

The Role of High-Power Stealth Micro-Pulsed Laser Therapy in Treating Neuro-musculoskeletal Disorders

High Power-Micro-Pulsed Laser Therapy (HPMPLT) is classified as an actinotherapy meaning it results in a chemical and metabolic change in living tissue – this is called photo-biomodulation.

HPMPLT can facilitate the healing and regeneration of living tissue. HPMPLT has shown to inhibit scar tissue formation, at the same time, stimulating collagen, elastin and fibrocartilage growth. As a result, most tissues heal twice as strong as natural healing due to the lack of non-functional adhesions and scar tissue formation.

HPMPLT can also heal disc pathology. The outer 1/3 of the intervertebral disc is vascularized, HPMPLT can stimulate neo-capillary growth and fibroblast proliferation causing the disc to become more elastic and resilient. No other therapy or modality can achieve these desired effects.

Additionally, HPMPLT activates stem cells, as well as osteoblasts in bone. Fractures heal in half the time with less chance of non-union.

Today, High Power Micro-Pulsed Laser Therapy is considered the best and safest treatment available for nerve pathology. Photo-modulation with HPPLT causes increased intraneural blood flow and accelerated peripheral nerve regeneration – this translates into decreased numbness, tingling, pain and balance disturbances.

How and Where are Lasers used in Today's Medical Practice (1)

- A) **Laser as a stand-alone modality can treat the following conditions:** Nerve pain, arthritis (degenerative joint disease), neuropathy, non-healing wounds, and post-surgical healing to reduce pain and inflammation. Common conditions treated include: neck, shoulder and back pain, elbow and wrist pain, hip and knee pain, foot and ankle pain.
- B) **Laser as a non-pharmacologic option for pain management:** Physicians and patients alike are requesting non-opioid, non-invasive, safe and side-effect free solutions to treat acute and chronic pain.

(1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.

C) **Medical specialties utilizing laser therapy include:** Primary Care Physicians (MD/DO), Physical Medicine & Rehabilitation Specialists, Orthopedic Surgeons, Sports Medicine and Pain Management Physicians, Regenerative Medicine Specialists, Neurologists, Plastic Surgeons, Podiatrists, Chiropractors and Veterinarians.

Reference Materials

Below is a list of pertinent medical literature gleaned from Pub-Med supporting the use of laser therapy to treat neuro-musculoskeletal disorders:

1) Lasers Med Sci. 2015 Dec;30(9):2335-9. doi: 10.1007/s10103-015-1814-6. Epub 2015 Sep 29. ***Does addition of low-level laser therapy (LLLT) in conservative care of knee arthritis successfully postpone the need for joint replacement?*** Ip D¹.

2) J Lasers Med Sci. 2014 Autumn; 5(4): 163–170. PMCID: PMC4281990 PMID: 25653816. ***Effect of Low Level Laser Therapy on Proliferation and Differentiation of the Cells Contributing in Bone Regeneration.*** Reza Amid,¹ Mahdi Kadkhodazadeh,² Mitra Ghazizadeh Ahsaie,³ and Arian Hakakzadeh.^{3 1} Department of Periodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran² Department of Periodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran³ Gifted and Talented Dental Students Division, Students' Research Committee, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran Corresponding Author: Mitra Ghazizadeh Ahsaie, DDS; Gifted and Talented Dental Students Division, Students' research committee, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Copyright © 2014 J Lasers Med Sci.

3) Lasers Med Sci. 2015 Nov;30(8):2189-94. doi: 10.1007/s10103-015-1730-9. Epub 2015 Mar 13. ***Effect of low-level laser therapy on mesenchymal stem cell***

(1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.

proliferation: a systematic review. Ginani F¹, Soares DM², Barreto MP³, Barboza CA^{4,5}.

