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Extended Abstract

Paradigm Shift in Health Enhancement by Management of Painful Conditions and Fractures via the Use of Non-invasive Low-level Laser Therapy (Lllt)

David Ip

Wellness Pain Centre, Hong Kong SAR China

Introduction

Pain is one of the most common reason for a doctor's visit world-wide. Very often, we are being prescribed pain killers, but if the response was slow, many a times more potent pain killers are being given which carry with it many side effects. One can see from the famous opoid crises reaching headline news in United States for example which act as a reminder that we should shy away from overuse of opoid type analgesics. One good alternative at least in the field of musculoskeletal related pain such as pain arising from injured nerves, tendons, ligaments, joints, such as from sports injuries, traffic accident injuries, or industrial injuries is via the use of non-invasive low-level laser therapy(LLLT). Furthermore, the above mentioned injuries can sometimes lead to bony fractures which, if relatively undisplaced, can also be treated by LLLT via non-invasive means. This of course is a blessing especially in pediatric patients since no parent like to see their child being subjected to surgical operation that involve lots of pain and suffering.

Special feature of LLLT

Low-level laser therapy (LLLT) is not new, for it was in use for 30-40 years in Europe, and more than 15 years in USA. In the past, some doctors and patients appear to have some hesitation in its acceptance presumably because earlier researches tend to report variable results using different protocols. The author has, over the past decade, reported on the success of employment of LLLT as a means of treating not only neural, tendon, and joint ailments; but more recently reported the remarkable healing power of LLLT in fresh fractures to the point that (at least in younger individuals) the fracture ends not only heal faster but in fact the angulation of the fracture can be corrected at the same time. This is the first time that a non-invasive physiotherapy machinery harbouring the concomitant effect of both healing the fracture as well as correction of fracture angulation without recouce to surgery. Figure 1 illustrates CT scan image of a young patient with fractured heel bone, Figure 2 showing healing of the heel bone After LLLT treatment for 3 months. The good thing about illustrating the effect of LLLT on fracture is that unlike claims of positive effects of injuured tendons, joints, nerves wherein one may be very skeptic of the good clinical outcome, the use of x-ray images or CT scan images help to provide more concrete evidence of the healing power of LLLT

Basic Science

Our body cells have structures inside the mitochondria called Cytochrome Oxidase which can absorb incipent LLLT irradiation and transfer this energy to usable energy of the cells and help heal the injured body cells which are often under oxidative stress. In addition, LLLT may have action on the nitric oxide pathway to help improve the local microcirculation of injured body tissues. The mechanism whereby LLLT reduce pain are not yet completely understood but include its endorphin like action, and NSAID (non-steroidal anti-inflammatory) actions, and its actions on the peripheral nerves. The reader is advised to read published works of Professor Hamblin from Harvard University if he is interested in knowing more about the mechanism of action of LLLT. The reader can also consider reading some of the works of the author on healing of fracture.

The role of Low Level LASAER Therapy in healing the fracture is concerned; in the past decade, abundant laboratory animal studies had elucidated the possible mechanism whereby LLLT enhances bone healing. The mechanism involved is manifold, including the induction of osteoblast formation and differentiation via increase in bone morphogenic protein BMP2-induced phosphorylation pathway. The same author Hirata also demonstrated that LLLT could stimulate BMPs-induced expression of type 1 osteonectin, octeocalcin mRNA and collagen. Lastly, other authors also demonstrated improvement in the mineralization process via enhanced IGF-1 and BMP production.

Versatility

LLLT not only has application in the field of Orthopedics, it has vast application in many other fields of medicine not within the scope of discussion in the current abstract, but at least include the field of dentistry, the field of head trauma, stroke; to name but a few examples

Safety

There are over 4000 published scientific papers on the topic of LLLT (nowadays a newer name coined by Professor Hamblin of Harvard University being "Photobiomodulation LED") and the great majority of research papers have reported no side effects.

Conclusion

There is a general world-wide tendency to move to more natural therapies in maintaining our health and well-being. One of the most useful natural therapy to heal pain and in fact to heal body tissue cells that are injured is via the use of low-level laser therapy (LLLT).