

# Biomin F: a smart bioactive glass toothpaste

**Swati Nehete** introduced an international audience of more than 2,000 practitioners to the concept behind Biomin F at a recent FMC Study Club webinar. **Moira Crawford** reports

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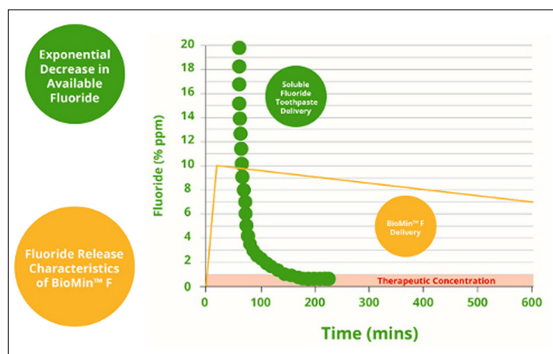
Freelance journalist



Biomin F toothpaste delivers low level fluoride over an extended period, producing acid resistant fluorapatite to reduce the symptoms of dentine hypersensitivity and remineralise demineralised tooth enamel. This was the take-home message of Dr Swati Nehete, senior clinical lecturer in restorative dentistry at Queen Mary University of London, and a clinical adviser to Biomin Technologies, speaking at an FMC Study Club webinar.

Dr Nehete gave her lecture online to a 2,000-strong audience from 63 countries, all tuning in from their own homes to hear her speak during the COVID-19 lockdown.

She opened the webinar with some history, beginning when Professor Larry Hench developed the first bioactive glass in 1969, which he defined as: 'A bioactive glass dissolves in body fluids, releasing calcium and phosphate and forms hydroxycarbonated apatite,' and termed the glasses 'calcium phosphosilicates.'



**Figure 1: Fluoride release**

Dr Nehete summarised the implications. 'It's important that bioactive glass recruits cells, is biodegradable and osteoconductive,' she said. Bioactive glasses were not initially intended for dental use, but were quickly adopted, and Novamin, using Professor Hench's formulation, has had great success in oral health.

There are a wide number of applications for bioactive glass in addition to toothpastes, including incorporating it into orthodontic adhesives; air polishing, where it produces a smooth surface and 'a significant reduction in sensitivity'; in restorative materials that may remineralise residual caries and self-repair the effects of marginal leakage; as an endodontic sealant; and also can be incorporated into varnishes, sealants and desensitising prophylaxis pastes.

## Biomin F

Moving onto Biomin F, Dr Nehete explained how it is 'designed and optimised for dental applications', containing a higher level of phosphate and calcium than Novamin, incorporating fluoride and a smaller particle size.

Biomin F has been designed to treat:

- Dentine hypersensitivity – associated with cold or mechanical stimuli, or postoperative sensitivity associated with periodontal therapy or tooth whitening
- Early caries – prevention and treatment
- Acid erosion – remineralisation of demineralised tooth surface.

She went on to describe the 'smart properties' of Biomin, highlighting its slow release over 12 hours (Figure 1), depositing fluorapatite preferentially in an acidic pH,

promoting remineralisation. Its small particle size ensures low abrasivity and enables the particles to enter the dentinal tubules, occluding them and so reducing fluid flow, the trigger for dentine hypersensitivity.

## Fluoride application – a paradigm shift

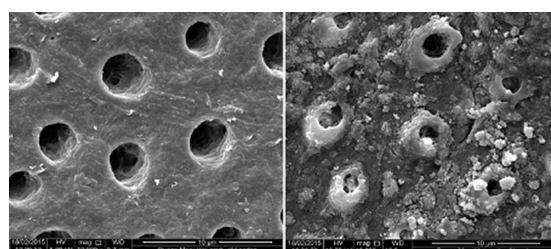
While fluoride has been central to the prevention and management of caries, Dr Nehete argued that a shift was needed in the way it is delivered – and challenged some of the accepted beliefs about it. 'COVID-19 will force the profession to review current practice in favour of preventive and minimally invasive dentistry (MID)', she said.

Biomin, containing only 530ppm fluoride, had an important role to play here, thanks to its slow release mechanism. 'We need something smarter,' she said, quoting Professor Ten Cate of ACTA: 'For treatments to be effective longer than the brushing and the salivary clearance, fluoride needs to be deposited and slowly released. Biomin F potentially does exactly this!'

She quoted numerous studies, noting that high concentrations of fluoride produce insoluble calcium fluoride, and laboratory experiments show that after about 90 minutes even high concentration toothpastes leave no therapeutic level of fluoride in the mouth. By contrast, the Biomin particle, attached by a polymer (polyacrylic acid) to the tooth surface, stays in place, slowly delivering a controlled dose of fluoride for up to 12 hours. Biomin glasses dissolve faster when the pH is lower in the mouth. 'Early carious lesions present an acidic environment which favours Biomin dissolution for remineralisation,' she said.

