Nau mai haere mai,

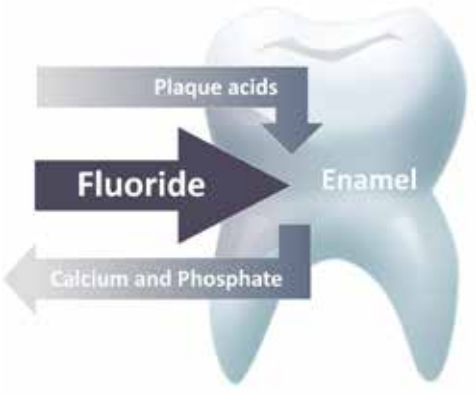
Welcome to the seventh issue of our NFIS e-newsletter 'On Tap'. There continues to be robust debate about the ongoing value of community water fluoridation. The Hamilton City Council decision to cease its community water fluoridation (CWF) programme on 6 June has been topical and included commentary from the Prime Ministers Chief Scientific Advisor, and the Minister of Health. Many of these statements can be found on our website under the CWF Activity Hub tab.

Much of the ongoing media discussion included the usual issues raised: suggested adverse health effects, lack of personal choice and the right of councils to fluoridate. While we can't comment on the last two values based issues we can comment on the first one. Our ongoing review of the scientific literature, both from New Zealand and overseas, has failed to turn up evidence to substantiate these claims. On 25 July we put out a media release to encourage people to go onto our website and read the full literature reviews. We know that in our busy lives it is very difficult to carve out the time to read anything more than the first page and the key findings. But we do strongly encourage you, especially if you live in one of the areas going to referendum on CWF in October (Whakatane, Hamilton and Hastings) to read these documents and get a good understanding of what the science is actually saying, what is being reinforced by further research and what further research is not being able to replicate.

FLUORIDE IN THE MOUTH

The main effect of fluoride for preventing dental decay occurs after teeth have erupted through the gums. It is important that the methods used to supply fluoride to the teeth are able to keep it around the teeth for as long as possible. Fluoridated water and fluoride toothpaste have been shown to be the most effective ways to do this. In this article we describe how fluoride helps to stop the dental decay process and discuss the way these two methods keep fluoride on the teeth during the breaks between when we are drinking water or brushing our teeth.

Tooth enamel softening and hardening



Tooth enamel is the hard outer surface of the tooth, made up of minerals, in particular calcium and phosphate. Dental biofilm is the wet environment around the teeth which bacteria use to attach to the tooth enamel. When a person eats or drinks foods and beverages containing sugar[1], the sugar reacts with the bacteria in the biofilm and creates acidity causing a drop in the pH[2]. The acids cause demineralisation (a loss of minerals such as calcium and phosphate) of the tooth enamel, making it more porous, and softer (therefore dissolving the enamel), and more prone to decay. When a person stops eating or drinking items containing sugar, the pH returns to normal and the mineral loss can be recovered by the enamel, making it harder again – this is called remineralisation.

How fluoride helps control dental decay

There is general agreement that the main effect of fluoride is in the way it helps to stop dental decay. Fluoride must be present in the right place (in the biofilm), and at the right time (when sugars react with bacteria, creating an acid environment) to limit demineralisation and encourage remineralisation. When fluoride is present in the biofilm, and the pH lowers to a certain level and the acidity increases, another mineral called fluorapatite is formed. Some of the calcium and phosphate that was lost is recovered as fluorapatite, reducing the demineralisation of the enamel.

Remineralisation occurs when the exposure of the teeth to sugar stops, the acids are cleared by saliva, the acidity lowers and the pH increases. The biofilm is filled with enamel hardening minerals when the pH rises to a certain level. The presence of fluoride in the biofilm pushes the calcium and

1. The term 'sugars' covers a range of simple and complex carbohydrates and fruit sugars – fructrose.
2. pH is a measure of the acidity or basicity of a substance dissolved in water. Solutions with a pH less than 7 are said to be acidic and solutions with a pH greater than 7 are basic or alkaline. Pure water has a pH very close to 7.

CONTINUES ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

phosphate back into the enamel again. The aim is to keep a constant low level of fluoride in the biofilm and this can be done by drinking fluoridated water which supplies fluoride to the saliva, and by using fluoride toothpaste.

