



FACT SHEET

Sugar and dental health

What causes tooth decay?

The causes of tooth decay are complex and multifactorial however, there is no doubt that carbohydrate foods, which include sugars, play a role in the development of tooth decay (dental caries). The frequency of drinking sweetened drinks and eating these foods, as well as other factors such as cleaning teeth and the use of fluorides all play a role in the etiology of dental caries.

A comprehensive literature review concluded; "that the role of the diet is not so much related to the diet itself but to the individual behaviour of people. Where oral hygiene and fluoride supplementation are adequate, the diet has become a lesser factor in caries prevention."¹

Diet plays an important role in protecting teeth. Just as we should eat well to maintain a healthy body, we need to eat appropriately to maintain a healthy mouth. Carbohydrate foods, including sugar, need not pose a significant risk to dental health if they are consumed mainly at mealtimes and there is adequate oral hygiene with the use of fluoride.

The impact of carbohydrates on dental caries is dependent mainly on the frequency of consumption and not necessarily the amount consumed.² Tooth decay is also affected by the type of food consumed, degree of oral hygiene performed, availability of fluoride, salivary function and possibly genetic factors.³ Prevention programmes to control and eliminate dental decay need to focus on dietary habits as well as on the use of fluorides, good oral hygiene and regular check ups.

The following information provides an overview of factors contributing to dental decay and shows how they can be managed to reduce the risk.

What is tooth decay?

Tooth decay occurs when the hard outer enamel layer of the tooth is damaged.

Most damage to tooth enamel is caused by acids produced by bacteria in the plaque that forms on teeth. The bacterial acid (that is produced each time food is eaten) causes calcium, phosphate and fluoride to be dissolved out of the tooth enamel.

If this occurs often over many months, the enamel crystals will finally break and holes (referred to as a dental caries or decay) will occur.

Dental erosion can also occur in the mouth. This occurs when the teeth are eroded away either by acids from foods and drinks or gastric reflux. The acids dissolve the dental enamel across its whole surface and the teeth become very sensitive.

Understanding and managing the causes of tooth decay

As previously mentioned, tooth decay is a multifactorial issue. Two key indicators of cariogenic potential are the type of food consumed (including the form, acidity and nutrient composition) and the frequency of consumption. Salivary function, oral hygiene and the use of fluorides also play a role in the development of dental caries.

THE TYPE OF FOOD

Most foods contain some form of carbohydrate or sugars. Some plaque bacteria can make acid from any food or drink that contains carbohydrates. Long-lasting sources of sugars such as, dried fruits, fruit leathers and hard or chewy sweets are concentrated sources of sugar and stick to teeth for a long time. This leads to an increased exposure time in the mouth as the sugars are gradually released over time.

Sucrose appears to be the most cariogenic of all the sugars because in addition to being fermented by oral bacteria, it is a substrate for the synthesis of extracellular and intracellular polysaccharides. Sucrose has also been reported to lower the concentrations of calcium, phosphorous and fluoride in the teeth.⁴

There is also growing concern about the dental erosion linked to any drinks or foods which are acidic. These include all cordials, fruit-based drinks and carbonated drinks whether they contain sugars or not.

Important general advice is to limit the overall consumption of these drinks and when consumed, to do so in a short space of time rather than by continual sipping.

However, there are also some carbohydrate-containing foods which can have a protective role and are therefore particularly useful for consumption between meals. These include foods which are rich in calcium, phosphate and protein such as dairy foods.



FACT SHEET

CONTINUED ► Understanding and managing the causes of tooth decay

Because fruits and vegetables stimulate saliva they are not usually a problem.

A recent bulletin by the World Health Organisation concluded, "In line with the dietary goals for the prevention of all major diet-related chronic diseases, a diet rich in fruits, vegetables and wholegrain starchy foods and low in free sugars and fat is likely to benefit many aspects of oral health including the prevention of caries, periodontal conditions, oral infectious diseases and oral cancer".⁵

FREQUENCY OF CONSUMPTION

How often we eat can influence dental health. It's therefore important to allow time between snacks and meals so that the natural saliva in our mouths can go to work counteracting the acid that causes tooth decay. Saliva can even repair some of the damage caused by acid. This natural process needs time to work. It can't happen while there is food in the mouth, so it's important to leave at least two hours between eating for saliva to start the repair process. The key health message here is to "Give teeth a rest".

There is a positive relationship between consumption, especially heavy consumption, of sugar-containing soft drinks and the risk of developing tooth decay.⁶ Constant sipping of drinks can also pose a risk to teeth. This is particularly important for young children to avoid. If children go to bed with a bottle or walk around sucking on a bottle or feeding cup for extended periods of time, the chances of dental decay and erosion are very high. Likewise, if older children use sipper bottles filled with cordial, soft drink or fruit juice, their teeth will also be at risk of erosion. If children want to sip on a drink, give them water and

save milk, sweetened drinks or juices for meal and snack times. Young people should also be discouraged from the current trend of sipping drinks from sipper bottles over prolonged periods of time as this may interfere with the work of saliva in the repair process.

SALIVARY FUNCTION

Saliva plays an important role in dental health. Not only does it assist in washing foods away from teeth, and neutralising the acids, but it also re-mineralises teeth and repairs minor damage caused by plaque acids.

There are some circumstances where individuals may not be producing sufficient saliva. This occurs with some illnesses and some medications. One way to stimulate saliva is to chew gum after eating. Sugar free gums usually contain sugar-alcohol based products like xylitol which can also help to protect your teeth.² Your dentist can suggest other ways to increase saliva or limit the damage caused by too little saliva.

