

Laser Therapy

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Disclosure

- Part owner of the OrthoLazer Nashua location



Laser Basics

LIGHT

Photons that travel in a wave and are measured in the electromagnetic spectrum

LASER

The amplification of Light by Stimulated Emission of Radiation. As a device, a laser stimulates atoms or molecules to emit light at specific wavelengths and amplifies that light.



LASER Light Amplification by Stimulated Emission of Radiation



Multiwave Locked System

Patented delivery system uses 2 specific wavelengths, simultaneously and synchronized: 808nm (for inflammation and long-lasting effect) and 905nm (analgesic and is fast acting)

Together they are very effective. Both are infrared; they are invisible to the naked eye but can be seen with a camera, or with an infrared sensor card or device

Cleared by FDA in 2002 for animal use; 2009 for human use



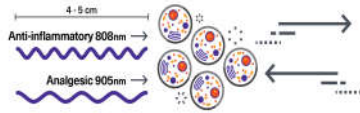
MLS Wavelengths

905nm- pain

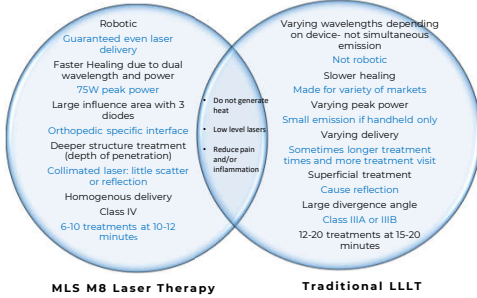
- Fast acting analgesia and accelerated healing
- Increase the activity of mitochondria respiratory chain complexes I, II, III, IV and succinate dehydrogenase
- Induces an increase in ATP synthesis that aids in healing process

808nm- inflammation

- Decreased edema and inflammation
- Affects the second absorption peak of cytochrome oxidase, which activates mitochondria to increase ATP production

