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Response to a list of *"50 Reasons to Oppose Fluoridation"* compiled by Dr Connett*

Responses by TW Cutress

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* from www.fluoridalert.org/50

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Response to a list of *50 Reasons to Oppose Fluoridation*, compiled by Dr Connett*

Responses by TW Cutress

Section 1: General Comments

This report offers comments on the listed *'50 Reasons to Oppose Fluoridation'* by Dr Connett. The 50 reasons are put forward by Dr Connett as a "thorough review of the scientific literature as regards both the risks and benefits of being exposed to the fluoride ion". However, the listing is not a review, but a selection of published findings that question or use data to cast doubt on the value and safety of fluoridation. No balance of evidence for- and against- fluoridation is provided, as might be expected in a review.

The reasons listed are clearly selected to represent fluoride and fluoridation as: non-effective in reducing tooth decay, an imposed medication, a toxic substance, or a source of other toxic substances. A wide variety of adverse human health effects are attributed by Dr Connett to supplementation of drinking water with fluoride. Mostly these reasons contradict the existing consensus of scientific, medical and epidemiological evidence upheld by independent, multidisciplinary scientific reviews. Recent examples of such reviews are the National Health and Medical Research Council Review (NHMRC 1999), the York Report (2000), the World Health Organization Report (WHO 2002) and the Medical Research Council Report (MRC 2002).

The list of reasons and other material supporting claims made by Drs Connett and Godfrey opposing water fluoridation are contentious. Some stated reasons (e.g. 1, 4, 8, 6 and 50) are statements or comments without scientific content.

* from www.fluoridalert.or/50

I note that some of the reasons (i.e. 1, 8, 46, 48, 49 and 50) are not actually reasons but personal subjective viewpoints, some of which lack literal or factual substance. Many of the references are from doubtful publications (e.g. 10% are published in the journal *Fluoride* which specialises in anti-fluoride articles). Also, Dr Connett lists as reasons his submissions to various government and scientific agencies, although no information is provided on the responses from the agencies. I offer two examples of Dr Connett's and Dr Godfrey's selective use of information to promote their viewpoint on fluoridation. On one hand, Dr Connett applauds the York Report (2000) for its criticism of fluoride epidemiology over the past 40 years on the grounds of inadequate methodology. On the other hand, he completely ignores the conclusions of the York Report (2000), (also the NHMRC review (1999), the MRC (2002) and WHO (2002) reports) that there is no convincing evidence of adverse human health outcomes from water fluoridation, apart from dental fluorosis. In addition, both Drs Connett and Godfrey claim that the reagents used for fluoridation are impure toxic wastes from the aluminium and fertilizer industries, despite the high level of quality control and monitoring demanded by agencies involved in reagent manufacture and processing of water (Cutress 2004). These claims are made despite the fact that relevant information on water processing and its purity is readily available to the general public.

Section 2: Approach to this Response

For conciseness, this response to *50 Reasons to Oppose Fluoridation* is organised under titles with common themes:

- Fluoride and caries
- Fluorosis
- Fluoride and adverse health effects
- Fluoride and contaminants
- Ethical issues
- 'Other'

Reasons that do not relate to any common theme are discussed under 'other'. Some reasons were discussed in a detailed response (Cutress 2004) to claims made previously by Dr Godfrey.

This response relies heavily on four comprehensive reviews of fluoride and human health: the Australian NHMRC reports (1999), the York report (2000), the WHO review (2002) and the MRC report (2002). A major WHO report (2003) on diet, nutrition and prevention of human diseases also includes significant comment on the role of fluoride in the prevention of tooth decay. These major reviews take different approaches towards assessing the voluminous data on fluoride. For example, the York Report (2000) is a systematic, purist and methodological approach, whereas the NHMRC review (1999) offers a more conservative and traditional review. Both these reviews assessed and graded the quality of studies included in their respective reports.

Section 3: Specific Responses

Fluoride and dental caries

Reasons 2–7, 11, 36, 37, 39 and 40

Reason 2. Fluoridation is not necessary. Most Western European countries are not fluoridated and have experienced the same decline in dental decay as the US (see data from World Health Organization in Appendix 1, the 'Reasons' given by countries for not fluoridating are presented in Appendix 2).

Reason 3. Fluoridation's role in the decline of tooth decay is in serious doubt. The largest survey ever conducted in the US (over 39,000 children from 84 communities) by the National Institute of Dental Research showed little difference in tooth decay among children in fluoridated and non-fluoridated communities (Hileman 1989). According to NIDR researchers, the study found an average difference of only 0.6 DMFS (decayed missing and filled surfaces) in the permanent teeth of children aged 5–17 residing in either fluoridated or non-fluoridated areas (Brunelle and Carlos 1990). This difference is less than one tooth surface! There are 128 tooth surfaces in a child's mouth. This result was not shown to be statistically significant. In a review commissioned by the Ontario government, Dr David Locker concluded: "The magnitude of [fluoridation's] effect is not large in absolute terms, is often not statistically significant and may not be of clinical significance" (Locker 1999). Where fluoridation has been discontinued in communities from Canada, the former East Germany, Cuba and Finland, dental decay has not increased but has actually decreased (Maupome 2001; Kunzel and Fischer, 1997, 2000; Kunzel 2000 and Seppa 2000).

