board would be responsible for providing impartial, balanced, information on fluoridation to voters in forthcoming referenda, no mention was made by Mr Rousseau of the advice given on 9 November 2006 by the American Dental Association that, in order to reduce the risk of enamel fluorosis in teeth, "If using a

^aRotton J, Tikofsky RS, Feldman HT. Behavioural effects of chemicals in drinking water. *J Appl Psychol* 1982;67(2):230-8.

^bStilwell WF, Edson NL, Stainton PVE. Report of the commission of inquiry on the fluoridation of public water supplies. Wellington: RE Owen, Government Printer; 1957.

^cHodgson P. Letter to Hone Harawira. 2006 Jul 6. Unpublished.

^dRousseau B. Opposition respected but fluoride necessary [letter]. *Otago Daily Times* 2007 Sept 6;17.

product that needs to be reconstituted, parents and caregivers should consider using water that has no or low levels of fluoride.”^{ab} Similarly, no mention was made of the findings of the National Research Council’s 507-page report on *Fluoride in drinking water: a scientific review of EPA’s standards*^c or of the review of this by Robert J Carton, PhD.^d In like manner, Jason Armfield made no reference to the NRC report, published on 22 March 2006, in his defence of fluoridation submitted on 24 June 2007.^e

Dr Carton’s review concluded:

“The NRC [National Research Council] committee’s reevaluation of EPA’s MCLG [Environmental Protection Agency, Maximum Contaminant Level Goal] for fluoride in drinking water failed to identify a safe level of fluoride in drinking water. This failure can be attributed to misdirection by EPA of the intended goal of the effort. When the committee requested and received a change in its mandate from evaluating the MCL [Maximum Contaminant Level] to the MCLG, EPA strangely omitted the key scientific criteria necessary for evaluating this standard. The committee should have been told to look for health effects that “can be reasonably anticipated, even though not proved to exist.” As a result of this omission, the NRC panel focused only on end points that were totally certain and concluded that the current standard of 4 mg/L did not protect against bone fractures and severe dental fluorosis. For the first time in history, a committee of the NRC removed severe dental fluorosis from the benign category of cosmetic effects and added it to the list of adverse health effects. In addition, Stage II skeletal fluorosis was added to the list, but the committee was unable to state with absolute certainty that this was occurring at the current EPA standards.

“This review applied the necessary criteria to some but not all of the adverse health effects discussed in the NRC report. The results are as follows:

- “1 Moderate dental fluorosis is an adverse health effect occurring at fluoride levels of 0.7–1.2 mg/L, the levels of water fluoridation.
- “2 The Lowest Observed Adverse Effect Level (LOAEL) for bone fractures is at least as low as 1.5 mg/L and may be lower than this figure.
- “3 Stage II and Stage III skeletal fluorosis may be occurring at levels less than 2 mg/L.
- “4 Stage I skeletal fluorosis, arthritis clinically manifested as pain and stiffness in joints, is an adverse health effect which may be occurring with a daily fluoride intake of 1.42 mg/day, which exceeds the amount the average person obtains in their diet in non-fluoridated areas. The Maximum Contaminant Level Goal (MCLG) should be zero.
- “5 Decreased thyroid function is an adverse health effect, particularly to individuals with inadequate dietary iodine. These individuals could be affected with a daily

^aADA.org [homepage on the Internet]. Chicago: American Dental Association; c1995-2008. Interim guidance on reconstituted infant formula [ADA E-Gram]. 2006 Nov 9. Available from: <http://www.ADA.org>

^bcited in: Burgstahler AW. Fluoridated bottled water [editorial]. *Fluoride* 2006;39:252-4.

^cDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. *Fluoride in drinking water: a scientific review of EPA’s standards*. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>

^dCarton RJ. Review of the 2006 United States National Research Council report: *Fluoride in drinking water*. *Fluoride* 2006;39:163-72.

^eArmfield JM. When public action undermines public health: a critical examination of antifluoridationist literature. *Aust N Z Health Policy* 2007;4:25. doi:10.1186/1743-8462-4-25.

fluoride dose of 0.7 mg/day (for a “standard man”). Since this exceeds the amount already in the diet, the MCLG should be zero.

“6 Fluoride has adverse effects on the brain, especially in combination with aluminum. Seriously detrimental effects are known to occur in animals at a fluoride level of 0.3 mg/L in conjunction with aluminum. The goal for this effect should also be zero.

“The committee should be applauded for their efforts in general and in particular for ignoring directives not to include discussions of water fluoridation and silicofluorides. Their recommendations for research should be taken seriously. EPA has sufficient information in this report to act immediately, using the appropriate criteria set forth in the Safe Drinking Water Act. Using the preventive public health intent of the law, the Maximum Contaminant Level Goal for fluoride in drinking water should be zero.”

Returning to the situation in Dunedin and the views of The World Health Organization, the New Zealand Dental Association, the New Zealand Medical Association, the Plunket Society, and the Ministry of Health, no one doubts that these authorities are sincere and well meaning with the best interests of the population, particularly vulnerable children, at heart. After the Commission of Inquiry reported in 1957 that fluoridation was safe and effective, it was left to local authorities to implement it.^a Eight referenda were planned for November 1959. In Dunedin, after the announcement for a referendum was made, the Otago Children’s Dental Health Association was formed to promote fluoridation with an impressive list of patrons including people connected with the Schools of Dentistry and Medicine of the University of Otago and the Health Department. All the referenda results were of heavy majorities against the introduction of fluoridation. In Dunedin 23,000 voted of the 47,000 eligible to vote, more than those voting in the mayoral election. The result was 14,247 (63.2%) voted against it and 8,312 for it. The majority was so decisive that the special votes were not counted. Fluoridation was subsequently started in Dunedin in 1967 without a further referendum. When the Otago District Health Board, based in Dunedin, sponsored referenda in North, West, South and Central Otago in 2007 they did not give Dunedin residents an opportunity to express their views again. The results from the Waitaki District in North Otago in October 2007 were 6,363 (68.7%) against fluoride being added to the water and 2,900 being for it.

Despite the continued endorsement of fluoridation by prestigious authorities, it is well to consider that Galileo noted: “In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual.” There is no sound evidence that swallowing fluoride helps to prevent tooth decay. There is growing concern about the role of fluoride as a neurodevelopmental toxin.^b The human brain does not complete its development until early adult life and there is an awareness that exposure to toxins during that time may interfere with a person’s potential. Perhaps one day the folly of having an Otago Children’s Dental Health Association promoting fluoridation will be recognized and an Otago Children’s Mental Health Association will be formed in Dunedin in recognition of the

^aMitchell A. Fluoridation in Dunedin: a study of pressure groups and public opinion. *Political Science* 1960;12(1):71-93.

^bGrandjean P, Landrigan PJ. Developmental neurotoxicity of industrial chemicals. *Lancet* 2006;368:2167-78.

fundamental importance, for having a healthy and satisfying life, of avoiding exposure to neurotoxins, such as fluoride, during the developmental period of the brain.

There is now general agreement that it is not sensible to take fluoride systematically by swallowing when it acts topically on the surface of the teeth.^a Over 600 professionals signed a statement, released on 9 August 2007, calling for an end to the practice of water fluoridation worldwide.^b In February 2008 the number of professional signatories was over 1400. When an editorial commenting on the statement was published in *Fluoride* an editor's note commented:^c

"When founded 40 years ago, the International Society for Fluoride Research (ISFR) and its journal *Fluoride* were responding to an acute need for a more open climate for conducting and publishing bio-medical and environmental fluoride-related research—a climate that would be free from restrictions imposed by editorial policies of mainstream journals bent on upholding a particular point of view about controversial issues such as the subject of the guest editorial below. Unfortunately, this veil of forced conformity, although beginning to be pierced, has not yet been entirely lifted, and, in a number of countries, it not only continues to stifle and prevent funding of nonconforming research, but it also impedes proper care and concern for public health and welfare that are the hallmarks of genuine and honest science. Although the ISFR and *Fluoride* do not take an official position on the issue of water fluoridation, it is in a spirit of openness to differing views that we are happy to publish this guest editorial."

