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The Comparison of Effects between Pulsed and CW Lasers on Wound Healing

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ABSTRACT

Objective: **In order to evaluate the effects of pulsed continuous wave (CW) laser and detect the role of wound healing in rats using both pulsed and CW 635-nm low-level laser therapy (LLLT), a pilot study was undertaken.** ***Background Data*****: Some acceleration effects of wound healing on animals were found after treatment using various lasers with CW. There are other reports, however, using pulsed CW laser to evaluate the effects of wound healing in rats.** ***Materials and Methods:*** **An elliptic wound was created aseptically with a scalpel on the shaved back of the rats after anesthesia. The rats treated were restrained in a Plexiglas cage without anesthesia during the laser irradiation period. An Erchonia pulse laser (635 nm) was used in the experiment. The laser beam was delivered through an expander. The percentage of relative wound healing was calculated.** ***Results:*** **The percentage of relative wound healing was 4.32 in 100 Hz, 3.21 in 200 Hz, 3.83 in 300 Hz, 2.22 in 400 Hz, 1.73 in 500 Hz and 4.81 in CW.** ***Conclusion:*** **LLLT using pulsed, CW laser at the appropriate dosimetry and frequency can provide acceleration in wound healing in rats. The 100-Hz frequency had a better effect than other pulse frequencies used in the study. The effects of treatment using CW laser was higher than pulse frequency. The frequency of pulsed CW laser was not found to increase wound healing in rats compared with normal CW laser, as reported in our previous studies.**

INTRODUCTION

In the course of the past two decades, many studies have been conducted to investigate wound using low-level laser therapy (LLLT).[1] The basic tenet of laser therapy is that monochromatic laser light has a wavelength-dependent capability to affect cellular behavior in the absence of significant heating.

Some experiments have found that visible irradiation stimulates capillary growth and granulation tissue formation. Other reports show altered keratinocyte motility and fibroblast movement following irradiation.[2] Animal studies that show some improvement after treatment, particularly in the earliest phases of wound healing, have been reported following laser irradiation.[3] Many studies comparing the effects of lasers using visible and near-infrared wavelengths have shown the best results with visible wavelengths.[4–7] There are fewer reports, however, using pulsed continuous wave (CW) lasers on animals. The aim of this pilot study was to evaluate the effects of pulsed CW laser and detect the role of wound healing in rats using both pulsed and CW 635-nm LLLT.

MATERIALS AND METHODS

Animals

Fourteen male Sprague-Dawley rats, weighing 336–440 g (382.6 ± 31.3 g) were utilized. After anesthesia with Ketalor (up to 50 mg/kg) and Xylocaine (up to 20 mg/kg) IP, the surgical site was shaved, then a hair removal lotion was applied to cleanse the skin of excess hair, to minimize reflection losses. The site was then disinfected with an isopropyl alcohol swab. An elliptic full-thickness skin wound (mean area = 1.04 cm^2) was created aseptically with a scalpel on the shaved back of the animal in the gluteus maximus region. All animals with wounds were divided randomly into treatment group ($n = 12$) and control group ($n = 2$) on the basis of the experimental process designated. The elliptic skin wound in our earlier studies[8] showed that there was faster healing with this type than with control (Table 1). In order to shorten the time of wound healing for more experimentation, we chose the elliptic skin wound for this study.

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