Reason 4. Where fluoridation has been discontinued in communities from Canada, the former East Germany, Cuba and Finland, dental decay has not increased but has actually decreased (Maupome 2001; Kunzel and Fischer, 1997, 2000; Kunzel 2000 and, Seppa 2000)

Reason 5. There have been numerous recent reports of dental crises in US cities (e.g. Boston, Cincinnati, New York City) which have been fluoridated for over 20 years. There appears to be a far greater (inverse) relationship between tooth decay and income level than with water fluoride levels.

Reason 6. Modern research (e.g. Diesendorf 1986; Colquhoun 1997, and De Liefde, 1998) shows that decay rates were coming down before fluoridation was introduced and have continued to decline even after its benefits would have been maximized. Many other factors influence tooth decay. Some recent studies have found that tooth decay actually increases as the fluoride concentration in the water increases (Olsson 1979; Retief 1979; Mann 1987, 1990; Steelink 1992; Teotia 1994; Grobleri 2001; Awadia 2002 and Ekanayake 2002).

Reason 7. The Centers for Disease Control and Prevention (CDC 1999, 2001) has now acknowledged the findings of many leading dental researchers, that the mechanism of fluoride's benefits is mainly TOPICAL not SYSTEMIC. Thus, you don't have to swallow fluoride to protect teeth. As the benefits of fluoride (if any exist) are topical, and the risks are systemic, it makes more sense, for those who want to take the risks, to deliver the fluoride directly to the tooth in the form of toothpaste. Since swallowing fluoride is unnecessary, there is no reason to force people (against their will) to drink fluoride in their water supply. This position was recently shared by Dr Douglas Carnall, the associate editor of the *British Medical Journal*. His [Carnall] editorial appears in Appendix.

Reason 11. The level of fluoride put into water (1 ppm) is up to 200 times higher than normally found in mothers' milk (0.005–0.01 ppm) (Ekstrand 1981; Institute of Medicine 1997). There are no benefits, only risks, for infants ingesting this heightened level of fluoride at such an early age (this is an age where susceptibility to environmental toxins is particularly high).

Reason 36. Since dental decay is most concentrated in poor communities, we should be spending our efforts trying to increase the access to dental care for poor families. The real "oral health crisis" that exists today in the United States, is not a lack of fluoride but poverty and lack of dental insurance. The Surgeon General has estimated that 80% of dentists in the US do not treat children on MedicAid.

Reason 37. Fluoridation has been found to be ineffective at preventing one of the most serious oral health problems facing poor children, namely, baby bottle tooth decay, otherwise known as early childhood caries (Barnes 1992 and Shiboski 2003).

Reason 39. The US Public Health Service first endorsed fluoridation in 1950, before one single trial had been completed (McClure 1970)!

Reason 40. Since 1950, it has been found that fluorides do little to prevent pit and fissure tooth decay, a fact that even the dental community has acknowledged (Seholle 1984; Gray 1987; PHS 1993; and Pinkham 1999). This is significant because pit and fissure tooth decay represents up to 85% of the tooth decay experienced by children today (Seholle 1984 and Gray 1987).

Response to reasons 2–7, 11, 36, 37, 39 and 40

Reasons 2–4. The major reviews of fluoride and associated health issues referred to in this report are the Australian NHMRC Review (1999), the York Report (2000), the WHO Report (2002) and the MRC Review (2002). They adequately deal with these claims.

The York Report (2000) identified 254 studies (from a total of 735 studies) from 30 countries between 1939–2000 that met its criteria on caries or fluorosis. These studies found no adverse effects that related to water fluoridation. Evidence from 26 studies on the incidence of dental caries found water fluoridation reduces the number of decayed, missing and filled teeth (DMFT) and numbers of caries-free teeth – although the magnitude of reduction between population groups varied widely. Evidence from 22 studies on change in the prevalence and incidence of caries following cessation of water fluoridation, suggested that tooth decay levels do increase, but the increase reported varies widely between studies. The NHMRC (1999) review found 45 studies of caries incidence that met their selection criteria – mostly from the USA, Australia, South Africa and the UK. The review concluded that fluoridation continued to provide significant benefits albeit of decreasing magnitude compared with communities with non-fluoridated water. Where fluoridation of the water had stopped, an increase in caries was generally evident.

Reason 5, 6. It is unclear what Dr Connett means by dental crises. Presumably the inverse relationship between tooth decay and income levels and, the modern research of Diesendorf 1986; Colquhoun 1997, and De Liefde, 1998? It is difficult to understand why these are defined as crises. While accepting the claim that "many other factors influence tooth decay", Dr Connett fails to recognise that these confounding factors are modifying the fundamental dietary etiology of tooth decay. Many third and fourth world communities are unaffected by tooth decay because of low or no dietary risk. The data and evaluations used by Diesendorf 1986; Colquhoun 1997; and De Liefde 1998, in attributing causes other than fluoridation to explain decreasing decay levels did not pass statistical scrutiny and do not satisfactorily contradict better quality databases (NHMRC 1999).

Reason 7. 'Topical' rather than a 'systemic' is now the favoured hypothesis for the mechanism of action of fluoride in reducing risk of tooth decay. Water fluoridation has the potential to offer both topical and systematic cover and is the most cost-effective pubic health option for distributing the dental benefits of fluoride, irrespective of mechanism, even for small communities (Burt 1978, Wright et al 2001). The benefits are in terms of numbers of people protected, at a lower cost and across a wider socioeconomic band.

