Fluoride supplements

Fluoride supplements are not recommended for use in Australia. Fluoride supplements have long been advocated as an alternative source of fluoride in non-fluoridated areas. A 2.2-mg NaF tablet provides 1 mg of fluoride per day, equivalent to the consumption of 1 L of fluoridated water with a concentration of 1 mg/L. However, in contrast to the evidence on the effectiveness of water fluoridation, fluoride tablet use has been quite varied in its effectiveness, mostly related to compliance in its regular intake. In addition, fluoride supplement use in pre-school years is associated with a significant increase in the risk of dental fluorosis. The question of whether the risk of fluorosis is outweighed by any benefit in caries protection has led to a number of guidelines recommending not to use fluoride supplements.

Recommendations for fluoride supplements from the Australian guidelines (ARCPOH 2006)

- Fluoride supplements in the form of drops or tablets to be chewed and/or swallowed should not be used.

Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) with fluoride

Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) with fluoride is a recent addition to the available fluoride products. It has been suggested that CPP-ACP with fluoride slows the progression of caries and remineralises enamel subsurface lesions. However, very few clinical studies have been published comparing the effectiveness of CPP-ACP including fluoride with various forms of fluoride alone. Thus, scientific evidence for its clinical effectiveness is not yet available (Azarpazhooh & Limeback 2008).

Further information

can be obtained from the

Dental Practice Education Research Unit,
School of Dentistry,
The University of Adelaide, Australia 5005.
Phone (08) 8303 4045 toll-free 1800 805 738
fax (08) 8303 4858
email dperu@ adelaide.edu.au
www.arcoph.adelaide.edu.au/depru

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Practice Information Sheet No. 3

Fluoride

Home use of fluoride

Introduction

This information sheet provides an update on Australian recommendations of fluorides for home use and the background for those recommendations.

Home use of fluoride is important in the prevention of dental caries and the management (remineralisation) of early carious lesions. The type of fluoride to be used depends on the age of the person and the risk category to which they have been assigned.

The effectiveness of fluoride varies with the frequency and duration of application, the specific fluoride compound used and the concentration of the fluoride present. Not all fluoride agents and treatments are equal. The more concentrated the fluoride and the greater the frequency of application, the greater the caries reduction (Newbrun 2001).

Drinking fluoridated water

The most important home-based strategy for preventing dental caries is the choice of tap water as the main source of drinking and cooking fluid in areas where the water supply has optimal levels of fluoride (NHMRC 2007). Recent evidence has shown that the increasing use of non-fluoridated bottled water, tank water and other sources of fluids (thus reducing fluoride intake) have resulted in increased caries rates, particularly in the deciduous dentition (Armfield et al. 2004). The availability of fluoridated bottled water, with informative labelling, is under consideration by the Australian government in 2008.

In areas where mains water has less than an optimal fluoride concentration, the recommendation is to use fluoride drops or tablets to make up fluoridated water which is then used for drinking and cooking. This is done by dissolving 1 mg of fluoride ion in one litre (L) of water.

Recommendations for water fluoridation from the Australian guidelines (ARCPOH 2006)

- So that people can choose to consume bottled or filtered waters containing fluoride, manufacturers should be encouraged to market bottled water containing approximately 1.0 mg/L fluoride and water filters that do not remove fluoride. An integral part of this guideline is that all bottled water and water filters should be labelled to indicate the concentration of fluoride in water consumed or resulting from the use of such products.
- So that people can choose to consume fluoridated water, sodium fluoride should be marketed as a water supplement for addition to non-fluoridated water sources, thereby achieving a fluoride concentration of approximately 1 mg/L.

Toothpastes

In Australia toothpastes with three different concentrations of fluoride are available. There is a junior or children's toothpaste with 400–550 ppm, a standard toothpaste with 1,000–1,500 ppm and a high concentration toothpaste containing 5,000 ppm.

Effectiveness

Fluoridated toothpaste is effective in the prevention of caries because the fluoride is taken up directly by dental plaque and demineralised enamel. Use of fluoridated toothpaste increases the fluoride concentration in saliva 100- to 1,000-fold, returning to baseline levels within 1–2 hours. Some of this salivary fluoride is taken up by dental plaque (CDC 2001).