As the tiny particles of Biomin F enter the dentinal tubules, they lay down fluorapatite preferentially on the apatite walls of the peritubular dentine. This in turn blocks the tubules, preventing fluid flow and reducing sensitivity. She showed scanning electron micrographs that clearly illustrate the occlusion of the tubules, which remain patent even after acid challenge (Figure 2).

Amongst the huge amount of research available on the Biomin website, some key papers conclude: 'This novel development opens up a unique opportunity in the prevention and management of DH and may also be beneficial in preventing acid erosion of the tooth surface

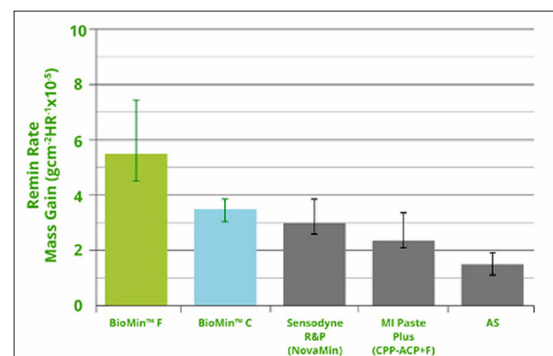


**Figure 2: Scanning electron micrograph images showing dentinal tubules before and after brushing with Biomin F**

and in the maintenance of oral hygiene by reducing the effects of plaque accumulation and gingival inflammation.'

Another states: '[Biomin] may provide better treatment response for the treatment of DH because of its early onset of action in relieving hypersensitivity, as compared with other dentifrices.'

Dr Nehete referred to the FDI World Dental Federation's Caries Continuum, featured on a live document from the FDI that 'supports a shift in caries management from restorative treatment to measures that arrest and prevent caries development.' The remineralisation action of Biomin F is an ideal fit for this, and she showed impressive laboratory results of its remineralisation rates (Figure 3). 'We like seeing clinical evidence, and we like seeing that things work,' she said.



**Figure 3: Comparative remineralisation rates**

She also showed images from Dr Stefano Daniele in Italy: an early adopter of Biomin F who has had excellent results in reversing white spot lesions after six to eight months.

## Less is more!

Dr Nehete concluded that Biomin, effective at just 530ppm fluoride, was an innovative alternative to high concentration fluoride, thanks to the addition of calcium and phosphate – especially now. 'In the wake of COVID-19, minimal intervention dentistry is here to stay,' she said.

Numerous questions followed concerning the use of Biomin F overnight – not currently recommended due to the inclusion of surfactant; risk of fluorosis – not a problem at this low level; the possible benefits of Biomin for patients with molar incisor hypoplasia, which may show promise, and the relative benefits of Biomin C, which contains no fluoride but is also extremely effective.

Dentists also asked whether Biomin F would interfere with tooth whitening, but Dr Nehete said that it could be used to manage sensitivity without affecting performance.

Following the webinar, Dr Nehete admitted she'd been quite apprehensive. 'When you are in front of an audience, you can get a feel for the pulse of the room. There is absolutely no feedback when you are speaking to a computer,' she said. 'That interaction with your listeners... brings the passion and understanding to the subject.'

For that reason, she enjoyed the interaction permitted by the 20-minute Q&A session after her lecture. 'That Q&A is so important for something as new as Biomin to the general community and it was good for me to get a feel for whether people "got" what I had to say.' She added: 'They are an intelligent audience who want to know why this is the next big thing. We owe it to them to make it as clear as possible.'

She sees webinars as being here to stay: 'The webinar is a fantastic way to disseminate new knowledge. It's a great tool to get information across, but there will always be a place for dental meetings and exhibitions for the social element, discussing things that you are passionate about.'

She is also passionate about Biomin's potential. Professor Robert Hill and Dr David Gillam have worked with a large R&D team who have made invaluable contributions, she said. 'I have been involved in the many stages of Biomin's development and I have a genuine interest in it. I think it has the potential to go places – it's an innovative solution to an age-old problem – using accepted science more smartly. It's got fantastic potential.'

**DR NEHETE'S WEBINAR** can be found on the Biomin E-Academy online learning platform: [biomin.co.uk/e-Academy](http://biomin.co.uk/e-Academy) or via Biomin's Youtube channel ([bit.ly/39qzgSv](https://bit.ly/39qzgSv)).

For information on Biomin, or to place an order, visit [www.trycare.co.uk/biomin-toothpaste](http://www.trycare.co.uk/biomin-toothpaste), [www.biomin.co.uk](http://www.biomin.co.uk), or call 01274 881044.