Reason 11. The available evidence (see major reviews, NHMRC 1999; York Report 2000; WHO Report 2002; and the MRC Review 2002) does not support the claim of a

greater health risk for infants ingesting fluoridated water or fluoride supplements at the recommended levels. The comparison of fluoride levels in breast milk with optimal fluoride levels in water appears to be irrelevant. Recent major reviews conclude that ingestion of fluoride at low levels poses no health risks other than dental fluorosis. Claims that the etiology of tooth decay is a consequence of lack of dental care, poverty, and lack of dental insurance are clearly incorrect. Individuals from privileged backgrounds, on regular subsidised (financially) dental care, but exposed to high-risk diets are susceptible to tooth decay – if not protected by fluoride. Tooth decay is dependent on diet (Rugg-Gunn 1993; WHO 2003), which in turn, is influenced by socioeconomic factors. Attempts to control caries by improving dental resources for care, and increasing insurance cover are an 'ambulance at the foot of the cliff" approach to care. For communities, prevention not treatment of dental disease overshadows the impact of individual treatment programmes – it also provides for the disadvantaged (no dentist, no insurance or social welfare finance). At present, fluoridation fulfils that role. Dental treatment and health insurance are associated with inequalities in health care, whereas fluoridation reduces inequalities (Pine 1997).

Reason 36. Dr Connett again lays blame for tooth decay on lack of dental treatment and poverty. This is contrary to the basic philosophy of public health that prevention not treatment is the mainstay of public health principles. The emphasis of fluoridation is directed towards preventing disease rather than facing the consequences of not preventing it (i.e. need for treatment). Fluoridation crosses the boundaries of socioeconomic variables. Providing wholesale treatment to cope with socioeconomic inequalities is more difficult, more costly. A treated tooth is a lifetime risk.

Reason 39. This is not a convincing reason to oppose fluoridation. At that time the decision was based on considerable epidemiological data comparing prevalence of tooth decay and fluoride occurring naturally in drinking waters in communities throughout the USA. In addition there was a wealth of animal and other laboratory investigations. The fluoridation of the city of Grand Rapids water supply 60 years ago was effectively the field trial.

Reason 40. From the earliest epidemiological studies, it was evident that fluoridated water conferred the greatest protection on the smooth surfaces of teeth and least on surfaces with morphological pits and fissures (Ripa L et al 1988). Pit and fissure decay becomes proportionally (c.f. smooth surfaces) the more dominant decay type as decay levels decrease (Burt B 1994; Kaste et al 1996). Cessation of fluoridation generates a situation where smooth surface decay becomes more prevalent (NHMRC 1999).

Fluorosis – dental and skeletal

Reasons 9, 10 and 23

Reason 9. The US fluoridation program has massively failed to achieve one of its key objectives, i.e. to lower dental decay rates while holding down dental fluorosis (mottled and discoloured enamel), a condition known to be caused by fluoride. The goal of the early promoters of fluoridation was to limit dental fluorosis (in its mildest form) to 10% of children (NRC 1993, pp. 6–7). A major US survey has found 30% of children in optimally fluoridated areas had dental fluorosis on at least two teeth (Heller 1997), while smaller studies have found up to 80% of children impacted (Williams 1990; Lalumandier 1995; and Morgan 1998). The York Review estimates that up to 48% of children in optimally fluoridated areas worldwide have dental fluorosis in all forms and 12.5% with symptoms of aesthetic concern (McDonagh 2000).

Reason 10. Dental fluorosis means that a child has been overdosed on fluoride. While the mechanism by which the enamel is damaged is not definitively known, it appears fluorosis may be a result of either inhibited enzymes in the growing teeth (Dan Besten 1999), or through fluoride's interference with G-protein signalling mechanisms (Matsuo 1996). In a study in Mexico, Alarcon-Herrera (2001) has shown a linear correlation between the severity of dental fluorosis and the frequency of bone fractures in children.

Reason 23. Some of the early symptoms of skeletal fluorosis, a fluoride-induced bone and joint disease that impacts millions of people in India, China, and Africa, mimic the symptoms of arthritis (Singh 1963; Franke 1975; Teotia 1976; Carnow 1981; Czerwinski 1988; DHHS 1991). According to a review on fluoridation by *Chemical & Engineering News*, "Because some of the clinical symptoms mimic arthritis, the first two clinical phases of skeletal fluorosis could be easily misdiagnosed" (Hileman 1988). Few if any studies have been done to determine the extent of this misdiagnosis, and whether the high prevalence of arthritis in America (one in three Americans have some form of arthritis – CDC 2002) is related to our growing fluoride exposure, which is highly plausible. The causes of most forms of arthritis (e.g. osteoarthritis) are unknown.

