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# Role of self assembling peptide matrix in dentistry

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The self assembling peptide matrix showed a promising results in the regenerative dentistry including biometric remineralisation of initial carious lesions. This peptide forms a 3D Matrix within demineralized carious lesions , which enables nano hydroxyappetite crystal formation facilitating and serving as a scaffold for the regeneration of lost enamel structure.

It is clinically available as Curodont repair and it has a chemical structure Ace-Gln-Gln-Arg-Phe-Glu-Trp-Glu-Phe-Glu-Gln-Gln-NH2. It is synthetic and manufactured under cGMP which does not have any animal or plant products. It does not show any cytotoxic effects or any immunological response.

The peptide exists as unimers of random coil conformations in water at a pH above 7.5 below which it changes into a anti-parallel beta-pleated sheet . It also self assembles above a critical concentration a hierarchical self assembly to form tapes and ribbons within seconds and forms fibrils and fibers with in 24 hours. It can grow to a significant length. Confocal microscopy and mass spectroscopy showed that the monomers P11-4 diffuses through the pores of demineralized enamel , where fiber formation is triggered and 3D matrix is formed. The micro tomography analysis of remineralized specimens found a remineralisation upto 90% of original enamel density . In vitro studies have shown the effect of P11-4 for Ca2+ ions and its action as a nucleator for de-novo hydroxyappetite formation enabling stable bridge binding of the new regenerated enamel to the tooth hard tissue. P11-4 diffuses beyond the volume of the carious lesion and after the formation of fibers is complete ,the fibers seems to occupy the observed lesion.Once the product is applied on the surface of tooth the fibers can bind to the tooth via Ca2+ binding sites to aprismatic HA crystal on the surface of the tooth.

**The role of self assembling peptide for occlusal initial caries**

Because of infra-occlusion position of erupting permanent molars and covering of gingiva over the occlusal surfaces in partially erupted teeth sealing with sealants poses a problem. So the new solution to this problem is self assembling peptide matrix protein which has shown a significant reduction of caries post treatment with P11-4 fluoride varnish per laser fluorescence , a visual analog scale , the international caries detection and Assessment system (ICDAS) and the nyvad caries activity criteria . The P11-4 was applied according to manufacturer's instruction that showed clinically and statistically significant improvements observed after 3 and 6 months of its application. As the surface of the tooth which undergoes constant demineralization is not prismatic in structure the long axis of the hydroxyappetite crystal is available for binding , and the natural zeta- potential of the enamel surface seems to facilitate binding of these peptides. As a result the 3D matrix will bind into the tooth surface with multiple binding sites.

**The role of self assembling peptide matrix gel in dentinal hypersensitivity**

A layer of SAPM gel on the dentin surface, has a complete coverage of dentin tubules because of the SAPM has Ca2+ ions binding sites, the layer on the dentin surface is expected to attract Ca2+ from saliva forming hydroxyappetite crystals, resulting on a stronger, more stable layer that is less susceptible to abrasion .

Like any other pain, dentin hypersensitivity is subjective and patients perception of identical pain stimuli can be very different , as can be the effect of pain on daily life , on the other hand pain relief is also subjective and certainly not linear.

The use SAPM gel only occurs when DHS is present and pain acts a reminder. During sensitivity episodes , it is used multiple times within a short period of time (eg: twice daily for 1 week and stopped thereafter ) provided relief beyond its period of use as none parameters indicated increased pain and the VAS/VRS scores indicated continuous pain relief beyond its application , until the end of the trial.