MEDWIN PUBLISHERS
Committed to Create Value for Researchers

Annals of Physiotherapy & Occupational Therapy
ISSN: 2640-2734

Mechanism of Non-Invasive Fracture Healing and Fracture Re-modelling via the use of Low-level Laser Therapy

David Ip*

Wellness Clinic, MBBS FRCS(Edin) Orth FHKCOS FHKCOS(Rehabilitation) FHKAM (Orth Surg), Hong Kong

***Corresponding author:** Ip David, Wellness Clinic, MBBS FRCS(Edin)Orth FHKCOS FHKCOS(Rehabilitation) FHKAM (Orth Surg), Hong Kong

Mini Review

Volume 9 Issue 3

Received Date: August 20, 2026

Published Date: September 25, 2026

DOI: 10.23880/aphot-16000293

Abstract

In recent years, the use of Low-level laser therapy has experienced a warm welcome in view of its safety record, and its support from eminent professors like Professor Hamblin. But in the field of physiotherapy, before we embark to use a physical therapy machine to treat a certain condition, physiotherapist need to know the mechanism of the physiotherapy modality used. This review focus on the use of LLLT in treatment & re-modelling fractures. As this topic might not be high-lighted enough in standard text, it is hoped that physiotherapists interested in the topic will find the discussion fruitful

Introduction

LLLT (low-level laser therapy) is a physical therapy modality whereby it acts by inducing a photochemical reaction in the cell, a process referred by Professor Hamblin of Harvard as "photo biomodulation" Photobiology works on the principle that when light hits certain molecules called chromophores, the photon energy causes electrons to be excited and jump from low-energy orbits to higher-energy orbits. LLLT not only energizes the injured cells but improves microcirculation via its action on the nitric oxide pathway and subsequent action on protein synthesis as well as gene activation [1].

It has been a well-known fact that the traditional use of painkillers in managing musculoskeletal pain in joint degenerations or other injury such as work accidents or automobile accidents are only symptomatic and not without side effects. Commonly used physiotherapy machines like ultrasound, trans-cutaneous electrical stimulation, do not have bio-modulation potential, whereas LLLT or low-level laser therapy has bio-modulation effect to aid in healing of various musculoskeletal structures, including tendon, bone, muscle, ligament or nerve injuries. An example of the use of LLLT in healing comminated fracture of the calcaneum can be seen in Figures 1 and Fig 2 shows the result of LLLT aided healing and re-modelling of the fracture after 1 year, with no loss of heel height and no operation needed. Figures 3 shows an adult with multiple rib fractures in traffic accident at presentation while Figure 4 shows the same chest cage after 1 year of LLLT treatment. Notice even the displaced fracture rib fragments healed and remodeled. Other advantages of using LLLT include it is safe from side-effects, as the author detected no side-effects after performing 80,000 LLLT pain treatments. LLLT is well tolerated even in children and the elderly. As LLLT has healing potential, patients with different musculoskeletal conditions recovered after LLLT seldom relapse, thus saves the patient needing long-term medications.

One commonly asked question is how can LLLT help remodel a displaced bony fracture. This is achieved firstly by increased cellular energy and metabolism of injured cells of the body tissues - as said, light photons stimulate cell mitochondria to produce more ATP thus aiding cellular repair and regeneration [2]; LLLT promotes local blood supply via the nitric oxide pathway [3] and promotes angiogenesis thus improving the blood and nutrient supply to the fracture;

what is more important is LLLT influences Both osteoblasts or cells that build bones as well as osteoclasts i.e. cells that remodel bone thus the process improves bone mineral density and tensile strength of the fracture.

Another commonly asked question is the mechanism whereby LLLT increases the amount of new bone formation. This is mediated via Gene Activation and resultant increased protein synthesis and production of BMP or bone morphogenetic proteins that are powerful growth factors (Figures 1-4).

Figure 1: The Figure shows Comminated Fractured Calcaneum.

