Wound therapy

Wound healing is a complex and dynamic process that involves modifying the wound environment depending on the patient's health status. Scar formation depends on many factors that influence wound healing, are important to bear in mind because most of the negative factors involved can be stopped by implementing an adequate treatment. The consensus in wound therapy recommends dressings that should keep a moist and alkaline environment thus creating a protective barrier against mechanical stress and secondary infections, in view of promoting granulation.

Some studies have shown that separate administration of vascular endothelial growth factor (VEGF) or Stromal cell-derived factor-1α (SDF-1α) exhibited a therapeutic effect in promoting angiogenesis in the wound healing process. In a study of Long et al., a collagen membrane is prepared as a drug delivery scaffold to investigate whether the combined administration of SDF-1α and VEGF has a synergistic therapeutic effect on diabetic wound healing. They specifically fused a collagen-binding domain (CBD) with SDF-1α and VEGF separately, and sustained release of the two recombinant proteins from the collagen scaffold is successfully observed. Meanwhile, when a CBD-VEGF and CBD-SDF-1α co-modified scaffold is implanted in a diabetic rat skin wound model, it not only shows a synergistic effect in facilitating angiogenesis but also reduces inflammation in the short-term. Moreover, long-term results reveal that the co-modified scaffold is also able to enhance rapid wound healing, promote blood vessel regeneration, and assist cell proliferation, re-epithelialization, and extracellular matrix accumulation. Taken together, the study indicates that the CBD-VEGF and CBD-SDF-1α co-modified scaffold helps in quick recovery from chronic diabetic wounds by coordinating angiogenesis and inflammation [1].

Berce et al. aimed to synthesize a polymer-based sponge containing chitosan-sodium hyaluronate-resveratrol (CHR) and to evaluate its regenerative potential. The process of synthesizing the CHR polymer was described before microtomography analysis was conducted and the density and porosity of the obtained sponges was assessed. The cytotoxicity was evaluated in vitro. By undertaking the in vivo testing of the CHR polymer, we aimed to determine the CHR sponge's potential to stimulate tissue regeneration after inflicting a controlled, reproducible and measurable skin wound in an animal model. Skin punch biopsies were harvested from the healed area and were subjected to histopathological evaluation. The results obtained in this study confirmed that this polymer accelerates the formation of granulation facilitating wound healing, while also achieving a bacteriostatic outcome [2].

Negative pressure wound therapy

see Negative pressure wound therapy

1)
Long G, Liu D, He X, Shen Y, Zhao Y, Hou X, Chen B, OuYang W, Dai J, Li X. A dual functional collagen scaffold coordinates angiogenesis and inflammation for diabetic wound healing. Biomater Sci. 2020 Oct 7. doi: 10.1039/d0bm00999g. Epub ahead of print. PMID: 33025970.
2)

Berce C, Muresan MS, Soritau O, Petrushev B, Tefas L, Rigo I, Ungureanu G, Catoi C, Irimie A, Tomuleasa C. Cutaneous wound healing using polymeric surgical dressings based on chitosan, sodium hyaluronate and resveratrol. A preclinical experimental study. Colloids Surf B Biointerfaces. 2017 Dec 21;163:155-166. doi: 10.1016/j.colsurfb.2017.12.041. [Epub ahead of print] PubMed PMID: 29291501.