Clinical trials have demonstrated that the level of caries prevention associated with fluoridated toothpaste is lower than that of lifetime exposure to fluoridated water. However, other opinion indicates that the lifetime caries preventive benefit of fluoridated toothpaste may, in fact, be closer to the lifetime benefit of community water fluoridation (CDC 2001). There is also evidence that use of fluoridated toothpaste in conjunction with fluoridated water increases the caries preventive effect, leading to

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a benefit among those who use both that is greater than either vehicle alone, although the benefits cannot be simply added together (ARCPOH 2006).

A Cochrane systematic review of use of fluoridated toothpastes in 70 clinical trials (Marinho et al. 2003) found that the caries prevented fraction due to fluoride toothpaste was 24% (95% confidence interval (CI) 21–28%; p<0.0001). The effectiveness of fluoride toothpaste increased with higher baseline levels of caries, higher fluoride concentration, higher frequency of use and supervised brushing.

Appropriate use

Brushing twice a day with fluoride toothpaste is more effective in preventing caries than once a day or less (Marinho et al. 2003; Topping et al. 2005). Whether increasing the number of daily brushings from two to three times a day results in lower dental caries experience is unclear. Rinsing after tooth brushing affects fluoride concentration in the mouth and affects caries experience (Sjögren & Birkhed 1994; Chestnutt et al. 1998). Thus, it is recommended that people do not rinse after brushing.

Toothpaste in young children

As with other fluoride vehicles, there is a need to balance the caries preventive effect of fluoridated toothpaste with the risk of dental fluorosis in children under 6 years of age. In Australia during the early 1990s, recommended guidelines for the use of fluoridated toothpaste included age of commencement, parental supervision, using a pea-sized amount of toothpaste per brushing, spitting not swallowing, and not rinsing after brushing. This has resulted in a halving in prevalence of fluorosis, bringing it to a far more acceptable level (Riordan 2002; Spencer et al. 2008). Commencement of tooth cleaning before a child's first birthday is associated with reduced caries prevalence later in childhood compared with delayed tooth cleaning. Before the age of 18–24 months, the use of fluoridated toothpaste does not confer any extra benefit in preventing caries later in childhood. In contrast, the risk of dental fluorosis is elevated among children who begin using fluoridated toothpaste before the age of 30 months (Do & Spencer 2007). It should be noted, however, that these patterns have been observed in a fluoridated area. It is plausible that exposure to fluoridated toothpaste at younger ages may be more important in caries prevention among children in non-fluoridated areas.

Young children have a strong swallowing reflex, yet swallowing toothpaste is a risk factor for fluorosis. Young children up to 6 years of age tend to swallow rather than spit out most of the toothpaste with which they brush. For instance, approximately 65 per cent of toothpaste used may be ingested by a 2-year-old, 50 per cent by 3 and 4 year-olds and just over 30 per cent by 7 year-olds (Barnhart et al. 1974). Bhuridej et al. (2007) found that the estimated mean ingested amount of fluoride among 3 year old children was 0.17 mg per brushing, an average of 62% (range up to 98%) of the amount of dentifrice used. This was less when parents supervised brushing, emphasising the importance of parental supervision of young children using toothpaste. Hence, for young children, a minimal amount of low concentration fluoride toothpaste should be used. Following brushing, children should just spit out, as adding water to the mouth to rinse increases the likelihood of swallowing the toothpaste.

Use of toothpaste in individuals at high risk of caries

Individuals at high risk of caries may require additional fluoride to prevent disease development. Among children under 6 years of age, particularly those in non-fluoridated areas, it may be appropriate to recommend use of a standard toothpaste (1,000 ppm), as the risk of caries and its sequelae may outweigh the risk of fluorosis and its effects. Evaluation of the history of fluoride intake of the young child would inform such a recommendation.

For older children, teenagers and adults at high risk, increased exposure to fluoride may be accomplished by increasing the frequency of brushing with toothpaste. For teenagers and adults use of a toothpaste with a fluoride concentration greater than 1,500 ppm as an alternative or in addition may be advisable. In particular, such recommendations should apply to older adults at risk of root caries (Baysan et al. 2001; Twetman et al. 2003).

