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Editorial

Development of A Periodontal Regenerative Product

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Periodontitis is a very common adulthood inflammatory condition of the tooth supporting tissues namely periodontal ligaments, root cementum and alveolar bone. This common and prevalent condition leads in its late uncontrolled stages to total tooth loss due to the total destruction of tooth supporting tissues. Controlling the periodontal health and reconstruction of its lost tissues to regain the original architecture has become a demanding treatment to restore the tooth function and improve the quality of life. The available treatment options used until today such as scaling and root planning, open flap debridement, guided tissue regeneration, implantation of autograft, allograft or alloplastic materials, chemical root conditioning or their combinations, have not offered a reproducible dependable outcome and the clinical results vary widely and are often unpredictable. Giving restricted regeneration potentials and serious limitations.

Studies have shown that a variety of growth factors (GFs) can induce, enhance and support the healing and tissue reformation of the destructed periodontal tissues. Triggering the latent self-repair abilities of the patient own tissues through the recruiting and stimulation of the periodontal stem cells at the defect site. However, limitations in the development of a clinical off-the-shelf therapeutic form with sustain release of the effective ingredients are still to be overcome.

The knowledge of the role of these GFs in the regeneration of the periodontium has encouraged the scientists to investigate the effect of delivering concentrated amounts of them to the defect sites by a similar way of the body mechanism.

A recent way to deliver a concentrated dose of GFs to the site of injury is through the preparation of autologous platelet rich plasma (PRP) from the patient's own blood and its application at the defect site. It has been shown that it is rich in PDGF, TGF-b and IGF-I growth factors that are important GFs in the processes of wound healing and tissues regeneration of the periodontium. However, PRP loss its efficiency quickly when it is delivered as it is, as the GFs are released rapidly and their activity is lost in a short time. To maintain a sustain release of the GFs from PRP overtime and to keep their effectiveness over a longer period throughout the healing process. A carrier has to be developed to contain the GFs within its matrix and provide a controlled slow release of them as it degrades.

Thermo-sensitive and pH-sensitive hydrogels have gained a lot of interest in the biomedical applications. They are considered smart biomaterials. They offer the ability to be injected while in the sol state and gels at the body temperature or at the body pH forming a hydrogel in the injection site. This option offers less invasive surgeries, easy of application, no negative drawbacks such as local heating or toxic byproducts, no need for customized graft material as they can take the shape of the defects. Drugs can be loaded easily in the sol state, retained in the material as it gels and released slowly while the hydrogel degrade.

Many studies have investigated the use of these hydrogels combined with different types of GFs for enhanced healing and regeneration. However, the use of a single GF or two at most was the trend in most of the investigations. There is scarce in studies on the incorporation of platelet concentrate (GF concentrate) that can imitate the natural healing process in one easy applicable carrier. Finding a way to preserve the platelet bioactivity for a long term in one of these hydrogels is a challenge that needs some focus for its important potential [1-5].

Summary

Developing an off-the-shelf product that can be applied easily, offer sustain release of multiple GFs in periodontal defects in their natural ratios and can induce excellent regenerative results, is a demand in the medical field.

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