Some debate exists, however, as to whether topical fluoride, as in toothpaste, is of any value. Although topical fluoride gives consumers a choice and many see it as useful, there is evidence that fluoride can be harmful to the teeth. Large-scale studies in Japan and India indicated that dental caries rates can actually be lower with less rather than more natural fluoride in the drinking water.^{def} An adequate intake of calcium, along with other important tooth nutrients, which today are often still deficient among children, even in developed countries, is far more important for caries resistance than exposure to fluoride.^{ghi}

Weston Price, DDS (Doctor of Dental Surgery), examined many primitive or First Nation people in widespread parts of the world in the early decades of the twentieth century and found they had excellent teeth when they ate their traditional diets (Figure 50).^j These diets were diverse and based on sea foods, domesticated

^aBurgstahler AW, Limeback H. Retreat of the fluoride-fluoridation paradigm [editorial]. *Fluoride* 2004;37:239-42.

^bConnett P. Professionals mobilize to end water fluoridation worldwide [editorial]. *Fluoride* 2007;40:155-8.

^cBurgstahler AW. Editor's note. *Fluoride* 2007;40:155.

^dBurgstahler AW. Fluoridated bottled water [editorial]. *Fluoride* 2006;39:252-4.

^eImai Y. Relation between fluoride concentration in drinking water and dental caries in Japan. *Koku Eisei Gakkai Zasshi* 1972;22(2):144-96. [Abstracted in *Fluoride* 1973;6(4):248-51].

^fRay SK, Ghosh S, Tiwari IC, Nagchaudhuri J, Kaur P, Reddy DCS. An epidemiological study of caries and its relationship with the fluoride content of drinking water in rural communities near Varanasi. *Indian J Prev Soc Med* 1981;12(3):154-8. [Abstracted in *Fluoride* 1983;16(1):69].

^gTeotia SPS, Teotia M. Dental caries: a disorder of high fluoride and low dietary calcium interactions (30 years of personal research). *Fluoride* 1994;27:59-66.

^hBurgstahler AW. Fluoridated bottled water [editorial]. *Fluoride* 2006;39:252-4.

ⁱWaldbott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978. p. 243, 377-80.

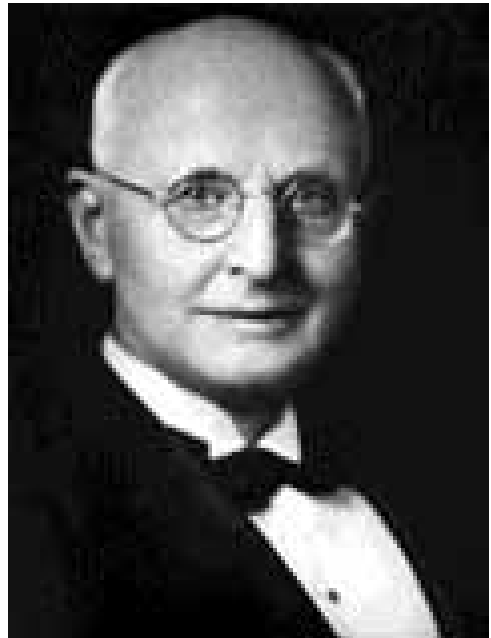
^jPrice WA. *Nutrition and physical degeneration*. 7th ed. La Mesa, CA, USA: Price-Pottenger Nutrition Foundation; 2006. p. 201-15.

animals, game, or dairy products. Some contained almost no plant foods while others had a variety of fruits, vegetables, grains, and legumes. In some, the food was mainly cooked while, in others, many foods, including animal foods, were eaten raw. However, they shared several characteristics such as not containing any refined foods such as white sugar or flour. He found that more vitamins, both fat and water soluble, and minerals were present compared to modern diets. He found that parents who had excellent teeth and facial features on a traditional diet could have children with poorly developed narrow dental arches with crowded teeth, poor development of the nasal passages and the middle third of the face, and marked dental decay when they used a modern diet including white flour and sugar. He noted that the Maoris of New Zealand were:

“... reported by early scientists to be the most physically perfect race living on the face of the earth. They accomplished this largely through diet and a system of social organization designed to provide a high degree of perfection in their offspring. To do this they utilized foods from the sea very liberally. The fact that they were able to maintain an immunity to dental caries so high that only one tooth in two thousand had been attacked by tooth decay (which is probably as high a degree of immunity as that of any contemporary race) is a strong argument in favor of their plan of life.”

Dr Price found the Maori in New Zealand had excellent teeth with a decay rate of less than 1 tooth in 2000 teeth. As a person has about 28 teeth by the age of 12, with the last four, the four third molars not erupting until after the age of 18, when the total is then 32, this corresponds approximately to less than one person in 62 having dental decay or less than 2% of Maoris without the use of added fluoride. In 2006, in New Zealand, over 60% of Maori children in Year 8 at school, about age 12, in both fluoridated and nonfluoridated areas, had some dental decay.^a

Clearly adding fluoride to water has not restored the teeth of Maori children back to the level of excellence they had in the past. In short, fluoridation has been ineffective. The ineffectiveness is the result of the practice not being built on sound science. The attempt to improve dental health with fluoridated water has not been effective and never had a sound scientific basis. In my view, the use of topical



Photograph courtesy of Joan Grinzi, RN,
Executive Director,
Price-Pottenger Nutrition Foundation,
7890 Broadway, Lemon Grove, CA 91945, USA.

Figure 50. Weston A Price, DDS, author of *Nutrition and physical degeneration*, published by the Price-Pottenger Nutrition Foundation, <http://www.ppnf.org>.

^aMinistry of Health Manatū Hauora, New Zealand Health Strategy DHB Toolkits [homepage on the Internet]. Wellington; Ministry of Health; c2007 [cited 2007 Nov 11]. Available from <http://www.newhealth.govt.nz/toolkits/>; click on “Oral Health,” then on “Age 5 and year 8 health data from the School Dental Services 2006,” then click on “Y8 2006” in the menu on the bottom of the screen.

fluoride in dental products is also unsound and fluoride does not result in teeth being decay free. The apparent reduction in decay in the first teeth to appear, the deciduous teeth, is related to fluoride delaying the eruption of these teeth so that they have less time exposed to the decay-producing environment in the mouth. The timing of the eruption of the teeth is determined by thyroid hormones, and fluoride interferes with these.^a

No clinically significant differences in the rates of dental decay are found in the permanent teeth when factors such as socioeconomic status and ethnicity are controlled for.^{bcde} Professor John Spencer and Jason Armfield compared the dental caries prevalence in children ingesting public (fluoridated) and nonpublic (nonfluoridated) water in South Australia. For deciduous teeth, a small apparent benefit of fluoridation was observed but for permanent teeth “The effect of consumption of nonpublic water on permanent caries experience was not significant.” Mark Diesendorf noted that this was consistent with other studies which found that fluoridation is ineffective in permanent teeth.^f

I consider that the relationship of diet to dental health described by Weston Price will be a more rewarding path to follow than the blind alley of fluoridation and topical fluoride.

