FLUORIDE ON THE BRAIN | *RCR IN/FOCUS REPORT - January 2024*

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For the production of *Fluoride on the Brain*, we approached the New Zealand Dental Association, but unfortunately no one was able to be interviewed in time for our deadline. However, **Dr. Robin Whyman, the NZDA's Director of Dental Policy** has since provided written answers to our questions.

THE NEW ZEALAND DENTAL ASSOCIATION RESPONSE

RCR: What do you see in the dental surgeries of NZ? Can you paint a picture of NZ's general oral health?

DR. ROBIN WHYMAN: Oral health is quite diverse. Around 50% of young adults have good oral health with low levels of dental decay and few fillings in their teeth. They may need other oral health care such as removal of wisdom teeth or orthodontic care.

Among the other 50% of young adults there can be very high levels of dental decay requiring extensive dental treatment.

Among mid age and older adults we often see high levels of past dental care such as fillings, crowns and extractions, and new decay continues to occur. Older adults are at increased risk of an acceleration of new decay often associated with chronic health conditions and medications (such as antidepressants and some cardiac medications). Older adults are frequently taking a number of medications and the combined effects can sometimes create a dry mouth and be associated with increased dental decay.

In addition to dental decay there is ongoing risk of periodontal (gum) diseases, dental restorations (fillings and crowns) needing replacement and a risk of other oral conditions such as oral cancers.

RCR: Can you explain how dental caries are formed?

DR. ROBIN WHYMAN: Dental caries (or dental decay) is a disease process. In its early stages it involves an acidic environment causing loss of calcium and phosphate from the crystal structure of the dental enamel of teeth. This is called demineralisation and is a dynamic process. In a healthy state it is balanced by a process of remineralisation where the calcium and phosphate return to the dental enamel when the environment on the tooth surface is less acidic or neutral.

When there is an environment that is more acidic and promoting more demineralisation dental caries (dental decay) develops. If this goes on for long enough it moves from an early lesion where the surface is still intact and can be repaired by remineralisation, to one where the structure breaks down and a hole develops and grows.

RCR: In your understanding, how does fluoride work?

DR. ROBIN WHYMAN: Fluoride works on the surface of the teeth, especially on the dental enamel, by changing the balance between factors demineralising the tooth surfaces (taking out the calcium and phosphates from the dental enamel) and remineralisation.

Fluoride changes the balance and becomes incorporated in the dental enamel, building a small amount of fluoride into the enamel crystals of the dental enamel and making them more resistant to demineralisation. It also assists remineralisation of dental enamel that has been exposed to acids from the diet.

RCR: Can you talk about the difference between fluoride being used topically, and in our water supply?

DR. ROBIN WHYMAN: Fluoride from the water supply exposes teeth to a low level of fluoride on a frequent basis each day as people drink water and consume other food or drinks made from fluoridated water.

It is also absorbed once swallowed and increases the fluoride levels in saliva by a small amount, increasing the remineralising environment throughout the day.

Topical fluorides come in two main forms – toothpastes and professionally applied fluorides.

Fluoridated toothpaste is an important part of everybody's daily tooth care. and contains around 1000 to 1450ppm fluoride. When teeth are brushed the fluoride is brushed across the teeth and works as explained to encourage remineralisation and repair of the teeth.

The most common professionally applied topical fluoride is fluoride varnish. It also works topically. However, it contains very much higher levels of fluoride (approx. 22600ppm fluoride) and is designed to be used when a person has at risk areas of dental decay and to help rebuild the dental enamel. It doesn't provide the same day to day protection that fluoridated water and toothpastes can. In fact, fluoride varnish needs to be supported by regular use of fluoridated toothpastes and fluoridated water to be effective. Fluoride varnishes are only recommended for use in professional dental decay reduction programmes for at risk children, adolescents, and adults.

RCR: What are your views on its toxicity?

DR. ROBIN WHYMAN: Fluoride consumed in high doses over a very short period can create acute toxicity. This is a associated with a number of symptoms but particularly gastric issues such as nausea and vomiting.

However, this occurs at levels well above those from fluoridated water or from toothpastes used correctly.

Longer term or chronic exposure to high fluoride levels in early childhood while tooth development occurs can cause dental fluorosis. This is a tooth enamel defect characterised by opaque white areas in the enamel, caused by excess exposure to fluoride while the teeth are forming in the jaws and before they erupt into the mouth. Tooth development occurs during the first 8 years of life; beyond this age children are no longer susceptible to fluorosis.

The New Zealand Oral Health Survey in 2009 showed the overall level of moderate fluorosis to be very low, indicated that dental fluorosis prevalence is not increasing, and that levels of fluorosis are similar between fluoridated and non-fluoridated areas.

