

# New advances in biological wound care and aesthetic medicine

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CONFLICT OF INTEREST:  
None

## Summary

Recalcitrant and indolent extremity ulceration remains a major challenge to ulcer clinics. Key cell involvement and repair in wound healing include fibroblasts, myofibroblasts and keratinocytes. Dysregulation of these key factors and aberrations of the extra-cellular matrix (ECM) result in pathologic and chronic ulceration. Cell therapy (i.e. platelets, keratinocytes and fibroblasts), together with growth factors (GF) and platelet-rich plasma (Regenlab® and Plateltex®) are valuable adjuncts to conventional or traditional surgical wound healing and care protocols. Topical application of natural therapeutic agents such as honey (L-Mesitran®) also favourably influence the wound healing process and this approach is strongly supported by quantification cell biology studies. Tisseel® Fibrin Sealant provides a stabilised matrix for ingrowing fibroblasts and therefore also plays an important role in wound healing. Plateltex®, a new generation, blood component activation kit, registered in EU countries as a medical device (CEO476), allows for rapid *ex vivo* platelet-gel generation in the side-room. Biological viable platelet and fibrin gel is available for topical application within 10 minutes. Exclusion criteria for topical treatment with platelet gel, platelet-rich plasma (PRP), and GF include residual neoplastic cells after resection in a wound bed. Quantification and advanced skin scanning technology demonstrate that autologous platelet-rich plasma (PRP), administered in the form of dermal facial mesotherapy, can ameliorate modest facial skin wrinkling in the short to medium term, and can be used as stand-alone therapy or in combination with RF, IPL or fractional non-ablative therapy. Topical application of autologous platelet gel eliminates the dangers of homologous blood products. The risk of infection after application of platelet gel is minimal, but contamination must be eliminated during the processing steps of PRP. Currently there is no clinical evidence that the GFs in platelet gels promote tumour growth or that they are involved in carcinogenesis.

## Etiopathogenesis of indolent ulceration: some cell biology aspects relevant to chronicity of surgical wounds

Factors that commonly enhance chronicity of ulceration include: neglected wound care, unhygienic conditions, ulcer position and size, infection, slough and exudate, ischaemia, ulcer depth, foreign bodies, presence of necrotic tissue, underlying osteitis, diabetes mellitus, and chronic venous insufficiency (venous leg ulcers).

Cell biology factors associated with slow or non-healing of venous and diabetic foot ulcers include:

- Dysfunction of mesodermal fibroblasts and abnormal migration of epidermal keratinocytes (i.e. venous stasis ulcer fibroblasts)

- Local over-expression of matrix proteins (i.e. fibronectin)
- Disturbance of fibroblast PDGF (alpha and beta) receptors
- Disturbance of VEGF-A mediated interactions
- Disturbance of cytoskeleton-actin in the cell cytocavitary network, resulting in reduced motility or cell locomotion (a characteristic of senescence and reduced growth capacity of cells (fibroblasts))
- Disturbance in extra-cellular signal transduction mechanisms (MAPK-ERK) (Researchers at Boston University have shown, during 2006, that venous ulcer exudates directly inhibit the MAPK-ERK pathway, producing negative trophic factors that effect fibroblast proliferation and ulcer healing.<sup>1</sup>)