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### Transforming tissue repair into truly regeneration with L-PRF

Leukocyte/platelet-rich fibrin (L-PRF), a second-generation platelet concentrate for topical use, is an autologous blood-derived product, which can be obtained, quickly and at low cost. It is classified as one of the four families of platelet concentrates for surgical use and is, therefore, a different class of products than traditional PRPs. L-PRF is produced from peripheral, which is immediately centrifuged without any anticoagulant. Coagulation starts during the centrifugation according to a specific protocol (FDA approved and CE marking). After centrifugation a red blood cell base at the bottom, acellular plasma as a supernatant (platelet-poor plasma) and the L-PRF clot in-between can be observed. The latter, rich in fibrin, platelets ( $\pm 95\%$  of initial blood) and leukocytes ( $\pm 50\%$  of initial blood), can be transformed into a membrane of 1 mm in thickness by careful compression in a surgical box (Expression Box, IntraSpin System, Intra-lock, Boca Raton, USA). L-PRF membranes remain intact for more than 14 days in vitro (even more than 28 days in culture) and over 21 days in vivo. Due to a specific polymerization, architecture of the fibrin matrix and cell content they possess antibacterial effects. L-PRF appeared therefore as a very interesting biomaterial to enhance wound healing. As it was proven in vitro, the Intraspin/LPRF membranes with a special fibrin network, progressively release a significant amount of growth factors (e.g., transforming growth factor  $\beta 1$  (TGF $\beta$ -1), platelet-derived growth factor AB (PDGF-AB), vascular endothelial growth factor (VEGF), BMPs and insulin-like growth factors (IGF)), matrix glycoproteins (thrombospondin-1 (TSP-1)), fibronectin and vitronectin) and sequences of cytokines (e.g., IL-1 $\beta$ , IL-6, TNF- $\alpha$  and IL-4) for at least 7 days. The effects of L-PRF in vitro on cell cultures are very strong during at least 28 days, with a strong stimulation of proliferation of all tested cell lines (fibroblasts, pre-keratinocytes, preadipocytes, osteoblasts and mesenchymal stem cells) and also a stimulation of differentiation of bone cells. L-PRF membranes behave in vitro like a Human Living Tissue interacting in co-cultures with cells (with the release of the leukocytes from the membrane enhancing the environment to stimulate the M2 macrophage activity and this specific behavior reinforced the idea of using L-PRF membranes like a covering tissue graft in skin wounds. L-PRF can be considered as an autologous blood derivate living tissue graft. In this sense, L-PRF is a very simple treatment without any risk for the patient that could be tried in all cases. The possibility to use L-PRF as a biological scaffold by itself or associate with a biomimetic implant surface as open the opportunity to regenerate soft and hard tissue in such a way that was not possible before. The clinical, immune histochemistry and histological findings (SEM, Confocal Laser and Optical Microscopy) of our animals and humans studies over the last 14 years confirm the potential of L-PRF as a biological scaffold or as a living tissue graft for hard and soft tissue regeneration in acute or chronic wounds. We have been able to probe the potential of L-PRF as a regenerative biomaterial in chronic wounds such as: Diabetic foot, venous ulcers, osteomyelitis, and osteonecrosis by bisphosphonate. In acute wounds: Traumatic wounds and burns. The possibility to use L-PRF in regenerative procedures like bone or skin grafts had led to new treatment concepts affecting a broad spectrum of clinical conditions. What we thought impossible yesterday could be routine tomorrow, through the natural guided regeneration therapy with IntraSpin/L-PRF.

### Biography

Nelson R Pinto is the Founder and Chairman of the Research Center for Tissue Engineering and Regenerative Medicine in Concepcion, Chile, where for the past 30 years he maintained an active private practice specializing in Advance Oral Implantology. Currently, he is a Professor at the Universidad de Los Andes, Chile, Post-Graduate School of and Periodontics and Implantology and a Visiting Professor at the Department of Oral Health Sciences and Periodontology, University Hospitals Catholic University, Belgium. He is a world leading expert in L-PRF, soft and hard tissue regeneration and wound healing.

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