Response to reasons 9, 10 and 23

Reasons 9 and 10 have been reviewed in detail (NHMRC 1999; York Report 2000; WHO Report 2002; and, the MRC Review 2002). The association between ingestion of low levels of fluoride and a potential for dental fluorosis has been well known for more than 70 years. Children in fluoridated communities show a 15–30% prevalence of dental fluorosis of a few teeth – mostly of the very mild to questionable category by the Deans Index. No other adverse health effects have been confirmed. It is misleading to suggest (Reason 23) that skeletal fluorosis also occurs from exposure to low levels (< 5 ppm) of fluoride in water. Skeletal effects are a consequence of long-term exposure to high levels of fluoride in water (> 8 ppm). These levels are usually found in environmental waters with naturally occurring high fluoride levels, volcanic areas or where coal with high fluoride content is burnt (WHO 2002).

Likewise, the claim that fluoride initiates arthritis and osteoarthritis has no significant scientific support. Indeed, the recent reviews by NHMRC (1999), York (2000), MRC (2002) and WHO (2002) dismissed such claims.

Fluoride and adverse health effects

Reasons 13–22, 24–28 and 34–35

Reason 13. Fluoride is very biologically active even at low concentrations. It interferes with hydrogen bonding (Emsley 1981) and inhibits numerous enzymes (Waldbott 1978).

Reason 14. When complexed with aluminium, fluoride interferes with G-proteins (Bigay, 1985, 1987). Such interactions give aluminum-fluoride complexes the potential to interfere with many hormonal and some neurochemical signals (Strunecka and Patocka 1999, Li 2003).

Reason 15. Fluoride has been shown to be mutagenic, cause chromosome damage and interfere with the enzymes involved with DNA repair in a variety of cell and tissue studies (Tsutsui 1984; Caspary 1987; Kishi 1993; and Mihashi 1996). Recent studies have also found a correlation between fluoride exposure and chromosome damage in humans (Sheth 1994; Wu 1995; Meng 1997; and Joseph 2000).

Reason 16. Fluoride forms complexes with a large number of metal ions, which include metals which are needed in the body (like calcium and magnesium) and metals (like lead and aluminium) which are toxic to the body. This can cause a variety of problems. For example, fluoride interferes with enzymes where magnesium is an important co-factor, and it can help facilitate the uptake of aluminium and lead into tissues where these metals wouldn't otherwise go (Mahaffey 1976; Allain 1996; Varner 1998).

Reason 17. Rats fed for one year with 1 ppm fluoride in their water, using either sodium fluoride or aluminium fluoride, had morphological changes to their kidneys and brains, an increased uptake of aluminium in the brain, and the formation of beta amyloid deposits which are characteristic of Alzheimer's disease (Varner 1998).

Reason 18. Aluminum fluoride was recently nominated by the Environmental Protection Agency and National Institute of Environmental Health Sciences for testing by the National Toxicology Program. According to EPA and NIEHS, aluminium fluoride currently has a "high health research priority" due to its "known neurotoxicity" (BNA 2000). If fluoride is added to water which contains aluminium, then aluminium fluoride complexes will form.

Reason 19. Animal experiments show that fluoride accumulates in the brain and exposure alters mental behaviour in a manner consistent with a neurotoxic agent (Mullenix 1995). Rats dosed prenatally demonstrated hyperactive behaviour. Those dosed postnatally demonstrated hypoactivity (i.e. under activity or "couch potato" syndrome). More recent animal experiments have reported that fluoride can damage the brain (Wang 1997; Guan 1998; Varner 1998; Zhao 1998; Zhang 1999; Lu 2000; Shao 2000; Sun 2000; Bhatnagar 2002; Chen 2002, 2003; Long 2002; Shivarajashankara 2002a, b; Shashi 2003 and Zhai 2003) and impact learning and behaviour (Paul 1998; Zhang 1999, 2001; Sun 2000; Ekambaram 2001; Bhatnagar 2002).

Reason 20. Five studies from China show a lowering of IQ in children associated with fluoride exposure (Lin Fa-Fu 1991; Li 1995; Zhao 1996; Lu 2000; and Xiang 2003a, b). One of these studies (Lin Fa-Fu 1991) indicates that even just moderate levels of fluoride exposure (e.g. 0.9 ppm in the water) can exacerbate the neurological defects of iodine deficiency.

Reason 21. Studies by Jennifer Luke (2001) showed that fluoride accumulates in the human pineal gland to very high levels. In her PhD thesis Luke has also shown in animal studies that fluoride reduces melatonin production and leads to an earlier onset of puberty (Luke 1997).

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; Waldbott 1978). 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) 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 Joyet 1958). 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, which is a hormone replacement drug used to treat an under active thyroid). In Russia, Bachinskii (1985) found a lowering of thyroid function, among otherwise healthy people, at 2–3 ppm fluoride in water.

Reason 24. In some studies, when high doses of fluoride (average 26 mg per day) were used in trials to treat patients with osteoporosis in an effort to harden their bones and reduce fracture rates, it actually led to a HIGHER number of fractures, particularly hip fractures (Inkovaara 1975; Gerster 1983; Dambacher 1986; O'Duffy 1986; Hedlund 1989; Bayley 1990; Gutteridge 1990. 2002; Orcel 1990; Riggs 1990 and Schnitzler 1990). The cumulative doses used in these trials are exceeded by the lifetime cumulative doses being experienced by many people living in fluoridated communities.