That Western countries deliberately added fluoride to their water supplies puzzled the late Professor Emerita Niloufer Chinoy, who was only too aware of the health problems caused by naturally occurring fluoride in Gujarat State, India, and published 66 articles on fluoride, including its effects on the liver, kidneys, muscles, brain, testes, and ovaries (Figure 51).^g

The impetus for fluoridation appears to have come from the need to solve an industrial pollution problem rather than being the result of careful studies on how to reduce tooth decay. The green light for the procedure was given by Oscar Ewing, Director of Social Security in charge of the United States Public Health



Figure 51. Niloufer Jamshed Chinoy, PhD, Professor Emerita, Gujarat University, Ahmedabad, India. 17 October 1939–8 May 2006. She was the first to report the genotoxic effect of fluoride on humans exposed to high levels of fluoride in drinking water. She published over 300 research and review articles in the scientific literature. She was puzzled that Western countries would voluntarily add fluoride to their water supplies when she was so aware of the damage it caused in Gujarat State, India.

^aSchuld A. Is dental fluorosis caused by thyroid hormone disturbances? [editorial]. *Fluoride* 2005;38:91-4.

^bArmfield JM, Spencer AJ. Consumption of nonpublic water: implications for children's caries experience. *Community Dent Oral Epidemiol* 2004;32:283-96. [abstract in *Fluoride* 2004(3):316].

^cSpencer J. Dental research on fluoridation misused. *Fluoride* 2006;39:326-7.

^dDiesendorf M. Response to John Spencer's obfuscation of the results of his own paper. *Fluoride* 2006;39:327-30.

^eSpittle B. Fluoridation promotion by scientists in 2006: an example of "tardive photopsia" [editorial]. *Fluoride* 2006;39:157-62.

^fDiesendorf M. Comments by Dr Mark Diesendorf [on Armfield JM, Spencer AJ. Consumption of nonpublic water: implications for children's caries experience. *Community Dent Oral Epidemiol* 2004;32:283-96]. *Fluoride* 2004(3):316-7.

^gRao MV, Verma RJ, Jain NK, Jhala DD. Niloufer Jamshed Chinoy—Our cherished president, 1939–2006. *Fluoride* 2006;39:81-5.

Service, when the trials in Newburgh, New York, USA; Grand Rapids, Michigan, USA, and Brantford, Ontario, Canada, had been under way for only five years and before any permanent teeth of the children, born in these cities since the trials started, had erupted.^a The experiments were supposed to have run for 10–15 years before a decision on implementing fluoridation was made. No reliable scientific conclusions about the benefits of fluoridation on permanent teeth could possibly have been made when fluoridation was approved by Mr Ewing, as none of these teeth had erupted in the children born under fluoridation.

In 1944 Ewing was employed by the Aluminium Company of America (ALCOA), which had a serious problem disposing of the fluoride produced in aluminium smelters because it contaminated the atmosphere, poisoned livestock and damaged plant life, at an annual salary of \$750,000, although apparently no major litigation was pending at the time. A few months later he was made Federal Security Administrator with an announcement that he was taking a big salary cut in order to serve his country,^b and as a member of President Truman's cabinet, he committed the Public Health Service to the promotion of fluoridation. In addition to the aluminium manufacturers having a problem with fluoride pollution, the makers of the atomic bomb faced threats of damages due to the release of fluoride. Uranium hexafluoride is used in the production of enriched uranium. Christopher Bryson has noted, in his book *The fluoride deception*, there is evidence that the Atomic Energy Commission supported fluoridation in an attempt to improve the image of fluoride.^c

Slowly a new light is dawning. The late Dr John Colquhoun (Figure 52), was once an ardent fluoride promoter and in 1977 published a paper reporting how children's tooth decay had declined in Auckland, particularly in the low-income areas following fluoridation of its water.^d He noted "I was so articulate and successful in my support of water fluoridation that my public service superiors in our capital city, Wellington, approached me and asked my to make fluoridation the subject of a world study tour in 1980—after which I would become their expert on fluoridation and lead a campaign to promote fluoridation in those parts of New Zealand which



Figure 52. John Colquhoun, BDS, PhD. 4 January 1924–23 March 1999. Editor of *Fluoride* 1991–1998. While serving as an Auckland City Councillor for Glen Eden from 1955 to 1958 he persuaded the Mayor and fellow councillors to agree to fluoridate the Auckland water supply, apart from Onehunga. He was later the Principal Dental Officer for Auckland. His account of why, in 1983, he changed his mind about fluoridation is available in *Fluoride* 1997;31(2):179-85 at www.fluorideresearch.org

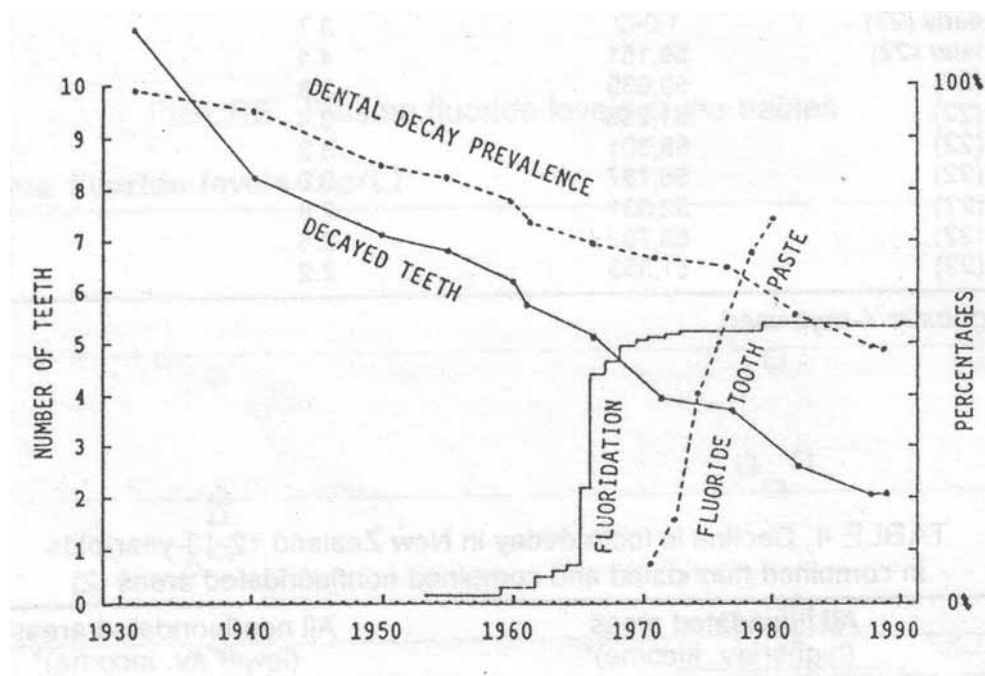
^aWaldbott GL. A struggle with titans. New York: Carlton; 1965. p. 17, 41, 135.

^bWaldbott GL, Burgstahler AW, McKinney HL. Fluoridation: the great dilemma. Lawrence, Kansas: Coronado Press; 1978. p. 310-4.

^cBryson C. The fluoride deception. New York: Seven Stories Press; 2004.

