CONCLUSIONS: Diabetic wounds are more prone to infection than non-diabetic wounds. Inoculation with S. aureus created a sustained infection in diabetic wounds and caused significant wound healing delay. Expression of human Beta-Defensin-3 showed no sustained antibacterial effect but improved wound healing by 25% in infected diabetic wounds.

Gene transfer of insulin-like growth factor (IGF-1) improves wound healing in diabetic full-thickness porcine wounds

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INTRODUCTION: Wound healing is delayed in diabetic patients. Diminished growth factor secretion is one of the causes. The aim of this study was to investigate whether IGF-1 gene therapy in diabetic wounds could improve wound healing.

METHODS: Full thickness wounds were created on the dorsum of diabetic (streptozotocin-induced) pigs. Wounds were kept in a wet environment through the application of wound chambers. The wounds were transplanted with suspensions of either IGF-1 transfected autologous keratinocytes or non-transfected autologous keratinocytes. Wound reepithelialization and contraction were measured. IGF-1 concentration was measured daily.

RESULTS: Diabetic wounds transfected with IGF-1 expressing keratinocytes showed 900-fold higher IGF-1 concentrations (457 ng/ml) than keratinocytes control wounds (0.51 ng /ml) and 100-fold higher concentrations than non diabetic pigs (4.5 ng/ml). Wounds transfected with IGF-1 expressing keratinocytes showed 82% reepithelialization on day 12, whereas the non-transfected keratinocytes group showed 58% ($p = 0{,}006$). Saline-treated control wounds showed a 32 % reepithelialization rate.

CONCLUSIONS: Keratinocytes served as an efficient vehicle to deliver IGF-1 into diabetic porcine full-thickness wounds. IGF-1 gene delivery improved the rate of healing.

Hyaluronate-iodine (hyiodine) complex in the treatment of non-healing wounds

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INTRODUCTION: Hyiodine is a complex approved in the European Union, composed of hyaluronate and iodine. Combining these two agents has the potential to facilitate wound healing through synergy.

METHODS: Hyiodine soaked dressings were applied to non-healing wounds in three patients every other day. Patients were monitored in the wound clinic weekly. Measurements of the wound area and depth, and digital photography were used to document wound progression.

RESULTS: The first patient had a 9.9 cm2 to 3.5 cm2 wound regression over 27 weeks with hyiodine. A 28 cm2 to 1.8 cm2 reduction was noted in the second patient's wound over 16 weeks. The third patient had four lower extremity wounds, two of which were chronic. Hyiodine was compared with Papain-Urea in the treatment of these wounds and the data were analyzed using student's t-test. The regression in the chronic wounds using hyiodine (190.4 cm2 to 60.5 cm2) was compared to Papain- Urea (41 cm2 to 21.12 cm2) over 11 ½ weeks, $t = 0.008$. Similarly, regressions in the newly developed wounds over 7 weeks were compared; Hyiodine (50 cm2 to 27.36 cm2) versus Papain- Urea (11.16 cm2 to 9.92 cm2) $t = 0.00002$.

CONCLUSIONS: Enhanced and accelerated wound healing was noted in this pilot study, which is believed to be induced by the combination of hyaluronate, a molecule with immune cell activation, angiogenic properties and strong water affinity, and iodine, a molecule with strong antimicrobial activity. An expanding study is currently in progress.

Influence of material components on cellular proliferation and vascualrity of microdformational wound therapy (MDWT)

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INTRODUCTION: The micro-deformational wound therapy dressing (MWT) often referred to as Vacuum Assisted Closure (V.A.C.) has been a major advance in wound healing yet its mechanism of action is poorly understood. We studied the impact of each MWT component on wound healing and investigated the time dependent effects of its application.

METHODS: Full thickness skin wounds in db/db mice were treated for 12 hours and 7 days with the composite MWT or its single components (polyurethane ether foam with (PUF-C) and without compression (PUF), suction (S), or occlusive dressing (C)). At the end of each period the wounds were analyzed for wound closure, micro and macro-deformation, and also stained with PECAM-1, Ki67 and H&E to quantify vasculature, proliferation, granulation tissue formation, and morphology.

RESULTS: MWT caused wound bed undulations causing up to 20% wound surface strain. Faster wound closure was observed after 12-hour MWT application. The MWT treatment, both for 7 days and 12 hours, increased cell proliferation (4.5 fold increase) compared to all other groups. Polyurethane foam contact increased microvessel density in the wound bed. 12-hour MWT and PUF treatments increased granulation tissue formation compared to all other groups.