Reason 25. Nineteen studies (three unpublished, including one abstract) since 1990 have examined the possible relationship of fluoride in water and hip fracture among the elderly. Eleven of these studies found an association, eight did not. One study found a dose-related increase in hip fracture as the concentration of fluoride rose from 1 ppm to 8 ppm (Li 2001). Hip fracture is a very serious issue for the elderly, as a quarter of those who have a hip fracture die within a year of the operation, while 50 percent never regain an independent existence (all 19 of these studies are referenced as a group in the reference section).

Reason 26. The only government-sanctioned animal study to investigate if fluoride causes cancer, found a dose-dependent increase in cancer in the target organ (bone) of the fluoride-treated (male) rats (NTP 1990). The initial review of this study also reported an increase in liver and oral cancers; however, all non-bone cancers were later downgraded – with a questionable rationale – by a government-review panel (Marcus 1990). In light of the importance of this study, EPA Professional Headquarters Union has requested that Congress establish an independent review to examine the study's results (Hirzy 2000).

Reason 27. A review of national cancer data in the US by the National Cancer Institute (NCI) revealed a significantly higher rate of bone cancer in young men in fluoridated versus non-fluoridated areas (Hoover 1991). While the NCI concluded that fluoridation was not the cause, no explanation was provided to explain the higher rates in the fluoridated areas. A smaller study from New Jersey (Cohn 1992) found bone cancer rates to be up to 6 times higher in young men living in fluoridated- versus non- fluoridated areas. Other epidemiological studies have failed to find this relationship (Mahoney 1991; Freni 1992).

Reason 28. Fluoride administered to animals at high doses wreaks havoc on the male reproductive system – it damages sperm and increases the rate of infertility in a number of different species (Kour 1980; Chinoy 1989; Chinoy 1991; Susheela 1991; Chinoy 1994; Kumar 1994; Narayana 1994a, b; Zhao 1995; Elbetieha 2000; Ghosh 2002 and Zakrzewska 2002). While studies conducted at the FDA have failed to find reproductive effects in rats (Sprando 1996, 1997, 1998), an epidemiological study from the US has found increased rates of infertility among couples living in areas with 3 ppm or more fluoride in the water (Freni 1994), and two studies have found a reduced level of circulating testosterone in males living in high fluoride areas (Susheela 1996 and Barot 1998: 33) Some individuals appear to be highly sensitive to fluoride as shown by case studies and double blind studies (Shea 1967, Waldbott 1978 and Moolenburg 1987). In one study, which lasted 13 years, Feltman and Kosel (1961) showed that about 1% of patients given 1 mg of fluoride each day developed negative reactions. Can we as a society force these people to ingest fluoride?

Reason 34. According to the Agency for Toxic Substances and Disease Registry (ATSDR 1993), and other researchers (Juncos and Donadio 1972; Marier and Rose 1977; and Johnson 1979), certain subsets of the population may be particularly vulnerable to fluoride's toxic effects; these include: the elderly, diabetics and people with poor kidney function. Again, can we in good conscience force these people to ingest fluoride on a daily basis for their entire lives?

Reason 35. Also vulnerable are those who suffer from malnutrition (e.g. calcium, magnesium, vitamin C, vitamin D and iodide deficiencies and protein poor diets) (Massler and Schour 1952; Marier and Rose 1977; Lin Fa-Fu 1991; Chen 1997; Teotia 1998). Those most likely to suffer from poor nutrition are the poor, who are precisely the people being targeted by new fluoridation programmes. While being at heightened risk, poor families are less able to afford avoidance measures (e.g. bottled water or removal equipment).

Response to reasons 13–22, 24–28 and, 34–35

These reasons claim that many diverse disease and health conditions have a common aetiology linked to supplementation of water with low concentrations of fluoride. Connett's *50 Reasons to Oppose Fluoridation* include claims that the following adverse effects on animal and human health are linked to fluoride ingestion:

- cell mutation in insects, cell culture and animals
- decreased fertility in animals and humans
- interference with enzyme function, hormones and neurochemicals
- 'couch potato' syndrome (hypoactivity)
- Alzheimer's disease
- onset of early puberty and reduced intelligence quotient
- cause of fatigue, weight gain, muscle and joint pain, heart diseases
- cause of hip fractures
- cause of cancer
- causes adverse health effects of the elderly, diabetics, in those with kidney dysfunction, the malnourished and low socioeconomic families.

None of the above conditions can be explained by a fluoride aetiology, according to recent major reviews, NHMRC (1999), WHO (2002), York (2000) and MRC (2002). The WHO report (2002) concludes "all organisms are exposed to fluoride. Epidemiological studies show no reasonable evidence of adverse effects of controlled fluoridation on morbidity, mortality, cancer, bone fractures or genotoxic effects. Neither was there evidence that consumption of drinking water was associated with mutagenicity, systemic effects on respiratory, haemopoietic, hepatic or renal systems, nor reproductive or developmental organs".

The York Report (2000) states "insufficient evidence is available to reach a conclusion that bone fractures, cancer, or other adverse health conditions were associated with fluoride in water".

The NHMRC report (1999) states “the purpose of this review instigated in 2002 was to consider the conclusions and recommendations of the York Report (2000) and conclude on what further research was required on fluoride and health. Their conclusions were that ‘there is insufficient evidence to establish a link between fluoridated drinking water and health, apart from a decreased risk of dental caries and increase in dental fluorosis. No increased risk was identified for bone or other cancers, hip fracture, osteoporosis, kidneys, or immune systems’”.

