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Short Communication

The Use of Concentrated Growth Factor in Dentistry

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Abstract

Rapid development of new technologies in the field of medicine and dentistry caused formulation of innovative solutions. The latest and currently the most popular one is concentrated growth factor (CGF). The purpose of this paper is to provide information CGF and its usage in dentistry.

Keywords: Growth Factors; Concentrated Growth Factor (CGF); Dentistry

Introduction

Platelet concentrates for medical and dental use are autogenous regenerative preparations, obtained through the centrifugation of a blood sample of the patient. The initial production of platelet-rich plasma [1] was presented in 1998 and the second, platelet rich fibrin PRF [2], in 2000. Lastly, the CGF which was developed by Sacco [3], in 2006, obtained from blood samples through a simple and standardized separation protocol, by means of a specific centrifuge (Medifuge; Silfradent Srl, Sofia, Italy). The mechanism involves high quantities of growth factors in the platelets such as platelet-derived growth factor (PDGF), transforming growth factors ß-1 (TGF-β1), epidermal growth factor (EGF), fibroblast growth factor (FGF), insulin growth factor-I (IFG-I) and vascular endothelial growth factors (VEGF), which can stimulate cell proliferation, chemotaxis and angiogenesis [4].

CGF preparation

Venous blood samples are obtained from the patient and placed in a sterile 10-mL 2 blood tubes without anticoagulants. These tubes are then immediately centrifuged in a special centrifuge device (Medifuge; Silfradent Srl, Sofia, Italy) for 13 minutes. This device uses a special program: 2700 rpm for 2 minutes, 2400 rpm for 4 minutes, 2700 rpm for 4 minutes, and 3000 rpm for 3 minutes. At the end of centrifugation, the CGF is characterised by four phases;

1. A superior phase represented by the serum,
2. An interim phase represented by a fibrin buffy coat,
3. A liquid phase containing the growth factors,
4. The lower phase represented by the red blood cells.

CGF and Dentistry

CGF shows higher tensile strength, more growth factors, higher viscosity and adhesive strength than early generation platelet concentrates like PRF [5]. The autologous fibrin acts as a scaffolding material and as a reservoir to deliver certain growth factors at the site of application [6]. Moreover, it reduces postoperative complications such as pain, inflammation and morbidity [7]. According to the literature search, limited studies [8-12] regarding the effect of CGFs on periodontal ligament cells, in the treatment of bone defects and peri-implant bone defects, and on dental implant osseointegration have been identified.

Qiao., *et al.* [8] observed that addition of CGFs significantly improved clinical effectiveness of BPBM for human intrabony defect treatment. Gökmenoğlu., *et al*. [9] found the positive clinical impact of additional application of CGF with bone graft materials in treatment of bone defects. Similarly, Mirković., *et al.* [10] reported that application of concentrated growth factors is one of the possible methods for reconstruction of bone defects after removal of large jaw cysts.

Durmuşlar., *et al.* [11] evaluated the effects CGF on the healing of peri-implant bone defects in rabbits. In another study, Pirpir., *et al.* [12] reported that the concentrated growth factor had positive effects on implant stabilization and osseointegration.

Although there are many superiorities of this innovative technology, the authors whom conducted researches about CGF, emphasized that long-term, randomized, controlled clinical studies with larger sample sizes are needed to evaluate the clinical efficacy of CGF.

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Volume 2 Issue 5 May 2018