
BIOPHYSICAL THERAPEUTIC APPROACHES IN THE AUSTRIAN CLUSTER FOR TISSUE REGENERATION

Heinz Redl, Peter Slezak, P. Dungal

The Austrian Cluster for Tissue Regeneration, Vienna, Austria
Ludwig Boltzmann Institute for Experimental and Clinical
Traumatology/AUVA Research Center, Vienna, Austria

One of the central research points of the Austrian Cluster for Tissue Regeneration are the underlying mechanisms of shockwave and light therapy that lead to remarkable and beneficial outcomes in tissue regeneration. For almost 30 years, extracorporeal shock wave therapy has been clinically implemented as an effective treatment to disintegrate urinary stones. This technology has also emerged as an effective noninvasive treatment modality for several orthopedic and traumatic indications including problematic soft tissue wounds. Delayed/nonhealing or chronic wounds constitute a burden for each patient affected, significantly impairing quality of life. Intensive wound care is required, and this places an enormous burden on society in terms of lost productivity and healthcare costs. Therefore, cost-effective, noninvasive, and efficacious treatments are imperative to achieve both (accelerated and complete) healing of problematic wounds and reduce treatment-related costs. Several experimental and clinical studies show efficacy for extracorporeal shock wave therapy as a means to accelerate tissue repair and regeneration in various wounds. However, the biomolecular mechanism by which this treatment modality exerts its therapeutic effects remains unclear. Potential mechanisms include initial neovascularization with ensuing durable and functional angiogenesis. Furthermore, recruitment of mesenchymal stem cells, stimulated cell proliferation and differentiation, and anti-inflammatory and antimicrobial effects as well as suppression of nociception are considered important facets of the biological responses to therapeutic shock waves.