The MRC (2002) report concludes “no links were evident to support claims of adverse health outcomes (non-dental) from fluoridation, such as bone fractures, cancer, immune system defects, reproductive, kidney, gastrointestinal tract and developmental defects. Also discounted were effects resulting from chemicals used in fluoridation”. No particular urgency for further studies on adverse health effects was recommended. The only additional recommended research was into the trends in fluoride exposure in relation to dental fluorosis and other similar looking tooth defects.

Ethics

Reasons 31 and 32

Reason 31. Fluoridation is unethical because individuals are not being asked for their informed consent prior to medication. This is standard practice for all medication, and one of the key ‘reasons’ why most of western Europe has ruled against fluoridation (see appendix 2). As one doctor aptly stated, “no physician in his right senses would prescribe for a person he has never met, whose medical history he does not know, a substance which is intended to create bodily change, with the advice: ‘take as much as you like, but you will take it for the rest of your life because some children suffer from tooth decay.’ It is a preposterous notion”.

Reason 32. While referenda are preferential to imposed policies from central government, it still leaves the problem of individual rights versus majority rule. Put another way – does a voter have the right to require that their neighbour ingest a certain medication (even if it’s against that neighbour’s will)? The recent Nobel Laureate in Medicine and Physiology, Dr Arvid Carlsson (2000), was one of the leading opponents of fluoridation in Sweden, and part of the panel that recommended that the Swedish government reject the practice, which they did in 1971. According to Carlsson: “I am quite convinced that water fluoridation, in the not-too-distant future, will be consigned to medical history. Water fluoridation goes against leading principles of pharmacotherapy, which is progressing from a stereotyped medication – of the type 1 tablet three times a day – to a much more individualized therapy as regards both dosage and selection of drugs. The addition of drugs to the drinking water means exactly the opposite of an individualized therapy” (Carlsson 1978).

Response to reasons 31 and 32

The ethical debates on fluoridation appear non-resolvable. Fluoride is a natural component of the diet. Its wide natural distribution in foods and water belies the confused debate on ethical acceptance of controlled fluoridation. The WHO report (2002) states that:

- "fluoride is ubiquitous in the environment"
- "virtually all foodstuffs contain at least some trace of fluoride. Elevated levels are present in fish. Tea leaves are particularly rich in fluoride"
- "the concentration of fluoride in food products is not significantly increased by use of super phosphate fertilizers (which contain 1–3% fluoride)"
- "irrigation using fluoridated water does not accumulate in foodstuffs".

There is a major confounding factor of the ethical debates. Adjusting rather than introducing a new dietary component is the issue that is omitted from the ethical comments in the paper *50 Reasons to Oppose Fluoridation*. Is naturally occurring fluoride in water ethically acceptable, but adjustment of the same element in water unacceptable?

Fluoride contaminants

Reasons 42–45

Reason 42. The chemicals used to fluoridate water in the US are not pharmaceutical grade. Instead, they come from the wet scrubbing systems of the super phosphate fertilizer industry. These chemicals (90% of which are sodium fluorosilicate and fluorosilicic acid), are classified hazardous wastes contaminated with various impurities. Recent testing by the National Sanitation Foundation suggest that the levels of arsenic in these chemicals are relatively high (up to 1.6 ppb after dilution into public water) and of potential concern (NSF 2000 and Wang 2000).

Reason 43. These hazardous wastes have not been tested comprehensively. The chemical usually tested in animal studies is pharmaceutical grade sodium fluoride, not industrial grade fluorosilicic acid. The assumption being made is that by the time this waste product has been diluted, all the fluorosilicic acid will have been converted into free fluoride ion, and the other toxics and radioactive isotopes will be so dilute that they will not cause any harm, even with lifetime exposure. These assumptions have not been examined carefully by scientists, independent of the fluoridation programme.

Reason 44. Studies by Masters and Coplan (1999, 2000) show an association between the use of fluorosilicic acid (and its sodium salt) to fluoridate water and an increased uptake of lead into children's blood. Because of lead's acknowledged ability to damage the child's developing brain, this is a very serious finding yet it is being largely ignored by fluoridating countries.

Reason 45. Sodium fluoride is an extremely toxic substance just 200 mg of fluoride ion is enough to kill a young child, and just 3–5 grams (e.g. a teaspoon) is enough to kill an adult. Both children (swallowing tablets/gels) and adults (accidents involving fluoridation equipment and filters on dialysis machines have died from excess exposure.

Response to reasons 42–45

Reasons 42–45 were thoroughly investigated and explained previously in a letter to Dr Godfrey (Cutress 2004). The evidence in the international peer-reviewed literature justifies the supplementation of drinking water with fluoride and silico-fluorides at low concentrations.

Theoretical and experimental data indicate that chemical dissociation of silico-fluorides is essentially complete at the low concentrations of the reagent in drinking water.

Levels of the elements As, Ni, Sb, Pb, Cd and Hg in drinking water from all sources are within internationally acceptable levels and pose no risk to human health. Manufactures and retailers of silico-fluoride reagents are required to certify the heavy metal content of their product, which is also subjected to independent analyses. Regular monitoring of processed potable drinking waters ensures that heavy metal contamination is well below public health limits. There is no evidence to justify claims that these heavy metals are carcinogenic individually or synergistically.