ORAL HYGIENE

Regular brushing and flossing of teeth not only removes foods which might cause decay but also harmful plaque bacteria. Adults should be aware that they can inadvertently transfer their own plaque bacteria to children when they taste foods, share drinks or even use their own mouth to clean pacifiers. Such practices are advised against, as they not only pose risks to dental health but can also result in the transfer of other more harmful bacteria such as hepatitis and meningococcal meningitis.

Some people have special oral hygiene needs due to tooth spacing, tooth crowding

or other factors, so always ask your dentist, orthodontist, dental hygienist or dental therapist about the best way of cleaning your teeth.

EDUCATION

The key message with respect to food is more about when and how often a particular food should be consumed, rather than seeing individual foods as 'good' and 'bad'. Encouraging children to avoid a particular food can be counterproductive. More emphasis should be given to the overall diet rather than singling out particular foods. This, combined with a greater focus on tooth brushing using a fluoride toothpaste, needs to be the key focus of dental health education.⁷

FLUORIDE

Reduction in tooth decay in industrialised countries has largely been attributed to fluoride. Fluoride slows down the softening of dental enamel by acid and speeds up the rehardening by saliva. Use of optimally fluoridated water and toothpaste is a key strategy to reduce tooth decay. A recent review concluded that while controlling sugar consumption plays a key role in caries prevention but with the advent of extensive fluoride exposure, it is not the most important aspect.⁸ The New Zealand Dental Association actively promotes the addition of fluoride to water supplies as a proven method of dental caries prevention and control.

In regions where water is not fluoridated other fluoride products can be recommended. This should be discussed with your dentist, dental hygienist or dental therapist.





FACT SHEET

Tooth trends

The severity of tooth decay in children in industrialised countries has decreased over the last three decades, but this trend has halted in younger children and may be reversing in some groups.⁹ This may be in part to the increased consumption of non-fluoridated bottled water.

We are all aware of the trend towards aging populations, and older people are now more likely to retain their teeth throughout their life. This makes protection of teeth earlier in life, to minimise later maintenance, more important than ever. The risk of decay of teeth roots (root decay) increases in older people. They need to follow the same preventive oral hygiene practices as those recommended for the general population.

Top teeth tips

There are many ways in which we can keep our teeth in top condition. Here are some simple strategies:

- Use a fluoride toothpaste even if you live in a fluoridated area. This is one of the most effective means of delivering fluoride.¹⁰
- Limit the amount and frequency of intake of sweetened drinks in order to minimise dental erosion.
- Drink rather than sip sugar sweetened beverages.²
- Take dental hygiene seriously. Brush and floss twice daily and make regular visits to your dentist or dental hygienist.
- Enjoy treats, but try to restrict the amounts of sugary foods eaten and keep to meal times, or special occasions, rather than snacking throughout the day.
- Eat a combination of foods and include dairy foods with fermentable carbohydrates and other sugars. Try to consume these foods with, rather than between meals.²
- Rinse the mouth with water, chew sugarless gum (especially those containing sugar-alcohols) and eat dairy products after the consumption of fermentable carbohydrates.²
- Chew sugarless gum between meals and snacks to increase salivary flow.²
- Moderate eating frequency.²

Don't allow toddlers to continuously suck on a bottle or feeding cup. Save juice and milk for meal times and if a child does need something to sip in-between meals or at bedtime, make it water – keeping in mind the need for saliva production.

Last updated November 2008

REFERENCES

1. Van Louveren C and Duggel MS. *The role of diet in caries prevention, International Dental Journal* 2001; 51: 388-408
2. Touger-Decker & van Loveren. *Sugars and dental caries. Am J Clin Nutr* 2003;78(suppl):881S-92S
3. Williams Peter. *Is there a need for a dietary guideline in Australia? Australian Journal of Nutrition and Dietetics* (2001) 58:1
4. Paes Leme AF, Koo H, Bellato CM, Bedi G, Cury JA. *The role of sucrose in cariogenic dental biofilm formation – new insight. J Dent Res.* 2006 Oct;85(10):878-87.
5. Moynihan PJ. *The role of diet and nutrition in the etiology and prevention of oral diseases. Bull World Health Organ.* 2005 Sep;83(9):694-9.
6. *Diet and tooth decay: For the dental patient. JADA* 2002;133:527
7. Duggel MS and Van Louveren C. *Dental considerations for dietary counselling. International Dental Journal* 2001; 51: 408-412
8. Burt BA, Pai S. *Sugar consumption and caries risk: a systematic review. J Dent Educ.* 2001 Oct;65(10):1017-23.
9. *Diet, Nutrition and the Prevention of Chronic Diseases, Report of the Joint WHO/FAO expert consultation. Geneva, Switzerland 28 January–1 February 2002. P9 38*
10. *Diet Nutrition and the Prevention of Chronic Diseases, Report of the Joint WHO/FAO expert consultation. Geneva, Switzerland 28 January–1 February 2002. Pg 40*



The Sugar Research Advisory Service (SRAS) is a public information service funded by the New Zealand Sugar Company Limited. The SRAS is advised by a panel of independent health and nutrition experts whose role is to review all SRAS-produced information and guide the SRAS on issues of health and nutrition.



Contact details are:
The Secretariat
SRAS
PO Box 5224
Wellesley Street
Auckland
Fax 09 308 9456
Email info@sras.org.nz