4) Pain Res Manag. 2016;2016:9163618. doi: 10.1155/2016/9163618. Epub 2016 Dec 20. **Effectiveness of High Intensity Laser Therapy for Reduction of Pain in Knee Osteoarthritis.** Angelova A¹, Ilieva EM¹

5) *Medicine (Baltimore)*. 2016 Aug;95(31):e4424. Doi 10.1097/MD.0000000000004424. **Effectiveness of low-level laser on carpal tunnel syndrome: A meta-analysis of previously reported randomized trials.** Li ZJ¹, Wang Y, Zhang HF, Ma XL, Tian P, Huang Y

6) J Back Musculoskelet Rehabil. 2018 Feb 6;31(1):191-196. doi: 10.3233/BMR-170793. **Efficacy of high intensity laser therapy in treatment of patients with lumbar disc protrusion: A randomized controlled trial.** Chen L^{1,1}, Liu D^{1,1}, Zou L¹, Huang J¹, Chen J¹, Zou Y¹, Lai J¹, Chen J¹, Li H¹, Liu G¹.

7) Am J Phys Med Rehabil. 2017 Jun;96(6):e97-e110. doi: 10.1097/PHM.0000000000000675. **Efficacy of Stellate Ganglion Blockade Applied with Light Irradiation: A Systemic Review and Meta-analysis.** Liao CD¹, Tsauo JY, Chen HC, Liou TH.

8) Appl Biochem Biotechnol. 2018 Sep;186(1):161-173. doi: 10.1007/s12010-018-2729-z. Epub 2018 Mar 12. **Efficiencies of Low-Level Laser Therapy (LLLT) and**

(1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.

Gabapentin in the Management of Peripheral Neuropathy: Diabetic Neuropathy.

Abdel-Wahhab KG¹, Daoud EM², El Gendy A², Mourad HH³, Manna FA³, Saber MM²

9) Sci Transl Med. 2014 May 28;6(238):238ra69. doi: 10.1126/scitranslmed.3008234.

Photoactivation of endogenous latent transforming growth factor- β 1 directs dental stem cell differentiation for regeneration. Arany PR1, Cho A2, Hunt TD3, Sidhu G3, Shin K4, Hahm E3, Huang GX3, Weaver J5, Chen AC6, Padwa BL7, Hamblin MR8, Barcellos-Hoff MH9, Kulkarni AB2, J Mooney D10

10) Lasers Surg Med. 2011 Jul;43(5):401-9. doi: 10.1002/lsm.21063. ***Induction of autologous mesenchymal stem cells in the bone marrow by low-level laser therapy has profound beneficial effects on the infarcted rat heart.*** Tuby H1, Maltz L, Oron U

11) J Transl Med. 2010; 8: 16. PMID: PMC2830167 Published online 2010 Feb 16. doi: [10.1186/1479-5876-8-16] PMID: 20158898 ***Lasers, Stem Cells, and COPD.*** Feng Lin,^{#1} Steven F Josephs,^{#1} Doru T Alexandrescu,^{#2} Fanela Ramos,¹ Vladimir Bogin,³ Vincent Gammill,⁴ Constantin A Dasanu,⁵ Rosalia De Necochea-Campion,⁶ Amit N Patel,⁷ Ewa Carrier,⁶ and David R Koos¹

12) ***Laser Light - A New, Non-invasive Treatment for Erectile Dysfunction: A Placebo-controlled, Single Blinded Pilot Study:*** Y. Yacobi M.D., A. Sidi M..D. Department of Urologic Surgery, The Wolfson Medical Center, Holon, Israel

13) Stem Cells International Volume 2015, Article ID 974864, 12 pages <http://dx.doi.org/10.1155/2015/974864> ***Review Article Low Reactive Level Laser***

(1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.

Therapy for Mesenchymal Stromal Cells Therapies Toshihiro Kushibiki, Takeshi Hirasawa, Shinpei Okawa, and Miya Ishihara
Department of Medical Engineering, National Defense Medical College, 3-2 Namiki, Tokorozawa, Saitama 359-8513, Japan. Received 19 September 2014; Accepted 14 March 2015

14) Pain Med. 2010 Aug;11(8):1169-78. doi: 10.1111/j.1526-4637.2010.00907.x. **Low-level laser therapy for acute neck pain with radiculopathy: a double-blind placebo-controlled randomized study.** Konstantinovic LM¹, Cutovic MR, Milovanovic AN, Jovic SJ, Dragin AS, Letic MDj, Miler VMPhotomed Laser Surg. 2016 Dec;34(12):638-645. doi: 10.1089/pho.2016.4095.

