



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

**Cecilia Young\***

Department of Dental Surgery, Physician Pharmacist People Health Magazine, Hong Kong

**\*Corresponding Author:** Cecilia Young, Department of Dental Surgery, Physician Pharmacist People Health Magazine, Hong Kong.

**Received:** June 14, 2018; **Published:** July 18, 2018

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.

### Bibliography

1. Mester, et al. "The biomedical effects of laser application". *Lasers in Surgery and Medicine* 5.1 (1985): 31-39.
2. Huang, et al. "Biphasic dose response in low level light therapy-an update". *Dose-Response* 9.4 (2011): 602-618.
3. Young, et al. "Low Level Light Therapy (LLLT): Penetration and Photobiomodulation" (2017).
4. Sousa, et al. "Systematic literature review: influence of low-level laser on orthodontic movement and pain control in humans". *Photomedicine and Laser Surgery* 32.11 (2014): 592-599.
5. Cruz, et al. "Effects of low-intensity laser therapy on the orthodontic movement velocity of human teeth: A preliminary study". *Lasers in Surgery and Medicine* 35.2 (2004): 117-120.
6. Doshi-Mehta Gauri and Wasundhara A Bhad-Patil. "Efficacy of low-intensity laser therapy in reducing treatment time and orthodontic pain: a clinical investigation". *American Journal of Orthodontics and Dentofacial Orthopedics* 141.3 (2012): 289-297.
7. Genc, et al. "Effect of low-level laser therapy (LLLT) on orthodontic tooth movement". *Lasers in Medical Science* 28.1 (2013): 41-47.
8. Limpanichkul W, et al. "Effects of low-level laser therapy on the rate of orthodontic tooth movement". *Orthodontics and Craniofacial Research* 9.1 (2006): 38-43.

9. da Silva Sousa, *et al.* "Influence of low-level laser on the speed of orthodontic movement". *Photomedicine and Laser Surgery* 29.3 (2011): 191-196.
10. Youssef, *et al.* "The effect of low-level laser therapy during orthodontic movement: a preliminary study". *Lasers in Medical Science* 23.1 (2008): 27-33.
11. Camacho AD and SA Cujar. "Acceleration effect of orthodontic movement by application of low-intensity laser". *Journal of Oral Laser Applications* 10 (2010): 99-105.
12. Artés-Ribas M, *et al.* "Analgesic effect of a low-level laser therapy (830 nm) in early orthodontic treatment". *Lasers in Medical Science* 28.1 (2013): 335-341.
13. Tortamano André, *et al.* "Low-level laser therapy for pain caused by placement of the first orthodontic archwire: a randomized clinical trial". *American Journal of Orthodontics and Dentofacial Orthopedics* 136.5 (2009): 662-667.
14. Angelieri, *et al.* "Effects of low intensity laser on pain sensitivity during orthodontic movement". *Dental Press Journal of Orthodontics* 16.4 (2011): 95-102.
15. Esper, *et al.* "The effect of two phototherapy protocols on pain control in orthodontic procedure-a preliminary clinical study". *Lasers in Medical Science* 26.5 (2011): 657-663.
16. Domínguez Angela and Sergio A Velásquez. "Effect of low-level laser therapy on pain following activation of orthodontic final archwires: a randomized controlled clinical trial". *Photomedicine and Laser Surgery* 31.1 (2013): 36-40.
17. Shaughnessy, *et al.* "Intraoral photo biomodulation-induced orthodontic tooth alignment: a preliminary study". *BMC Oral Health* 16.1 (2016): 3.
18. Samara Said A, *et al.* "Velocity of orthodontic active space closure with and without photo biomodulation therapy: a single-center, cluster randomized clinical trial". *Lasers in Dental Science* 2.2 (2018): 109-118.
19. Lim, *et al.* "A clinical investigation of the efficacy of low level laser therapy in reducing orthodontic post adjustment pain". *American Journal of Orthodontics and Dentofacial Orthopedics* 108.6 (1995): 614-622.
20. Turhani, *et al.* "Pain relief by single low-level laser irradiation in orthodontic patients undergoing fixed appliance therapy". *American Journal of Orthodontics and Dentofacial Orthopedics* 130.3 (2006): 371-377.
21. Kau, *et al.* "Photo biomodulation accelerates orthodontic alignment in the early phase of treatment". *Progress in Orthodontics* 14.1 (2013): 30.
22. Esfahanizadeh, *et al.* "Correlation Between Bone and Soft Tissue Thickness in Maxillary Anterior Teeth". *Journal of Dentistry (Tehran, Iran)* 13.5 (2016): 302.
23. Kim, *et al.* "New method of assessing the relationship between buccal bone thickness and gingival thickness". *Journal of Periodontal and Implant Science* 46.6 (2016): 372-381.
24. Fuentes, *et al.* "Assessment of buccal bone thickness of aesthetic maxillary region: a cone-beam computed tomography study". *Journal of Periodontal and Implant Science* 45.5 (2015): 162-168.
25. Jin, *et al.* "The thickness of alveolar bone at the maxillary canine and premolar teeth in normal occlusion". *Journal of Periodontal and Implant Science* 42.5 (2012): 173-178.
26. Park, *et al.* "The thickness of alveolar bone at the mandibular canine and premolar teeth in normal occlusion". *Journal of Craniofacial Surgery* 25.3 (2014): 1115-1119.
27. Ghassemian, *et al.* "The thickness of facial alveolar bone overlying healthy maxillary anterior teeth". *Journal of Periodontology* 83.2 (2012): 187-197.
28. Guiselini, *et al.* "Evaluation of Effective Transmission of Light Through Alveolar Bone: A Preliminary Study". *Journal of Lasers in Medical Sciences* 7.3 (2016): 159-162.
29. Guiselini, *et al.* "Pilot study on laser propagation in maxillary and mandibular bone: Grey level image analysis for optical measurements". *Photodiagnosis and Photodynamic Therapy* 18 (2017): 226-231.

#### Volume 2 Issue 8 August 2018

© All rights are reserved by Cecilia Young.