ALLIANCE FOR NATURAL HEALTH SUBMISSION
TO CONSULTATION ON WHO GUIDELINES TO DRINKING-WATER QUALITY
"**Chemical safety of drinking-water: assessing priorities for risk management"**

30 November 2004

The following submission is made by the Alliance for Natural Health, with regard to the WHO's consultation on 'Chemical Safety of Drinking Water' (http://www.who.int/water_sanitation_health/dwq/cmp/en/).

The Alliance for Natural Health is a pan-European and international alliance of scientists, health care practitioners, natural health care companies and consumers working cooperatively to protect the long-term interests of natural healthcare.

The following comments are made in response to specific questions posed by the consultation.

1. **Does this text respond to an issue of concern?**

   Yes. Particularly in relation to the discrete role of contaminants or nutrients and the need to separate dosage ranges for such physiologically distinct effects.

2. **Does this text compete with or complement other publications in the area ? If so, which?**
   Yes. Notably the WHO/FAO nutrient risk assessment project (http://www.who.int/ipcs/highlights/nutrientraproject/en/) and the Water Sanitation & Health expert group (http://www.who.int/water_sanitation_health/dwq/nutconsensus/en/).

3. **Is the level of guidance and information provided inappropriate?**
   Yes. The guidance for fluoride does not consider adequately risk factors associated with total dietary intake, long-term exposure, artificial fluoridation, fluoride exposure from dental care products and differences in population group susceptibility, effects of mixtures of contaminants, among other factors.

4. **Is there superfluous information that could be omitted?**
   No.

5. **Are there major omissions that should be corrected?**
   Yes (see Sections 6.1, 6.2, 6.3 and 7).

6. **Are there errors of fact or interpretation that should be corrected ? If so, what?**

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6.1 *WHO risk assessment of fluorides*

The consultation document clearly recognises the potential for fluorides in drinking waters to cause harm,[1,3] and recognises that such fluorides in water may arise naturally or may be added in water treatment processes[2]. Based on the appreciation of the potential for fluorides to cause adverse health effects, fluoride has been considered an "Essential Priority Chemical" by the WHO.[3]

The document states that, "Widespread dental mottling is a health indicator that water contains high concentrations of fluoride"[4], and there is extensive evidence that such enamel opacities may occur at levels substantially beneath 1.0 mgF/l, the level considered by authorities in countries such as the UK, Ireland and the USA as appropriate for artificial fluoridation of the water supply.

The WHO guideline for fluoride is given as 1.5 mg/l,[2] suggesting incorrectly that levels beneath this are acceptable and safe.

6.2 *Categorization of distinct health impacts of fluorides*

Very clear distinctions should be made between:

a) the dose range of fluorides that may be beneficial to health;
b) those dosages of specific forms of fluoride that might give rise to adverse health effects in different population groups;
c) those dosages that have been shown to reduce the prevalence of dental caries, and;
d) the effects of mixtures of contaminants, such as fluorides, aluminium,[5] lead, arsenic, cadmium, etc.

No such distinctions have been made in the rolling revision, and it is of paramount importance that these are made and that the independence of these four discrete health impacts is appreciated in the risk assessment.

Accordingly, although there is some evidence that levels of fluoride (added or naturally-occurring) > 0.7 mgF/l in drinking water may reduce significantly the incidence of dental caries,[6] the health impact of such levels of fluoride in water needs to be considered independently.

[1] *Rolling Revision of the WHO Guidelines to Drinking Water Quality*, WHO, July 2004, Section 2.4.1, p. 16.
[2] *Rolling Revision of the WHO Guidelines to Drinking Water Quality*, WHO, July 2004, Appendix 1, p. 70.
[3] *Rolling Revision of the WHO Guidelines to Drinking Water Quality*, WHO, July 2004, Figure 1.1., p. 11.
[4] *Rolling Revision of the WHO Guidelines to Drinking Water Quality*, WHO, July 2004, Appendix 4, p. 99.
[5] Flaten TP. Aluminium as a risk factor in Alzheimer's disease, with emphasis on drinking water. *Brain Research Bulletin*, 2001; 55 (2): 187-196.
[6] Murray JJ. Efficacy of preventive agents for dental caries. Systemic fluorides: water fluoridation. *Caries Res.* 1993;27 Suppl 1: 2-8.

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Furthermore, there is evidence that some of the studies supporting dental health benefits of artificial fluoridation are flawed,[7] and that reductions in dental caries in some countries are independent of both fluoridation of water supplies and inclusion of fluoride in toothpastes (Figure 1).