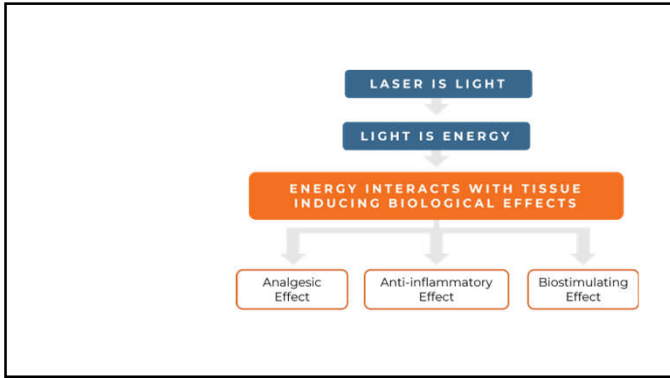


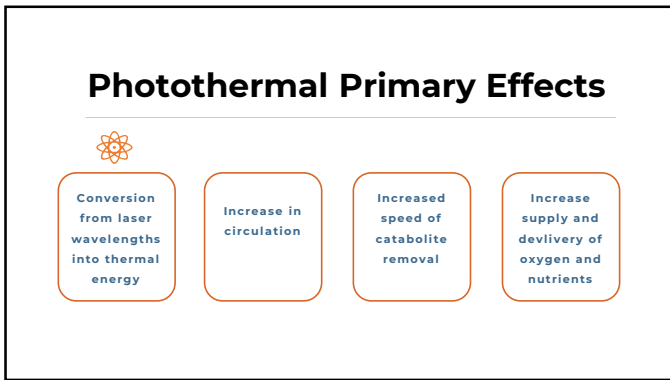
MLS vs Traditional LLLT

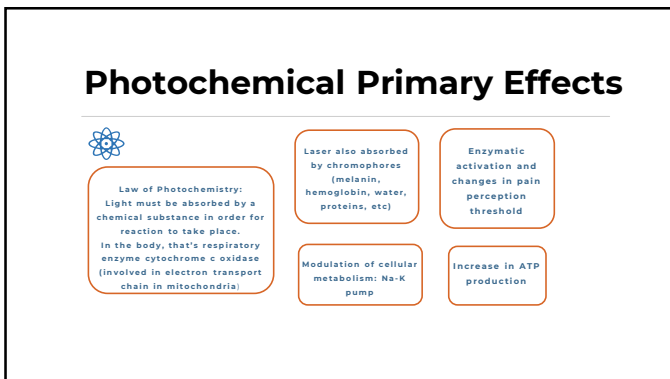


Pain Treatment Comparisons

Option	Total Cost	Effectiveness	Invasive	Painful	Side Effects	Lasts
MLS M8 Robotic Laser	\$420-840	Nearly 80%	No	No	No	Indefinitely
Medications	Copay	Variable	Yes	No	Yes	Hours to days
Injections-corticosteroid	Copay/\$300	Nearly 75%	Yes	Yes	Yes	Up to 6 months
Injections-viscosupplementation	Copay/\$300-5700	50%-65%	Yes	Yes	Yes	Up to 6 months
PRP	\$700-\$1400	50%-75%	Yes	Yes	Yes	Up to 6 months*
Stem Cells	\$4000-\$6000	50%-75%	Yes	Yes	Yes	Up to 6 months
Other Lasers	Variable	Variable	No	Possible	No	Short Term







Photomechanical Primary Effects



Production of Extracellular matrix (tissue repair and regeneration)

Maintenance of homeostatis of tissue

Re-absorption of edema

Reactivation of microcirculation

Secondary Effects

Effects on cells

Increases ATP synthesis
Increases Myo-B α -enolase, regulating and mediating reconstruction of damaged muscle fibers
Increases Extracellular matrix and encourages remodeling
Increases NLRP-10 (anti-inflammatory protein)

Effects on tissue

Increases PPI protein and alkaline phosphate activity
Increases actin and tropomyosin
Increases Galectin α -3 and HNRNP K proteins (induces angiogenesis and regenerates nerve fibers)
Reduced edema reabsorption times
Prevents formation of scare tissue

Systemic Secondary Effects

Analgesic effect

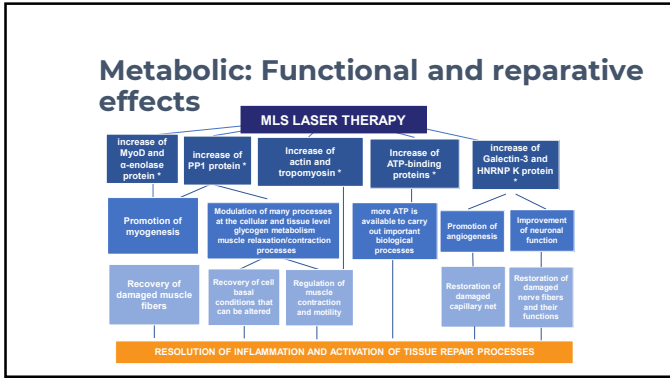
Blocks pain stimulus conduction
Washes out allogenic substances like histamine
Increases endorphin synthesis
Modulates pain stimulus

Anti-inflammatory effects

Induces vasodilation
Encourages permeability of lymphatic capillary vessels
Washes out and inhibits pro-inflammatory molecules

Bio stimulation

Increases nutrients, oxygen, and growth factors
Activates cell functions (metabolism)
Induction and recovery of muscle fibers
Induction and recovery of nerve endings
Reduces scar tissue formation



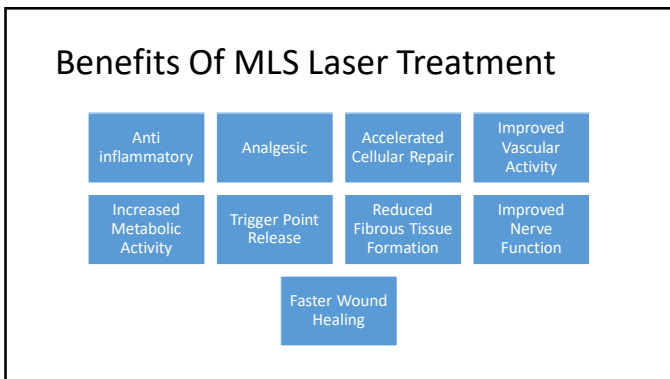
Additional Tool in Your Clinical Tool Belt

Laser works by emitting the energy of light into the damaged cell which stimulates intracellular activity

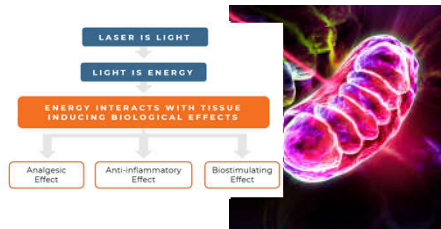
Pain, whether acute or chronic, is devastating to patients, and can quickly lead to decline in baseline status for older people.