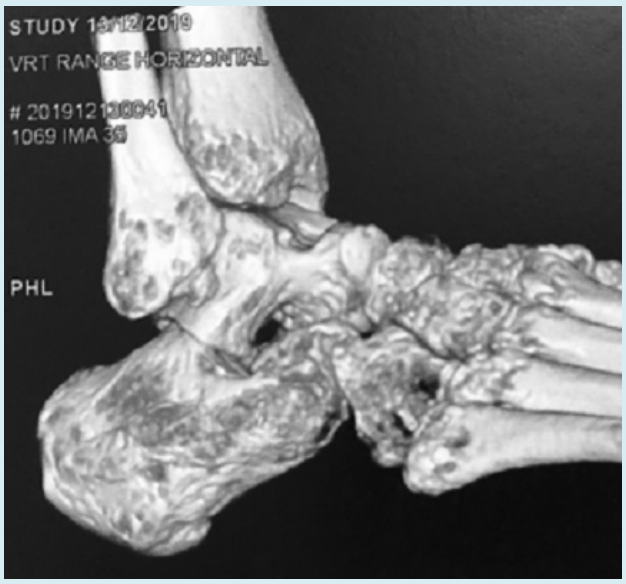

Figure 2: The Figure shows Healing of Fractured Calcaneum and Heel Height reconstituted after LLLT treatment.

Figure 3: Multiple Rib Fractures including displaced fragments in Chest Cage after Traffic Accident.

Figure 4: All Fractures Healed and Remodel after LLLT.

Copyright© David Ip.

Conclusion

LLLT can help to heal the fracture by production of new bone; but at the same time re-model the fracture. The process of re-modelling is of utmost importance since there is no use to create new bones if the bone is healed in a malformed alignment. The interested reader is advised to read the works of Professor Hamblin [4] of LLLT from Harvard University for more details.

References

1. Ip D (2016) Use of Low-Level Laser Therapy in Orthopaedics. 1st(Edn.), LAP LAMBERT Academic Publishing, Germany.

2. Ferraresi C, Beatriz K, Pinar A, Vanderlei S B, Michael RH et al.(2014). LLLT increases mitochondrial membrane potential and ATP synthesis in C2C12 myotubes with a peak response in 3–6 hours.

3. Photochem Photobiol 30: 91(2): 411-416

4. Yumi M, Nguyen J, Akens M, Moriyama EH, Lilge L (2009) In vivo effects of low-level laser therapy on inducible nitric oxide synthase Lasers Surg Med 41: 227-231

5. Hamblin M, Tanupriya A, Sousa MD (2016) Handbook of Low-level Laser Therapy. 1st(Edn.), Jenny Stanford Publishing.

Copyright© David Ip.

YOUR RESEARCH DESERVES GLOBAL VISIBILITY

• Publish • Discover • Share • Connect

MEDICAL	CLINICAL	LIFESCIENCES	PHARMA
90+ OPEN ACCESS JOURNALS		400+ RESEARCH TOPICS	

SUBMIT YOUR RESEARCH
Submit your manuscript through our online submission system.

REPRINTS
If you require a reprint of any article, please contact us. info@medwinpublishers.com

BECOME A REVIEWER
Share your expertise and contribute to scholarly publishing.

SCAN TO EXPLORE MEDWIN JOURNALS

• Journals • Submit Manuscript • Reviewer Program • Article Tracking

Our Journals indexed in

Embase® ELSEVIER | PubMed National Library of Medicine NLM | Crossref | Google Scholar | INDEX COPERNICUS INTERNATIONAL | ISSN INTERNATIONAL STANDARD SERIAL NUMBER INTERNATIONAL CENTRE | ROAD DIRECTORY OF OPEN ACCESS SCHOLARLY RESOURCES | EuroPub | Scilit | WorldCat® | Academic Resource Index ResearchBib | ADVANCED SCIENCE INDEX | INTERNATIONAL Scientific Indexing | ICMJE INTERNATIONAL COMMITTEE of MEDICAL JOURNAL EDITORS

This article published by **Medwin Publishers,** 28475 Witherspoon Dr, Novi, MI 48377, United States, +1-248-247-6042, WhatsApp +1 (248) 275-1133, info@medwinpublishers.com

© 2026, by the Authors. The articles published from this journal are distributed to the public under "**Creative Commons Attribution License**" (https://creativecommons.org/licenses/by/4.0/). Therefore, upon proper citation of the original work, all the articles can be used without any restriction or can be distributed in any medium in any form.