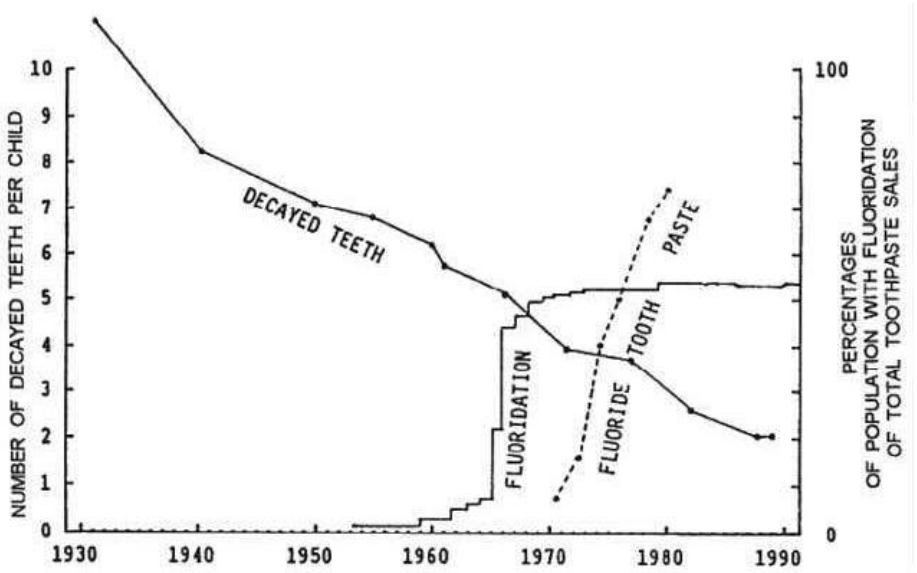

Figure 1. 50-year decline in tooth decay in 5-year-olds. Compiled from New Zealand Health Department records of 5-year-old's tooth decay, 1930-1990 (Source: Colquhoun, J [8], © 1997 University of Chigago Press)

There is also strong evidence that fluoride bioavailability varies according to different forms of fluoride present in drinking waters[9] and will vary according to the presence of associated salts, such as calcium[10] and magnesium.[11]

In the view of the Alliance for Natural Health, the principle of using fluoride (whether of natural origin or by addition in water treatment) as a medicinal method of reducing dental caries cannot be justified given the difficulty of controlling dosage and the risk of causing unwarranted side effects. In addition, such medicinal use has not been formally approved by the majority of regulatory authorities using standard market authorisation protocols.

[7] Connett, P. *The fluoridation of drinking water: a house of cards waiting to fall. Part 1: The science.* Waste Not #373, November 1993; Canton, NY: Work on Waste, USA.
[8] Colquhoun J. Why I changed my mind about water fluoridation. *Perspect Biol Med.* 1997; 41(1): 29-44.
[9] Gitomer WL, Sakhaee K, Pak CYC. A comparison of fluoride bioavailability from a sustained-release NaF preparation (Neosten) and other fluoride preparations. *Journal of Clinical Pharmacology,* 2000; 40 (2): 138-141.
[10] Tenuta A, Alvarenga RCC. Reduction of the bioavailability of fluoride from Antarctic krill by calcium. *International Journal of Food Sciences and Nutrition*, 1999; 50 (4): 297-302.
[11] Heard K, Hill RE, Cairns CB, Dart RC. Calcium neutralizes fluoride bioavailability in a lethal model of fluoride poisoning. *Journal of Toxicology - Clinical Toxicology*, 2001: 39 (4): 349-353.

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Given concerns over potential adverse health effects of fluorides, artificial water fluoridation or fluoride medication, as in other forms of medication, should be a healthcare *option*, rather than being made compulsory. Such an approach would not only be more scientifically rational as dosages can then be controlled, if required, via oral administration, it also takes into account the freedom of choice of individuals.

6.3 *Concerns over WHO guideline for fluoride*

The WHO has set the guideline for fluoride at 1.5 mgF/l, when the level known to induce dental fluorosis may be significantly less than this. Levels of 0.7 mgF/l in drinking water are associated with significant incidence of dental fluorosis.[12,13,14]

A recent study in Ethopia demonstrates that moderate levels of fluoride (0.3 – 2.2 mg/l) in drinking water caused a rate of 91.8% dental fluorosis in children, [15] while a Chinese study warned that levels of fluoride over 0.7 mg/l should not be allowed given the high rates of fluorosis that result.[14]

There is a very large body of published research demonstrating the correlation between increased rates of dental fluorosis and fluoride concentration, although comparisons between studies are often difficult or even invalid owing to differences in methodologies used, especially with regard to measurements of dental fluorosis.