15) **Photo-biomodulation Triple Treatment in Peripheral Nerve Injury: Nerve and Muscle Response.** Mandelbaum-Livnat MM¹, Almog M¹, Nissan M¹, Loeb E², Shapira Y¹, Rochkind S¹

16) Lasers Surg Med. 2016 Jul;48(5):498-504. doi: 10.1002/lsm.22480. Epub 2016 Feb 2. **Positive effects of low level laser therapy (LLLT) on Bouchard's and Heberden's osteoarthritis.** Baltzer AW¹, Ostapczuk MS^{2,3}, Stosch D¹

17) Lasers Med Sci. 2014 Sep;29(5):1695-700. doi: 10.1007/s10103-014-1576-6. Epub 2014 Apr 15. **The effect of low-level laser therapy on knee osteoarthritis: prospective, descriptive study.** Soleimanpour H¹, Gahramani K, Taheri R, Golzari SE, Safari S, Esfanjani RM, Iranpour A

18) **J Lasers Med Sci.** 2018 Winter;9(1):63-68. doi: 10.15171/jlms.2018.13. Epub 2017 Dec 26. **Therapeutic and Analgesic Efficacy of Laser in Conjunction With**

(1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.

Pharmaceutical Therapy for Trigeminal Neuralgia. Ebrahimi H1, Najafi S2, Khayamzadeh M2, Zahedi A3, Mahdavi A4

19) Front Syst Neurosci. 2014; 8: 36. Published online 2014 Mar 14. doi: [10.3389/fnsys.2014.00036] PMID: 24672439 **Augmentation of cognitive brain functions with transcranial lasers.** F. Gonzalez-Lima* and Douglas W. Barrett

20) AJR Am J Roentgenol. 2017 Feb;208(2):380-385. doi: 10.2214/AJR.16.16403. Epub 2016 Nov 29. **Ultrasound Evaluation of Morton Neuroma Before and After Laser Therapy.** Gimber LH¹, Melville DM¹, Bocian DA², Krupinski EA³, Guidice MP¹, Taljanovic MS¹

21) J Photochem Photobiol B. 2016 Nov;164:36-42. Doi.10.1016/j.jphotobiol.2016.08.025. Epub 2016 Aug 31. **Use of low level laser therapy to control neuropathic pain: A systematic review.** de Andrade AL¹, Bossini PS², Parizotto NA³

2018-2019. Technological Medical Advancements, LLC (TMA), manufacturers of the Diowave brand of therapeutic laser systems is recognized as the founders of Class IV high power laser therapy. TMA is a physician-based company that manufactures and sells the Diowave laser brand, the most technology advanced laser therapy systems in the world. TMA markets its laser systems to the human MD-DO, DC, PT, collegiate & professional sports markets, as well as to the VA and DOD systems. TMA also markets to the veterinary arena, both small and large animal, equine, as well as to the private sector. Physicians purchasing Diowave lasers include: Regenerative Medicine Specialists, Primary Care (MD-DO), Orthopedic Surgeons, Sports Medicine and Pain Management Specialists, Physical Medicine & Rehabilitation Specialists, Plastic Surgeons, Veterinarians, Podiatrists, and Chiropractors. Please visit us at www.diowavelaser.com to learn more about our cutting-edge therapy for neuro-musculoskeletal pain management and wound healing.

(1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.



- (1) The Diowave Laser System was cleared under FDA 510-k as an infrared lamp intended to emit energy in the infrared spectrum to provide topical heating for the purpose of elevating tissue temperature for temporary relief of minor muscle and joint pain, muscle spasm, pain and stiffness associated with minor arthritis, promoting relaxation of muscle tissue, and to temporarily increase local blood circulation.