

Effect of polarized light emitting diode irradiation on wound healing.

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Source

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Abstract

BACKGROUND:

We propose a new phototherapy using polarized light from light emitting diode (LED). The purpose of this study is to clarify the effect of polarized LED irradiation on wound healing.

METHODS:

Five groups were classified: control (C), unpolarized (U), linearly polarized (L), right circularly polarized (RC), and left circularly polarized (LC) LED irradiation. In vitro study, fibroblast cell cultures were irradiated, and cellular proliferation was evaluated with a WST-8 assay. In vivo study, full-thickness skin defect of 20 mm diameter was created on the dorsal side of rats. The ratio of the residual wound area was measured, and expression of type 1 and type 3 procollagen mRNA in granulation tissue was determined by real-time reverse transcription polymerase chain reaction method.

RESULTS:

The cellular proliferation rates of group RC and L were significantly higher than other groups. The ratio of the residual wound area of group RC and L was significantly reduced than group C and U. Expression of type 1 procollagen mRNA in group RC was found to be significantly increased about 1.5-fold in comparison with the group C. There were no significant differences for type 3 procollagen.

CONCLUSIONS:

The right circularly polarized light and linearly polarized light promoted the process of wound healing by increasing the proliferation of fibroblasts, and the right circularly polarized light increased the expression of type 1 procollagen mRNA. The effectiveness of right circularly polarized light suggests that some optical active material, which has a circular dichroic spectrum, takes part in a biochemical reaction.

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