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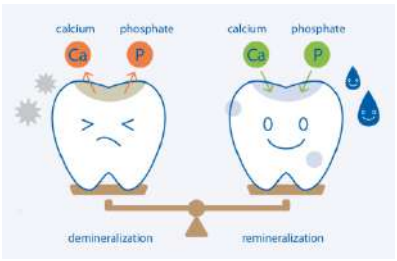
Enzymes: a new gold standard for treating white spot lesions?

White spot lesions are a common dental concern. These chalky, opaque areas are demineralised enamel, and indicate the beginning stages of tooth decay. Luckily, caries progresses slowly, and with the right method, its early process can even be reversed. A recent study by researchers from Ancona University[1] has proven that a combination of sodium fluoride with enzymes is especially effective when it comes to remineralising teeth.

White spot lesions are the result of an imbalance in the mineral content of the tooth enamel. Poor oral hygiene, a high-sugar diet, and inadequate fluoride exposure are common culprits. But the demineralisation of dental hard tissues happens gradually. In a complex, cyclical process, acid-producing bacteria weaken the protective outer layer of the teeth by breaking down sugars. These attacks from oral biofilms dissolve hydroxyapatite into Ca^{2+} and $PO4^{3-}$ ions. The result clinically manifests as enamel demineralisation without cavitation, due to their appearance also known as white spot lesions.



In contemporary restorative dentistry, remineralisation is regarded as both a preventive strategy and a minimally invasive therapeutic approach for initial carious enamel lesions. Numerous efforts have been made to develop efficient therapies focusing on remineralisation and enhancing the aesthetic appearance of white spot lesions. Fluoride containing toothpastes are known to rebuild weakened enamel by attracting minerals like calcium and phosphate. But there is no consensus on which formulation is the most effective when it comes to remineralising tooth enamel.

In search of the perfect toothpaste

In order to shed clarity on the remineralisation potential of different toothpaste formulations, researchers compared three commercial toothpaste formulations containing 1450 ppm of fluoride: hydroxyapatite with fluoride ions, sodium monofluorophosphate with arginine, and sodium fluoride with enzymes. They submitted teeth samples to a 7-day pH treatment, with two daily exposures of two minutes to the toothpastes and compared these to a control group.

The efficacy of remineralisation was evaluated by checking the sampled teeth's surface micromorphology, chemical-elemental composition, and the Vickers microhardness. All three of the tested dentifrices were found to remineralise the white

[1] Orilisi, G., Vitiello, F., Notarstefano, V. et al. Multidisciplinary evaluation of the remineralization potential of three fluoride-based toothpastes on natural white spot lesions. Clin Oral Invest 27, 7451–7462 (2023). https://doi.org/10.1007/s00784-023-05334-2

spot lesions, but with a different effect. The toothpastes containing enzymes and hydroxyapatite had a comparable effect on hardness recovery and crystallinity. However, the enzymatic toothpaste – **Curaprox enzycal 1450** - was found to have the single best remineralising potential according to micromorphological and chemical analyses.

Supporting saliva's natural function

The Curaprox enzycal toothpaste used in the study is unique in that it naturally supports saliva's existing function in the mouth. The balance between demineralisation and remineralisation depends on the saturation level of our saliva. Under suitable conditions, saliva remineralises enamel by supplying essential minerals such as calcium and phosphate and neutralises acids by breaking down food particles and bacterial plaque. The enzymes in the Curaprox enzycal are unique in that they boost the mechanics of this natural process.

The potential for enzymes in oral health is only starting to be realised. Due to their efficacy, they are expected to play a bigger role in supporting the oral microbiome in a way that is in line with the body's natural defences. Enzymatic toothpastes are an easy way for patients to prevent and treat white spot lesions, leading to better oral and systemic health.

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better health for you

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