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Light therapy by blue LED improves wound healing in an excision model in rats.

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Abstract

BACKGROUND: Low level light therapy (LLLT) is an attractive alternative to enhance wound healing. So far most studies are performed with red or infrared irradiation. However, we recently showed that blue light (470 nm) can significantly influence biological systems, improving perfusion by release of nitric oxide from nitrosyl complexes with haemoglobin in a skin flap model in rats. Here, we compared the effects of blue and red low level light by light-emitting diodes (LEDs) on in vivo wound healing in an excision wound model in rats.

METHODS: Circular excision wounds were surgically created on the dorsum of each rat. Excisions on either the left or right side were illuminated post-OP and on five consecutive days for 10 min by LED at 470 nm or 630 nm with an intensity of 50 mW/cm², while protecting the contralateral side from exposure. In the control group, neither side was illuminated. On day 7 post-OP, we analysed planimetric and histological parameters, as well as expression of keratin-1, keratin-10 and keratin-17 on mRNA level.

RESULTS: Illumination substantially influenced wound healing. Blue light significantly decreased wound size on day 7, which correlated with enhanced epithelialisation. Light also affected mRNA expression. Both wavelengths decreased keratin-1 mRNA on day 7 post-OP, while keratin-10 mRNA level was elevated in both light treated group compared to control. Keratin-17 mRNA was also elevated in the red light group, but was unchanged in the blue light group.

CONCLUSION: In contrast to previous studies, we showed that also blue light significantly influences wound healing. Furthermore, our data suggest that light therapy can play an important role in normotrophic wound healing by affecting keratin expression. Illumination would provide an easily applicable, safe and cost-effective treatment of surface wounds.

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