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### **Patient Information on Cold Laser Use:**

I have been certified in the use of the Theralase TLC-900 Laser System; Operation, Protocol and Safety

This is a link where you can find more information about this cold laser as well as research studies and testimonials.

<http://theralase.com/faqs/>

### **What is a laser??**

**L.A.S.E.R.**



## **Light Amplification by Stimulated Emission of Radiation**

### **Just a few definitions...**

**Light** – *the emission of electromagnetic waves, composed of photons, travelling in space*

**Laser** – *any device that can be made to produce or amplify electromagnetic radiation primarily by the process of stimulated emission*

**Phototherapy** – *the use of light energy for therapeutic purposes*

**Low-level laser therapy (LLLT)** – *the application of low-power light energy, within the visible red and near-infrared band of the electromagnetic spectrum, for therapeutic purposes*

This is a synopsis of the physiological effects of the Cold Laser:

# THREE KEY CELLULAR PATHWAYS

theraLASE<sup>®</sup>  
Healing at the Speed of Light<sup>®</sup>



## Accelerate Healing

660 nm - Adenosine Triphosphate (ATP) Pathway:

**Theralase stimulates the mitochondria of the cell to produce more Adenosine Triphosphate (ATP or basic cell energy) to accelerate tissue repair. (Proceedings of the International Society for Optics and Photonics, 2015)**

Cells that lack energy are unable to participate in the healing process. Laser energy is delivered to injured cells, which absorb the light and convert it into chemical energy, which is used to accelerate tissue repair. Once cells are fully energized they are able to stimulate each other to rebuild and heal the injured area.

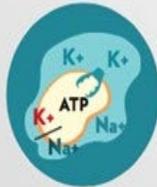


## Reduce Inflammation

905 nm - Nitric Oxide (NO) Pathway:

**Independent research proves that the proprietary Theralase 905nm superpulsed laser technology increases the production of Nitric Oxide (NO) by over 700%, increasing vasodilation and decreasing inflammation versus other competitive wavelengths. (Lasers in Surgery and Medicine, 2009).**

When tissue injury occurs, the inflammatory process is initiated to immobilize the area and prevent further damage to the tissue. This process is associated with pain caused by inflammation exerting pressure on nerve endings. In order to decrease inflammation in the particular region, the body produces Nitric Oxide (NO). However if not enough NO is produced, the inflammation remains. Increased Nitric Oxide production has been proven to relax the vascular network, dilate the capillaries, improve vascular function, protect against cell injury and help rebalance the immune response. This process not only reduces inflammation but brings much needed oxygen and other metabolites to the injured tissue aiding in their natural healing.



## Eliminate Pain

905 nm - Lipid Absorption Pathway

**Theralase laser technology effectively removes the pain signal at source by rebalancing the sodium potassium pathway. (Harvard Medical School, 2010)**

Neurons use electrical and chemical signals to transmit information. The transmission of pain is primarily due to an expulsion of sodium ions ( $\text{Na}^+$ ) and an influx of potassium ( $\text{K}^+$ ) ions into the nerve cell across the cellular membrane, altering the electrical potential difference of the nerve cell. The peak absorption of lipids occurs in the near infrared wavelength range of 905 nm to 930 nm. Since the cellular membrane is a bilipid membrane, laser light in the 905 nm range increases the porosity of the cellular membrane. Allowing the re-absorption of sodium ions and the expulsion of potassium ions across the membrane re-balancing the sodium-potassium pump and removing the pain signal at source.

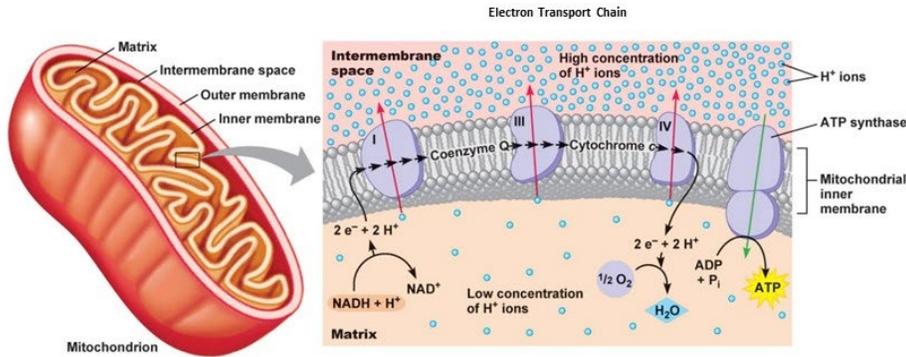
# ATP PATHWAY



The effects of Theralase® laser therapy, at the cellular level, are based on the absorption of light energy by photoacceptor molecules (i.e., chromophores) found in tissue.

