High Power Micro-Pulsed Laser Therapy and Stem Cells

A review of pertinent medical literature from PubMed shows how laser therapy treatments can safely and effectively activate stem cells. There is no detrimental effect upon the stem cells whatsoever. Laser therapy causes stem cell activation at the target site of photonic stimulation. Stem cell proliferation has been shown to occur along with the maintenance of cellular viability. Laser therapy also enhances stem cell injections by accelerating articular cartilage regeneration, pain reduction and reduction of boney edema just to name a few of the numerous synergies between the two procedures. Laser enhances stem cell outcomes, it never detracts. Laser therapy adds a cost-effective long-term maintenance program for stem cell patients. It can also act as a stand-alone modality to treat pathologies for those patients that cannot afford stem therapy or for those who did not have a positive outcome.

How to Integrate Laser Therapy into Your Medical Practice (1)

A) **Laser as a Stand-alone Modality**: As an alternative treatment option to stem cell therapy, laser therapy treatment costs are less expensive to the patient, can be administered by a medical assistant and might even provide better clinical outcomes.

B) **Administering Laser Therapy Treatment Post Stem Cell Therapy**: Integrating laser therapy treatment with stem cell treatment will enhance tissue regeneration at the onset.

C) **Administering Laser Therapy Treatment Post Stem Cell Therapy for Longer Term Maintenance:** Laser therapy treatments are an effective long-term maintenance therapy post stem cells therapy. The cost to the patient is minimal compared to having to repeat stem cell injections.

Reference Materials

Below is a list of pertinent medical literature supporting the use of laser therapy with stem cell therapy:

1) Lasers Med Sci. 2018 Jan;33(1):95-102. doi: 10.1007/s10103-017-2355-y. Epub 2017 Oct 12. ***Low-level laser irradiation induces in vitro proliferation of stem cells from human exfoliated deciduous teeth.***

2) Ginani F1, Soares DM2, de Oliveira Rocha HA3, de Souza LB1,4, Barboza CAG5,6. Stem Cell Rev. 2018 Aug;14(4):585-598. doi: 10.1007/s12015-017-9796-3. ***Beneficial Role of Low-Intensity Laser Irradiation on Neural β-tubulin III Protein Expression in Human Bone Marrow Multipotent***

(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.

Mesenchymal Stromal cells.

3) Ferreira-Silva V1,2, Primo FL3, Baqui MMA4, Magalhães DAR2, Orellana MD2, Castilho- Fernandes A1, Cruz MC5, Câmara NOS5, Covas DT2,6. Tedesco AC7. J Interv Cardiol. 2018 Jul 12. doi: 10.1111/joic.12539. [Epub ahead of print] ***Adjunctive laser-stimulated stem-cells therapy to primary reperfusion in acute myocardial infarction in humans: Safety and feasibility study.***
4) Elbaz-Greener G1,2,3, Sud M3, Tzuman O1,2, Leitman M1,2, Vered Z1,2, Ben-Dov N4, Oron U5, Blatt A1,2. J Cell Physiol. 2013 Jan;228(1):172-81. doi: 10.1002/jcp.24119. ***Photo-activation of bone marrow mesenchymal stromal cells with diode laser: effects and mechanisms of action.***
5) 5) Giannelli M1, Chellini F, Sassoli C, Francini F, Pini A, Squecco R, Nosi D, Bani D, Zecchi-Orlandini S, Formigli L. IEEE J Sel Top Quantum Electron. 2016 May-Jun;22(3). pii: 7000417. doi: 10.1109/JSTQE. 2016.2561201. ***Proposed Mechanisms of Photo-biomodulation or Low-Level Light Therapy.***
6) de Freitas LF1, Hamblin MR2. PLoS One. 2017 Jun 8;12(6):e0179175. doi: 10.1371/journal.pone.0179175. eCollection 2017. ***Low level laser (LLL) attenuate LPS-induced inflammatory responses in mesenchymal stem cells via the suppression of NF-κB signaling pathway in vitro.***
7) Yin K1, Zhu R1, Wang S1, Zhao RC1. J Cell Physiol. 2018 Oct;233(10):7026-7035. doi: 10.1002/jcp.26626. Epub 2018 May 10. ***Photo-biomodulation therapy and vitamin C on longevity of cell sheets of human dental pulp stem cells.***
8) Pedroni ACF1, Diniz IMA1,2, Abe GL1, Moreira MS3, Sipert CR1, Marques MM1. Int J Mol Med. 2018 Oct;42(4):2107-2119. doi: 10.3892/ijmm.2018.3804. Epub 2018 Aug 2. ***High-fluence low-power laser irradiation promotes odontogenesis and inflammation resolution in periodontitis by enhancing stem cell proliferation and differentiation.***
9) Hou T1, Li S2, Zhang G2, Li Y1. J Photochem Photobiol B. 2018 May;182:77-84. doi: 10.1016/j.jphotobiol.2018.03.015. Epub 2018 Mar 22. ***Combined effects of photo-biomodulation and alendronate on viability of osteoporotic bone marrow- derived mesenchymal stem cells.***
10) Fallahnezhad S1, Amini A1, Hajihossainlou B2, Chien S3, Dadras S4, Rezaei F5, Bayat M6. Lasers Med Sci. 2018 Sep 19. doi: 10.1007/s10103-018-2638-y. [Epub ahead of print] ***Effect of photo-***

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biomodulation on neural differentiation of human umbilical cord mesenchymal stem cells.