^dColquhoun J. The influence of social rank and fluoridation on dental treatment requirements. *NZ Dent J* 1977;73:146-8.

had resisted having fluoride put into their drinking water.” However, by 1983, after looking at the world situation and studying the treatment statistics for all the 12- and 13-year-old children in New Zealand, he became thoroughly convinced that fluoridation caused more harm than good and had the courage to change his mind.^a He found that when similar fluoridated and non-fluoridated areas were compared, child dental health was slightly better in the non-fluoridated areas. In addition, he noted that tooth decay had started to decline in New Zealand well before the use of water fluoridation and fluoridated toothpaste commenced and that the decline continued after children had received fluoride all their lives so that the continuing decline could not be because of fluoride (Figure 53).^b He noted that the cause of the decline could justifiably be described as a “mystery” but that it correlated well with changes in the diet that had occurred. While sugar consumption had remained high, there had been an increased dietary intake of fresh fruit and vegetable, which contained important micronutrients, and of cheese which had decay-inhibiting properties.



Solid line: mean number of decayed missing or filled teeth (dmft)
 Broken line: tooth decay prevalence (100 minus the % that are decay-free)
 Fluoridation (solid line) percent of population with fluoridated water
 Fluoride tooth paste (broken line): percent of total toothpaste sales.

Figure 53. 50-year decline in tooth decay of 5-year-olds in New Zealand.

^aColquhoun J. Why I changed my mind about water fluoridation. *Perspect Biol Med* 1997;41:29-44. Reprinted in *Fluoride* 1998;31:103-118. Further articles discussing the paper are: Pollick H. Critical review of Why I changed my mind about water fluoridation by John Colquhoun. *Fluoride* 1998;31:119-26. Colquhoun J. Response to critique of Howard Pollick. *Fluoride* 1998;31:127-8; Spittle B. Changing one's mind: and examination of evidence from both sides of the fluoridation debate. *Fluoride* 1998;31:235-44.

^bColquhoun J. Fluorides and the decline in tooth decay in New Zealand. *Fluoride* 1993;26:125-34.

He noted that the overall decline in permanent tooth decay was similar to that for primary teeth but the pattern of decline was complicated by the sudden reduction of fillings in permanent teeth, reflected in an immediate very steep decline in DMFT and decay prevalence, following a change in 1977 in the diagnostic procedure (Figure 54).

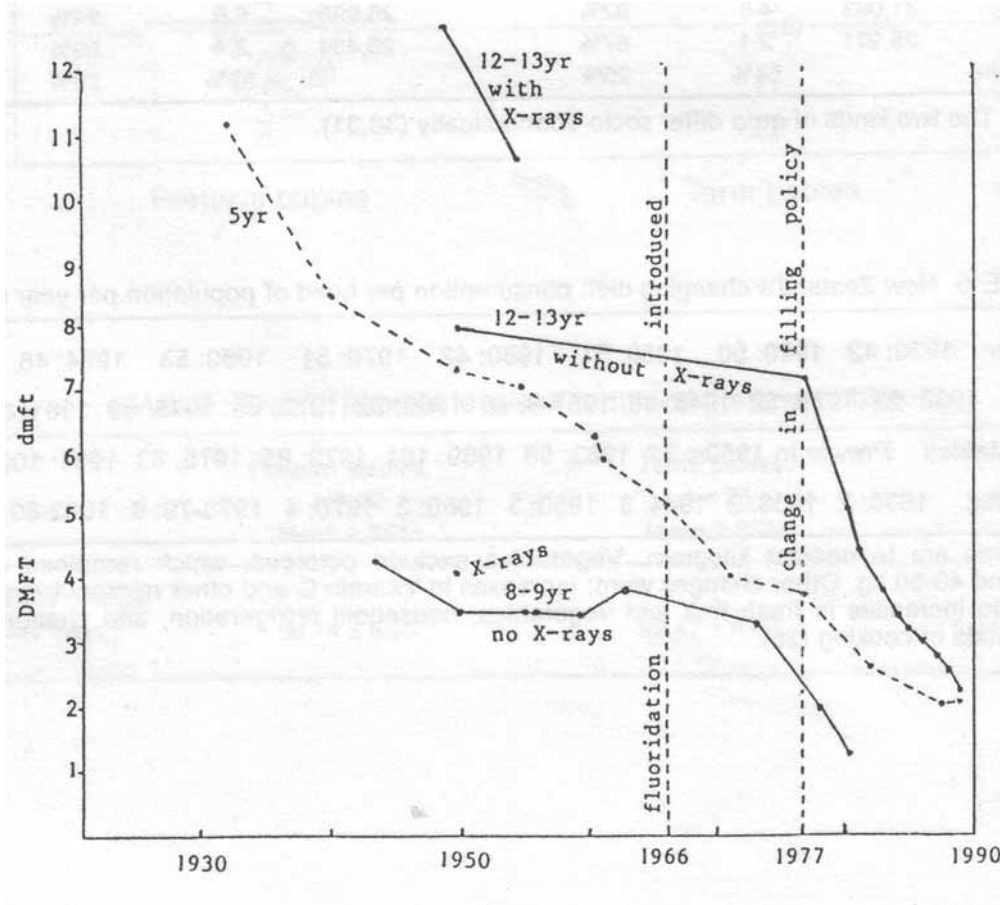


Figure 54. 50-year declines in tooth decay (mean dmft or DMFT) for children aged 12–13, 8–9 and 5 years in New Zealand.

Until 1977 New Zealand school dental operators diagnosed as “decay” even slight surface defects in permanent teeth. They inserted fillings at that earliest stage of possible decay. Such “thorough” criteria were applied to permanent teeth rather than to primary teeth, and especially to older children receiving their final treatment before passing into the care of private dentists. In 1977 a new filling policy was adopted. Instead of “in doubt, fill” the approach became “if in doubt, wait and see and spend more time on educational and preventive procedures.”

It has been acknowledged that the decline in the DMFT and decay prevalence after the 1977 change was too steep to be wholly due to a reduction in tooth decay prevalence and surveys revealed no increase in the “D” (decayed) component of the DMFT scores compared to earlier surveys. The use of X-rays by early examiners complicated the interpretation of the results. X-rays revealed smooth surface decay between teeth which was often undetectable without X-rays and the use of X-rays declined in 1948–1950 and in 1954–1955. Thus an apparent reduction in decay might have just reflected a decreased use of X-rays in diagnosis. However, even when the “with X-rays” results are disregarded, the overall declines from 1950 to 1993 were found to be similar for permanent and primary teeth.^a

In the USA, Bill Osmunson, DDS, MPH, has also shown graphically the lack of a relationship between the presence of fluoridation in the water at a state or county level and the presence of dental decay.^b He found that having very good or excellent teeth was related to having a high income rather than fluoridated water (Figures 55 and 56).

