



## Low level Light Therapy - Direction of Irradiation for Orthodontic Movement and Reduction of Pain

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Mester, et al. stated that the effect of low energy laser conforms to the Arndt-Schultz law [1]. Low Level Light Therapy may be in the form of laser or LED light. Huang, et al. mentioned that the number of instances of biphasic dose response reported in the Low Level Light Therapy was increasing as time passes [2]. Most studies did not mention which layer or depth was the target irradiation tissue [3].

A systematic literature review concluded that it seems to have a demonstrated efficacy of Low Level Laser on orthodontic movement and pain control after activation in humans, but further studies are warranted to determine the best protocols with regard to energy and frequency [4].

The Low Level Laser devices usually irradiate to both buccal and palatal / lingual direction for acceleration of tooth movement [5-11] and reduction of pain after activation [12-16]. Some investigators designed the studies using Low Level Light in the form of a mouthpiece panel for the acceleration of the tooth movement, but the irradiation was only from the buccal to the lingual/palatal direction [17,18]. Lim, et al. [19] and Turhani [20] irradiated only 1 point from buccal to test the effectiveness of Low Level Laser on reduction of pain after orthodontic activation.

A study used a set of four extra-oral treatment arrays, each with a flexible printed circuit board and a set of LEDs to irradiate from buccal only to test the effectiveness of photobiomodulation for orthodontic alignment [21]. The patient can put it on and thus reduce the time for transportation and the cost.

Some studies investigate the thickness of soft tissue [22,23] and alveolar bone [22-27]. Guiselini, et al. evaluated the effective transmission of light through alveolar bone [28,29]. E.g. Of the central incisors, 77% of all sites had a buccal thickness of 0.5 mm - 1 mm, and 23% had a thickness of 1.0 - 1.5 mm. Of the lateral incisors, 71% of sites less than 1 mm [23]. Such information can give us an idea of the range of depth that the light should pass through and act on.

The biphasic nature of Low Level Light Therapy raises a concern of how deep the light pass through with the intended function i.e. to stimulate or to inhibit the target cell activities [3]. Whether the deeper part gain enough energy for photobiostimulation without photobioinhibitory effect in the superficial layer is an area of research interest.

For the one direction buccal to palatal/lingual irradiation protocol, the dosage of the irradiation to the target tissue at the palatal or lingual side after passing through the root could also be discussed. The penetration of red and infrared to dentine thus form another area of research interest. The effectiveness of treatment protocol of alternate irradiation from buccal and lingual/palatal direction at a period e.g. day 1, day 4, day 7 and 10 etc. could be studied for better application of Low Level Light Therapy.

### Declaration

The author is the director of Heal and Grow Low Level Light Therapy Limited.

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