Drinking fluoridated water

When either optimally[3] fluoridated water is drunk or food prepared with it is eaten, a temporary increase in salivary fluoride levels occurs. Absorbed fluoride is then taken up by the bone and returned to the blood. Increased blood concentration of fluoride is kept constant in the short term by both daily intake of fluoride and exchange with fluoride in the bone. With regular intake of fluoride, there is a higher level of fluoride in the saliva, following the higher levels in the blood. There is no mechanism in the body to keep the blood fluoride level at a steady state over a long period of time, so fluoride in the saliva is dependent upon fluoride intake. When the external supply of fluoride is interrupted, the concentration in the blood and then the saliva decreases. The higher fluoride concentration in the saliva needed for tooth protection cannot be sustained without further intake.

Brushing with fluoridated toothpaste

The amount of fluoride in saliva also increases every time teeth are brushed with fluoridated toothpaste but the levels return to normal after about two hours. However, during tooth brushing fluoride is spread throughout the mouth and stored in places such as the biofilm and the enamel surface. Therefore, although salivary fluoride levels drop, some fluoride remains present to slow the dental decay process as described above.

To summarise, fluoride needs to be in the saliva and the dental biofilm to help stop dental decay. Both the drinking of fluoridated water and/or using fluoride toothpaste work in similar ways to achieve this, with the only difference being the way fluoride is kept in the mouth. When drinking fluoridated water or brushing teeth with fluoridated toothpaste is stopped, the protective effect of fluoride is lost after a few days. Therefore it will be not be available to influence the softening and hardening of the tooth enamel (demineralisation and remineralisation) and dental decay happens faster.

The broad reach of community water fluoridation

From the perspective of looking at health for the whole community, community water fluoridation programmes provide the opportunity to reduce dental decay for those of us who do not or are not able to brush their teeth on a regular basis without support. Although ideally we brush our teeth twice a day everyday, in reality this doesn't always happen. The New Zealand Oral Health Survey (2009) found that only two in three adults and only 43% of 2-17 year olds brushed their teeth twice daily with fluoride toothpaste. Community water fluoridation provides added protection for our teeth for the times we forget to brush, or are not able to brush at all.

References

Angeles Martinez-Mier, E. (2011). Fluoride: Its Metabolism, Toxicity, and Role in Dental Health. Journal of Evidence-Based Complementary & Alternative Medicine 2012. 17:28.

Cury, J.A. and Tenuta, L.M.A. (2008). How to Maintain a Cariostatic Fluoride Concentration in the Oral Environment. Advances in Dental Research. 20:13

Ministry of Health (2010) Our Oral Health: Key findings of the 2009 New Zealand Oral Health Survey. Wellington: Ministry of Health

3. In New Zealand, fluoride in a concentration between 0.7–1.0 milligrams per litre (mg/L) is considered the optimal level that provides protection against tooth decay.

Waimarama

Kia ora e hoa ma,

Many of our readers will be aware that the South Taranaki District Council's decision to extend community water fluoridation to Patea and Waverley has been challenged in the High Court by way of judicial review. The proceedings are being brought by an organisation called New Health New Zealand Incorporated, who argue that community water fluoridation is a breach of Section 11 of the Bill of Rights Act 1990. Section 11 is the right to refuse medical treatment. New Health argues that community water fluoridation is medical treatment and that people cannot refuse that treatment if it is added to public water supplies.

The case is the first test of the legality of community water fluoridation under the New Zealand Bill of Rights Act 1990 and the outcome is likely to be of interest to all local authorities who currently have community water fluoridation programmes.

As an added element to the case, the Attorney-General has joined the case. The Attorney-General has successfully applied to the High Court to be heard on the Bill or Rights issue because he considers the case to be of national importance.

While NFIS is a science information service and does not have legal experts and can provide no advice on this case, we are highlighting it as we feel the case will be of great interest to our readers. Here is a summary of what has been said in the media about the case.

Abridged from Stuff.co.nz 'Taranaki fluoride ruling ends up in court' 30 April 2013

The application has been made to the High Court at New Plymouth, but a date for a hearing is yet to be set down.

New Health New Zealand Inc. Director David Sloan said they were focusing on South Taranaki because it was adding fluoride to a previously untreated supply [untreated with fluoride though treated as per the New Zealand Drinking Water Standards].