Fluoride as used in fluoridated water with a maximum acceptable value of 1.5mg/L (ppm) and recommended level of 0.7-1mg/L (ppm) is not toxic and in New Zealand it is not associated with increasing levels of dental fluorosis.

RCR: Can you comment on the NTP report and the evidence that opponents of fluoride cite of its toxicity?

DR. ROBIN WHYMAN: The National Toxicology Programme (NTP) report was a systematic review of the research on fluoride exposure and neurodevelopmental and cognitive effects in humans. It started in 2016. It has been subject to much ongoing debate and review, including issues of the accuracy and precision of the text. A draft report and meta-analysis of the data was accepted by a Board of Scientific Counselors of the National Toxicology Programme in May 2023. The draft reports were sent to the Director of National Institute of Environmental Health Sciences. It remains for the Director to make final decisions about the recommendations of the report and the meta-analysis.

The issue of whether fluoride in drinking water at levels in New Zealand communities with community water fluoridation affect neurological development or IQ was considered by New Zealand's Chief Science Advisor in his report in 2014.

He reported that in the studies that have raised concerns the fluoride exposures "were many (up to 20) times higher than any that are experienced in New Zealand or other CWF communities, the studies also mostly failed to consider other factors that might influence IQ, including exposures to arsenic, iodine deficiency, socioeconomic status, or the nutritional status of the children. Further,

the claimed shift of less than one standard deviation suggests that this is likely to be a measurement or statistical artefact of no functional significance."

RCR: How dangerous to children's IQ do you think fluoride is?

DR. ROBIN WHYMAN: The report of the New Zealand's Chief Science Advisor and Royal Society of New Zealand in 2014 did not support the suggestion that fluoride at the levels used in community water fluoridation is a risk to children's IQ or their cognitive function.

Similarly a 2016 report by the National Health and Medical Research Council (NHMRC) in Australia reviewed the literature. It states "Overall, the body of evidence for an adverse effect of fluoride on IQ and cognitive function is largely of very limited quality and is not particularly relevant to the Australian context. The best and most relevant evidence is from the only high-quality study (Broadbent et al 2014) which found no evidence for an adverse effect of fluoridated water at levels comparable to that seen in Australia on intelligence in children (as measured by IQ)."

The study cited by Broadbent et al is a New Zealand study from the highly reputed Dunedin study. Combined with the wider reviews by the Chief Science Advisor and the NHMRC it gives a strong level of confidence that data in New Zealand does not support the suggestion of a risk to children's IQ from community water fluoridation in our environment.

RCR: How much does sugar play a part in dental caries?

DR. ROBIN WHYMAN: Sugar is an important part of the dental caries process. Teeth are covered by a thin layer of biofilm that is colonised by bacteria. Bacteria in the biofilm metabolise sugars into acids that then demineralise the tooth surface.

The more frequently sugars are available to the bacteria of the tooth surface the more demineralisation occurs and the more dental decay develops.

RCR: I understand one place everyone agrees is the role of sugar – What is a solution to reducing sugar intake?

DR. ROBIN WHYMAN: Sugar intake is very influenced by the foods of our diet and drinks.

Reducing sugar intake occurs most from eating lower amounts of processed foods and drinks. This involves reducing or removing sugars in processed foods and drinks and is why the NZ Dental Association supports reducing or removing sugary drinks in the diet and replacing them with water.

The NZ Dental Association supports a levy on sugary drinks to reduce their intake. International data has shown that a levy reduces intakes and benefits population health through reduced levels of dental decay, obesity and diabetes.

RCR: Why are Māori and Pacifica children affected more than the "others" group in MOH statistics?

DR. ROBIN WHYMAN: Māori and Pacifica health is influenced by a complex interplay of factors including culture, poverty and deprivation.

Societal poverty and deprivation is well established to influence diets and overall health. Families with lower incomes are more likely to consume energy rich processed foods that are high in sugars.

Māori and Pacifica adults also experience poorer oral health than non-Māori and Pacifica adults. Intergenerational effects on oral health have been shown in research such as the Dunedin study, where adults with poor oral health also have children with poor oral health.

Recent research is also indicating that slightly a greater proportion of Māori and Pacifica families appear to live in communities that do not have access to fluoridated water.

RCR: Do you have any common ground with the opponents to fluoride?

DR. ROBIN WHYMAN: The NZ Dental Association does not disagree that the effects of community water fluoridation occur through a topical mechanism as described in the answers to these questions.

We are not fully informed on the position of opponents to Community Water Fluoridation on sugar and what their solutions to tackling excessive dietary sugar are, but that is potentially an area of common ground.

The NZDA believes the Community Water Fluoridation programme, widespread use of fluoridated toothpastes and initiatives to reduce refined sugars in our diet are the most important things we can do to achieve broad improvements to oral health in the population across all age and ethnicity cohorts.