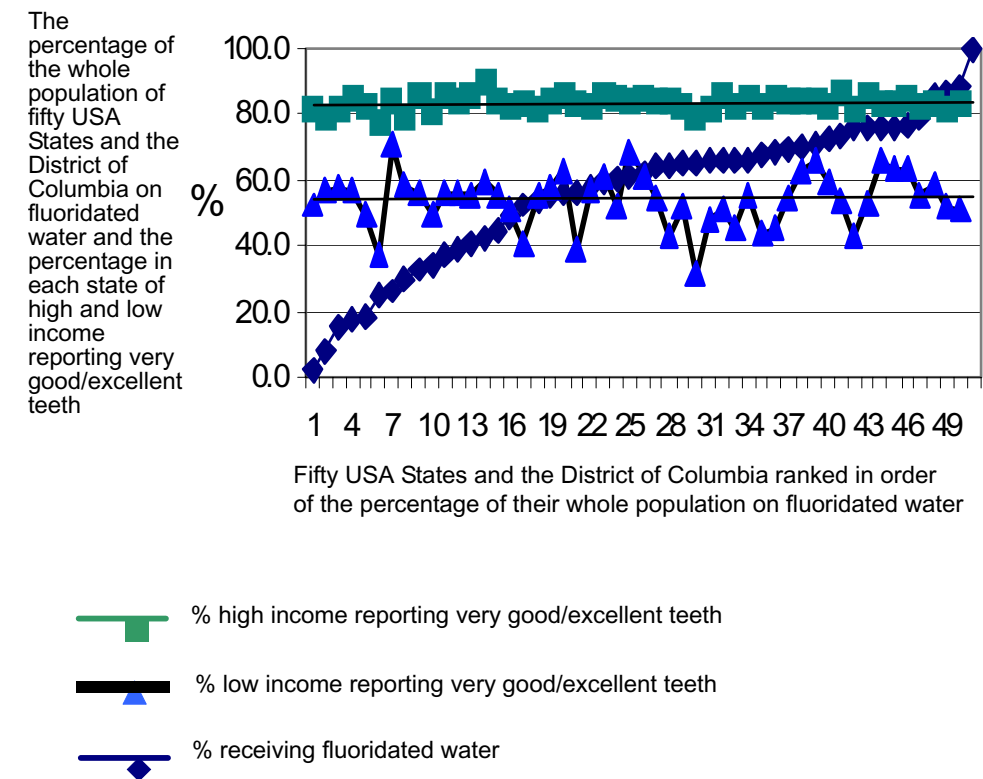
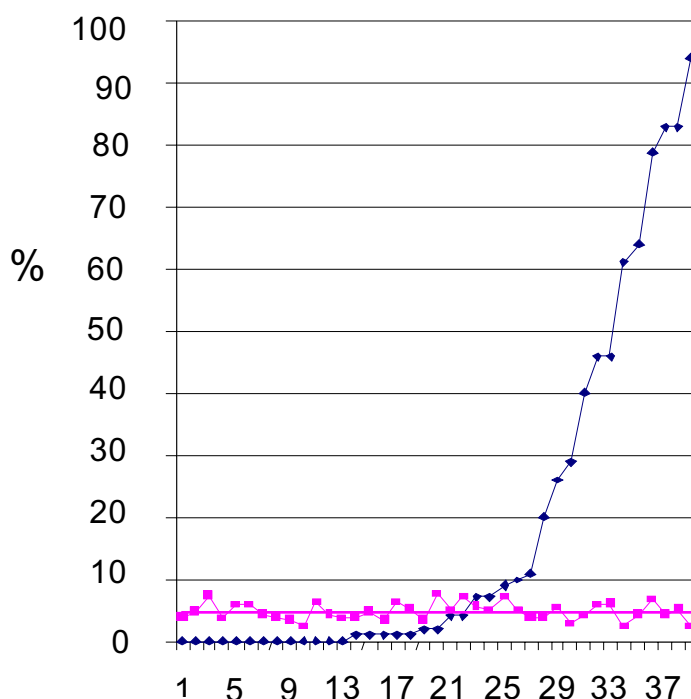


Figure 55. Fifty USA States and the District of Columbia ranked in order of the percentage of their whole population on fluoridated water and the percentage in each state of high and low income reporting very good/excellent teeth. To arrive at the percentage of whole population fluoridated, the USGS percent of those served by public water was multiplied by the percent on fluoridated public water.

^aColquhoun J. Fluorides and the decline in tooth decay in New Zealand. *Fluoride* 1993;26:125-34.
^bOsmunson B. Water fluoridation intervention: dentistry's crown jewel or dark hour? [guest editorial]. *Fluoride* 2007;40(4):214-21.

The percentage of thirty-nine Washington State counties plotted in order of the percentage of residents receiving fluoridated public water and 3rd grade students evaluated for treated and untreated decayed or filled tooth surfaces



Thirty-nine Washington State counties plotted in order of the percentage of residents receiving fluoridated public water

Figure 56. Thirty-nine Washington State counties plotted in order of the percentage of residents receiving fluoridated public water and 3rd grade students evaluated for treated and untreated decayed or filled tooth surfaces.

At an international level, Chris Neurath found that graphs of tooth decay trends for 12-year-olds in 24 countries, prepared using the most recent World Health Organization data, show that the decline in dental decay in recent decades has been comparable in 16 nonfluoridated countries and 8 fluoridated countries which met the inclusion criteria of having (i) a mean annual per capita income in the year 2000 of US\$10,000 or more, (ii) a population in the year 2000 of greater than 3 million, and (iii) suitable WHO caries data available.^a The WHO data do not support fluoridation as being a reason for the decline in dental decay in 12 year olds that has been occurring in recent decades (Figures 57–59). Similarly, Professor Cheng, professor of epidemiology at Birmingham University, Sir Iain Chalmers, UK Cochrane Centre, and Professor Sheldon, Department of Health Studies, University of York, who chaired the Advisory Board for the 2000 York report,^b found that cavity rates had declined equally in fluoridated and nonfluoridated European countries over three decades.^c They noted, “This trend

^aNeurath C. Tooth decay trends for 12 year olds in nonfluoridated and fluoridated countries. *Fluoride* 2005;38(4):324-5.

^bMcDonagh M, Whiting P, Bradley M, Cooper J, Sutton A, Chestnutt I, Misso K, Wilson P, Treasure E, Kleijnen J. A systematic review of public water fluoridation. Report 18. York: NHS Centre for Reviews and Dissemination, University of York; 2000.

^cCheng KK, Chalmers I, Sheldon TA. Adding fluoride to water supplies. *BMJ* 2007;335:699-702.

has occurred regardless of the concentration of fluoride in water or the use of fluoridated salt.” They indicated that fluoridation, touted as a safer cavity preventive, never was proven safe or effective and may be unethical. They considered that, “In the case of fluoridation, people should be aware of the limitations of the evidence about its potential harms and that it would be almost impossible to detect small but important risks (especially for chronic conditions) after introducing fluoridation.”

Figure 57. Tooth decay trends, as indicated by the DMFT Index (Decayed, Missing, or Filled Permanent Teeth), for 12 year olds in eight nonfluoridated countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy) using World Health Organization data.

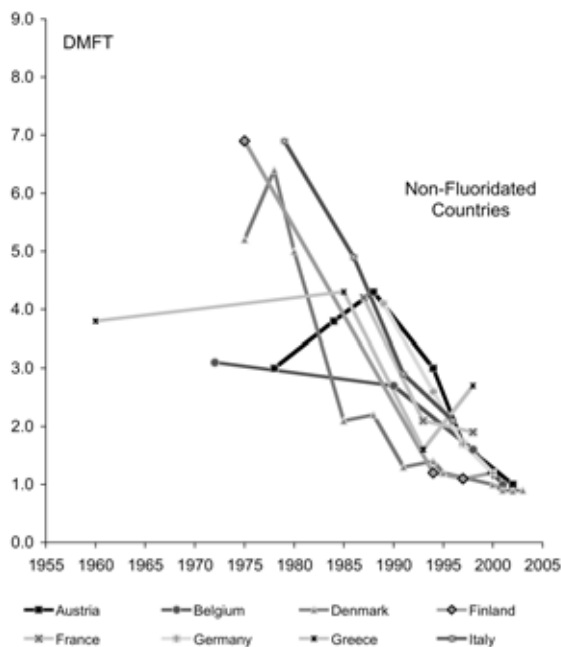


Figure 58. Tooth decay trends, as indicated by the DMFT Index (Decayed, Missing, or Filled Permanent Teeth), for 12 year olds in eight nonfluoridated countries (Japan, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, The United Kingdom) using World Health Organization data.