Primary Care struggles to help patients manage pain due to lack of helpful resources

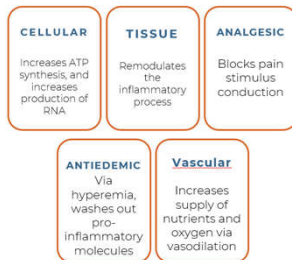
Laser Therapy is FDA cleared for the relief of pain and inflammation, recommended by the CDC and the AAOS.



What is Laser Therapy Photobiomodulation



Healing at the cellular level



- Increased synthesis of ATP
- Slight increase in temp: <3 degrees Celsius
- Angiogenesis and Vasodilation
- Extra Cellular Matrix Protein Synthesis
- Fibroblastic in growth
- Cytokine mediated reduction in Pro Inflammatory Cascade
- Collagen Remodeling

- Turn off Inflammatory Macrophages
- Produce anti-inflammatory Cytokines (IL-10)
- Block Cytokine Pro-Inflammatory Cycle
- Reduce Pro-Inflammatory Cytokine production (IL-6, TNF, Beta-Interferon)
- Reduce pain, swelling, inflammation

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MLS LASER THERAPY IS IDEAL FOR

- Tendon and ligament injuries
- Soft tissue injuries
- Muscle strains and tears
- Sore muscle and joints
- Degenerative joint conditions
- Neurological pain
- Chronic non-healing wounds
- General pain



**Clinical Indications:
Acute Injuries**

- Reduction in Bruising
- Reduction in Swelling
- Reduction in Pain
- Faster return to function



- Treatment course is 6 visits
- Treatment time is 6-10 minutes
- Completed in 2-3 weeks
- Cost is typically \$450.00 (Health Savings and Flexible Spending)
- Strains, Fractures, Sprains, Trauma, Superficial Wounds

**Clinical Indication:
Chronic Inflammatory Conditions**

Alternative to Surgery and Injections

- Arthritis
- Tendinitis
- Nerve Compression
- Bursitis
- Repetitive Use Disorders

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- Treatment course is 12 visits
- Treatment time is 6-10 minutes
- Completed in 4-6 weeks
- Cost is typically \$840.00 for 12 visits (Health Savings and Flexible Spending)
- Arthritis, Tendinopathy, Neuropathy, Back/Neck pain, Plantar Fasciitis, Carpal Tunnel Syndrome

- MLS Laser Therapy is ideally suited to support patients in achieving optimal surgical outcomes. Your post-op patients are excellent candidates for treatment and rely on you to properly educate and connect them with a referral.

How MLS Laser Improves Surgical Outcomes

- Improved Wound Healing
- Decreased Stiffness
- Increased Early ROM
- Improved Pain Control
- Decreased Usage of Pain Medications
- Decreased Neuropathies and Neuritis
- Improved Tendon Healing
- Reduction in Bruising
- Reduction in Swelling
- Faster Return to Function

Clinical Indications: Post Surgical

- Reduction in bruising
- Reduction in swelling
- Reduction in pain
- Faster return to function



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- Treatment course is 6 visits
- Treatment time is appx 10 min
- Completed in 2-3 weeks
- Cost is typically \$420.00 for 6 visits (Health Savings and Flexible Spending)

Surgical Procedure

Arthroscope
Initiate laser 2-3 days post op

Arthroplasty
Initiate laser 2-3 days post op
Hips and Knees are dressing dependent

Spinal Surgery
Initiate Laser 1 week post op

In addition: delayed healing in post op wounds



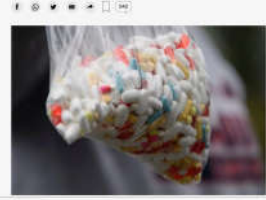
• MLS M8 Robotic Laser Therapy is FDA-cleared for the relief of pain, inflammation, and edema.

