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Effect of NASA light-emitting diode irradiation on molecular changes for wound healing in diabetic mice.

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OBJECTIVE: The purpose of this study was to assess the changes in gene expression of near-infrared light therapy in a model of impaired wound healing.

Background Data: Light-Emitting Diodes (LED), originally developed **for NASA** plant growth **experiments in space**, show promise for delivering light deep into tissues of the body to promote wound healing and human tissue growth. In this paper we present the effects of LED treatment on wounds in a genetically diabetic mouse model.

MATERIALS AND METHODS: Polyvinyl acetal (PVA) sponges were subcutaneously implanted in the dorsum of BKS.Cg-m +/+ Lepr(db) mice. LED treatments were given once daily, and at the sacrifice day, the sponges, incision line and skin over the sponges were harvested and used for RNA extraction. The RNA was subsequently analyzed by cDNA array.

RESULTS: Our studies have revealed certain tissue **regenerating genes** that were **significantly upregulated** upon LED treatment when compared to the untreated sample. Integrins, laminin, gap junction proteins, and kinesin superfamily motor proteins are some of the genes involved during regeneration process. These are some of the genes that were identified upon gene array experiments with RNA isolated from sponges from the wound site in mouse with LED treatment.

CONCLUSION: We believe that the use of NASA light-emitting diodes (LED) for light therapy will **greatly enhance** the **natural wound healing process**, and **more quickly** return the patient to a preinjury/illness level of activity. This work is supported and managed through the **Defense Advanced Research Projects Agency (DARPA) and NASA Marshall Space Flight Center-SBIR Program.**

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