nanoXIM
CarePowder

WHITE PAPER

nanoXIM•CarePowder

Summary

The nanoXIM•CarePowder is a synthetic micro-hydroxyapatite powder for Oral Care applications, manufactured by FLUIDINOVA S.A. in Portugal.

Dental hypersensitivity prevention, pain reduction, enamel remineralization, and cavity prevention are the main benefits of this micro-hydroxyapatite ingredient.

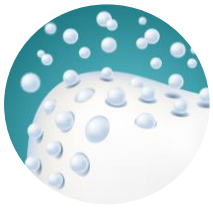
nanoXIM•CarePowder also contributes to a smooth and protected tooth surface, restoring its natural whiteness.

nanoXIM•CarePowder is the recommended ingredient for dry formulations, and can be incorporated in tooth powders, toothpaste tablets and chewing gums.

Mode of action

1.

Dental hypersensitivity, a short and sharp pain, prevents us from drinking hot coffee, ice cream, or even an orange juice without feeling pain. The action of certain food and drinks (hot, cold, acidic) are considered aggressions to our teeth, resulting in the exposure of dentin tubules and the underlying nerves to the external environment (the dentin loses its protective covering).



2.

HAp has a great potential in the treatment of dental hypersensitivity, as it can be incorporated inside the dentin tubules. Consequently, these become sealed and pain is reduced.

3.

As a result, a new layer is formed, remineralizing the tooth enamel and protecting the tooth surface, preventing the appearance of new cavities and making it resistant to acid attacks of our favourite meals.

4.

The deposition of HAp on the enamel surface improves its smoothness for better light reflection, and consequently brighter and whiter teeth.

Enamel Remineralization

In vitro study

The objective of this study was to evaluate the enamel remineralization potential of a tooth tablet containing 5% nanoXIM•CarePowder under dynamic conditions simulating *in vivo* caries formation. For that purpose, enamel specimens from extracted bovine incisors were used as substrates and prepared using standard methods. Artificial enamel lesions were created by placing the specimens for thirty-three hours in a solution containing lactic acid. As a control, a tablet without nanoXIM•CarePowder was used. Surface microhardness (SMH) analyses using Vickers Hardness Number (VHN) were performed on the enamel specimens at baseline and following the artificial lesion procedure. Then, a treatment regimen was performed on the enamel samples and repeated for twenty days as illustrated in Figure 1.

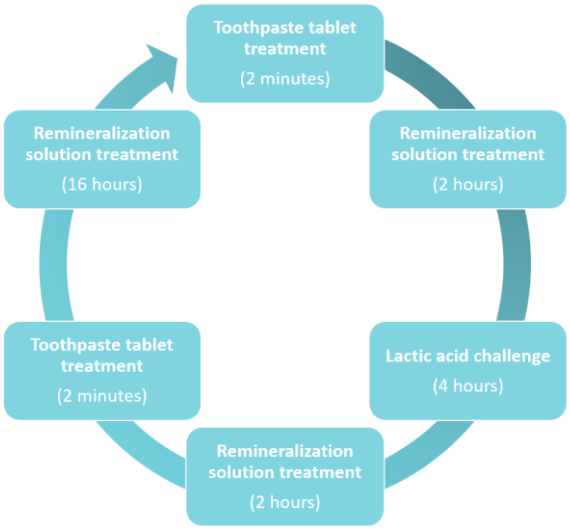


Figure 1: The different treatment stages performed daily on the enamel specimens during twenty days.

Briefly, the cyclic treatment consisted of two-minute treatment periods with tooth tablet, four hours acid challenge period in the acid lactic for lesion formation and the remaining time consisting on the immersion of the enamel samples in the remineralization solution. For the tooth tablet treatment, the specimens were immersed into slurries to simulate daily brushing. The slurries were prepared by diluting 5 g of tooth tablet (grounded into fine powder) in 10 g of deionized water. As remineralization solution medium, an artificial saliva with mucin solution was used. After twenty days of treatment, SMH was determined one last time on the enamel specimens to evaluate the remineralization potential. Percent surface microhardness recovery (% SMHR) was calculated using the SMH values of each specimen measured at the three time points (baseline, post demineralization and after twenty days of treatment), according to the expression bellow:

$$\% \text{ SMHR} = [(D1 - R)/(D1 - B)] \times 100,$$

where B = surface microhardness in terms of VHN of enamel specimen at baseline; D1 = VHN after *in vitro* demineralization; R = VHN after *in vitro* remineralization treatment.

The results show that the toothpaste tablets containing 5% nanoXIM•CarePowder had a significantly higher ability to remineralize the enamel lesions, compared to the toothpaste tablets without nanoXIM•CarePowder (Figure 2). Both toothpaste tablets were fluoride-free.

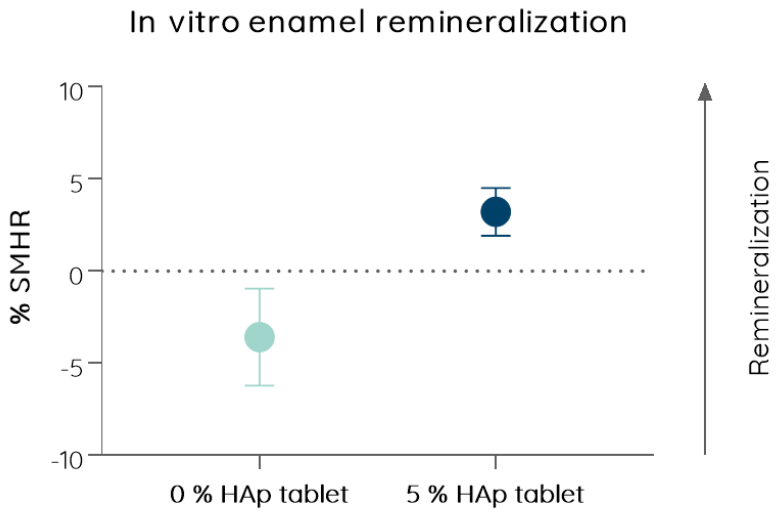


Figure 2: Percentage of surface microhardness recovery (% SMHR) of enamel specimens after twenty days of remineralization treatment using toothpaste tablets without HAp and containing 5% HAp.

Conclusion

After twenty days of treatment, the tooth tablet containing 5% HAp showed an excellent remineralization effect, and created a new and restored tooth surface.

This study demonstrates that nanoXIM•CarePowder is an effective remineralizing agent when incorporated in toothpaste tablets – with a 6.8% outperformance of SMHR, compared to a tablet without nanoXIM•CarePowder.

Source: Therametric Technologies, In Vitro Enamel Remineralization Testing Using a pH Cycling Model, 2022.

FLUIDINOVA

THE NANO-HYDROXYAPATITE SPECIALIST

FLUIDINOVA, S.A.

Rua de Rosa Jácome Felgueiras 57, 4475-188 Maia

Phone: +351 22 011 9746 | Email: nanoxim@fluidinova.com