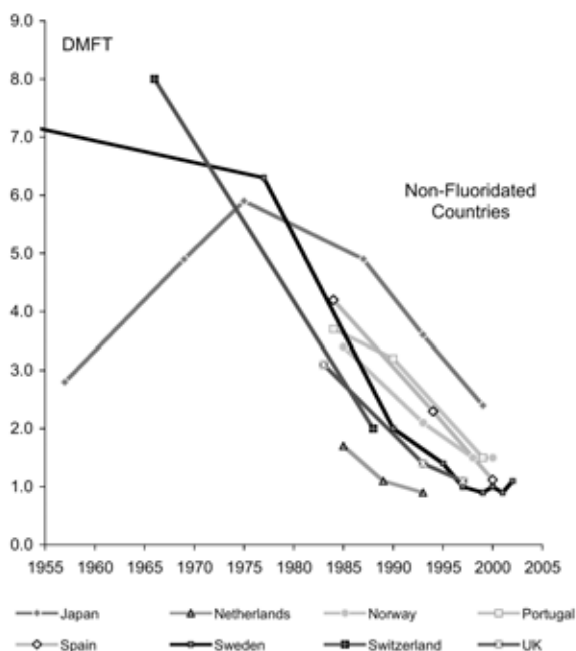
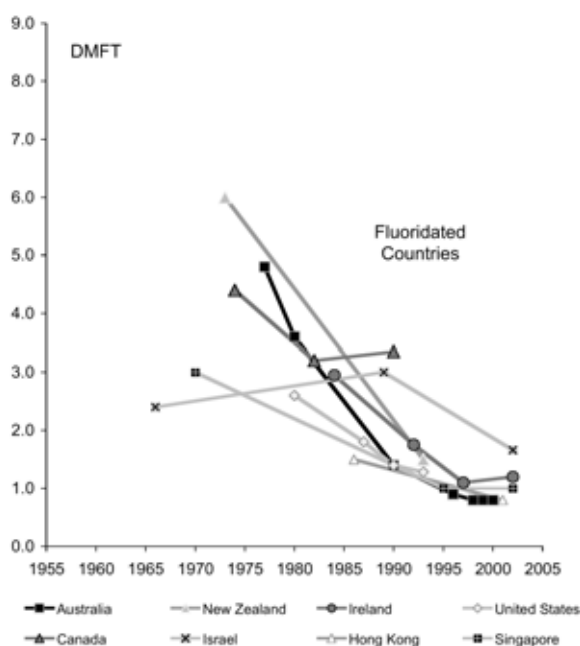


Figure 59. Tooth decay trends, as indicated by the DMFT Index (Decayed, Missing, or Filled Permanent Teeth), for 12 year olds in eight fluoridated countries (Australia, Canada, Hong Kong, Iceland, Israel, New Zealand, Singapore, The United States of America) using World Health Organization data.



In a like manner, to Dr Colquhoun changing his mind, Dr Richard Foulkes, in December 1973, in a two volume report entitled *Health Security for British Columbians* (colloquially termed “The Foulkes Report”) made 264 recommendations, including one advocating that “mandatory” fluoridation of drinking water be introduced into the Province of British Columbia, Canada. Subsequently he realised the practice was no longer tenable and worked towards ending it (Figure 60).^a



Figure 60. Richard G Foulkes, MD. 15 January 1923–3 September 2007. Associate Editor of *Fluoride* 2000–2007. After recommending, in December 1973, in a two volume report *Health security for British Columbians* the “mandatory” fluoridation of drinking water, he changed his mind, in 1990, and spent much of his time speaking and writing on fluoride and fluoridation. He noted the impact of fluoridation on salmon species in an article published in *Fluoride* 1994;27:220-6.

^aBurgstahler AW. Richard Gordon Foulkes, MD. 1923–2007[in memoriam]. *Fluoride* 2007;40(4):225-7.

Similarly, in April 1999, Associate Professor Hardy Limeback, Head of Preventive Dentistry, Faculty of Dentistry, University of Toronto took a public stand against water fluoridation (Figure 61).^a Together with Professor Emeritus Albert Burgstahler he noted that correcting calcium deficiency is a much more critical need than fluoride to prevent tooth decay.^{bcd} They observed that nutritionally deficient, refined sugar-rich diets—not lack of fluoride—are increasingly recognized as the principal cause of continued and even increasing high rates of tooth decay, especially in early childhood, occurring in fluoridated as well as nonfluoridated communities. In addition, they pointed out that there was unrefuted evidence for caries-resistant teeth being formed by optimal, complete dental nutrition and that the teeth of monkeys, hamsters, and rats, raised on a natural diet “do not develop appreciable caries later on very high sugar diets but do develop caries with an early high sugar diet during tooth development.”^e Domestic animals including young and adult cats and dogs kept as pets, when fed nutritionally balanced diets rich in calcium and phosphorus, do not develop dental caries.



Figure 61. Hardy Limeback, BSc, PhD (Biochemistry), DDS. Associate Professor and Head, Preventive Dentistry, Faculty of Dentistry, University of Toronto, Ontario, Canada. In April 2000 he wrote an open letter indicating that he was now officially opposed to adding fluoride, especially hydrofluosilicic acid, to drinking water because of new evidence for the lack of effectiveness of fluoridation in modern times and new evidence for potential serious harm from long-term fluoride ingestion.

Emeritus Professor Paul Connett has spent over a decade working tirelessly in an attempt to bring science into the fluoridation debate (Figure 62). He considers that the evidence is now clear that fluoridation is ineffective and unsafe that it is now a matter of ensuring that this is reflected in legislation. He has helped mobilize professionals representing a variety of disciplines but all having an abiding interest in ensuring that government public health and environmental

^aLimeback H. Recent studies confirm old problems with water fluoridation: a fresh perspective [editorial]. *Fluoride* 2001;34:1-6.

^bPrice WA. Nutrition and physical degeneration: a comparison of primitive and modern diets and their effects. Los Angeles: Am Acad Appl Nutr; 1948, especially Ch.16.

^cAslander A. The technique of complete tooth nutrition. *Pakistan Dent Rev* 1968;18(4):2-9. Cf. Laplaud P. Prevention sociale de la carie dentaire. Thèse pour le doctorat en chirurgie dentaire. Dactylo-Sorbonne, Paris, 1969. p. 125-6.

^dTeotia SPS, Teotia M. Dental caries: a disorder of high fluoride and low dietary calcium interactions (30 years of personal research). *Fluoride* 1994;27:59-66.

^eSognnaes RF. Is the susceptibility to dental caries influenced by factors operating during the period of tooth development? *J Calif State Dent Assoc* 1950;26(3) Suppl:37-52.

policies be determined honestly, with full attention paid to the latest scientific research and to ethical principles, to call for an end of the practice of water fluoridation worldwide. He notes:^a

"In the wake of a number of important research reports, reviews, and government advisories that have been published or issued over the last few years, opponents of water fluoridation have been reaching out to professionals in medical, dental, scientific, academic, legal, and environmental fields, from around the world, to sign a statement calling for an end to this practice.

"The Professionals' Statement refers to eight "events" as the basis for an urgent call to end fluoridation worldwide. The most important event cited is the publication in March 2006, of the 507-page National Research Council (NRC) report *Fluoride in Drinking Water: A Scientific Review of EPA's Standards*.^b This report, which took over three and half years to complete, was conducted by one of the most balanced panels ever assembled in the US to look at fluoride. Not directed to look at water fluoridation *per se*, the panel reviewed a large body of literature in which fluoride was shown to have a statistically significant association with a wide range of adverse effects. These include an increased risk of bone fractures, decreased thyroid function, lowered IQ, arthritic-like conditions, and dental fluorosis. Based on their analysis of

these findings, the Statement emphasizes that, 'Considering the substantial variation in individual water intake, exposure to fluoride from many other sources, its accumulation in the bone and other calcifying tissues, and the wide range of human sensitivity to any toxic substance, fluoridation provides NO margin of safety for many adverse effects, especially lowered thyroid function.'

