

Sirt1 Gene Delivery to Improve Wound Healing

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Technology description

Novel gene therapy delivered from a hydrogel wound dressing (Nanonets™) augments Sirt1 expression to improve wound healing #biomedical #therapeutics #woundhealing #genetherapy

BACKGROUND

Chronic wounds such as non-healing diabetic foot ulcers are a great challenge for the physician and contribute to increasing healthcare costs. Others have attempted to improve chronic wound healing by autologous skin transplantation, tissue-engineered human skin equivalents, bone marrow-derived cells or lineage commitment of stem cells to the keratinocyte lineage, and delivery of drugs. One currently marketed product delivers recombinant platelet-derived growth factor to the wound bed, but it has significant side effects, including cancer.

ABSTRACT

Northwestern scientists have developed a novel gene therapy to improve healing of chronic wounds, which combines Sirt1 expressing lentiviruses with a hydrogel wound dressing. Sirt1 is a histone deacetylase whose expression is decreased in the skin of diabetic mice and this phenomenon is thought to contribute to a slow wound healing phenotype. Prof. Ameer and colleagues have combined the Nanonets™ technology with Sirt1-expressing lentiviruses. This composite material was able to significantly improve wound healing in the diabetic mouse model over the course of 21 days, while also reducing inflammation and scarring. Expression of the Sirt1 transgene was sustained over 6 weeks, indicating that this invention has the potential to become a simpler and less labor-intensive alternative to current wound management protocols.

Publications

Jian Yang, Robert van Lith, Kevin Baler, Ryan A. Hoshi, and Guillermo A. Ameer. A Thermoresponsive Biodegradable Polymer with Intrinsic Antioxidant Properties. *Biomacromolecules*, 2014, 15 (11), pp 3942–3952. DOI: 10.1021/bm5010004

Application area

- Diabetic foot ulcer treatment
- Vascular graft improvement
- Research reagent

Advantages

- Inexpensive
- Reduced scarring and inflammation

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