

## The Role LLLT in the Management of Skin Graft Donor Site

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### Abstract

It is well known that LLLT has role in the wound ed preparation of ulcers, but the role of LLLT in healing delayed healing skin graft donor sites has very scanty data. In this article we sharing our experience of treating a skin graft donor site which was showing delay in healing.

**Keywords:** Skin grafting; Donor site; Delayed healing; LLLT.

### Introduction

Adult wound healing comprises of three stages: the inflammatory phase, the proliferative phase, and the re-modelling phase. These 3 stages have to occur in sequentially to result in healing of wound. Any factors that hinder the progression of these phases can result in delay in the healing of any wound. The LLLT is a modality with known benefit in wound bed preparation of any ulcer. But the data about its role in the management of delayed healing skin graft donor site is scanty. The LLLT was applied in 4 sessions to a delayed healing skin graft donor site.

### Materials and Methods

This study was conducted in the department of Plastic Surgery at tertiary care center after getting the departmental ethical committee approval.

Informed written consent was taken from the patient. The details of the patient in study are as follows: A 36 years old female with no known co morbidities with h/o road traffic accident 8 months back and underwent right below knee amputation due to vascular injury and degloving injury of the left lower limb for which serial debridement and splint thickness grafting over the raw areas, she now has non-healing ulcers over the graft donor site (Fig. 1). It was being treated with conventional wound bed preparation methods, but as it was still not healing it was decided to give a course of LLLT therapy adjunct with conventional treatments.

LLLT was given to the wound bed in four session sessions, once a week for a total of four session, after each session of wound inspection and dressing (Fig. 2). Gallium Arsenide (GaAs) diode red laser (wavelength 650 nm, frequency 10 kHz and output power 100 mW) was used as a source of LLLT. It is a continuous beam laser with an energy density of 4 J/cm<sup>2</sup>. Machine delivers laser in scanning mode (non-contact delivery) with 60 cm distance between laser source and wound. In each session, the wound was given laser therapy for duration of 125 second followed by non-adherent absorbent dressing.

### Result

The skin graft donor site healed well after four sessions of LLLT with good stable scar (Fig. 3).



Fig. 1: Donor site with RAW areas.



Fig. 2: DLLLTL being applied.



Fig. 3: Donor site healed completely

## Discussion

LLLT means Low level Laser Therapy. Low level Laser uses energy much less than that is used for cutting, ablation therapy. By definition Low-level lasers are one with power density less than 500 mW/cm<sup>2</sup>.<sup>1,2</sup> LLLT is used as an adjuvant to conventional therapy with promising results, in patients with ulcers.<sup>3</sup> LLLT is a form of phototherapy that use electromagnetic radiation. LLLT does not generate heat but produces photochemical and photophysical effects, with the intention of re-establishing cell homeostasis. Essentially, light energy is delivered topically in a controlled, safe manner and it is absorbed by photo-absorbers (chromophores) that transform it into chemical energy.<sup>4</sup>

Positive effects of LLLT are: It accelerates tissue repair, increases the formation of granulation tissue, helps in wound contraction, decreases inflammation, modulation, and it also helps in pain reduction.<sup>5</sup>

According to the literature, low-energy photoemissions given at a wavelength range of 600nm to 900nm accelerates cell proliferation and wound healing processes.<sup>6</sup> Its action is thought to: Stimulate respiratory chain components such as flavin and cytochromes which increase adenosine triphosphate (ATP) synthesis,<sup>7</sup> thus enhancing the rate of mitoses and increasing fibroblast numbers<sup>8-12</sup>, Stimulate collagen and elastin production, leading to better reepithelialisation<sup>13</sup>, Stimulate microcirculation and dilatation of the capillaries and neovascularisation to increase tissue oxygenation<sup>14</sup>, Liberate mediator substances such as histamine, serotonin and bradykinin to influence macrophages, Regenerate lymphatic vessels.

## Conclusion

It is well established fact that LLLT is beneficial in the management of ulcers. It is now found to have role in the management of donor site which was showing delay in healing. But limitation of the study is, it was done on a single patient and needs large randomized control trials to draw a conclusive inference.

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