Recommendations for toothpaste from the Australian guidelines (ARCPOH 2006)

- From the time that teeth first erupt (about 6 months of age) to the age of 17 months, children's teeth should be cleaned by a responsible adult, but not with toothpaste.
- For children aged 18 months to 5 years (inclusive), the teeth should be cleaned twice a day with toothpaste containing 0.40–0.55 mg/g (400–550 ppm) fluoride. Toothpaste should always be used under supervision of a responsible adult. A small pea-sized amount should be applied to a child-sized soft toothbrush and children should spit out, not swallow, and not rinse.
- For people aged 6 years or more, the teeth should be cleaned twice a day or more frequently with standard fluoride toothpaste containing 1 mg/g (1,000 ppm) fluoride. People aged 6 years or more should spit out, not swallow, and not rinse.
- For children who do not consume fluoridated water or who are at elevated risk of developing caries for any other reason, guidelines about toothpaste usage should be varied, as needed, based on advice from a dental professional. Variations could include more frequent use of fluoridated toothpaste, commencement of toothpaste use at a younger age, or earlier commencement of use of standard toothpaste containing 1 mg/g (1,000 ppm) fluoride.
- For teenagers, adults and older adults who are at elevated risk of developing caries, dental professional advice should be sought to determine if they should use toothpaste containing a higher concentration of fluoride (i.e. greater than 1 mg/g (1,000 ppm) fluoride).

Mouthrinses

Only a few mouthrinses sold in Australia contain sufficient fluoride to effectively prevent decay. The exceptions are those containing at least 200 mg/L F, intended for daily use, and 900 mg/L F, intended for weekly use. Fluoride mouthrinses can offer an additional fluoride vehicle for individuals with elevated risk of caries. The use of fluoride mouthrinse increases among adolescents (Armfield 2006). This suggests that it may represent an appealing additional source of fluoride among adolescents at high risk of developing caries, but this should be in addition to use of fluoridated toothpaste and at a different time. After rinsing, the mouthrinse should be spat out, not swallowed. Children aged less than 6 years should not use fluoride mouthrinses because of the probability of ingestion and risk of dental fluorosis.

Recommendations for mouthrinses from the Australian guidelines (ARCPOH 2006)

- Children under the age of 6 years should not use fluoride mouthrinse.
- Fluoride mouthrinse may be used by people aged 6 years or more who have an elevated risk of developing caries.

Home-use gels

Due to recent changes in the Government regulations relating to fluoride products, fluoride gels for home use are now not available.

Summary

The following table presents a summary of recommendations for home fluoride use

	Low risk	Moderate risk (As recommended by dental professionals)	High risk (As recommended by dental professionals)
< 18 months of age	Drink water with fluoride Brush without toothpaste	Drink water with fluoride Brush with child toothpaste	Drink water with fluoride Brush with child toothpaste
18 months – < 6 years	Drink water with fluoride Brush with child toothpaste 2 times per day Spit, do not rinse	Drink water with fluoride Brush with standard toothpaste 2 or more times per day Spit, do not rinse	Drink water with fluoride Brush with standard toothpaste 2 or more times per day Spit, do not rinse
6 years – teenager	Drink water with fluoride Brush with standard toothpaste 2 times per day Spit, do not rinse	Drink water with fluoride Brush with standard toothpaste 2+ times per day Spit, do not rinse	Drink water with fluoride Brush with standard toothpaste more than 2 times per day Spit, do not rinse
Teenager, adult, elder	Drink water with fluoride Brush with standard toothpaste 2 times per day Spit, do not rinse	Drink water with fluoride Brush with standard toothpaste 2 or more times per day Spit, do not rinse	Drink water with fluoride Brush with high fluoride toothpaste more than 2 times per day Spit, do not rinse

Home use of fluorides is important in the prevention and management of dental caries. Drinking fluoridated water and using fluoridated toothpaste twice a day form the basis of caries prevention. However, for individuals at moderate to high risk, additional measures should be considered for recommendation by the dental professional.