Additionally, in different parts of the world, different risk factors interact in different ways to give rise to different impacts. Variations result according to the population group exposed, the form of fluoride present, the presence of other minerals (e.g. Ca, Mg) which impact bioavailability, diet (especially sugar consumption), volume of food and water/beverage consumption, use of fluoride-containing oral care products, oral hygiene, use of fluoride supplements, etc.

The psycho-social impact of dental fluorosis must also be considered in any risk assessment.[16,17,18]

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[12] Bottenberg P, Declerck D, Ghidey W, Bogaerts K, Vanobbergen J, Martens L. Prevalence and determinants of enamel fluorosis in Flemish schoolchildren. *Caries Res*. 2004; 38(1): 20-8.
[13] Ekanayake L, van der Hoek W. Prevalence and distribution of enamel defects and dental caries in a region with different concentrations of fluoride in drinking water in Sri Lanka. *Int Dent J.* 2003; 53(4): 243-8.
[14] Yang J, Long Y, Shen Y. The optimal concentration of drinking water in eastern Guangdong. *Hua Xi Kou Qiang Yi Xue Za Zhi*. 2001; 19(1): 38-40.
[15] Wondwossen F, Astrom AN, Bjorvatn K, Bardsen A. The relationship between dental caries and dental fluorosis in areas with moderate- and high-fluoride drinking water in Ethiopia. *Community Dent Oral Epidemiol.* 2004;32 (5): 337-44.
[16] McKnight CB, Levy SM, Cooper SE, Jakobsen JR. A pilot study of esthetic perceptions of dental fluorosis vs. selected other dental conditions. *ASDC J Dent Child* 1998; 65(4): 233-8, 229.
[17] Griffin SO, Beltran ED, Lockwood SA, Barker LK. Esthetically objectionable fluorosis attributable to water fluoridation. *Community Dent Oral Epidemiol* 2002; 30(3): 199-20.
[18] Clark DC, Hann HJ, Williamson MF, Berkowitz J. Aesthetic concerns of children and parents in relation to different classifications of the Tooth Surface Index of Fluorosis. *Community Dent Oral Epidemiol.* 1994; 22(6): 461-4.

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Furthermore, few studies attempt to explore the relationship between dosages that result in dental fluorosis and potentially even more serious health impacts. There is evidence that fluoride dosages present in drinking water may lead to skeletal demineralisation and bone fractures,[19] and a range of neurotoxic effects, which may include a predisposition to Alzheimer's Disease.[20]

To conclude, therefore, the Alliance for Natural Health considers a guideline level of naturally-occurring fluoride in excess of 0.7 mgF/l cannot be justified on the basis of existing scientific evidence which should take into account total fluoride intake, not solely fluoride intake from drinking-water, as well as particular forms of fluoride present (and consequent bioavailability, assessed following determination of serum F levels).

Furthermore, on the basis of available evidence, the Alliance for Natural Health is strongly opposed to artificial fluoridation of drinking water supplies, pending comprehensive toxicological testing and approval of the artificial fluorides involved.

7. Overall Conclusions

In undertaking the risk assessment of nutrients and contaminants in drinking water, the Alliance for Natural Health considers it essential that the WHO assesses the nutrient role of fluoride *independently* of the effects associated with a reduction in incidence of dental caries.

The risk assessment should be conducted taking into account total fluoride intake, not only fluoride intake from drinking-water and should also consider differences in bioavailability relating to different forms of fluoride as well as in relation to the presence of other ions (e.g. Ca, Mg) known to impact fluoride bioavailability.

In terms of the risk assessment, there is likely to be no safety margin between those dosages that result in purported dental caries benefits and those that are toxic to at least some sectors of the population. In contrast, according to available evidence, there is an overlap in dosages that give rise to harmful and beneficial effects (pertaining to dental caries incidence).

Finally, the Alliance for Natural Health urges the WHO to both consider revising its existing guideline level of 1.5 mgF/l to 0.7 mgF/l and promoting strategies other than artificial fluoridation of water supplies for the reduction of dental caries pending toxicological evidence of the long-term safety of water fluoridation programmes as well as formal medicinal approval of artificial fluorides.

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[19] Alarcon-Herrera MT, Martin-Dominguez IR, Trejo-Vazquez R, Rodriguez-Dozal S Well water fluoride, dental fluorosis, and bone fractures in the Guadiana Valley of Mexico. *Fluoride*, 2001; 34 (2): 139-149.
[20] Strunecka A, Patocka J. Aluminofluoride complexes in the etiology of Alzheimer's disease. *Group 13 Chemistry II Structure and Bonding*, 2002;104: 139-180.

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