Light energy is absorbed by mitochondrial cytochromes (*cytochrome c oxidase*) and/or porphyrins leading to increased oxidative metabolism →

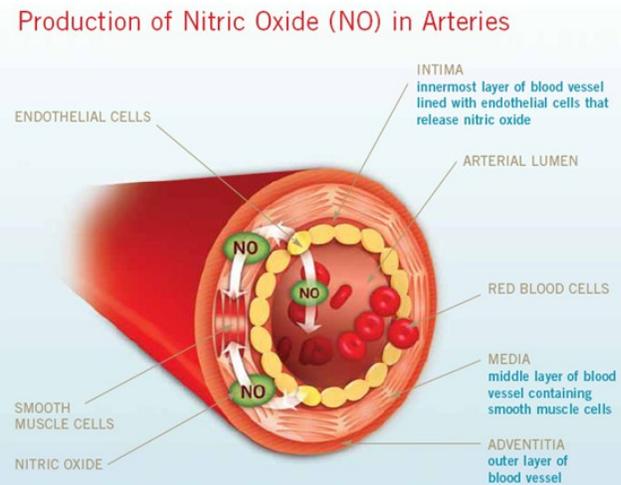
**Increased ATP production = Accelerated tissue healing!!!**



# NITRIC OXIDE (NO) PATHWAY



Theralase® laser therapy employs inducible nitric oxide synthase (iNOS) to activate **production of nitric oxide** in mitochondria.

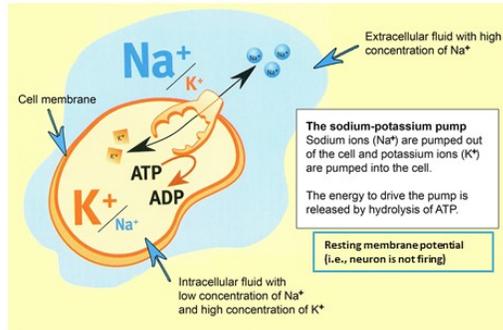


- Nitric oxide signals endothelial cells to relax, leading to increased dilation of blood vessels and lymphatic vessels.
- Dilation of blood vessels increases blood flow and decreases inflammation.
- Dilation of lymph vessels increases drainage and decreases swelling.

# LIPID ABSORPTION PATHWAY



Rebalancing the Sodium – Potassium ( $\text{Na}^+$  /  $\text{K}^+$ ) pump across the nerve cell membrane removes the pain signal at the source.



Activation of receptors in the bi-lipid membrane of cells opens channels within the membrane, altering the flow of  $\text{Na}^+$  and  $\text{K}^+$  ions across the membrane (allows re-absorption of  $\text{K}^+$  and expulsion of  $\text{Na}^+$ ).

This change in electron gradient across a nerve cell can stop the propagation of impulses across the cell and remove pain signals at the source.

## What are some conditions that can be assisted with use of a Cold Laser?

# CONDITIONS TREATED



- Over 70 Clinically Proven Treatment Protocols**
- Acute Injuries/Trauma
- Musculoskeletal
- Inflammatory Conditions
- Autoimmune Disease
- Additional Uses

**Other treatable conditions include:**

Otitis	Fibromyalgia	Low Back Pain
Sinusitis	Psoriasis	Sacroiliac Joint Pain
Trigeminal Neuralgia	Lymphedema	Patellofemoral Pain
Lumbar Disc Herniation	Sesamoiditis	Kelliod Hypertrophic Scar

## CONDITIONS TREATED



### Acute Injuries/Trauma

- Muscle Strains/Ligament Sprains
- Tendon Tears
- Post-Surgical Healing
- Fractures
- Sports Injuries
- Motor Vehicle Accidents (MVA's)

### Neuro-Musculoskeletal

- Repetitive Stress Injuries
- Rotator Cuff Tears
- Fibromyalgia
- Temporomandibular Joint (TMJ)
- Plantar Fasciitis
- Peripheral Neuropathies

### Inflammatory Conditions

- Tendonitis/osis
- Bursitis
- Epicondylitis

### Degenerative Conditions

- Osteoarthritis
- Degenerative Disc Disease

### Autoimmune Disease

- Rheumatoid Arthritis

## OTHER CONDITIONS TREATED



### Dermatological

- Psoriasis
- Eczema
- Acne

### Dental

- Tooth Implant
- Tooth Extraction
- Muscle Soreness

### Podiatric Conditions

- Sesamoiditis
- Bunion Pain
- Gout

### Wound Management

- Diabetic Ulcers
- Post-Operative Wounds
- Sutures

## Are there any Contraindications?

# CONTRAINDICATIONS

*theraLASE*  
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Contraindication	Rationale
Over the eye (direct intra-ocular viewing)	Potential damage to the retina
Cancer, benign or malignant (patient should be > 5 years cancer free)	Biostimulation of lesion promoting malignancy
Over abdominal and pelvic area of pregnant women	Interference with normal development and growth of fetus
Over a hemorrhagic area	Exacerbating the condition by laser-induced vasodilation