Low-Level Light Stimulates Excisional Wound Healing in Mice

Tatiana N. Demidova-Rice, BS,1,2 Elena V. Salomatina, BS,1 Anna N. Yaroslavsky, PhD,1,3 Ira M. Herman, PhD,2* and Michael R. Hamblin, PhD 1,3,4**

1Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, Massachusetts 02114
2Graduate Program in Cell Molecular and Developmental Biology, Sackler School of Graduate Biomedical Sciences, Tufts University School of Medicine, Boston, Massachusetts 02111
3Department of Dermatology, Harvard Medical School, Boston, Massachusetts 02115
4Harvard-MIT Division of Health Sciences and Technology, Cambridge, Massachusetts 02139


Abstract

**Background:** Low levels of laser or non-coherent light, termed low-level light therapy (LLLT) have been reported to accelerate some phases of wound healing, but its clinical use remains controversial.

**Methods:** A full thickness dorsal excisional wound in mice was treated with a single exposure to light of various wavelengths and fluences 30 minutes after wounding. Wound areas were measured until complete healing and immunofluorescence staining of tissue samples was carried out.

**Results:** Wound healing was significantly stimulated in BALB/c and SKH1 hairless mice but not in C57BL/6 mice. Illuminated wounds started to contract while control wounds initially expanded for the first 24 hours. We found a biphasic dose–response curve for fluence of 635-nm light with a maximum positive effect at 2 J/cm2. Eight hundred twenty nanometer was found to be the best wavelength tested compared to 635, 670, and 720 nm. We found no difference between non-coherent 635_15-nm light from a lamp and coherent 633-nm light from a He/Ne laser. LLLT increased the number of a-smooth muscle actin (SMA)-positive cells at the wound edge.

**Conclusion:** LLLT stimulates wound contraction in susceptible mouse strains but the mechanism remains uncertain.