

In lockdown: protecting children's teeth

The innovative technology behind **BioMin F for Kids** can offer enhanced dental protection to children who can't get in to see you in the surgery

As the coronavirus lockdown continues, and dental surgeries remain closed for the foreseeable future, patients are having to take responsibility for maintaining their own dental health – and, importantly, that of their children. With regular check-ups, hygiene appointments and the availability of fluoride treatments suspended, it's more vital than ever that children are encouraged to keep their teeth scrupulously clean to avoid problems developing while they can't get in to see the dental team.

In addition, other effects of the lockdown have been that children and adults alike are spending more time on their screens and devices, and they appear to be grazing and snacking more – which is likely to store up dental problems if dental hygiene isn't kept up to scratch. Every time a person consumes a sugary snack or fizzy drink, the pH in the mouth is lowered, and it takes 2-3 hours for this level to return to normal. If another snack is consumed within that time, the mouth does not have time to recover, and the risk of demineralisation rises (Figure 1).

Worrying statistics

Even before the lockdown, however, children's dental health was giving cause for concern, both in the UK and elsewhere. Despite being entirely preventable, dental caries remains one of the commonest diseases affecting young children, and dental extractions are the most frequent reason for hospital admissions in children under 10. By the age of four, more than one in every four children in the UK has a dental cavity. This figure is mirrored in the US, where government statistics state that 42% of children aged between two and 11 have had dental caries in their primary teeth, with children from ethnic minority backgrounds and in families on lower incomes most likely to be affected.

In recognition of this growing problem, the advice in the UK is now that children over the age of three years should be recommended to brush at least twice daily

'MAGIC STUFF'

BBC 4 has recently aired a programme in the *How To Make* series, where materials scientist Zoe Laughlin looks at the technology behind toothbrushes and toothpastes, including a fascinating interview with Professor Robert Hill, inventor of BioMin F. Find it on BBC iPlayer, series 1 episode 2.

with a pea-sized amount of toothpaste containing 1 3 5 0 - 1 5 0 0 p p m fluoride, ie an adult strength toothpaste. However, a drawback of conventional toothpaste, based on soluble fluoride, is that although it delivers fluoride at the time of brushing, this level drops away to non-therapeutic levels within 90 minutes. Even with high concentrations of fluoride, the protective effect of the fluoride is compromised. At the same time, many parents are concerned about giving their children high levels of fluoride because of the perceived risk of fluorosis.

The challenge has been to develop a toothpaste which continues to deliver fluoride at a low, controlled dose over several hours, continuously protecting the teeth and enabling remineralisation. BioMin F, based on innovative bioactive glass technology developed in the laboratories of Queen Mary University, London, works in exactly this way, mimicking the natural processes in the mouth to restore the pH and remineralise damaged tooth enamel to strengthen and protect the teeth.

Following brushing with BioMin F, the tiny particles adhere to the tooth surface, where they gradually dissolve for up to 12 hours, releasing a controlled supply of fluoride, calcium and phosphate ions in the optimum ratio to produce fluorapatite, the fluoride analogue of natural tooth mineral. This is precipitated onto the tooth surface, remineralising damaged tooth enamel. Research (Bakry et al 2018) has shown that BioMin F remineralises not just the surface but also penetrates into the sub-surface enamel, replacing lost mineral there too. At the same time as the mineral ions are released, the dissolution of BioMin F leads to a rise in pH, hence protecting against demineralisation of the tooth. Additionally, as mouth acidity increases, for example following consumption of a sugary or fizzy drink, the particles start to dissolve faster to restore the pH balance and remineralise the tooth enamel.

BioMin F For Kids

The benefits of BioMin F are now available in a toothpaste specifically designed for children. BioMin F for Kids has the same fluoride strength as original BioMin F (5%, which equates to 530 ppm fluoride). This is considerably lower than the concentration of conventional toothpaste, but the level of fluoride remains higher and the protective effect remains for longer (Figure 2). A recent study in children (Garg et al, 2020) illustrated this by comparing fluoride retention



levels after brushing with BioMin F and Colgate for Kids. The level of fluoride in the children's saliva was compared after 30 minutes and one hour, and while the fluoride levels in the soluble fluoride group had dropped back to baseline, the BioMin F group of children continued to have raised levels for considerably longer. The researchers concluded: 'These new technology dentifrices could be a means of reducing the fluoride content of toothpastes for children, while ensuring adequate concentrations are maintained for longer. Therefore, fluoro calcium phosphosilicate dentifrices may provide a new direction for caries prevention.'

BioMin F for Kids is aimed at children aged between three and six, and is available in two pleasant fruity flavours, melon and strawberry. Feedback on the taste and texture from children trialling the product was positive. It comes as a silvery coloured gel that does not contain titanium dioxide, and has of course undergone all the required cytotoxicity and biocompatibility studies required for sale in the UK. It is suitable for vegans and has halal certification.

A friendly dinosaur character, Bino, has been developed to appeal to children's imagination and support the launch of BioMin F for Kids. Bino appears on the packaging, and other support materials such as reward stickers, colouring-in sheets and advice notes for children and parents. These can be accessed via the BioMin F website.

Enhanced protection

The coronavirus lockdown is not going to end any time soon and it is likely to take many months before any kind of normality returns to dental practices. In the meantime, the innovative technology behind BioMin F for Kids can offer enhanced dental protection to children who can't get in to see you in the surgery.

References

- Bakry AS et al (2018) A novel fluoride containing bioactive glass paste is capable of re-mineralising early caries lesions. *Materials* 11 1636
- Garg et al (2020) Comparative retentive levels of fluoride levels in saliva following toothbrushing with sodium fluoride and fluoride-containing bioactive glass dentifrices in children – an in vivo study. *Heal Talk* 12;3:56-58



Schematic representation of the changes in plaque pH in an individual who **A** has frequent food and drink intake during the day, or **B** limits their food and drink intake to main meals only. The critical pH is 5.5, below which teeth begin to demineralise.



Figure 1: Comparative pH levels between grazing and eating only main meals

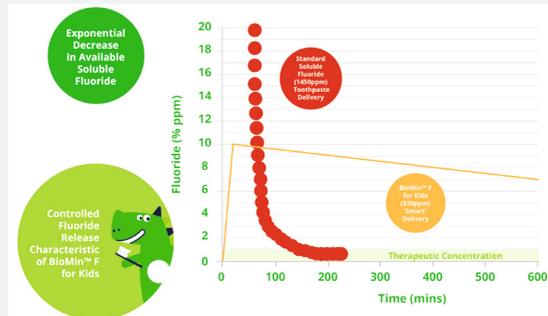


Figure 2: Fluoride levels after brushing

BIOMIN F FOR KIDS is available in melon and strawberry flavour, recommended retail price £4.99. Pack size 35ml/50g. For information on BioMin, or to place an order, go to www.trycare.co.uk/biomin-toothpaste or www.biomin.co.uk, or call 01274 881044.