"Even though fluoridation promoters in the US and other fluoridating countries have essentially ignored the NRC fluoride report, it did trigger at least one change in policy. The American Dental Association (ADA) is now advising parents not to use fluoridated tap water to make up baby formula.^c Although the ADA issued this advisory to reduce the risk of dental fluorosis, which now impacts 32% of all American children and up to 40% in fluoridated communities, the Professionals' Statement points to the fact that fluoridated water contains

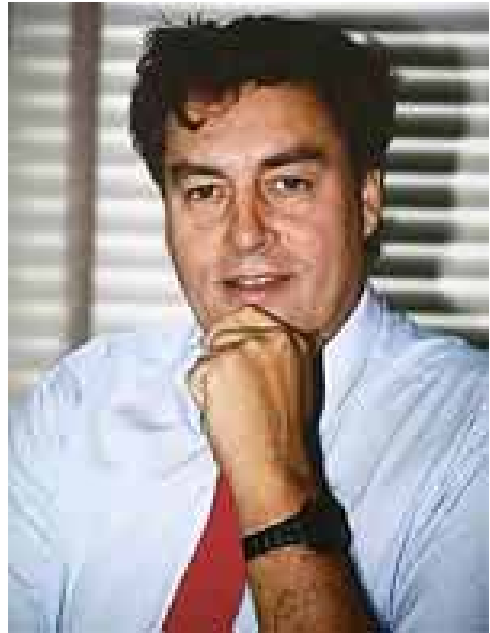


Figure 62. Paul H Connett, BS (Honors), PhD., Emeritus Professor of Chemistry, St Lawrence University, Canton, New York, USA; Executive Director, Fluoride Action Network (FAN) www.FluorideAction.net His *50 reasons to oppose fluoridation* are posted on the FAN website together with the response from the Irish Government, and his detailed 87-page reply, dated January 20, 2006, to Mr John Moloney.

^aConnett P. Professionals mobilize to end water fluoridation worldwide [editorial]. *Fluoride* 2007;40:155-8.

^bDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. *Fluoride in drinking water: a scientific review of EPA's standards*. Washington, DC: The National Academies Press; 2006. [Contract No.: 68-C-03-013. Sponsored by the U.S. Environmental Protection Agency].

^cAda.org [homepage on the Internet]. Chicago: American Dental Association; c1995–2007 [cited 2007 Aug 7]. Available from: http://www.ada.org/public/topics/fluoride/infantsformula_faq.asp

250 times more fluoride than naturally present in mothers' milk in nonfluoridated communities (i.e., 1 ppm versus 0.004 ppm F ion).^{ab}

"Buttressing health concerns, the Statement cites an extensive list of publications since 1982 indicating there is little evidence of any significant difference in tooth decay between fluoridated communities and non-fluoridated communities. It also refers to the UK government sponsored "York Review," the first systematic review of water fluoridation, which could find no grade A studies ("high quality, bias unlikely") demonstrating anti-caries benefits of fluoridation.^c Such dismal evidence for the benefits of fluoridation, despite the enthusiastic support given to this practice by the US Public Health Service for over 50 years, is consistent with another event discussed in the Statement: the concession by the Centers for Disease Control and Prevention (CDC) in 1999 and again in 2001 that the predominant action of fluoride on the teeth is topical, not systemic.^{de}

"With such findings in hand, the Statement concludes that whatever the meager dental benefits may be, they do not justify the serious risks involved. The seriousness of those risks received further reinforcement by another event: the publication in May 2006 of a peer-reviewed, case-control study from Harvard University that found a 5- to 7- fold increase in osteosarcoma in young males associated with exposure to fluoridated water during their 6th, 7th, and 8th years of life.^f While the Statement cautiously admits that "this study does not prove a relationship between fluoridation and osteosarcoma beyond any doubt, the weight of evidence and the importance of the risk call for serious consideration." As the late Dr John Colquhoun, former editor of this journal, asked me in a videotaped interview in 1998, "Is one death of a teenage boy from osteosarcoma an adequate exchange for saving a part of a cavity in a child's tooth? I think when you put that issue to the lay public, they are mostly common sense people, they say no. If there is the slightest possibility of harm we shouldn't be adding it to the water, even if it does prevent cavities, for which there is now considerable doubt." The fact that this type of bone cancer is frequently fatal tilts the balance overwhelmingly in favor of ending water fluoridation.

"The Statement further calls upon "medical and dental professionals, members of water departments, local officials, public health organizations, environmental groups and the media to examine for themselves the new documentation that fluoridated water is ineffective and poses serious health risks." In addition, the Statement points out: "It is no longer acceptable to simply rely on endorsements from agencies that continue to ignore the large body of scientific evidence on this matter—especially the extensive citations in the NRC (2006) report." ...

"In summary, the Statement concludes: "It is time for the US, and the few remaining fluoridating countries, to recognize that fluoridation is outdated, has serious risks that far outweigh any minor benefits, violates sound medical ethics, and denies freedom of choice. Fluoridation must be ended now."

^aBeltrán-Aguilar ED, Barker LK, Canto MT, Dye BA, Gooch BR, Griffen SO, Hyman J, Jaramillo F, Kingman A, Nowjack-Raymer R, Selwitz RH, Wu T. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis—United States, 1988–1994 and 1999–2002 [surveillance summary]. *MMWR Morb Mortal Wkly Rep* 2005 Aug 26;54(SS-3):1-43.

^bDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. Fluoride in drinking water: a scientific review of EPA's standards. Washington, DC: The National Academies Press; 2006. [Contract No.: 68-C-03-013. Sponsored by the U.S. Environmental Protection Agency]. p. 40.

^cMcDonagh MS, Whiting PF, Wilson PM, Sutton AJ, Chestnutt I, Cooper J, Misso K, Bradley M, Treasure E, Kleijnen J. Systematic review of water fluoridation. *BMJ* 2000;321:855-9. Full report available from: <http://www.york.ac.uk/inst/crd/fluorid.htm>. Analysis and comment available from: <http://www.fluoridealert.org/york.htm>.

^dDivision of Oral Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. Achievements in Public Health, 1900–1999: Fluoridation of Drinking Water to Prevent Dental Caries. *MMWR Morb Mortal Wkly Rep* 1999 Oct 22;48(41):933-40. Available at: <http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/mm4841a1.htm>

^eAdair SM, Bowen WH, Burt BA, Kumar JV, Levy SM, Pendrys DG, Rozier RG, Selwitz RH, Stamm JW, Stookey GK, Whitford GM. Centers for Disease Control and Prevention. Recommendations for using fluoride to prevent and control dental caries in the United States [recommendations]. *MMWR Morb Mortal Wkly Rep* 2001 Aug 17;50(RR14):1-42. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5014a1.htm>.

