

## BACK TO BACK

# New Zealand drinking water should be fluoridated

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## YES

Of course New Zealand's drinking water should be fluoridated. Community water fluoridation (CWF) in New Zealand involves adjusting the fluoride concentration from about 0.2–0.3 parts per million (ppm) to 0.7–1.0 ppm (that's about one fluoride ion among one million water molecules). Let's consider the context for using CWF:

1. Tooth decay is a modern-day scourge, affecting New Zealanders in all age groups;
2. CWF is effective; and
3. CWF is a safe public health intervention.

### Tooth decay is a modern-day scourge

More and more New Zealand adults are keeping their teeth. Rates of complete tooth loss (edentulism) in NZ adults—especially before CWF was introduced—were once the highest in the world. The ongoing fall in edentulism is encouraging, but the greater tooth retention means that the risk of tooth decay is now greater than ever before. Decay-associated tooth loss (one at a time) remains very common among adults with their own teeth.<sup>1</sup> Tooth decay is the most common chronic disease in the world, having marked ef-

fects on sufferers' day-to-day lives. It continues through life, with about one newly affected tooth surface per year in the average person.<sup>2</sup> In other words, anyone with teeth (whether child or adult) is at risk of the disease.

There are two important life stages where tooth decay susceptibility is even greater. The first of these is early childhood, where the baby teeth are particularly susceptible to decay-causing environments and behaviours, to the point where more than 5000 New Zealand children per year have to undergo dental treatment under general anaesthesia because they have too much decay. Maori children and poor children are over-represented among those treated in this way. The second one is old age, where the decay rate over time among older people residing in nursing homes is more than double that seen among those in their own homes; among those with dementia, it is twice as high again.<sup>3</sup> The latter observation suddenly takes on much more importance when we consider that New Zealand lacks a systematic approach to meeting the day-to-day oral care needs of people in rest homes.

### Community water fluoridation is effective

Community water fluoridation is not a 'magic bullet'; it will not eliminate tooth decay, but it

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While evidence can help inform best practice, it needs to be placed in context. There may be no evidence available or applicable for a specific patient with his or her own set of conditions, capabilities, beliefs, expectations and social circumstances. There are areas of uncertainty, ethics and aspects of care for which there is no one right answer. General practice is an art as well as a science. Quality of care also lies with the nature of the clinical relationship, with communication and with truly informed decision-making. The **BACK TO BACK** section stimulates debate, with two professionals presenting their opposing views regarding a clinical, ethical or political issue.

will reduce it. How? Tooth decay begins as very small 'etchings' of the dental enamel; these occur as dietary sugars are fermented (turned into weak acids) by bacteria within the plaque biofilm which forms on the tooth surface. Once those sugars have been used up, that demineralisation can be counterbalanced with subsequent remineralisation by calcium and phosphate ions from the saliva, slowly replacing the minerals which were lost. There is a continual cycling between demineralisation and remineralisation; the longer spent in the former, the greater the chance of a cavity. If fluoride is present, it not only enters the enamel, making it more resistant to acid attack, but it also inhibits demineralisation and the plaque bacteria. Fluoride works by being present at low levels in the oral fluids, rather than through being incorporated into the developing enamel (as previously assumed).

New Zealand evidence of fluoridation's effectiveness has come from a number of studies that have shown that not only is decay experience lower among children living with CWF, but socioeconomic inequalities in dental health are also lower.<sup>4</sup> Health service data complement these population-level data by drawing our attention to the 'tail' of the disease distribution: in a decade-long case series of child referrals for treatment under general anaesthesia in Otago, those referred had fewer cavities if they came from a fluoridated area. Those from non-fluoridated areas were 2.4 months younger (on average) and had more decayed teeth.<sup>5</sup> These findings underline CWF's continued importance for decreasing early childhood tooth decay across the disease distribution.

Where adults are concerned, a recent meta-analysis found that, overall, CWF was associated with 27% less caries experience among adults.<sup>6</sup> The most recent New Zealand national oral health survey was conducted in 2009, and showed that lifetime decay experience was higher among adults in areas without CWF.<sup>1</sup>

### **Community water fluoridation is a safe public health intervention**

Scaremongering about CWF's safety has been around for decades. Those opposed to CWF

tend to downplay or trivialise positive findings, to misinterpret epidemiological data, and to discredit scientists and the various health bodies which support CWF.<sup>7</sup> In New Zealand, the decision to fluoridate water rests with territorial local authorities rather than public health officials, adding another entry point for misinformation and direct political pressure on vulnerable local politicians.