The carcinogenic potential of fluoride claimed by Dr Connett is without basis according to the conclusions of NHMRC 1999; WHO 2002; York Report 2000; and MRC 2002 reviews and reports. A recent major WHO report on diet, nutrition and disease (2003) recommends the use of fluorides and fluoridation to prevent tooth decay.

‘Other’ reasons

Reasons 1,8,12, 29, 30, 38, 41, 46, 49 and 50

Reason 1. Fluoride is not an essential nutrient (NRC 1993 and IOM 1997). No disease has ever been linked to a fluoride deficiency. Humans can have perfectly good teeth without fluoride.

Response to reason 1

Advocacy for water fluoridation as a public health programme was never based on claims that it is an essential element in humans. Clearly, since the discovery of an epidemiological association between fluoride and lower caries susceptibility in the 1930s, the potential of fluoride as an ‘essential’ nutritional element was considered. Several studies specifically examined this possibility (Sharples, McCollum 1933). One major problem was the preparation of a fluoride-free diet because of the element’s ubiquitous presence in food. A compromise diet that was very low in fluoride was used in rat studies. These studies indicated that rats on the low fluoride diet were less healthy than experimental groups. Similar results were obtained with mice. Studies over several contiguous generations of mice on diets with minimal fluoride content showed evidence of severe anaemia and a decreased reproductive ability (Messer, Armstrong, Singer 1972). It was demonstrated in mice that fluoride satisfied the criteria as an essential element. However, water fluoridation is not advocated on the basis of fluoride being an essential element.

Dr Connett’s statement “humans can have perfectly good teeth without fluoride” is correct. Communities and individuals with low fluoride intakes, but no tooth decay have been frequently reported over many decades. Dietary factors explain the onset of tooth decay (Rugg Gunn 1993; WHO 2003). Adoption of diets high in refined carbohydrates (CHO) is consistent with a greater risk of dental caries. Fluoride lessens the adverse effect of such diets on teeth. The protection decreases as the exposure to CHO increases. Lower caries risk in communities is associated with dietary patterns involving lower use of refined CHO.

Reason 8. Despite being prescribed by doctors for over 50 years, the US Food and Drug Administration (FDA) have never approved any fluoride product designed for ingestion as safe or effective. Fluoride supplements are designed to deliver the same amount of fluoride as ingested daily from fluoridated water (Kelly 2000).

Response to reason 8

Dietary fluoride supplements in the USA are available only by prescription – implying FDA approval. FDA do not have jurisdiction over additives to drinking water in the USA. FDA approval for water fluoridation is unnecessary. The Safe Drinking Water Act of 1974 repealed the FDA's jurisdiction over drinking water. In 1979, the FDA and the Environmental Protection Agency (EPA) agreed, by a Memorandum of Understanding, to clarify their respective roles in relation to water quality to prevent overlapping of roles. The EPA now has exclusive regulatory authority over drinking water in the USA. The Centre for Disease Control (CDC) through its Department of Health and Human Resources actively supports a policy of water fluoridation.

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.

Response to reason 12

Fluoride is not continuously cumulative in the body tissues – see recent comprehensive reviews (NHMRC, 1999; York Report, 2000; MRC, 2002; WHO, 2002). Approximately 99% of body fluoride is stored in the mineralised tissues (bones and teeth). However, these mineralised 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.]

Reason 29. The fluoridation programme has been very poorly monitored. There has never been a comprehensive analysis of the fluoride levels in the bones, blood, or urine of the American people or the citizens of other fluoridated countries. Based on the sparse data that has become available, however, it is increasingly evident that some people in the population – particularly people with kidney disease – are accumulating fluoride levels that have been associated with harm to both animals and humans, particularly harm to bone.

Response to reason 29

On the contrary, there is an abundance of information on the content of fluoride in the body and its distribution among body tissues. Fluoride is not a major health matter and to propose the collection of even more international data seems unnecessary. The claim about kidney damage is without evidence. None of the in-depth reviews (NHMRC 1999; York Report 2000; MRC 2002; WHO 2002) identified any evidence of fluoride as a risk factor in kidney disease.

Reason 30. Once fluoride is put in 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 and 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 and Heilman 1999), fluoridated dental products (Bentley 1999 and Levy 1999), mechanically deboned meat (Fein 2001), teas (Levy1999), and pesticide residues on food (Stannard 1991 and Burgstahler 1997).

Response to reason 30

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.

Reason 38. The early studies conducted in 1945–1955 in the US, which helped to launch fluoridation, have been heavily criticized for their poor methodology and poor choice of control communities (De Stefano 1954; Sutton 1959, 1960 and 1996; Ziegelbecker 1970). According to Dr Hubert Arnold, a statistician from the University of California at Davis, the early fluoridation trials "are especially rich in fallacies, improper design, and invalid use of statistical methods, omissions of contrary data, and just plain muddle headedness and hebetude". In 2000, the British Government's "York Review" could give no fluoridation trial a grade A classification – despite 50 years of research (McDonough 2000, see Appendix 3 for commentary).

Response to reason 38

The York Report (2000) found that fluoride was associated with a reduction in dental caries, this was based on the 200 studies which passed its strict acceptance criteria. This report concluded that there were no correlations between adverse health effects and fluoride in relation to risk of hip fracture, cancer, bones, kidneys and other soft tissues. Only the positive correlation between fluoride in water and dental fluorosis is highlighted in the listed *50 Reasons to Oppose Fluoridation*.