Council chief executive Craig Stevenson has said the legal action could be an opportunity to get a definitive ruling on the practice "once and for all" because the plaintiffs are asking for a ruling on the legal right for a council to add fluoride to water supplies. "In addition they are invoking the New Zealand Bill of Rights Act, which deals with the right to refuse to undergo medical treatment." Mr Stevenson said the council will defend its decision but is seeking financial assistance from central government.

"Unfortunately, when you go to the High Court, you get no change from $100,000 but costs could easily be as high as $200,000. "We don't think it is fair that our ratepayers should foot the bill for a judicial review which challenges all councils' legal rights to make such a decision.

Abridged from: The New Zealand Herald 'Court battle for council could re-open nation's vexed fluoride-in-water debate' March 31 2013

Local government elections loom in October and several councils are considering whether to continue fluoridating their water.

Whakatane and Hastings will hold referendums with their elections. Hamilton City Council is revisiting the issue, despite spending $100,000 on a binding referendum five years ago. That referendum reported 70 per cent support for fluoridation, but the 30 per cent who opposed it have dug in their heels. Their 177 post-referendum submissions have forced a tribunal hearing.

CONTINUES ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

Further north, the Thames-Coromandel District Council recently voted to retain fluoride in water.

However, the community board has been researching the possibility of allowing residents to "opt out" of fluoride. This would involve installing $800 water tanks, at the ratepayer's expense, for each family that does not want fluoridated water.

The question of whether to fluoridate public water supplies, seemingly settled by science and the demands of health in the 1980s, is once more an open question.

The society says it seeks to protect the "best interests and health freedoms of consumers". Director David Sloan argues everyone has the right to refuse to undergo medical treatment under the New Zealand Bill of Rights Act. He also argues councils have not had the authority to fluoridate water supplies since the Local Government Act 2002 was enacted.

The implications for communities which have lost/could loose community water fluoridation include:

- An increased importance of twice daily brushing with fluoridated toothpaste.
- Increased application of fluoride varnishes and gels.
- Some level of protection will be provided by food and beverages produced in areas with community water fluoridation consumed in areas without it.
- Increased pressure for Oral Health Promoters and Dental Therapists to provide brushes and toothpaste for those of us who can't regularly afford toothpaste and toothbrushes (yes there are quite a lot of us in this situation).
- Increased requests to General Practitioners and pharmacies for fluoride supplements.
- Increased pressure on District Health Board Community Dental Departments to provide dental treatment to those who cannot afford private treatment.

We watch the outcome of the Judicial Review with interest.

Ngā mihi, Emmeline

Key findings

One of our roles is to provide up to date reviews on the research around community water fluoridation relevant to New Zealand. As the debate around community water fluoridation increases around New Zealand we would like to highlight the New Zealand fluoride context and some of our key findings from our 2010 to 2012 reviews.

The New Zealand context:

- Naturally-occurring fluoride concentrations in the water supplies are low – generally around 0.2mg/L.
- The maximum acceptable value for fluoride in drinking water is 1.5mg/L, this is based on the WHO guideline designed to prevent any known negative health effects i.e. dental or skeletal fluorosis.
- Up to date information about the continuing rates of tooth decay in New Zealand is shown in the 2009 NZ Oral Health Survey.
- The Oral Health Survey continues to show differences in decay rates between areas with and without community water fluoridation.
- The Oral Health Survey shows rates of dental fluorosis to be the same for areas with and without community water fluoridation and that these rates are not increasing.
- Toothpaste in New Zealand contains around 1000mg/kg, this is the same as other developed countries and is recommended for adults and children.

Key findings February to July 2012:

- In Brazil, lifetime exposure to community water fluoridation resulted in fewer hidden dental caries (ones visible only on x-ray) (Hashizume, Mathias, Ciblis and Maltiz, 2012).
- In Iowa, USA, three genes were found to influence risk of dental caries. This meant that some people in the study were more likely to have tooth decay than others (Wang et al, 2012).
- In North Carolina, USA, a school based mouth rinse programme did not significantly reduce the number of dental caries amongst school children (Divaris, Rosier and King, 2012).
- In the United Kingdom, fluoridated milk was found to help prevent tooth enamel from softening (Maliowski, Duggal, Stafford and Toumba, 2012).
- Also in Iowa, USA, it was found fluoride from food alone increased risk of dental fluorosis in some children (Rankin et al, 2012).
- In Australia, adding fluoride to water in towns where there were more than 1000 people cost less than treating the extra dental problems people had in areas where water was not fluoridated (Cobiac and Vos, 2012).