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The New Zealand Ministry of Health's ongoing monitoring of research on the safety of CWF has found no credible or consistent evidence to support withdrawing CWF. The relevance to CWF of a recent review purporting to show that fluoride exposure reduces IQ<sup>8</sup> has yet to be demonstrated. The only consistently observed CWF side effect is that diffuse opacities of enamel are more common (33% versus 20%), but new longitudinal research shows that those fade over time (through ongoing remineralisation by saliva) and are less apparent by late adolescence.<sup>9</sup> The trade-off between tooth decay (which does not fade) and the minimal aesthetic impact of diffuse opacities (which do) is a worthwhile one.

Those who are opposed to CWF assert that we do not need it: people can take fluoride tablets, brush with fluoride toothpaste and use mouth rinses if they want to use fluoride to prevent decay. That's all very well for the 'worried well' in the middle classes (who tend to have more positive self-care and health behaviours anyway), but it is neither feasible nor humane to leave the rest of the population to it. For example, only 59% of adults in the most deprived 20% of neighbourhoods brush their teeth twice daily with fluoride toothpaste.<sup>1</sup> There is, therefore, a role for the State in preventing tooth decay in the New Zealand population: CWF remains the most efficient, effective and rational way to do it.

## References

1. Ministry of Health. Our oral health. Key findings of the 2009 New Zealand Oral Health Survey. Wellington: Ministry of Health; 2010.
2. Broadbent JM, Thomson WM, Poulton R. Trajectory patterns of dental caries experience in the permanent dentition to the fourth decade of life. *J Dent Res*. 2008;87:69–72.
3. Chalmers JM, Carter KD, Spencer AJ. Caries incidence and increments in community-living older adults with and without dementia. *Gerodontology*. 2002;19:80–94.
4. Schluter PJ, Kanagaratnam S, Durward CS, Mahood R. Prevalence of enamel defects and dental caries among 9-year-old Auckland children. *N Z Dent J*. 2008;104:145–152.
5. Kamel MS, Thomson WM, Drummond BK. Fluoridation and dental caries severity in young children treated under general anaesthesia: an analysis of treatment records in a 10-year case series. *Community Dent Health*. 2013;30:15–18.
6. Griffin SO, Regnier E, Griffin PM, Huntley V. Effectiveness of fluoride in preventing caries in adults. *J Dent Res*. 2007;86:410–415.
7. Armfield JM. When public action undermines public health: a critical examination of antifluoridationist literature. *Aust N Z Health Policy*. 2007;4:25.
8. Choi AL, Sun G, Zhang Y, Grandjean P. Developmental fluoride neurotoxicity: a systematic review and meta-analysis. *Environ Health Perspect*. 2012;120:1362–1368.
9. Do L, Spencer AJ. Natural history of dental fluorosis in a longitudinal cohort study. Conference presentation. International Association for Dental Research, 91<sup>st</sup> General Session, Seattle, USA. March 2013.

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# NO

The primary concerns with fluoridation are medical. It is therefore inappropriate that dentists continue to dominate this debate. This article primarily addresses some adverse medical effects from fluoridation. For the most comprehensive discussion of fluoridation to date, the reader is referred to: *The Case against Fluoride*.<sup>1</sup>

Fluorine is a common, inherently toxic element. Fluorine naturally presents as calcium fluoride in water supplies. Water fluoridation systems use either hydrofluorosilicic acid or derivative sodium hexafluorosilicate. These compounds have never been tested for human health safety.

Silicofluorides do not fully dissociate to form free fluoride ions in aqueous solution and revert to the silicofluoride ion in acid stomach conditions. The World Health Organization<sup>2</sup> states that 40% of ingested fluoride is absorbed through the stomach wall as molecular hydrofluoric acid (a known mutagen). This negates the ‘all fluoride ions are the same’ deception.

Tooth decay has decreased in all OECD communities, mostly unfluoridated, to essentially the same level since fluoridation was implemented, for a number of reasons. These include improved refrigeration, increased consumption of cheese, increased antibiotic use, increased socioeconomic status, and increased awareness of oral health. But the biggest reason in NZ is that the Ministry of Health directed school dental nurses to stop filling teeth unnecessarily. They stopped filling tiny surface enamel defects during the Hastings experiment, producing an overnight 25% reduction in ‘decay’, attributed to fluoridation in the report.<sup>3</sup> In 1976, they stopped drilling and filling perfectly healthy molars—a 64% reduction over five years.<sup>4</sup>

### The origins of fluoridation theory

The original belief was that fluoride had to be ingested to harden teeth during enamel formation. This was discredited in 1999.<sup>5</sup> Any significant effect from fluoride is topical, not systemic, through high fluoride concentrations (such as toothpaste), not through fluoridated water washing over the teeth during the day. The Centers for Disease Control and Prevention (CDC) acknowledges there is no evidence that fluoroapatite, while phys-

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