11) Chen H1,2, Wu H1, Yin H3, Wang J4, Dong H5, Chen Q2, Li Y2. Photomed Laser Surg. 2018 Feb;36(2):83-91. doi: 10.1089/pho.2017.4344. Epub 2017 Nov 13. ***In Vitro Effects of High-Intensity Laser Photo-biomodulation on Equine Bone Marrow-Derived Mesenchymal Stem Cell Viability and Cytokine Expression.***

12) Peat FJ1, Colbath AC1, Bentsen LM1, Goodrich LR1, King MR1. PLoS One. 2018 Apr 5;13(4):e0195337. doi: 10.1371/journal.pone.0195337. eCollection 2018. ***Low power laser irradiation and human adipose- derived stem cell treatments promote bone regeneration in critical-sized calvarial defects in rats.***

13) Wang YH1,2,3, Wu JY2,4, Kong SC2, Chiang MH1,2, Ho ML2,3,5,6, Yeh ML7,8, Chen CH2,9,10. Lasers Med Sci. 2018 Sep 24. doi: 10.1007/s10103-018-2637-z. [Epub ahead of print] ***Short-term evaluation of photo-biomodulation therapy on the proliferation and undifferentiated status of dental pulp stem cells.***

14) Ferreira LS1, Diniz IMA2, Maranduba CMS3, Miyagi SPH4, Rodrigues MFSD5, Moura- Netto C1, Marques MM6,7. Prog Biophys Mol Biol. 2018 Mar;133:36-48. doi: 10.1016/j.pbiomolbio.2017.11.001. Epub 2017 Nov 8. ***Comparison of the in vitro effects of low-level laser therapy and low-intensity pulsed ultrasound therapy on bony cells and stem cells.***

15) Bayat M1, Virdi A2, Rezaei F3, Chien S4. J Photochem Photobiol B. 2018 May;182:42-51. doi: 10.1016/j.jphotobiol.2018.03.010. Epub 2018 Mar 26. ***Stereological and molecular studies on the combined effects of photo-biomodulation and human bone marrow mesenchymal stem cell conditioned medium on wound healing in diabetic rats.***

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17) Zaccara IM1, Mestieri LB1, Moreira MS2, Grecca FS1, Martins MD1, Kopper PMP1. PLoS One. 2015 Aug 31;10(8):e0136942. doi: 10.1371/journal.pone.0136942. eCollection 2015. ***Human Tubal-Derived Mesenchymal Stromal Cells Associated with Low Level Laser Therapy Significantly Reduces Cigarette Smoke-Induced COPD in C57BL/6 mice.***

18) Peron JP1, de Brito AA2, Pelatti M3, Brandão WN1, Vitoretti LB2, Greiffo FR2, da Silveira EC2,

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Oliveira-Junior MC3, Maluf M4, Evangelista L5, Halpern S5, Nisenbaum MG5, Perin P4, Czeresnia CE5, Câmara NO6, Aimbire F7, Vieira RP3, Zatz M2, de Oliveira AP3. Einstein (Sao Paulo). 2017 Jul-Sep;15(3):334-338. doi: 10.1590/S1679-45082017AO3991. ***Low-level laser irradiation promotes proliferation of cryopreserved adipose-derived stem cells.***

19) Ginani F1, Soares DM2, Rocha HAO1, Barboza CAG1. Front Physiol. 2018 Feb 23;9:123. doi: 10.3389/fphys.2018.00123. eCollection 2018. ***The Effects of Photo-biomodulation of 808 nm Diode Laser Therapy at Higher Fluence on the in Vitro Osteogenic Differentiation of Bone Marrow Stromal Cells.***

20) Amaroli A1, Agas D2, Laus F2, Cuteri V2, Hanna R1, Sabbieti MG2, Benedicenti S1. Photomed Laser Surg. 2018 Aug;36(8):415-423. doi: 10.1089/pho.2018.4453. Epub 2018 Jul 6. ***Effects of Photo-biomodulation on Degranulation and Number of Mast Cells and Wound Strength in Skin Wound Healing of Streptozotocin-Induced Diabetic Rats.***

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.

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