Key findings September 2011 to January 2012:

- In South Australia infant formula use was associated with a higher prevalence of fluorosis in non-fluoridated areas but not in fluoridated areas (Do, Levy and Spencer, 2011).
- Water fluoridation status in the continental Unites States of America has no influence on osteosarcoma incidence rates during childhood and adolescence (Levy and LeClerc, 2011).
- Two studies (in Alaska, USA and Northern Territory, Australia) showed that community water fluoridation is an effective tooth decay prevention measure in rural indigenous communities (Klejka et al 2011 and Slade et al 2011).
- Two studies (in Japan and Sweden) found that increased public knowledge and understanding of fluoride reduces public concern about community water fluoridation and improves oral health behaviours (Furukawa et al, 2011 and Jensen et al, 2011).
- A Japanese laboratory study found that fluoride intake from infant milk formulas depends on the fluoride concentration of added water (Nohno, Zohoori and Maguire, 2011).
- A study in Santiago, Chile found that after eight years of community water fluoridation the number of children with no history of tooth decay had increased by 100% and the number of cases with significant tooth decay had decreased (Yvenes et al, 2011).

You can find a complete list of reviewed papers up to the present time at www.nfis.org.nz. The key conclusion from all of these reviews is that no new evidence has emerged to suggest a change is warranted to the Ministry's current community water fluoridation policy.

CONSORTIUM PARTNER

Introducing

MICHAEL BEASLEY

Michael Beasley is a medical toxicologist working at the New Zealand National Poisons Centre, within the Department of Preventive and Social Medicine, at the University of Otago. He has had 25 years' experience in this role. He provides information and advice to governmental organisations, private companies, health professionals, and the general public on occupational and environmental toxicology issues, as well as advising on emergency matters related to acute drug overdose.

To assist with its functions, the Poisons Centre has developed and maintains a database on the toxicity and effects of a wide range of drugs, chemicals, toxic plants and animals; and patient treatment in the event of poisoning. A major component of Michael's work involves additions to and enhancement of this database. He has also worked as a consultant in toxicology to the Department of Labour and the Accident Compensation Corporation (ACC). These roles have included participation in chemical toxicity panels, convened to assess the causal role of chemical exposures in specific cases of illness.

Michael's role in NFIS is to review very recent or newly published research on the toxicology of fluoride and to undertake other specific projects from time to time. These have included a review of the US EPA guideline value for fluoride in drinking water, and review of the studies of fluoride exposure and children's IQ.

WHAT'S NEW @ NFIS.ORG.NZ

CWF Activity Hub

We have a 'new look' CWF Activity Hub!

Check out the contents page and navigate our pages. You will find a selection of media articles, releases and responses, along with links to New Zealand and international evidence based organisations and documents. You will also find resources and powerpoint presentations developed by various DHBs that you can use or modify to best fit your community.

NFIS Documents

2013 Review of Scientific Papers February 2012 - July 2012 | A systematic review on new scientific papers relating to community water fluoridation in the New Zealand context published between February - July 2012

2013 Advisories

Neurological Development May 2013 | A review of recent literature on potential effects of CWF programmes on neurological development and IQ attainment

Cost Benefit of Community Water Fluoridation May 2013 | A review of the current cost benefit of community water fluoridation interventions

Community Water Fluoridation and Osteosarcoma May 2013 | Community Water Fluoridation and Osteosarcoma – Evidence from Cancer Registries

FAST FLUORIDE FACTS

Environmental Scan of Water Fluoridation Activity in New Zealand March 2012 – March 2013

A number of councils reviewed their stance on community water fluoridation (CWF) either as part of their annual or long term plan process, or through a separate consultation on the issue. Most councils retained their status-quo, whether that was fluoridated or un-fluoridated.

Central Hawkes Bay District Council decided to remove their CWF programme. While Waikato and South Taranaki District Councils decided to add CWF programmes.

Whakatane, Hastings and Hamilton Councils have decided to hold a referendum on CWF alongside the October 2013 local body elections.

South Taranaki District Council's decision to expand their CWF programme has been challenged with a judicial review.

Waikato District Council have successfully applied for funding through the Ministry of Health to help with CWF set-up costs. South Taranaki District Council is in the process of applying for set-up funding.

The March 2012 – March 2013 Environmental Scan is available on our website www.nfis.org.nz