Support of Laser Treatment from Governing Bodies

- This support is continually growing in response to clinical outcomes of treatment and need for non-invasive, opioid sparing alternatives.
- As a company, OrthoLazer actively works to promote increased awareness and recommendations for laser therapy.

C.D.C. Proposes New Guidelines for Treating Pain, Including Opioid Use

The agency threw out previous recommended limits on doses but encouraged "nonopioid therapies" whenever possible.



1

Minimize Opioids for all Opioid Naive Patients for acute, sub acute, and chronic pain

2

Utilize Opioid Alternatives Pharma Options

3

Utilize Opioid Alternative Non-Pharma Options: LASER made the list





MLS laser induced differentiation of myoblasts

- MyoD
- early marker of myogenesis
- role in muscle diff.

Effects of MLS laser on myoblast cell line C2C12.

I. Ugvalds F. Chahid and M. Housni

ABSTRACT
Low-level laser light (LLLT) has been shown to induce differentiation of myoblasts into myotubes. The aim of this study was to assess the effect of MLS laser on myoblast cell line C2C12. The cells were treated with MLS laser (630 nm, 100 mW, 10 min) and the expression of MyoD was assessed by immunofluorescence microscopy. The results showed that the expression of MyoD was significantly increased in the treated cells compared to the control cells. These findings suggest that MLS laser may be a useful tool for inducing myogenesis in vitro.

INTRODUCTION
Myoblasts are the precursors of muscle fibers. They are characterized by their ability to fuse and form multinucleated myotubes. The process of myogenesis is regulated by a number of transcription factors, including MyoD. MyoD is an early marker of myogenesis and its expression is essential for the differentiation of myoblasts into myotubes. The aim of this study was to assess the effect of MLS laser on myoblast cell line C2C12. The cells were treated with MLS laser (630 nm, 100 mW, 10 min) and the expression of MyoD was assessed by immunofluorescence microscopy. The results showed that the expression of MyoD was significantly increased in the treated cells compared to the control cells. These findings suggest that MLS laser may be a useful tool for inducing myogenesis in vitro.

Fig. 5. MyoD expression assessed by immunofluorescence microscopy. Control (a) and cells exposed to MLS treatments (b).

BMC Musculoskeletal Disorders

Research article



A systematic review with procedural assessments and meta-analysis of Low Level Laser Therapy in lateral elbow tendinopathy (tennis elbow)

Jan M Bjordal^{1,2}, Rodrigo AB Lopes-Martins³, Jon Jucansen^{1,4}, Christian Cooppe⁵, Anne E Ljunggren⁶, Apostolos Stengoulas⁷ and Mark J Hutchings⁸

Conclusion
The available material suggests that LLLT is safe and effective, and that LLLT acts in a dose-dependent manner by biological mechanisms which modulate both tendon inflammation and tendon repair processes. With the recent discovery that long-term prognosis is significantly worse for corticosteroid injections than placebo in LET, LLLT irradiation with 904 nm wavelength aimed at the tendon insertion at the lateral elbow is emerging as a safe and effective alternative to corticosteroid injections and NSAIDs. LLLT also seems to work well when added to exercise and stretching regimens. There is a need for future trials to compare adjunctive pain treatments such as LLLT with commonly used pharmacological agents.


- 13 RCTs
- 2.25x more likely to not call out
- Significant decrease in VAS pain scale (17 on 0-100 scale)
- Persisted at 3 mo f/u

Contents lists available at [ScienceDirect](#)

 **Journal of Science and Medicine in Sport** 

journal homepage: www.elsevier.com/locate/jams

Original research

Immediate pain relief effect of low level laser therapy for sports injuries: Randomized, double-blind placebo clinical trial 

A. Takenori^{a,*}, M. Ikuhiro^{b,c,d}, U. Shogo^{b,c}, K. Hiroe^e, S. Junji^a, T. Yasutaka^a, K. Hiroya^d, N. Miki^f

Randomized to either receive LLLT, or placebo laser results favored LLLT
75% of patients saw improvement
36% reduction in pain, vs 8% in placebo group