^fBassin EB, Wypij D, Davis RB, Mittleman MA. Age-specific fluoride exposure in drinking water and osteosarcoma (United States). *Cancer Causes Control* 2006;17:421-8. [abstracted in *Fluoride* 2006;39(2):152]

Dan Fagin, writing in *Scientific American*, January 2008, noted that the overconsumption of fluoride can raise risks of disorders affecting the teeth, bones, the brain, and the thyroid gland.^a He noted that the committee of the National Research Council (NRC) that released the 2006 report *Fluoride in drinking water: a scientific report on EPA's standards* concluded that fluoride could subtly alter endocrine function, especially in the thyroid and that the effects appeared to be strongly influenced by diet and genetics.^b Fagin reported that John Doull, Professor Emeritus of Pharmacology and Toxicology at the University of Kansas Medical Center, who chaired the report said, "The thyroid changes do worry me. There are some things there that need to be explored. ... 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 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. I think that's why fluoridation is still being challenged so many years after it began. In the face of ignorance, controversy is rampant."

Dr Waldbott foresaw an end to the controversy but only when medical practitioners recognized the existence of the chronic fluoride toxicity syndrome and water fluoridation was made illegal. In 1978, four years before his death in 1982, he wrote:

"As I enter the twilight of my long and active medical career, I know that the path I chose long ago, though strewn with many obstacles, is the only one I could have taken. No more satisfying nor humane goal can be attained than the truth which alleviates the suffering of mankind. When medical practitioners everywhere also recognize the severity of the problems of chronic fluoride toxicosis, and laws mandating truly safe drinking water are sincerely enforced, the health of millions will dramatically improve. Only then will fluoridation cease to be *The Great Dilemma*."^c

Twenty-five years later Dr Susheela has echoed these sentiments in her foreword to this book:

"I sincerely hope that, besides the general public, policy makers and health officials, in the interest of the nation and the people they are sworn to serve, will learn from reading this book to recognize and desist from the 'madness' being exercised by 'fluoridation of drinking water.' "

In the meantime, many people using fluoridated drinking water will have illness with fatigue that is not relieved by sleep. Hopefully, this book will help those so affected to realise that their health is in their own hands and that a cure is possible.

Feedback from readers will be welcomed by the author (contact details on p. ii.).

^aFagin D. Second thoughts about fluoride: new research indicates that a cavity-fighting treatment could be risky if overused. *Sci Am* 2008;298:74-81.

^bDoull J, Boekelheide K, Farishian BG, Isaacson RL, Klotz JB, Kumar JV, Limeback H, Poole C, Puzas JE, Reed N-MR, Thiessen KM, Webster TF, Committee on Fluoride in Drinking Water, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies. *Fluoride in drinking water: a scientific review of EPA's standards*. Washington, DC: The National Academies Press; 2006. Available for purchase online at: <http://www.nap.edu>.

^cWaldbott GL, Burgstahler AW, McKinney HL. *Fluoridation: the great dilemma*. Lawrence, Kansas: Coronado Press; 1978. p. 384.

ABOUT THE AUTHOR

Bruce J Spittle, MB ChB with distinction, DPM (Otago), Fellow of the Royal Australian and New Zealand College of Psychiatrists (Figure 63).

Recipient of John Malcolm Memorial Prize in Physiology and Biochemistry, William Ledingham Christie Prize in Applied Anatomy, Geigy Psychiatric Essay Prize, Dunedin Hospital Staff Fund Prize in Psychological Medicine, Ophthalmological Society of New Zealand Prize, Sir Gordon Bell Prize in Clinical Surgery, Batchelor Memorial Medal and Prize in Gynaecology and Obstetrics (shared), Rita Gillies Gardener Memorial Prize, Undergraduate distinctions in Anatomy, Physiology and Biochemistry, Medical Microbiology, and Preventive and Social Medicine, Senior Scholarship in Medicine 1966, Fowler Scholarships in Medicine 1967 and 1968, and the Travelling Scholarship in Medicine 1969.

Part-time Student Lecturer in Anatomy and Physiology to the Physiotherapy Class, Department of Anatomy, University of Otago Medical School, 1967–1969. Student Prosector for the Royal Australasian College of Surgeons, Department of Anatomy, University of Otago Medical School, 1967–1968. House Surgeon, Otago Hospital Board, 1970–1971. Assistant Lecturer and Registrar, Department of Medicine, University of Otago Medical School and Otago Hospital Board, 1972. Assistant Lecturer and Registrar, Department of Psychological Medicine, University of Otago Medical School and Otago Hospital Board, 1973–1975. Otago Postgraduate Medical Fellow, 1976. Fulbright-Hays Research Scholar and Post-doctoral Fellow in Psychiatry, University of Missouri, Columbia, USA, 1977. Senior Lecturer, Department of Psychological Medicine, Dunedin School of Medicine, University of Otago, New Zealand, and Consultant Psychiatrist for the Otago District Health Board, 1978–2004.

Co-editor 1994–1998, Managing Editor 1999–2007 of *Fluoride Quarterly Journal* of the International Society for Fluoride Research. Dr Spittle has published several articles on the effects of fluoride on health and was a peer reviewer for the 2000 University of York systematic review, *A systematic review of water fluoridation*. His work is referred to in both the York review and the 2006 NRC report, *Fluoride in Drinking Water: a scientific review of EPA's standards*. He received a distinction award in 2000 at the XXIIIrd conference of the International Society for Fluoride Research in Szczecin, Poland, for service to the Society

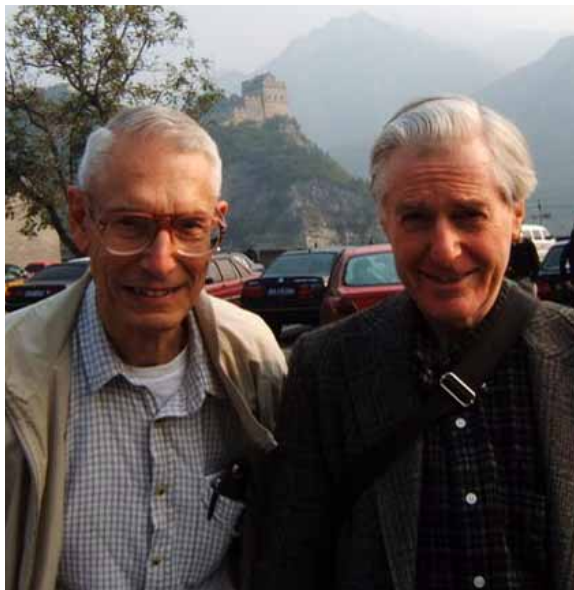


Figure 63. Professor Emeritus Albert W Burgstahler (left) and the author (right) at the Badaling section of the Great Wall of China prior to their attending the XXVIIth conference of the International Society for Fluoride Research, Beijing, China, 9–12 October 2007.

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FLUORIDE FATIGUE outlines the chronic fatigue, not relieved by extra sleep, and other various ill effects experienced by many when they drink fluoridated water. The book notes how to test if fluoride is causing these symptoms and, if it is, how they may often be cured.

“This book describes undeniable medical ill effects from fluoride added to drinking water. ... Those who deny reality and persist in discounting sensitivity to fluoride in drinking water are like ostriches with their heads in the sand. They would do well to heed what Dr Spittle has reported here and stop continuing to promote and be misled by scientifically indefensible claims that do not hold up under scrutiny.”

Albert W Burgstahler, PhD (Harvard, 1953)
Professor Emeritus of Chemistry
The University of Kansas, USA.
Editor, *Fluoride* (www.fluorideresearch.org)

“I am delighted with this book which very capably addresses a burning health problem in many developed and developing countries that is afflicting millions of men, women, and children. ... I sincerely hope that, besides the general public, policy makers and health officials, in the interest of the nation and the people they are sworn to serve, will learn from reading this book to recognize and desist from the “madness” being exercised by “fluoridation of drinking water.”

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