

Enamel Bio-Remineralization

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Abstract

Dental caries is considered as a highly prevalent disease and a major oral health problem. Modern dentistry focus to manage non-cavitated caries lesions non-invasively through remineralization in an attempt to prevent disease progression. Recent developments in tissue engineering like self-assembling peptide SAP offer considerable potential for smart dental therapies.

Key Words: Non cavitated lesion, SAP P11-4, Bio Remineralization

Description

It is well known that Non-cavitated enamel carious lesions extend up to 400 μm in depth. SAP a Rationally designed anionic β -sheet-forming peptides P 11 4 is a bio-active peptide synthesized from natural amino acids which is safe, noninvasive and spontaneously self-assemble itself to form three-dimensional scaffolds under defined environmental conditions This self-assembling peptide (SAP) P11-4 when applied in adequate amount on the affected lesion diffuses

deeply into the subsurface body of the non cavitated carious lesion and forms a 3-dimensional matrix along with other ionic components of enamel which are sufficiently available from patient's saliva inducing de-novo formation of hydroxyapatite (HAP) crystals, resulting in a biomimetic mineralization and thereby mimicking the action of enamel matrix protein which indeed results in regeneration of demineralized surface [1].



Before Treatment



After Treatment

Clinical trials suggest that a single application of P11-4 can be beneficial in the treatment of early caries lesions as peptide treatment significantly increases the net mineral gain due to a combined effect of increased mineral gain and inhibition of mineral loss. Also as mentioned when specific peptide concentrations are used, P114 switches from a low viscosity isotropic liquid to an elastomeric nematic gel at $\text{pH} < 7.4$ and the anionic groups of the P114 side chains would attract Ca^{++} ions, inducing de novo precipitation of hydroxyapatite resulting in biomineralisation and avoid the ultimate excavation of the tooth to place a restoration. This current

cutting edge technology replaces the early concept of wait and watch and then goes minimal invasive treatment [1,2].

References

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