Reason 41. Despite the fact that we are exposed to far more fluoride today than we were in 1945 (when fluoridation began), the "optimal" fluoridation level is still one part per million, the same level deemed optimal in 1945! (Mariner and Rose 1977; Levy 1999; Rosier 1999 and Foment 2000).

Response to reason 41

Many community water fluoridation schemes have in fact reduced their recommended fluoride concentrations as a consequence of the decreasing prevalence of caries and the potential for an increase in fluorosis.

Reason 46. Some of the earliest opponents of fluoridation were biochemists and at least 14 Nobel Prize winners are among numerous scientists who have expressed their reservations about the practice of fluoridation (see appendix 4).

Response to reason 46

Since 1960, there have been 177 Nobel Prize winners in chemistry and medicine. Therefore, only 8% of these prize winners opposed or had reservations about fluoridation. Dr Connett does not differentiate between the number of the 14 who had reservations and those who were opposed. The only correct inference from the data from the Nobel Prize winners is that many of them supported fluoridation or had no firm viewpoint.

Reason 48. While pro-fluoridation officials continue to promote fluoridation with undiminished fervour, they cannot defend the practice in open public debate – even when challenged to do so by organizations such as the Association for Science in the Public Interest, the American College of Toxicology, or the US Environmental Protection Agency (Bryson 2004). According to Dr Michael Easley, a prominent lobbyist for fluoridation in the US, "debates give the illusion that a scientific controversy exists when no credible people support the fluorophobics' view" (see appendix 5). In light of proponents' refusal to debate this issue, Dr Edward Groth, a senior scientist at Consumers Union, observed that "the political pro-fluoridation stance has evolved into a dogmatic, authoritarian, essentially antiscientific posture, one that discourages open debate of scientific issues" (Martin 1991).

Reason 49. Many scientists, doctors and dentists who have spoken out publicly on this issue have been subjected to censorship and intimidation (Martin 1991). Most recently, Dr Phyllis Mullenix was fired from her position as Chair of Toxicology at Forsythe Dental Center for publishing her findings on fluoride and the brain; and Dr William Marcus was fired from the EPA for questioning the government's handling of the NTP's fluoride-cancer study (Bryson 2004). Tactics like this would not be necessary if those promoting fluoridation were on secure scientific ground.

Response to reasons 48 and 49

The four main reviews used in this response (NHMRC 1999; York Report 2000; MRC 2002; WHO 2002) are based on the consensus of a wide range of scientists and health professionals. With the exception of a link between dental fluorosis and fluoride intake, all other claims of adverse health effects were considered as without substantiated scientific basis. Claims that the opinions of some individuals with contrary viewpoints on fluoridation have been 'suppressed' appear contrary to the majority of scientific and health evidence accumulated over 70 years. Their viewpoints have been widely reported in different public news media and on internet websites. Overall these views have not been widely favoured.

Reason 50. The Union representing the scientists at US EPA headquarters in Washington DC is now on record as opposing water fluoridation (Hirzy 1999), according to the Union's Senior Vice President, Dr William Hirzy.

Response to reason 50

Dr Connett provides no information on the numbers of EPA scientists who identify adverse health outcomes due to fluoride use for prevention of tooth decay.

Section 4: References

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Overview of the Four Main References Used in this Report

The conclusions of these reports represent a consensus of 52 members [no dissenters were listed] representing a broad range of multi-disciplinary scientists in the basic science and health fields. The WHO report was additionally scrutinised by 35 independent reviewers, across 17 countries. Their conclusions were based on the assessment of approximately 970 scientific and medical publications (each review overlapped in relation to the reference material used).

Details of report review teams

- WHO report: 20 members and secretariat advisers from 14 countries. Reviewed by 35 independent reviewers from 17 countries; 400 publications reviewed.
- NHMRC review: 6 members; 150 publications reviewed.
- York Report: 10 members; 270 publications reviewed.
- MRC UK review: 16 members; 150 publications reviewed

The York Report reviewed 88 international studies. These were all graded of low epidemiological value. The data were considered to be unreliable because of the lack of controlled clinical assessments and no comprehensive statistical analyses. The review recognised the inherent problem of clinical assessments, variability and in methodologies.

The review reconfirmed the positive dose-response relationship between fluoride levels in water and the resulting magnitude of dental fluorosis. The prevalence and severity of fluorosis in studies of communities exposed to 1 ppm fluoride varied greatly between studies. A very rough estimate was that the proposed prevalence of fluorosis was 44% and the severity of aesthetic concern about 12.5%. These estimates appear higher than the 25–30% commonly accepted for 1 ppm water.

The NHMRC review also found the prevalence of dental fluorosis to be similar to the York Report (studies assessed overlapped). The diagnosis of fluorosis was found to vary widely between examiners and examination conditions and most fluorosis was mild. Increasing fluorosis over the past 20 years was considered a possibility with evidence of increased dental fluorosis in communities exposed to a combination of optimally fluoridated drinking water (0.6–1.1 ppm) and discretionary sources of fluoride. The reviewers considered that there was a need for continued monitoring of the situation to avoid excessive intake of fluoride.