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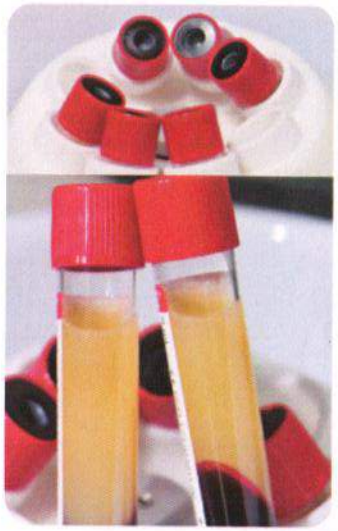
The Development of Concentrated Growth Factors (CGF)

The wound healing process is mediated by a wide range of intracellular and extracellular events. An interesting clinical option to optimize the healing of hard and soft tissue is using platelet concentrates called Concentrated Growth Factors (CGF).

Platelets contain high quantities of growth factors such as platelet-derived growth factor (PDGF), trans- forming growth factor-b1 (TGF-b1) and b2 (TGF-b2), fibroblast growth factor (FGF), vascular endothelial growth factor (VEGF), and insulin-like growth factor (IGF), which stimulate cell proliferation, matrix remodeling, and angiogenesis (Intini, 2009).

Numerous techniques have been developed using platelet concentrate to obtain different ratios of platelets, growth factors, leukocytes, and fibrin matrix.

The first generation of platelet concentrate was Platelet Rich Plasma (PRP). PRP has been used to accelerate tissue healing for a long time, however research has indicated that it has only a poor ability to induce cell proliferation/differentiation and in some cases may result in undesirable contradictory effects such as delayed wound healing due to the required use of additives in the blood collection tubes.



Choukroun then developed the second generation platelet concentrate protocol in order to overcome some of the potential downsides to PRP use - Platelet Rich Fibrin (PRF). Under this protocol, a patient's venous blood sample was taken without anticoagulant additives being used. After centrifugation at 3000 rpm (approximately 400 "g") for 10 minutes, three layers are formed in the tube: red blood cells at the bottom, acellular plasma on the top, and a clot of PRF between them. Unlike previous platelet concentrates, which showed a fibrin glue-like consistency and quickly dissolved when applied, PRF had a solid fibrin consistency and did not dissolve quickly, providing a matrix that contained a significantly higher concentration of platelets, leucocytes and growth factors which were able to induce skin regeneration much better – however this system has now been further refined to the current third generation and market leading process called Concentrated Growth Factors (CGF).

CGF was developed by Sacco in 2006 and is produced by centrifuging venous blood samples with a special centrifuge device (Medifuge, Silfradent srl, Italy), and without the use of additives in the blood collection tubes similar to PRF. However, the specialised centrifugation speed protocol with the Medifuge (variable rpm from 2400- 2700), permits the isolation of a much larger, denser fibrin matrix that is far richer and superior in the isolation of growth factors.

The specialised centrifugation protocol results in CGF having a superior regenerative capacity and versatility when compared to older generation protocols.

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